# PROCEEDINGS OF V. INTERNATIONAL AGRICULTURAL, BIOLOGICAL, LIFE SCIENCE CONFERENCE AGBIOL 2023

## 18-20 SEPTEMBER 2023

## EDIRNE, TURKEY

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**Organized by**
**Trakya University**

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# WELCOME NOTES

You are welcome to our V. AGBIOL Conference that is organized by Trakya University. The aim of our conference is to present scientific subjects of a broad interest to the scientific community, by providing an opportunity to present their work as oral or poster presentations that can be of great value for global science arena. Our goal was to bring three communities, namely science, research and private investment together in a friendly environment of Edirne, Turkey in order to share their interests and ideas and to get benefit from the interaction with each other.

In September 2018, we organized the first AGBIOL Conference with more than 700 scientists and researchers from all over the world with over 800 scientific papers. Due to COVID-19 situation, II. AGBIOL 2020 has organized fully on-line event which was one of the biggest online conferences in recent years in the world with 499 papers and 1133 authors with 333 oral and 166 e-poster presentations from 55 countries. Due to COVID-19 situation, AGBIOL 2021 was organized online again. AGBIOL 2022 conference was organized with a worldwide participation from 44 countries over 522 papers contributed by over 1300 authors.

There is a worldwide participation from 33 countries 833 papers contributed by over 2000 authors with 522 oral and 311 poster presentations in AGBIOL 2023.

The AGBIOL 2023 will be normal participation as well as with online participation in Trakya University Balkan Congress Center in Edirne, Turkey on 18-20 September, 2023. The program will include oral talks by invited prominent scientists and oral and e poster presentations by participants in selected topics from the submitted **ABSTRACT**s focusing on Agriculture, Biology and Life Sciences topics.

With care for our nature and environment, we aim the green congress, meaning that as little as possible papers will be used. **ABSTRACT** book will be published in electronic book and will be distributed to the participants on flash memory stick as well as by e mail for online participants. All the e-posters should be prepared in electronic form and then submit to via the conference e mail and will exhibit in electronical poster boards as well as in online e poster hall in our web page during the conference.

The participants with paid conference fee will be able to access all the normal and virtual presentation talks in each session, as well as to visit the virtual poster hall via preliminary provided participant ID and codes. The selected **ABSTRACT**s will be published in the Conference **ABSTRACT** and Proceedings Book. Participants might send us their full papers, which based on their preferences will be published either in our Conference **ABSTRACT** and Proceedings Book or in selected International Indexed Scientific Journals.

**Conference Topics:**

Agriculture, Forestry, Life Sciences, Agricultural Engineering, Aquaculture and Biosystems, Animal Science, Biomedical science, Biochemistry and Molecular Biology, Biology, Bioengineering, Biomaterials, Biomechanics, Biophysics, Bioscience, Biotechnology, Botany, Chemistry, Chemical Engineering, Earth Sciences, Environmental Science, Food Science, Genetics and Human Genetics, Medical Science, Machinery, Pharmaceutical Sciences, Physics, Soil Science.

We would like to thank all of you for joining this conference and we would like to give also special thanks to our sponsors and collaborators for giving us a big support to organize this event.

Prof Dr Yalcin KAYA
Head of the Organizing Committee

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# THE ROAD TOWARDS THE ADOPTION OF BIOSIMILAR RECOMBINANT POLYPEPTIDE DRUGS. SOCIOECONOMIC FACTORS AND GENETIC ENGINEERING

*Tsochantaridis Ilias, Chronopoulou Sofia, Tokamani Maria, Sandaltzopoulos Raphael*[*]

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## ABSTRACT

Recombinant polypeptide drugs, mainly cytokines, hormones and antibodies, possess an ever-increasing market share and enjoy an extremely high price per dose. Although many patents expire every year, it is intriguing why in most countries there is a notable persistent preference for the original drugs over biosimilar. Despite their much lower cost and equal efficacy, biosimilars have not prevailed. This phenomenon constitutes a heavy burden to national health system in many countries. We have analyzed key socioeconomic parameters in order to explain this situation and propose measures to reverse it. In parallel, we have tried to implement methodologies to express recombinant pharmaceutical Interferon alpha 2a (IFNα2a) in the methylotrophic yeast *Pichia pastoris*. The synthetic gene encoding the human mature IFNα2a form was expressed as a secreted protein upon induction. Purification of the recombinant protein was performed by affinity chromatography. Its biological activity was confirmed in A549 and HT29 cells by monitoring transcriptional up-regulation of a panel of known interferon-stimulated genes (ISGs). Furthermore, examination of immunogenicity of recombinant IL-2 and IFNα2a was conducted *in vitro* using peripheral blood mononuclear cells from healthy donors. Structural stability of the mature polypeptides was investigated with circular dichroism and differential scanning fluorimetry. Interestingly, the polypeptide was formulated in various superior pharmaceutical forms that are currently being tested *in vivo* in mice, in order to evaluate bioavailability and pharmacokinetics.

# ENDOPHYTIC MICROORGANISMS FOR PLANT GROWTH PROMOTION AND BIOTECHNOLOGICAL APPLICATIONS

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## ABSTRACT

In the last year, more and more attention has been directed to organic farming, which has become a priority in agriculture. The great importance of enriching the root layer of the soil with beneficial microorganisms to improve the conditions of root nutrition is sufficient for the need for the application of endophytic microorganisms. This review elucidates the role and practical use of microbial endophytes. Endophytes are bacteria and fungi that live in the plant tissues of apparently healthy hosts without causing any harm to the plant. Most of our knowledge about the plant growth-promoting characteristics of endophytes comes from the study of bacterial endophytes, and comparisons can be useful for studying endophytic yeasts and fungi. They have a number of useful properties, namely: they synthesize physiologically active substances and supply the plant with them; increase the productivity of photosynthesis; enhance enzymatic processes in plants and improve the water regime; activate the activity of other microorganisms in the soil; act as antagonists of phytopathogenic microorganisms and increase the protective functions of plants. Their beneficial properties also include the ability to produce or alter the concentration of plant hormones such as indole acetic acid (IAA), gibberellic acid, cytokinins and ethylene; fixation of atmospheric nitrogen; suppression of the growth of harmful microorganisms through the production of siderophores, β-**1**3-glucanase activity, chitinase activity, synthesis of antibiotics and cyanide; and increase the solubility of phosphates and other properties. A number of free-living bacteria have the ability to fix nitrogen and increase its availability to the plant. Till now, no endophytic plant-growth-promoting microorganism has been registered yet as a biological agent. They have the advantage of biocontrol which is well protected from threats from the outside environment, but there is a risk of the presence of an endophytic microbe or its metabolite in edible plant parts. This necessitates more in-depth research on the duration of their action in plant tissues also ecological adaptation to the targeted environment.

**Keywords:** Biological control, endophytic microorganisms, plant growth-promotion, plant-microbe interaction, plant hormones, siderophores.

# FRUIT AND VEGETABLE BASED, DAIRY BASED FUNCTIONAL PROBIOTIC BEVERAGES, FORTIFIED BEVERAGES WITH BIOACTIVES: ANTICARCINOGENIC IMPLICATIONS AND COMMERCIAL TRENDS

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## ABSTRACT

It is recommended drinking six to eight glasses of water per day owing to water makes up 60 percent of our total body weight but many people find staying adequately hydrated to be a challenging task. Recently there has been growing recognition of the key role of foods and beverages in disease prevention and treatment. Especially, the production and consumption of functional beverages has gained much importance as their providing a health benefit beyond the basic nutritional functions. Functional beverages include an ingredient that gives that food health-promoting property over and above its usual nutritional value. With current trends, their functional properties, anti carcinogenic implications have been increased based on commercial demands. Bioactive compounds potentially extractable from the aimed plant foods and plant byproducts contain majorly phytochemical, fibers, natural flavor constituents, sugars, polysaccharides, proteins and its derivatives and can be fortified to beverages and called fruit and vegetable functional drinks, if fortify by protein concentrate, whey protein isolate, milk protein concentrate, probiotic addition and other dairy ingredients, they are called as dairy functional beverages. Also dairy functional drinks can be manufactured for human health. Bioactives in dairy beverages have many functions as antimicrobial, antithrombotic, antihypertensive, opioid, immunomodulatory, antioxidant related to gastrointestinal system, cardiovascular system, nervous and immune systems. Bioactive constituents as anticarcinogenic peptides are associated with chemopreventive properties, reduction of tumor proliferation as well as apoptosis. Cytotoxic milk peptide lactoferrin (whey protein) showed positive efficiency against cancer cells. Breast cancer treatments based on the lactoferrin utilization which results the inhibition of cancer cells through suppressing signaling of nasopharyngeal carcinoma cells. Peptides derived from beta casein (isoleucine -proline and valine-proline-proline) have been acted the hypertensive ability and characterized as potentially effective against cardiovascular diseases. Dietary casein and whey-based milk peptides and protein hydrolysates showed a vital role in maintaining immune system by the IgG antibodies production inducing the proliferation of spleen lymphocytes through mitogen inhibition, depending upon the availability of sialic acid. At present, beverages are the most effective functional food category due to their convenience and possibility to meet consumer demands for container contents, size, shape, and appearance, as well as ease of distribution and storage for refrigerated and shelf-stable products. The design and development strategies of functional beverages requires multistage processing which takes into account various parameters including organoleptic acceptance, physical and microbial stability, chemical and functional properties, cost and distributing strategies. From the nutrition perspective, functional and nutraceutical beverages has been increased great attention for healthy and safe bioactive constituent utilization.

**Keywords:** Fruit Beverages, Vegetable Beverages, Bioactives, Probiotics, Fortification, Anticarcinogenic, Antioxidant

# THE CURRENT ASSESMENTS ON VALUE-ADDED NUTRACEUTICAL PRODUCTS AND DEVICES IN FOOD INDUSTRY

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## ABSTRACT

Food and beverage sectors encounter diversified requires from recalls concerning serving customer demands. It is predicted that Industry 4.0 will turn manufacturers into predictors. The systems of connected sensors, devices, machinery, and data analytics are helping businesses of various sizes ameliorate efficiency, quality, and safety while reducing costs and time to market. This kind of expedited interruption through digitalization and automation produces the Industry 4.0 fundament. There is great need the sustainability of bioactive constituent programmes for „value-added food and food supplement agents “, „functional foods “, “super foods“and great demand on the following and observation of food plant design studies, production policies and actions through Industry 4.0. implementations. In this proceeding content, the recent assesments on value-added foods, nutraceuticals and food-controlled devices in food science in terms of Industry 4.0 regulations.

**Keywords**: Value-added products, food science, Industry 4.0, nutraceuticals, sensors

# THE ALTERATIONS ON FOOD QUALITY PROPERTIES AND ANTIOXIDATIVE AND ANTICARCINOGENIC BIOACTIVES BY HIGH HYDROSTATIC PRESSURE (HHP) PROCESSING STRATEGIES

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## ABSTRACT

Taste and appearance are among the basic properties for assessment of product's quality. Customers may take into account the production systems, packing, nutritious content and criteria for fair trade and ethical production. High hydrostatic pressure processing (HHPP) conditions (300–700 MPa) at moderate initial temperatures (around ambient) are generally sufficient to inactivate vegetative pathogens for pasteurization processes, some enzymes, or spoilage organisms to extend the shelf-life. Phenolic compounds, especially flavonoids have health-promoting benefits that play some important roles in foods as visual appearance, taste, aroma and represent an abundant antioxidant component of the human and animal diet. The aim of the review is to reveal the effect of high hydrostatic pressure processing strategies on the retention of antioxidant phenolic bioactives in foods and beverages. HHPP can increase extraction capacity of phenolic constituents and ensure higher levels of preserved bioactive constituents. High pressure extraction (HPE) can shorten processing times, provide higher extraction yields while having less negative effects on the structure and antioxidant activity of bioactive constituents. HPE enhances mass transfer rates, increases cell permeability, increases diffusion of phenolics and retains higher levels of bioactive compounds. Total phenolics in HHPP-treated foods were either unaffected or actually increased in concentration and/or extractability following treatment with high pressure.

**Keywords**: Food Quality, HHP, Antioxidative, Anticarcinogenic, Bioactives

# THE ANTOXIDANT ACTIVITY OF MYRTLE ESSENTIAL OILS IN SUNFLOWER OIL

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## ABSTRACT

Myrtle (*Myrutus Communis* L.) essential oils have been used to increase the oxidative stability sunflower oil. The essential oil was added to sunflower oil as well as 30% oil-in-water emulsions and frying oils at a ratio of 100 mg/kg, and their antioxidant properties were evaluated at the end of the storage and frying process. It was found sunflower oil is most susceptible to oxidative degradation. Myrtle essential oils were effective in increasing and/or protecting the phenolic content and increasing the antioxidant activity of sunflower oil as well as oil-in-water emulsions during storage and in the frying oil during frying. The antioxidant effects of Myrtle essential oils depended on pH, and the essential oils were found to be more effective in emulsions prepared at pH 3.4 and 5.4 in oil-in-water emulsions. In frying oil, myrtle essential oil has the effect of reducing peroxide index and TBA index, especially preventing darkening of after frying at 180°C for 10 hours. As a result, it was concluded that Myrtle essential oils can be used as natural antioxidants in sunflower oil, sunflower oil and emulsions (pH<7) and in frying oils as a source of natural antioxidants.

**Keywords**: Sunflower oil, myrtle, essential oils, antioxidant, emulsions, frying oils

# REVERSIBLE HEMATOLOGICAL AND BIOCHEMICAL TOXIC EFFECTS OF AZOXYSTROBIN AND DIFENCONAZOLE MIXTURE EXPOSURES IN OREOCHROMIS NILOTICUS UNDER INCREASED HEAT STRESS.

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## ABSTRACT

As one of the fastest growing sectors, aquaculture contributes to global food security. While pesticides play an important role in improving land productivity and food quality for a growing world population, especially in developing countries, their presence in agricultural drainage is a serious risk to all components of aquatic ecosystems. Additionally, there is a high risk that environmental contaminants will enter the human food chain and threaten public health. Therefore, there is an increasing need to find reliable approaches to rapidly determine the conditions of aquaculture ecosystems exposed to agricultural runoff and assess fish health and welfare. In addition to increases in pollutant inputs, increasing surface water temperatures due to climate change are affecting the physical condition of the aquatic system and coastal systems worldwide. Difenoconazole (cis-trans-3-chloro-4-(4-methyl-2-(1H-**1**2,4-triazol-yl methyl)-**1**3-dioxolan-2-yl) phenyl 4-chlorophenyl ether) It is a typical triazole fungicide used for the control of fungal disease in vegetables, grains and other field crops. Azoxystrobin is the most widely used fungicide worldwide. Although temperature is an important factor in toxicity, there are not enough studies to elucidate the metabolism related to the effects of temperature on pesticide toxicity. Therefore, in order to evaluate the health status of aquatic creatures and determine water quality, the effects of pesticide exposures to azoxystrobin and difenconazole mixture (0.5ppb, 5 ppb, 10 ppb) under heat stress (220C and 300C) on defense mechanisms in Oreochromis niloticus blood tissue and The reversibility of these effects was examined. In this study, it was determined that hematological, enzymatic and metabolic responses occurred in Oreochromis niloticus against exposure to the pesticide mixture azoxystrobin and difenconazole.

**Keywords**: pesticides, fish, enzyme, blood, heat stress

# EVALUATION OF ANTIDIABETIC EFFECTS OF PHENOLIC COMPOUNDS FROM PLANTS WITH IN VITRO AND IN VIVO APPROACHES

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## ABSTRACT

Diabetes Mellitus is characterized by high blood glucose (hyperglycemia) and is one of the most prevalent diseases worldwide. Currently, diabetes affects over 100 million people worldwide, and it is estimated to reach 366 million by 2030. Hyperglycemia triggers the development of major diabetic complications such as cardiovascular diseases, neuropathy, nephropathy, and retinopathy. Numerous approaches and drugs are available for the treatment of diabetes. However, insulin and other existing antidiabetic drugs have various limitations, including long-term treatment, adverse effects, and high costs. These limitations have increased the search for less side-effect-prone, effective, and affordable drugs. Extracts from plants have been used historically as complementary or alternative treatment strategies for diabetic patients, and their activities have been attributed to the presence of phenolic compounds. It has been reported that natural products play a vital role in the treatment of various diseases and drug design. This review focuses on the importance of natural products in diabetes treatment and the pharmaceutical significance and efficacy of phenolic compounds as antidiabetic.

**Keywords**: antidiabetic, diabetes affects, phenolic compounds

# ANTIFUNGAL POTENTIAL OF BACILLUS SPP. AGAINST STRAWBERRY GRAY MOLD CAUSED BY *BOTRYTIS CINEREA*

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## ABSTRACT

Grey mold, caused by the fungus Botrytis cinerea, is one of the most devastating diseases of strawberry (Fragaria ananassa). The objective of this study, conducted at the laboratory of the protection unit within the Hassan II Agronomic and Veterinary Institute and the SABEMA farm in Allal Tazi (north western-Morocco), was to evaluate the antagonistic effect of five bacterial strains of the genus Bacillus spp. (Bacillus amyloliquefeciens strain S**1** Bacillus subtilis strain S2, Bacillus subtillis strain S3, Bacillus amyloliquefaciens strain S4 and Bacillus velezensis strain O4) against Botrytis cinerea, tested in the laboratory and on fruit. The strains exhibited antifungal activity against Botrytis cinerea under in vitro conditions. Strain O4 was able to inhibit mycelial growth by 62.92% through direct confrontation and 64.58% by emission of volatile organic compounds. In addition, Bacillus subtillis strain S3 showed high inhibition (74.64%) compared to the control at 25% bacterial filtrate concentration. Treatment of fruit with cell culture and cell-free culture of the five studied strains controlled the development of gray mold in vivo and this was translated by low severity index in strawberries treated with strains I3 and S1 of Bacillus amyloliquefaciens, and Bacillus subtillis S3. The difference in efficacy of the different strains was dependent on the time of the treatment application; the preventive treatment was more effective compared to the curative treatment.

**Keywords**: *Fragaria ananassa, Botrytis cinerea, antagonistic effect, Bacillus amyloliquefaciens, Bacillus subtilis, Bacillus velezensis*

# BIO-CONTROL OF CITRUS BLACK ROT CAUSED BY *ALTERNARIA ALTERNATA* (FR.) KEISSL.

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## ABSTRACT

Citrus black rot is considered currently among the most serious fungal diseases in mandarin orchards, especially in susceptible varieties. In addition to its wide distribution, it has been becoming more severe in humid climate areas, where control is very difficult. The present study consists of the evaluation of the in vitro and in vivo antagonistic potential of three antagonistic bacteria strains of the genus *Bacillus* spp (O4, E7 and E10) against two strains of *Alternaria alternata* (Fr.) Keissl. causal agent of citrus black rot, in comparison with two chemical fungicides (imazalil and azoxystrobin).The results of the in vitro tests showed that the three strains of *Bacillus* spp. (O4, E7 and E10) generated an important inhibition of the radial growth of the two *A. alternata* strains in the order of 60% against the first strain compared to 25% for the second one, this can be explained by the difference of virulence. For the evaluation of the active substance, 5 concentrations were evaluated (0.01ppm; 0.05ppm, 0. 1ppm and 0.2ppm) for Imazalil with the inhibition of 7.84%; 44.11%; 48.03%; 59% after 7 days respectively, while the 5 azoxystrobin concentrations (0.001ppm; 0.01ppm; 1ppm, 10ppm and 100ppm) were evaluated with inhibition rates of 25.49%; 31.37%; 35.29%; 31.37%; 29.41% respectively.The results of the in vivo assays showed that the three *Bacillus* spp. strains inhibited the growth of both *A. alternata* strains. For strain **1** the analysis of variance showed that there was a high significant difference between treatments ($p=0.004$), the comparison of means showed that all bacterial treatments were significantly different to the control. Regarding strain 2, the analysis of variance showed a high significant difference ($p=0.003$) between treatments, and the comparison of means ($P \leq 5\%$) revealed 3 homogeneous groups (Control and strain E7, strain E10, strain O4) which are significantly different. O4 showed the highest inhibition rate in the order of 37% followed by E10 (21%) and E7 (7%). Concerning the chemical formulations, 3 concentrations were tested 250ppm, 450ppm and 1000ppm. The results were taken 10 days after inoculation. However, the 3 doses of azoxystrobin showed a highly significant inhibition (between 45% and 55%) compared to the control, while the tested doses of Imazalil showed no significant difference with the control.

**Keywords**: citrus, Alternaria alternata, antagonistic, *Bacillus* spp., biocontrol

# EXOPOLYSACCHARIDES FROM TWO RHIZOBIA STRAINS IMPROVE GERMINATION AND GROWTH OF WHEAT UNDER PB-STRESS

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## ABSTRACT

The major challenge facing agriculture nowadays is providing a sustainable food supply for nearly 8-9 billion people, while a large portion of the world's agricultural land is affected by problems related to salinity, drought, alkalinity, and toxicity as a result of inefficient and indiscriminate use of agrochemicals, such as fertilizers and pesticides, overexploitation of water resources, climate change, and periodic droughts. In recent years, there has been a surge of interest in research using PGPRs as a biological method, which is emerging as a promising solution for increasing wheat yields while minimizing the adverse effects of fertilizers. PGPRs induce stress tolerance in crop plants through several methods, under such environment bacterial biofilm formation produces an extracellular matrix with macromolecules essential for plant growth, these biofilms rely on exopolysaccharides (EPS) for plant-microbe interactions in harsh conditions. The present study aims to improve the germination of wheat (*Triticum aestivum*) by EPSs extracted from rhizobia under conditions of stress with different concentrations of Lead (Pb). We evaluated the effect of EPSs, Pb, and their combination on germination percentage, biomass, coleoptile and root elongation of wheat seedlings, total protein concentration, and on α-amylase activity. A treatment based on increasing concentrations of 0.5 and 1 mg/mL combined or not with 5 mg/mL of EPSs extracted from *Bradyrhizobium cytisi* and *Rhizobium mesosinicum* is applied. The results obtained from the improvement of the germination of wheat seedlings revealed that the combined treatments recorded a good tolerance against Pb toxicity, with *Bradyrhizobium cytisi* ‘s EPSs having a greater effect than those of *Rhizobium mesosinicum*. Protein content increases in Pb-treated seedlings as well as the combined treatment including EPSs of *Bradyrhizobium cytisi*. Addition of EPSs treatment enhance α-amylase activity affected negatively by Pb toxicity.

**Keywords**: exopolysaccharides, wheat, lead, germination

# ANALYSIS OF THE VARIANCE WATER DISTRIBUTION OF PIVOT SPRINKLER IRRIGATION ON THE PRODUCTIVITY OF THE POTATO PLANT IN EL OUED REGION OF ALGERIA

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## ABSTRACT

This study aimed to determine the extent different of distribution of the axial sprinkler water as a method of irrigation, and the effect of this on the quantity and quality of potato plant production in different areas along the axis sprinkler in the sandy soil of Eloued region in Algeria. For this, we relied on a sample of data consisting of 150 observations distributed over 10 areas according to the length of the axis. statistically we used oneway-analysis of variance after ensuring its statistical validity. Accordingly, we concluded that despite the significant statistical significance of the difference in the distribution of irrigation water( and the time taken and flow strength) along the axis, the difference in the amount of water supplied in the tenth area (tail region) reached a maximum of 57,58 % relative to the reference area ( the fourth region), which recorded at 42,42 % of what the reference area obtained, and at least 2**1**60 % was obtained in the eighth area relative to the reference region, which obtained 78,40 % of what the reference area obtained. However, according to the tests of our study, this had no significant effect on the difference, quantity and quality of production along the radius at the 5 % level. In light of these results, we concluded that the productivity of the irrigation water component fundamentally differs between the areas along the axis, which means that this irrigation method is not economical in sandy soils.

**Keywords**: axial irrigation, potato production, the analysis of variance, sandy soil

# EFFECT OF CLIMATE CHANGE ON VINE BUD BURST AND FLOWERING DATES IN TWO CONTRASTING REGIONS OF ALGERIA, ONE MOUNTAINOUS AND THE OTHER PLAIN

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## ABSTRACT

Global warming is a reality that has been strongly felt in recent years in Algeria. Fruit growing is exposed to the impacts of this warming, especially the vine. The effect of climatic variability on the behaviour of this species, Muscat Italia variety, was studied through a comparative analysis between a time series of daily temperatures, from 1980 to 2016, and a series of phenological observations (budburst and flowering), from 2000 to 2016, and from 1988 to 2016 in two regions with contrasting climates, in the North of Algeria, Benchicao (1133m), department of Médéa and Boumedfaa (260m), department of Ain Defla. Three approaches were undertaken: statistical, biological and modelling. The statistical approach was carried out on the climatic data of the two regions with contrasting climates. The biological approach consisted in determining the major periods of accumulation of the cold and heat unit requirements coinciding with the beginning of bud break and the beginning of flowering for the species studied. Climatic and phenological data were used in the modelling to predict future budbreak and flowering dates by the phenological platform, PMP5.5. Contrasting trends according to site and period were demonstrated: a significant warming was observed at the Boumedfaa (BM) site (0.50***), with a highly significant increase in mean annual maximum temperatures (0.56***). A trend towards earlier bud break dates for the grape variety 'Muscat Italia' was reported at Boumedfaa. No average warming was observed in Benchicao. However, late bud break was observed in the vineyard, as the continuous drop in temperature during the period February to March seems to have hindered the lifting of the dormancy of the buds. The failure to meet the cold unit requirements at the Boumedfaa site strongly affected the fitting efficiencies of the classical phenology models. Two models gave acceptable efficiencies when modelling flowering dates at Benchicao and Boumedfaa, Parabolic and Smoothed Utah respectively. Nevertheless, the parameters of these two functions are inconsistent with the physiology of the vine, especially the T0, indirectly confirming the existence of the failure of these models to take into account more complex physiological processes that occur in borderline areas like Boumedfaa.

**Keywords**: global warming, vine, budburst, flowering, modelling

# EFFECTS OF COLD STORAGE ON THE EVOLUTION OF SOME BIOCHEMICAL PARAMETERS AND ACRYLAMIDE FORMATION IN POTATO (SOLANUM TUBEROSUM) TUBERS IN THE DEPARTMENT OF AIN DEFLA, ALGERIA.

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## ABSTRACT

Potato (Solanum tuberosum) is one of the most important food crops in the world and ranks third after rice and wheat in terms of human consumption. Globally, approximately 368.247 million tonnes of potatoes are produced (Sawicka et al. 2018). Known for its high potential for potato production, the department of Ain Defla has deserved to be in the first order following the material and human efforts made to improve the quantity and quality of this speculation. However, many challenges have to be overcome to accomplish this task, among others, the deterioration of the biochemical and organoleptic quality post-harvest and during storage of potato tubers. A huge cold storage infrastructure is implemented to protect the growing production. During its life, the potato tuber undergoes various evolutionary processes, the most important of which are respiration, transpiration and finally physiological aging (accumulation of reducing sugars). A study was carried out in this context for two years, with the objective of determining the degree of physiological evolution of the tubers of four varieties of potatoes (potato with red skin; Kondor and Bartina; potato with white skin ; Spunta and Atlas) through biochemical indicators, such as, pH, acidity, reducing sugars (Glucose and fructose), starch and dry matter, during cold storage at temperatures ranging from 4°C at 8°C. A qualitative analysis of the formation of acrylamide under the effect of the content of reducing sugars, the temperature and the cooking time was carried out. Kondor revealed the highest pH value before and during storage. A gradual decrease in dry matter as a function of storage time was detected for all the varieties studied. A notable decrease in the starch content in the 3rd month of storage for all the varieties, in particular Kondor and Bartina. The Spunta variety showed significant amounts of reducing sugars from the 2nd month of storage. The formation of acrylamide was intense at 160°C for 4 minutes of frying in the Spunta and Kondor varieties. However, Kondor showed some resistance to the appearance of enzymatic browning (acrylamide) than Spunta under the same empirical conditions.

**Keywords**: potato, storage, quality, biochemical indicators, acrylamide

# SUPPRESSIVE EFFECT OF COMPOSTS TO CONTROL DAMPING OFF DISEASE OF ALEPPO PINE SEEDLINGS IN NORTHWESTERN ALGERIA

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## ABSTRACT

Damping off diseases are responsible for major production losses in agriculture and in the nursery forest in Algeria. The suppressive effects of four compost extracts were evaluated to suppress the damping off disease caused by *Fusarium redolens* and *Pythium ultimum* var. *ultimumin vitro* and *in vivo*. *In vitro* tests showed that the growth mycelia, the spore and sporangium germination, and spore production of the isolate of *F. redolens* and two isolates of *P. ultimum* var. *ultimum* were significantly inhibited. The *in vivo* test demonstrated that these composts protect significantly the Aleppo pine seedlings from damping-off by reducing disease incidence.

**Keywords**: Damping-off, compost, *Fusarium redolens*, *Pythium ultimum* var. *ultimum*, disease incidence

# SUPPRESSIVE EFFECT OF TWO COMPOST EXTRACT TO CONTROL THE SEED BORN DISEASE OF BARLEY AND WHEAT

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## ABSTRACT

Barley and wheat are among the main cereals grown in Algeria. However, they are subject to biotic and abiotic constraints. These include seed-borne fungal diseases. In our study we isolated the mycoflora transmitted by seeds by using two classic methods Agar test and Blotter test. The results obtained reveal the presence of five genera of pathogenic and saprophytic fungi with very high frequencies. For wheat seeds, the abandonment of *Fusarium* sp was 39%, *Penicillium* sp 19%, A*spergillus* sp 10%, *Cladosporium* sp11% and *Alternaria* sp 8%. While the frequencies of isolations from barley seeds were *Fusarium* sp with 30%, *Penicillium* sp 19%, *Aspergillus* sp 22%, *Cladosporium* sp 4% and *Rhizopous* sp 25%. The study of the effectiveness of two composts C1 and C2 against two isolates of *Fusarium* sp transmitted by seeds is used to analyze their physicochemical and biological properties and then to study their effect on mycelial growth, sporulation and germination. The results obtained showed that the two composts have a very significant inhibitory effect on the mycelial growth of *Fusarium* sp isolates (F1 and F2) with rates of 40.45% and 50.55% respectively. The *in vivo* test showed that these two composts have very significant effect in reducing the incidence seed born disease caused by these two isolates by up to 34%.

**Keywords**: Compost, biological and physic chemical characters, incidence, seed born fungal disease, *Fusarium* sp

# THE EFFECT OF WATER STRESS ON SEED GERMINATION OF SOME LEGUME SPECIES IN ALGERIA

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## ABSTRACT

The increasing occurrence of drought has sparked significant interest among numerous researchers in understanding the mechanisms enabling plants to adapt to this stress or to select varieties that exhibit effective genetic resistance to various production-specific obstacles. This study aims to evaluate the effect of water stress induced by polyethylene glycol (PEG 6000) at different concentrations on the germination of select legume species in Algeria. Water stress is a major limiting factor for plant growth in arid and semi-arid regions such as Algeria. Understanding the response of local legume ecotypes to this water stress can help identify varieties best suited to drought conditions in the region. The experiment was conducted under controlled conditions by germinating four legume species (4X4 Bean, Chickpea, Sidi Aich Faba bean, and Kalvedon Wonder Pea) in Petri dishes with varying concentrations of PEG 6000 to simulate water stress (0%, 5%, 10%, 15%, 20%) for a period of 7 days. Germination parameters such as germination rate, germination speed, germination kinetics, and seedling vigor will be evaluated and compared among the different ecotypes subjected to various dilutions of PEG 6000. The results of this study revealed significant variations in the germination response of legume species exposed to different dilutions of PEG 6000. The "Sidi Aich Faba bean" and "4X4 Bean" species exhibited better tolerance to water stress compared to "Chickpea" and "Pea" species, which proved to be more sensitive. These findings suggest that these varieties could be used in the selection of locally adapted legume cultivars for drought conditions in Algeria. In conclusion, this study has contributed to enhancing our understanding of the effect of water stress induced by PEG 6000 at different concentrations on the germination of legume ecotypes in Algeria. The obtained results could have significant implications for the development of drought-resistant varieties, thereby improving agricultural productivity and the sustainability of cropping systems in arid and semi-arid regions of the country.

**Keywords**: water stress, PEG 6000, legumes, germination, resistance

# THE EFFECT OF MOROCCAN SEAWEEDS FROM MEDİTERRANEAN COAST (HALOPTERİS SCOPARİA, GRACİLARİA DURA AND ENTERMORPHA COMPRESSA) ON MEDİCAGO SATİVA PLANT GROWTH

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## ABSTRACT

In agriculture, the use of chemical fertilizers and pesticides causes negative effects to the environment and human health. Therefore, choosing a sustainable agricultural model has become a challenge for agriculture and food security to reduce the use of these chemical products.In fact, organic farming has experienced a great development. Hence the interest in natural products of natural origin, such as plants and algae. The main objective of this study was to evaluate the biostimulant effect of extracts of a brown alga (Halopteris scoparia), a red alga (Gracilaria dura) and a green alga (Entermorpha compressa) on germination and growth of Medicago sativa plant. For this purpose, four treatments with the macroalgal extracts (25%, 50%, 75% and 100%) were tested. Then, the determination of the germination rate and the evaluation of the growth of the plant through physiological and biochemical parameters was carried out on the obtained plant biomasses. The results obtained revealed that the treatment of plants by 25%, 50% and 75% of aqueous extracts of Halopteris scoparia, Gracilaria dura and Entermorpha compressa, induced a significant increase in the germination rate and an improvement of the vegetative biomass growth (dry weight). In addition, the application of theses algae extracts studied resulted in an increase in the content of mineral elements and photosynthetic pigments (chlorophyll and carotenoids). In light of the results obtained, it was concluded that the macroalgal extracts studied could be suitable for promoting plant development. Furthermore, they can be an alternative way to develop sustainable agricultural practices that respect the environment.

**Keywords**: *Halopteris scoparia*, *Gracilaria dura* and *Entermorpha compressa*, seaweeds, biofertilization, biostimulation, *Medicago sativa*, growth, mineral elements, pigment contents

# FARMERS KNOWLEDGE ON MANAGEMENT OF CEREAL CYST NEMATODES HETERODERA SPP. IN THE PROVINCE OF AIN DEFLA IN ALGERIA

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## ABSTRACT

Cereals are an important food source in Algeria. In the province of Ain Defla located in Midwest, having fertile soils, with semi-arid Mediterranean climate, cereal crops are rotated with potato. Factors limiting cereals production, are climatic conditions mostly irregularity of rains. Moreover, nematodes damaging roots generate considerable losses. Previous studies have revealed the occurrence of cereal cyst nematodes (CCN) *Heterodera* spp. in several cereal fields. The recognized species are *H. avenae*, *H. latipons* and *H. hordecalis*; frequently found as mixed populations. *H. avenae* is the dominant species. The management of CCN requires knowledge by farmers to avoid of their multiplication and further dissemination. To have information if farmers are knowledgeable about the presence of (CCN), and how could be managed, a survey was conducted in different localities of the province. Several interviews were undertaken. The inquiry form was addressed to farmers and to persons responsible for 25 agricultural exploitations, particularly, those having a production system where the cereals take a considerable importance. The main objectives of this study were: to increase the current information on the infestation by CCN on cereals fields and how the mode of cultivation have an impact on the development of CCN, evaluating the current methods used for their management and inform to personal involved in cereals production on CCN. The results of the survey revealed that little knowledge of farmers about CCN and the inadequate mode of conduct of cereal crops are the main reasons that could contribute to the development of these parasites. Indeed, several cultural practices, as some techniques for soil preparation, choice of the varieties, rotation type, irrigation etc., are often favourables to the multiplication and dissemination of CCN. Additionally, farmers have limited level of formation on nematological issues and it is reflected on their decisions concerning the pest management of their exploitations. This is also reflected the poor success of the courses of capacitation performed by personal of agricultural advisory. Our results indicated also, that governmental organisms as the Plant Protection Services and the Direction of the Agricultural Services need to increase their effort, in order to educate cereal farmers for managing CCN and optimize cereal production. Also, it exists the needs to improve the soil analyses for CCN by the Regional Stations of Plant Protection in the province, in order to establish appropriated CCN managements programs.

**Keywords**: farmers knowledge, CCN, management, Ain Defla, Algeria

# COMPARATIVE EFFECTS OF INSECT GROWTH REGULATORS ON THE CUTICLE OF FIFTH INSTAR LARVAE OF THE DESERT LOCUST SCHISTOCERCA GREGARIA (ORTHOPTERA: ACRIDIDAE)

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## ABSTRACT

Desert locust *Schistocerca gregaria* (Forskål, 1775), is known as devastating pests in North Africa. Insect growth regulators (IGRs) can be an alternative to conventional insecticides. Studies were conducted to assess the effects of Lufenuron, Flufenoxuron and Triflumuron (IGRs, chitin synthesis inhibitor) on *S. gregaria* cuticle development. For our bioassay, the National Institute of Plant Protection provided specimens of *S. gregaria* (gregarious phase). Insects, were kept in an insectariums at El-Harrach ENSA (Algiers) with 32±2o C, 45% RH under a photoperiod of 12h light/12h dark, fed with grasses, cabbage, lettuce and complemented with cereal brand. *S. gregaria* (fifth instar) newly moulted were selected. Then divided in four groups and placed in four insectariums (30 x 25 x 25 cm).Lettuces (70g) as fed were spread on each insectarium. Then sprayed with the three IGRs at 0.025 ml/0.075 m2. An insectarium without spray was used as control. For each treatment, two insects were dissected, after two and after seven days, respectively. Dissection time were picked because at two days the formation of the endo-cuticle continues to developed during the post-exuvial period, and seven days was for target the pre-exuvial (of the imaginal moult). Dissected insects were prepared for histological studies. Measurements of cuticle layers using a photonic microscope with a micrometric objective were performed.Statistical analysis was calculated using Excel Stat version 7.1.Treated *S. gregaria* dissected after 2 days, exposed reductions of the endo-cuticle thickness. After two days endo-cuticle, thickness in treated with Lufenuron was 7.47µm, with Triflumuron was 8.45µm and with Flufenoxuron was 5.52µm, for not-treated was 12.67µm. Non-treated insects dissected after 7 days exhibited advanced moulting process, when were compared with treated. Non-treated insects showed new cuticle formation and digestion of the old cuticle. In contrast, no new cuticle layer was formed in treated insects. After seven days, endo-cuticle thickness for insects fed with Lufenuron was 22.75µm, with Triflumuron was 16.9µm and with Flufenoxuron was 8.92µm. For non-treated insects, the endo-cuticle thickness was 30.37µm. Statistical analysed showed significant differences on the thicknesses of the endo-cuticle between individuals treated and not treated. The hinder effect of the IGRs on chitin synthesis could explain the reduction of endo-cuticle thickness in treated insects. Formation of endo-cuticle depends on chitin, phenyl urea benzoyls and urea Acyls. Our results shown when Desert Locust are fed with IGRs, their endo-cuticle development are affected and their moulting process is slow.

**Keywords**: cuticle, desert locust *Schistocerca gregaria* fifth instar, insect growth regulators

# TOXIC EFFECT OF THREE PESTICIDES USED IN THE DIET ON THE REPRODUCTION AND OXIDATIVE STRESS PARAMETERS IN MALE RAT WISTAR

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## ABSTRACT

The present study aims to evaluate the toxic effects of three used pesticides as a mixture, Tebuconazole, Abamectin and Maneb from the triazole, avermectins and dithiocarbamates, families respectively, and to determine the toxic effect on reproduction and oxidative stress parameters. 30 adult male rats Wistar were divided into 3 groups of 10 rats in each one. G1 is the control group, the 2 other groups G2 and G3 were exposed respectively to mixture of pesticides in the diet with doses respectively (1 / 30.1 / 60) of the LD 50 of each pesticide for 8 weeks. At the end of the treatment period, animals were sacrificed. The right testis and epididymis excised and weighed. Blood and semen were collected. The right testis was frozen for sperm production and determination of oxidative stress parameters. The results of oxidative stress parameters showed a significant increase in malondialdehyde (MDA) associated with a decrease in glutathione (GSH) in the tissues studied (liver, epididymis and testes). A reduction in sperm concentration, motility, and viability also was observed in the treated groups as compared to the control. Thus, we suggest that the mixture of pesticides causes damages to the male reproductive in the rat.

**Keywords**: pesticides, toxicity, food, stress oxidative parameters, fertility parameters

# EVALUATION OF FUNGAL DISEASES INFECTING COCOYAM (*XANTHOSOMAS SAGITTIFOLIUM* SCOTT) IN DIFFERENT STORAGE CONDITIONS IN FAKO DIVISION

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## ABSTRACT

Cocoyam (*Xanthosoma sagittifolium*) is an important staple that generates income for 200 million people in the tropics. In spite of its importance, most of the tuber is lost during storage by diseases especially those of fungal etiology affecting its quality and marketability. This study was conducted to identify fungal pathogens infecting this crop at storage, to determine their incidence, abundance and distribution in different markets in Fako, to evaluate the different storage methods used by cocoyam traders in storing the tubers. A survey was carried out from March to August 2020 in which 220 mature symptomatic and asymptomatic cocoyam tubers were collected from 11 markets (20 samples per market; five samples per trader) within Fako Division. They were taken to the laboratory for fungal identification. Also, questionnaires were administered to 44 cocoyam traders on their storage practices, knowledge of diseases and means of transportation. Data were subjected to descriptive and inferential statistics, ANOVA and Turkey's HSD Parametric multiple comparism. Symptoms of disease on cocoyam included dry rot, soft rot and shrinking. Six fungal pathogens were identified namely *Aspergillus sp., Fusarium sp., Rhizopus sp., Trichothecium sp., Pythium sp.* and *Botrydiplodia theobromae.* Out of the 220 samples, 37.7% were infected with one or more pathogens. Mutengene was the most infected location having five of the six pathogens, with an incidence of 70%. *Fusarium sp.* was the most abundant (24 out of the 83 samples). It was determined that 72.7% of traders stored their produce in sack bags meanwhile cocoyam storage in pits mitigated the prevalence of fungal diseases the most. Breeding for multiple disease resistance in addition to appropriate storage is recommended for disease management.

**Keywords**: cocoyam, fungi, incidence, severity, food storage

# CHARACTERIZATION OF PLANT GROWTH PROMOTING MICROORGANISMS AND THEIR EFFECT ON DATE PALM (PHOENIX DACTYLIFERA L.) SEEDLING GROWTH AND SUPPRESSION OF FUSARIUM WILT

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## ABSTRACT

The present study deals with the efficacy of *Streptomyces* spp. and *Glomus* spp. isolates to control the fusarium wilt pathogen of date palm (*Phoenix dactylifera* L.), *Fusarium oxysporum* f.sp. *albedinis*, as well as the effect of these isolates on seedling growth in the presence and absence of the pathogen. The isolates were identified using a microbial identification system (Biolog). The genus *Glomus* is the most abundant fungi in rhizosphere of date palm in Biskra from Algeria. *Streptomyces* spp. BI21 showed the largest zone of inhibition against *F. oxysporum* f.sp. *albedinis* (35 ± 3 mm). In the absence or presence of the pathogen, the *Streptomyces* spp. BI21 and *Glomus* spp. A01 isolates increased seedling growth, and all plant growth parameters of date palm. The initial results indicate the arbuscular mycorrhizal fungi and *Streptomyces* as a promising biocontrol agent for promoting growth of plants and also controlling palm date Fusarium wilt disease.

**Keywords**: biocontrol, *Glomus* spp., *Streptomyces* spp., rhizosphere, *Fusarium* wilt, date palm

# EFFECTS OF DIFFERENT GROWING MEDIA CONTAINING CELERY ON PLEUROTUS OSTREATUS

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## ABSTRACT

The aim of this study is to contribute to the mushroom production sector, national economy and nutrition by increasing both sustainability and productivity with the use of celery, which is a food waste, in different growing environments. In this study, the effects of different growing media on the geometric and volumetric properties, spawn run period, primordium formation time, days to first, second and third harvest durations, yield and biological efficiency of P. ostreatus were investigated. Mushroom spawn was inoculated in composts containing Celery + Straw (C+S) or Celery + Straw + Bran + Sawdust (C+SBS) and mushrooms were grown by providing the necessary conditions. Accordingly, the shortest spawn run period, primordium formation time, 1st, 2nd and 3rd harvest time values were observed at the 5%C+S group (11.4days; 23.5days; 31.5days; 45.1days; 61.20 days, respectively), the highest values were observed in 1%C+SBS (19.5 days; 31.02 days; 40.15 days; 60.9 days; 84.9 days, respectively).The highest mean mushroom weight, yield and biological efficiency were obtained in the 5%C+S group (16.25g; 24.55 kg/100kg; 79.24%, respectively), while the lowest values were 1% C+SBS in these categories (9.35gr; 17.98kg/100kg; 59.93%, respectively). The lowest cap diameter value was 5.53cm in 20%C+SBS and control but the lowest stem length was observed in the control(4.99cm). There were the smallest stem diameter, weight and volume, maximum cap diameter, cap weight, volume and fruit body weight in the only 20%C+SBS group (0.54cm; 2.37g; **1** 53ml; 4.03cm; 7.08g; 7.51ml; 9.35g, respectively). The highest value of stem diameter, length, weight and volume, cap diameter, maximum diameter, weight, volume, and fruit body weight values were seen in 5%C+S (1.96cm;6.71cm;3.72g;2.49ml;7.45cm;7.35cm;11.55cm;16.28ml, respectively). As a result, the addition of 5% and 10% celery to the growing medium affected positively all of the categories that we investigated in oyster mushrooms. Besides the compost obtained by adding celery and only straw was found to be more effective than the Celery + Straw +Bran+ Sawdust group.

**Keywords**: celery, *Pleurotus ostreatus*, compost

# THE IMPORTANCE OF BIODEGRADABILITY OF PLASTICS USED IN AGRICULTURE

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## ABSTRACT

Biodegradability is a sought-after feature in agricultural applications, especially starch-based biodegradable plastics are the most widely used ones. Biodegradable covering films successfully perform essential tasks such as maintaining moisture and soil temperature and preventing weeds. Granular fertilizer films supply slow or controlled realese of fertilizers by preventing the environment from the resudies and provides sustanibility. In agriculture, biodegradable polymers are also used as planting tapes, which contain plant seeds and fertilizer together. After harvesting, these films are destroyed by the degradation process.
Biodeterioration plastics break down spontaneously as a result of microbiological and chemical processes and remain in the environment as microplastics. Biodegradable plastics, on the other hand, are destroyed in the environment by turning into products such as carbon dioxide, water and methane as a result of the process called mineralization.
In this study, the ASTM D 5988-03 test method, and the equivalent ISO 17556.2019 test method, which allows determining the degree of aerobic biodegradation of plastic materials by using soil or soil-compost mixture under laboratory conditions, were followed. After a period of exposure of the plastic material to the soil, the measurement of CO2 formed in the presence of microorganisms and the evaluation of the degree of biodegradability are provided. Biodegradability tests are not carried out in our country, and very few laboratories around the world perform this test and issue a biodegradability certificate. This method has been validated in our laboratory and biodegradability tests have been analyzed on polymer materials, which are the coating materials of some controlled release fertilizers used in agriculture. With the results obtained, it was checked whether the European Union met the criteria set forth or not.

**Keywords**: biodegradability, sustainability, agriculture, test method

# RESPONSE OF CASTOR (RICINUS COMMUNIS L.) TO ORGANIC FERTILIZER APPLICATION AND STAGGERED SOWING IN THE HUMID TROPICS

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## ABSTRACT

Castor (*Ricinus communis* L.) produces a non-drying oil with high pharmaceutical and industrial usage. However, there is a dearth of information on the appropriate agronomic practices for castor in the forest-savannah transition zone of the humid tropics. Two field trials were carried out during the late cropping season (June – December) of 2021 and 2022 on the organic research plot of the Institute of Food Security, Environmental Resources and Agricultural Research, Federal University of Agriculture, Abeokuta, Nigeria. The study evaluated the effects of organic fertilizer (OF) application and sowing date (SD) on agronomic performance of castor. The two factors evaluated in the study were organic fertilizer application (Control and organic fertilizer) and sowing date [eight sowing dates (SD1-SD8 i.e. from June 18 to August 5) staggered at 7 days interval]. The experiment was laid out in a split-plot arrangement fitted into Randomized Complete Block Design with three replicates. Fertilizer application and sowing date were allocated to the main plot and sub plot, respectively. Data were collected on phenology, growth, seed yield and attributes, and proximate composition of castor. Organic fertilizer application significantly ($p<0.05$) hastened number of days to 50% flowering and increased plant height at primary raceme in 2021. Sowing date had significant ($p<0.05$) effect on number of days to 50% flowering and physiological maturity, seed yield and yield attributes of castor in both years, except days to physiological maturity in 2021 and shelling percent in both years. Castor sown at SD1 and SD2 in 2022 produced seed yield of 773.7 and 799.1 kg/ha which was superior to the African average of 405.4 kg/ha but lower than the world average of **1**677.6 kg/ha. Organic fertilizer application significantly ($p<0.05$) increased protein content of castor seed in 2021 and reduced crude oil content in 2022. No significant OF × SD effect was recorded on seed yield in both years. It is therefore, recommended that for optimum production of high castor seed yield and quality, sowing should be done from SD1 to latest SD3 in the forest-savanna transition location.

**Keywords**: agronomic performance, castor, humid tropics, organic, seed quality

# CO-APPLICATION OF BIOCHAR AND ORGANIC FERTILIZER FOR IMPROVED PRODUCTIVITY OF SESAME (SESAMUM INDICIUM L.) IN THE HUMID TROPICS

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## ABSTRACT

Sesame (*Sesamum indicum* L.) grain yield has declined globally in recent time partly because of the cultivation of low yielding varieties and limited use of appropriate agricultural inputs on degraded soils. Therefore, two field trials were carried out during the late cropping season (July – Dec.) of 2020 and 2021 on the organic research plot of the Institute of Food Security, Environmental Resources and Agricultural Research, Federal University of Agriculture, Abeokuta. The study assessed the agronomic performance of three sesame varieties as affected by the application of organic nutrient sources. The experiment was laid out in a Randomized Complete Block Design and replicated three times. The two factors: Variety (V) and Organic Nutrient Source (T) were arranged in split plot with the Variety (White Benue, Cameroun White and E-8) as main plot and the Organic Nutrient Source (T1 - Control, T2 - Biochar at 2.5 ton ha-**1** T3 - Biochar at 5.0 ton ha-**1** T4 - Organic fertilizer @ 5.0 ton ha-**1** T5 – Organic fertilizer @ 5.0 ton ha-1 + Biochar @ 2.5 ton ha-1 and T6 - Organic fertilizer @ 5.0 ton.ha-1 + Biochar 5.0 ton.ha-1 ) as the sub plot. Data were collected on phenology, growth, grain yield and yield attributes, and seed quality in both years. The varieties were significantly ($p<0.05$) different in number of phenological days to flowering, capsule formation and physiological maturity with White Benue attaining the stages earlier than Cameroun White and E-8 in 2020. Varietal and organic nutrient sources effects were significant ($p<0.05$) for height to first capsule and height at flowering and harvest in both years. Varietal effect was not significant for grain yield and all the yield attributes measured in both years, except 1000-seed weight in 2021. However, T significantly ($p<0.05$) increased number and seed weight per plant, and grain yield in both years. Variety × Organic Nutrient Sources interaction effect was significant for all the sesame height characteristics and seed weight per plant in 2020. Application of T3 and T4, and their combinations (T5 and T6) significantly ($p<0.05$) enhanced seed weight and number of seeds per plant, and grain yield of sesame in both years relative to T**1** except number of seeds per plant in 2020. Sesame grain yield values recorded under T2-T6 were relatively high (1220.0 – 1553.3 kg ha-1) in 2020 and (966.3 – 1696.7 kg ha-1) in 2021. It is concluded that for improved sesame production in the forest-savanna transition zone, prospective farmers can apply biochar and organic fertilizer at 5 tons ha-1 alone or their combination (T5 – Organic fertilizer at 5 tons.ha-1+ Biochar at 2.5 tons.ha-1).

**Keywords**: bamboo biochar, grain yield, humid tropics, organic, sesame

# BIOEFFICACY OF TRICHODERMA SPP. AGAINST VASCULAR DECLINE OF YOUNG OLIVE TREES (OLEA EUROPAEA) IN NURSERIES

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## ABSTRACT

Surveys of three nurseries in northwestern Algeria have shown the presence of several cases of withering on olive seedlings. This study aims to confirm the pathogenesis of isolated species mycoflora associated with the young trees in nurseries with the symptom of dieback and wilting. In order to minimize the danger of the use of chemical substances in olive cultivation and establish a successful control strategy for this disease, the biological control potential of Trihoderma spp. isolates derived from rhizospheric soils of intact olive trees against Fusarium oxysporum (FO), Fusarium solani (FS) and Rhizoctonia solani (RS) under laboratory and greenhouse conditions was estimated. The results indicated that the symptoms observed in nursery were the result of a fungal complex comprising several primary and secondary pathogens contributing to the appearance of various symptoms. The results revealed the presence of dieback ranging from 13 to 26%. As regards the biological control test, all isolates of Trihoderma spp. were capable to inhibit pathogens mycelial growth significantly in vivo, the maximumwas recorded with the T4 isolate (78.89%) antifungal activity against FO. Results of greenhouse (in vivo) tests showed that plants injected only with antagonists or in combination with a fungal pathogen had a lower incidence of wilt disease than plants inoculated with a single pathogen. The decrease in the incidence of wilt disease was 80%, 58% and 50% FO, RS and FS respectively compared to the uninoculated control. Our results also showed that the four mixed Trichoderma isolates were able to stimulate plant growth parameters, which mainly resulted in better axial growth and higher biomass. The results obtained under greenhouse, shows the incorporation of Trichoderma directly into soil or composts for nursery soils as preventive and curative treatments.

**Keywords**: biocontrol, dieback, nurseries, olivier (*Olea europaea*), *Trichoderma* spp.,wilt

# ROOT ROT DISEASES CAUSED BY FUNGAL PATHOGENS IN PEA AND THEIR CONTROL POSSIBILITIES

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## ABSTRACT

Plant diseases that reduce yield and quality cause serious damage to both the producer and the economy of country. Production is constrained for a number of reasons, including annual yield loss from fungal infections and costs of control. The pea (*Pisum sativum* L.), an important food with regard to of nutrients, plays a significant role in our country's agriculture. Some significant fungal pathogens of root rot disease, which were detected in peas, are *Aphanomyces euteiches*, *Fusarium oxysporum* f.sp. pisi, *Fusarium solani* f.sp. *pisi*, *Rhizoctonia solani* and *Sclerotinia sclerotiorum*. These pathogens infect the pea roots initially, then kill the stem and above-ground tissues by extending through the vascular tissue; as a result of the infection, the pea plants wilt. Significant yield losses ranging from 30% to 57% occur in all pea growing areas, either before or during the flowering stage, as a result of the disease. The use of resistant cultivars combined with cultural control is the most safe, economical and effective method of protecting the pea plant against these disease agents. Within the scope of this review study, the symptoms, short biology, and control strategies of pea root rot pathogens are summarized in light of previous studies carried out by various researchers worldwide.

**Keywords**: fungal pathogens, root rot, pea, *Pisum sativum*, control

# HONEY BEE COLONY LOSSES IN BULGARIA AND SOME OF THE IDENTIFIED REASONS FOR THAT

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## ABSTRACT

The *Apis mellifera* species has a high sensitivity to environmental pollution and is successfully used for biomonitoring studies in many areas of the world. In recent years the genetic richness of honey bee populations in Europe is threatened by the uncontrolled introduction of genes from other subspecies into the adapted local populations, the stress of the changing environment and the agrochemical pollution, the new pathogens and the global climate changes. By usage of complex approaches different reasons for honey bee colony losses have been analyzed. The standardized international COLOSS questionnaire has been used to study the colony losses rate. The results reveal that for the period 2017 – 2022, the losses of bee colonies in Bulgaria increased from 2.04% to over 21%. During 2022 due to different reasons 1159 (21.28%) of the included in the study 5444 bee colonies have been lost as follows: problems with the queen bee – 172 (3.16%); natural disasters – 9 (0.17%); death or reducing in number to a few hundred bees in the hive - 990 (18.19%). Survey data show that in the areas with the greatest losses, sunflowers, rape, maize, orchards and autumn forage crops are predominantly grown on vast agricultural areas. Beekeepers report that different pesticides have been applied for plant protection in the areas of their apiaries, as well as that oxalic acid, coumaphos, amitraz, tau-fluvalinate are the most frequently applied against *Varroa*. The toxicity of a part of the mentioned agrochemicals has been investigated and different chromosomal mutations, DNA damage in spermatozoa and histopathological changes in the drone testes have been found in laboratory and in situ conditions as results of the studied chemicals actions. The results reveal the need to develop measures for conservation of the national genetic resource of *A. m. rodopica* and to conduct activities for further detailed studies of the risk factors for the honey bees health and viability in Bulgaria. Acknowledgments: This study was supported by the National Research Fund of Bulgaria by the contract KP-06-H5112/2021 "Complex assessment of genetic and environmental factors related to the losses of honey bees (*Apis mellifera* L.) in Bulgaria".

**Keywords**: *Apis mellifera*, colony losses, reasons

# HONEY BEE COLONY LOSSES IN DIFFERENT REGIONS OF BULGARIA

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## ABSTRACT

During past years the Bulgarian beekeeping is under great danger. During the period 2017 – 2022 honey bee colony losses have increased from 2.04% to over 21%. Two main reasons could be mentioned for that: 1) the uncontrolled imports of honey bee queens with foreign origin, although the Bulgarian law forbids it and 2) the usage of different pesticides in the agricultural activities which seem to be in relation to the reported high mortality rate of bee colonies in some regions in Bulgaria. The rate and the reasons for honey bee colony losses were investigated among all regions of Bulgaria by the standardized international COLOSS questionnaire. Through the survey in 2022, data were summarized for 46 apiaries with 5444 bee colonies from 36 locations throughout the country. More than 21% (1159 bee colonies) were reported as dead. The most significant losses were reported in apiaries located in the regions of Sliven, Plovdiv, Lovech, Stara Zagora, Vratsa, Pleven, Kardjali. Apiaries in Blagoevgrad, Varna, Veliko Tarnovo were with minimal losses.Of the total dead colonies the following losses due to objective reason were detected: problems with the queen bee – 14.8%, natural disaster – 0.8% and mortality in the hive or a sharp decrease in the number of bees with the family to several hundred – 85.4%. The most significant losses were found for apiaries located near agricultural areas with sunflower, rapeseed, corn, orchards and autumn fodder crops. Oxalic acid, coumaphos and amitraz and less frequently – flumethrin, thymol and lactic acid were the most frequently applied against varroatosis among the beekeepers surveyed. Residual amounts of 27 pesticides were found in the areas with the highest mortality. Among the group of the pesticides detected were insecticides (including acaricides), fungicides, herbicides and growth regulators. The presented and analyzed data should be considered when developing activities to protect the honey bee health status in Bulgaria.

**Acknowledgments**: This study was supported by the National Research Fund of Bulgaria by the contract KP-06-H5112/2021 "Complex assessment of genetic and environmental factors related to the losses of honey bees (*Apis mellifera* L.) in Bulgaria".

**Keywords**: *Apis mellifera*, regional honey bee colony losses, reasons

# GENOMIC EXPLORATION OF PLANT GROWTH-PROMOTING TRAITS IN ACTINOPHYTOCOLA ALGERIENSIS DSM 46746T BOUZNADA ET AL. 2016

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## ABSTRACT

This study explores the occurece and the distribution of Plant Growth-Promoting Traits (PGPTs) in the genome of *Actinophytocola algeriensis* Bouznada et al. 2016, a rare actinobacterium belonging to the *Pseudonocardiaceae* family. A comprehensive annotation of PGPTs was performed using the PLaBAse (PLant-associated BActeria web resources). The results unveil a diverse range of PGPT, underscoring the potential of *A. algeriensis* as a promising plant growth promoting bacteria (PGPB) for sustainable agriculture.
The genome of *A. algeriensis* exhibits an extensive repertoire of traits that directly and indirectly contribute to plant growth. The traits associated with direct effects, such as bio-fertilization and bio-remediation, as well as indirect effects, including stress control and competitive exclusion, are well-represented. Particularly noteworthy is the gene *ymfI|fabG|efpI->PGPT0003180*, which is consistently observed across several key categories, suggesting its multifunctional role in promoting plant growth. Among the identified traits, the "Colonizing Plant System" category emerges as the most prevalent, indicating *A. algeriensis*' remarkable ability to colonize plant systems—an essential prerequisite for exerting plant growth-promoting effects. Additionally, this effect is mostly assured by *ymfI|fabG|efpI->PGPT0003180* gene which falls under the root colonizing sub-category, highlighting the potential use of this strain as plant growth promoting rhizobacterium. Furthermore, the high occurrence of traits related to "Stress Control|Biocontrol" and "Competitive Exclusion|CE" indicate potential abilities of this bacterium in enhancing plant stress tolerance and outcompeting pathogenic organisms. These findings suggest that *A. algeriensis* holds significant promise as a potent plant growth-promoting agent, capable of colonizing plants to enhance nutrient uptake and manage both biotic and abiotic stresses. Further research should focus on experimental validation of these genomic insights and exploring practical applications of *A. algeriensis* for in sustainable agriculture.

**Keywords**: *Actinophytocola algeriensis* DSM 46746T, plant growth-promoting traits, *Pseudonocardiaceae,* PLaBase, sustainable agriculture

# MORPHOLOGICAL CHARACTERIZATION OF LOCAL BOR PEPPER SAMPLES IN NIGDE REGION

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## ABSTRACT

Pepper, originated from South America, is produced, and consumed in every region of Turkey. There is a significant genetic diversity of pepper due to wide separation and seeds collected from open pollinated plants in small-scaled production. Niğde, Turkey is an important agricultural region of Turkey. Although potato and apple production are carried out in the province, there is considerable vegetable production, especially tomato and pepper, in Center, Bor and Altunhisar. Bor pepper, produced in villages in Bor, is highly popular among the locals. There is no characterization study on Bor Pepper. Morphological characterization studies were performed in 110 local Bor pepper materials collected from 10 different locations around Niğde region. UPOV's descriptor list published for pepper was used in the morphological characterization studies. Various morphological analyzes were performed. All populations were investigated in terms of 46 properties, 23 of which belonged to the plant, 20 of the fruit and 3 of the seed. Mean, standard deviation and percentages of all characters described in the study. In terms of some investigated characters like stem hairiness, leaf hairiness, stem shape, plant growth habit, seed color, fruit flavour, and fruit color at intermediate stage and mature stage, the same morphological features were observed in all populations. On the other hand, significant variations were observed between other morphological features. The results show that Bor pepper genotypes could be a source of genetic material for commercial cultivation and showed the importance of preserving them as local varieties in the future.

**Keywords**: pepper, nigde, genetic diversity

# DEVELOPMENT AND VALIDATION OF HPLC-DAD METHOD FOR SIMULTANEOUS DETERMINATION OF DON, 3-ADON, 15-ADON IN TEBUCONAZOLE TREATED *FUSARIUM* SPP.

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## ABSTRACT

*Fusarium* is one of the major mycotoxigenic fungal genera. *F. graminearum* and *F. culmorum* are causative agent of Fusarium head blight and crown rot diseases in the small-grain cereals such as wheat, maize which resulted in economic losses and health damage in a large number of producing and consumer countries. These species predominantly synthesize trichothecene mycotoxins: deoxynivalenol (DON), also known as vomitoxin, and acetylated derivatives of DON (15-acetylated deoxynivalenol (15-ADON) and 3-acetylated deoxynivalenol (3-ADON). Mycotoxins produced by *Fusarium* spp. have acute and chronic effects on human and animal health. Various methods have been used *Fusarium* infections and indirectly the mycotoxin contaminations. Fungicide treatment is widely preferred and the most economical approach for ensuring agricultural sustainability. Tebuconazole is a triazole fungicide commonly used in agricultural areas for decades against *Fusarium*. In the study, a new HPLC-DAD method was developed and validated for simultaneous determination of DON, 15-ADON, and 3-ADON. Method optimization parameters (mobile phase A composition, flow rate, column temperature) were studied to enhance the separation performance. The chromatographic analyses were carried out on InertCloneTM ODS (3) 100 Å-LC (25cm x 4.6 mm, 5 µm) column by gradient program using mobile phase A (the deionized water containing 0.5% orthophosphoric acid) and mobile phase B (acetonitrile). Optimum chromatographic conditions were detected as 30°C column temperature and 0.5 flow rate. DAD detector was set at 218 nm throughout the analyses. System suitability, linearity, limits of detection (LOD) and limits of quantification (LOQ), precision (intra-day and inter-day) were investigated to prove validity of the developed method. Correlation coefficient (r2) values (≥ 0.9999) showed good linearity and calibration curve were linear in the range of 1-75 µg/mL for DON and 0.5-2.5 µg/mL for 15-ADON and 3-ADON. LOD and LOQ values were detected which ranging 0.415-0.646 µg/mL and 1.382-2.152 µg/mL. The intra-day and the inter-day recoveries of the analytes were obtained between 98.65-113.83% and 96.46-112.22%, respectively and the RSD% values were found less than 2%. Antifungal activities of tebuconazole against *Fusarium* PH-1 and FcUK99 reference strains and *Fusarium* field isolates were investigated. All chromatographic analyses showed that tebuconazole application affected mycotoxin production at different levels in the *Fusarium* isolates and reference strains.

**Keywords:** Tebuconazole, *Fusarium* spp., HPLC, Mycotoxins, DON, 3-ADON, 15-ADON.

**Funding:** This study was funded by TÜBİTAK [Project number: 119Z366].

# STUDY OF THE EFFECT AND AFTER-EFFECT OF LEGUMES ON SOIL BIOLOGY USING A BIO-INDICATOR: NEMATODES.

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## ABSTRACT

This study was carried out at the technical institute for field crops (ITGC) of Sétif, ALGERIA during the 2020/2021 crop year. Knowing and valorizing the effect of agricultural practices on soil biology, is a promising way forward towards more sustainable cropping systems. This study was conducted to gain a better understanding of the effect of legumes on soil biology. Its aim is to determine whether the presence of legumes has a specific effect on soil biology, by assessing it with a bio-indicator: the soil nematofauna. To achieve this objective, we tested four plots, including three of them with legumes as a crop precedent effect and after-effect (TNLt1C, TLt0PC, and TLT0V) and one control plot (TT) with a non-leguminous crop precedent. Soil samples were taken from these plots for physico-chemical analysis (N, P, CE, C/N...). The results thus obtained, revealed significant differences in soil biological activity between legumes and non-legumes, where the control (TT) showed a population of 389.74 NN/100ml, followed by the TLT0V field with a population of 265.81 NN/100ml, TNLt1C with 205.13 NN/ml and TLT0PC with 185.47 NN/100ml. Variations of nematodes abundance in soil under different crops, are the result of biotic interactions between roots and litter inputs and direct and indirect effects of plants on soil.

**Keywords**: legumes, non-legumes, bio-indicator, nematodes, biology of soil.

# DETERMINATION OF THE HARVEST TIME OF SILAGE CORN IN HIGH ALTITUDE REGIONS

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## ABSTRACT

Animal feeding with silage has become an indispensable technique all over the world. However, the cultivation of maize, which is the most important crop of silage in high altitude regions, is risky. For this reason, it is necessary to determine the varieties to be grown according to the altitude and their harvest times. This research is about the harvesting of corn varieties (SZE TC-513, Prestige and OSSK-644) with 3 different maturation periods on 3 different dates (1 September, 10 September and 20 September) in Erzurum, which has an altitude of 1860 m. The research was carried out in the experimental area of Atatürk University Plant Production and Research Center in 2012 and 2103. The field trial was set up as 3 replications according to randomized complete blocks experimental design, and the mean scores found to be significant were lettered according to the 5% probability level with the LSD multiple comparison test. Silage yield, some plant characteristics and silage quality characteristics were investigated during two years. According to the two-year average results; under current ecological conditions, Prestige and OSSK-644 varieties have higher silage yields (78.6 and 75.6 t/ha respectively). Between the harvest dates, September 20 (81.2 t/ha) was determined to give higher yields. According to the results of the research, it can be recommended to use mid-early varieties in high altitude regions and similar ecologies and to harvest them at the end of September.

**Keywords**: silage maize, high altitude, maturation, harvest time, variety

# EFFECT OF CYTOKININ APPLICATION ON YOUNG EINKORN (T. MONOCOCCUM) PLANTS SUBJECTED TO UVB IRRADIATION

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## ABSTRACT

The effect of plant growth regulator - phenylurea-type cytokinin 4PU-30 - on young einkorn plants exposed to UVB irradiation were studied. The plant growth regulator was applied by spraying, as an aqueous solution, before exposing the plants to UVB irradiation. The samples for analyses were collected after 3 days when there were visible symptoms of damage. It is well documented that UVB irradiation is associated with the formation of reactive oxygen species, leading to oxidative events. To investigate the antioxidant defense system in einkorn, the activities of antioxidant enzymes catalase, guaiacol peroxidase, glutathione transferase, superoxide dismutase were examined. Molecular analyses were performed to assess the expression levels of genes associated with cellular response to oxidative stress. The changes in the activity of the investigated enzymes caused by UVB irradiation, as well as the effect of pretreatment with cytokinin 4PU-30, as a possible protector against the adverse effects of oxidative stress, were discussed. The data shown are part of our research on the possibilities to alleviate the negative stress effects by using environmentally friendly substances and plant growth regulators with potentially protective action or inducing stress tolerance.

**Acknowledgements:** This research was funded by Bulgarian National Scientific Fund (BNSF) grant KP-06-N56/15

**Keywords**: UVB radiation, oxidative stress, phenylurea-type cytokinin 4PU-30, antioxidant enzymes, einkorn

# COMPARISON OF WHEAT AND EINKORN RESPONSES TO UV-B RADIATION AND THE EFFECT OF 4-PU-30 PRE-TREATMENT

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## ABSTRACT

Einkorn is the oldest known wheat and among the earliest forms cultivated by humans. Its use as an alternative species to contemporary wheat varieties could be regarded as a beneficial approach to organic farming since it is easier to digest and has more protein than modern wheat. Many studies have demonstrated that einkorn possesses naturally higher tolerance to some environmental stresses such as drought and temperature. However, these results are controversial and ambiguous, most probably due to subspecies specificity. Although a natural component of sunlight, UV-B is a powerful abiotic stress factor that negatively affects plant growth and development as well as DNA replication by triggering reactive oxygen species (ROS) formation. Plants have developed defense mechanisms for coping with the negative consequences of oxidative stress. Plant growth regulators could activate oxidative stress protection involving the scavenging of free radicals and consequently promote stress tolerance. The synthetic phenylurea-type cytokinin 4PU-30 is known to reduce the harmful effects of drought, salinity, and temperature stress. We compared the responses of wheat and einkorn seedlings to excessive UV-B irradiation in laboratory experiments and evaluated the effect of 4PU-30 pre-treatment by quantifying the amounts of compounds associated with oxidative events such as free proline, hydrogen peroxide (H2O2), malondialdehyde (MDA) and thiol (SH) compounds. A more pronounced stress response was evidenced in einkorn where UV-B provoked a greater increase in analyzed compounds compared to wheat. However, 4-PU 30 pre-treatment alleviated UV-B induced effects by demonstrating a tendency towards returning the amount of the investigated compounds to control levels. It could be concluded that the applied cytokinin had a positive impact on stress perception in both studied species.

**Funding:** This research was funded by Bulgarian National Scientific Fund (BNSF) grant KP-06-N56/15

**Keywords**: UVB radiation, oxidative stress, phenylurea-type cytokinin 4PU-30, wheat, einkorn

# OUTCOME OF SYNTHETIC CYTOKINE 4 PU-30 PRE-TREATMENT ON TRITICUM AESTIVUM AND TRITICUM MONOCOCCUM RESPONSES TO UV-B RADIATION

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## ABSTRACT

UVB radiation induces the production of harmful molecules, such as reactive oxygen species (ROS), thereby damaging plant organs and primary metabolites and reducing photosynthesis, all of which are necessary for plant life. In response to UVB stress, plants can activate secondary metabolism, leading to the accumulation of substances that act as antioxidants which scavenge ROS. The purpose of our study was to investigate the effect of UVB radiation, as well as the pretreatment of plants with cytokinin 4PU-30, on the antioxidant and antiradical activity in Triticum aestivum and Triticum monococcum, as well as the accumulation of phenols and flavonoids which play an antioxidant role. UVB irradiation induced an overall change in metabolite accumulation. In wheat, 4PU treatment caused a significant increase in terms of antiradical activity, which represented 143% compared to control plants, while in einkorn such effect of the regulator was not observed. In both species UVB radiation decreased antiradical capacity, while 4PU pre-treatment and subsequent UV treatment resulted in the activation in this particular oxidative stress protective mechanism. AO activity in wheat decreased after UVB treatment but slightly increased in einkorn. Pre-treatment with 4PU and subsequent UV illumination improved AO capacity in einkorn but not in wheat. These results could be indicative of the positive effect of the synthetic cytikinin 4PU on the activation of radical scavenging mechanisms in response to UVB stress in the two examined species - wheat and einkorn.

**Funding:** This research was funded by Bulgarian National Scientific Fund (BNSF) grant KP-06-N56/15

**Keywords**: UVB radiation, phenylurea-type cytokinin 4PU-30, antioxidant and antiradical activity, wheat, einkorn

# SILVER NANOPARTICLES EFFECTS ON GROWTH AND YIELD OF WHEAT (TRITICUM AESTIVUM L.)

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## ABSTRACT

Wheat is major food crop of world but unfortunately its production is decreasing day by day due to over-population therefore it is need of hour to execute modern technologies like nanotechnology to perk up the yield of important food crop. Silver nanoparticles (SNPs) have definite potential to enhance growth and yield of wheat. Diverse concentrations of silver nano-particles inconsistently affected germination and seedling growth. Use of 20 ppm SNPs predominantly improved germination percentage, germination index, shoot fresh weight, shoot and root dry weight of wheat. Silver nano-particles have significant impact on biochemical traits of wheat. Maximum free proline, total soluble protein, chlorophyll stability index and total soluble sugar were recorded at 40 ppm of SNPs and then started declined when concentration was increased. Enzymatic activities (SOD, POD, CAT and MDA content) of wheat increased by the application of silver nano-particles @ 40 ppm and tend to decline with higher concentrations of SNPs. Green house results reveal that silver nanoparticles enhanced growth and yield of wheat crop plants at lower concentrations (40 ppm of SNPs) while higher concentrations have detrimental effects. Silver nanoparticles can modify plant physiology to greater extent. Silver nanoparticles can be employed to improve germination indices, physiological attributes of plants to enhance resistance and stress tolerance which ultimately result in boosting growth and yield of crop plants.

**Keywords**: proline, sugars, enzymatic activities, yield, wheat.

# IN VIVO EFFICACY OF SOME ISOLATES OF TRICHODERMA SPP. ON VEGETATIVE DEVELOPMENT PARAMETERS

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## ABSTRACT

To guarantee good growth and good development of olive tree seedlings in nurseries, “ideal” fertilization is needed, which should make it possible to best combine good growth on site and good recovery after planting. Surveys carried out at 3 nurseries in western Algeria (Safia Dahra, bensaha pilot farm, sfizef nursery) and the experimental farm of the University of Mascara, allowed us to identify 4 isolates of Trichoderma spp . used as PGPFs to improve the growth and developmental status of seedlings in nurseries. The effects of Trichoderma strains in consortium inoculated on young olive plants on certain growth parameters under artificial infection conditions in pots were studied. The results obtained revealed relatively high values for the growth parameters: plant height (cm), number of leaves per plant, stem diameter (cm) and fresh and dry weight (g) in the treated plants compared to to untreated controls after 3 months of inoculation. The differences were statistically significant p = 0.029. Our results show that the four Trichoderma isolates in consortium were able to stimulate plant growth parameters which resulted in better axial growth and higher biomass. Biomass stimulation was observed not only in the aerial parts, but also in the root parts. The trial conducted "in vivo" as a growth biostimulator and biofertilizer showed a significant, satisfactory and very promising evolution of the growth parameters of the treated seedlings. The use of strains of Trichoderma spp. in agriculture is a promising practice that reduces the use of chemical fertilizers and pesticides while minimizing the cost of production and the negative impacts on the environment.

**Keywords**: olive tree (*Olea europaea*), nurseries, PGPF, *Trichoderma* spp, biostimulator, biofertilizer

# POTENTIAL FOR RAINWATER HARVESTING IN LAYING HEN EGG HOUSE: THE CASE OF BURSA

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## ABSTRACT

Rapid industrial development, population growth and climate change put significant pressure on water resources. Existing water resources are depleted rapidly or become polluted and fall to a quality that cannot be used for consumption. Therefore, the creation and sustainability of alternative water resources have become essential for our future. Especially in the agricultural sector, the availability of water resources is vital for ensuring continuity in production and food supply. In addition, approximately 70% of clean water resources are used in agriculture. In addition to crop production, animal production is an important water user. Therefore, saving water in agricultural production is of great importance. The use of rainwater in both plant and animal production is one of the savings tools in recent years. Water consumption in livestock farms is realized as drinking water and water for daily use. This study determined the potential of rainwater harvesting from the roof of a layer hen house in the Bursa region, and the system design was made. As a result of the study, it was determined that rainwater harvesting from the poultry house roof was highest in December with 44.7 m3 and lowest in August with 8.3 m3. It has been determined that collected rainwater can supply an annual average of 35.5% of water consumption and usage in the poultry house. When a water tank with a capacity of 45 tonnes is designed to collect rainwater, the system will pay for itself in 24 years.

**Keywords**: Bursa, drought, water harvest, water consumption, laying hens

# DETERMINATION OF HEAT STRESS BY TEMPERATURE-HUMIDITY INDEX IN ENRICHED CAGE SYSTEM LAYING HENS: A BURSA CASE STUDY

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## ABSTRACT

Providing optimum indoor conditions in livestock farms is critical regarding animal health, production efficiency and secure food production. Poultry animals are more sensitive to indoor environmental conditions than other farm animals. They are affected more quickly by changes in environmental conditions—especially high temperatures and relative humidity causing heat stress in animals, reducing productivity and causing vital effects. The temperature-humidity index is an important indicator to evaluate the heat stress caused by high temperature and humidity. This study aimed to determine the impact on laying hens by calculating the temperature-humidity index (THI) values for a poultry house with an enriched cage system operating in Bursa. According to the study results, THI values in June, July and August were determined to be at the critical limit where heat stress started to be seen. THI values were calculated as 70.**1** 75.6 and 75.2 for June, July and August, respectively. It was observed that high index values in summer months caused a decrease in egg production. In the other months, it was determined that the hens were in their comfort zone.

**Keywords**: heat stress, humidity, laying hen, poultry, temperature, temperature-humidity index

# DETERMINATION OF LOW TEMPERATURE RESISTANCE IN LOLIUM PERENNE L. GENOTYPES COLLECTED FROM HIGH ALTITUDE REGION

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## ABSTRACT

Perennial ryegrass (Lolium perenne L.) is an important species both as a forage plant and as a turfgrass. One of the most important reasons limiting the use of the plant is low temperatures. This research is planned to provide material for the breeding program to be started for low temperature resistance in perennial ryegrass. For this purpose, approximately 1000 clones of genotypes were collected from the high-altitude regions of the Eastern Anatolia Region (Erzurum, Erzincan, Kars, Bayburt, Ardahan, Ağrı) in 2019. These clones were planted in Atatürk University PlantProduction and Research Center experimental field and evaluated in terms of turfgrass and forage plant parameters for two years (2020 and 2021). Considering the two-year results, 46 turfgrass type and 62 forage type plants were selected from these genotypes. These selected plants were cloned and grown in viols in 2022 and subjected to cold resistance tests together with control cultivars. As a result of the test carried out in the growth chamber, the deaths of the genotypes from low temperature were between -1 oC and -15 oC. Forage type control variety (Lipresso) was completely damaged by cold at -9 oC, and 43 lines more resistant than this variety were determined. On the other hand, the control variety (Esquine), which is a turfgrass type, was frozen at -13 oC, and 5 lines were determined that were based on a lower temperature than the control variety. Studies should continue to develop new varieties related to these lines that are more resistant to low temperature than control varieties.

**Keywords**: perennial ryegrass, genotypes, cold resistance

# THE IMPORTANCE OF LENTIL GRAIN QUALITY IN HUMAN NUTRITION

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## ABSTRACT

The lentil is one of the edible grain legume plants that have been cultivated and used in nutrition from ancient times to the present day. In our country, the cultivation of commercial lentils is second only to chickpea among edible legume crops. The lentil production, which has an important position in the agriculture of our country, consists of 87.8% red lentils and 12.2% green lentils. Besides having an important place in human nutrition due to its high protein content, lentils also have an important effect on animal nutrition. Its dry grains contain 25% protein. In addition, it also contains important amino acids such as isoleucine and lysine. When compared to cereals, it is an important legume plant in terms of nutritional value with its high amount of protein and rich amino acid content. In human nutrition, lentils are preferred more than other edible grain legumes due to its low amount of anti-nutritional factors, high protein content and short cooking time compared to other legumes. The lentil is a legume that provides additional income to both the producer and the national economy by entering the cultivation shift in arid regions.

**Keywords**: entil, grain protein content, quality, amino acid

# DETERMINATION OF YIELD PROTEIN CHARACTERISTICS IN DIFFERENT BEAN VARIETIES

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## ABSTRACT

The experiment was conducted in the 2021-2022 growing season under the conditions of Aydın Province. The study aimed to determine the performance of three different bean varieties (Dermason-Efsane-Maş). The experiment was carried out in the producer field of Köşk district of Aydın province with three replications according to the coincidence blocks experimental design. Grain yield and protein ratios of the varieties were analyzed. It was determined that grain yield values varied between 150-200 kg/da and grain protein ratios varied between 22-25%. As a result of the study, it was determined that genotype factor was effective on the studied traits.

**Keywords**: bean, grain yield, grain protein ratio

# STUDYING THE EFFECT OF THE INSECTICIDE USED IN AGRICULTURE (RUSTILE) ON THE LARVAE OF THE DOMESTIC MOSQUITO (CULEX PIPIENS).

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## ABSTRACT

Mosquitoes are the first cause of transmission of viral diseases for both humans and animals, as they can transmit some viral diseases. These insects have attracted the attention of specialists, especially in the field of control. Extensive use of pesticides in agriculture and public health programs leads to numerous environmental problems and toxic effects on aquatic animals, especially non-target organisms. Thus, this method has many negative effects. Our study aims to know the effect of the insecticide used in agriculture Rustile to eliminate four stages of the life cycle of mosquitoes without causing damage to the ecosystem. So that we concluded through our work that the effect of these pesticides varies according to the concentration used, as shown by the sharp differences in the proportion and rate of mosquito mortality. The use of a 2.5 ml dose of rustic ide had a greater effect compared to both the 0.5 ml and 4.5 ml doses on the third day. If it turns out that using a dose of 4.5 ml of the pesticide was more effective in the third and fourth stages ($L_3$, $L_4$) compared to doses of 0.5 ml and 2.5 ml of the same pesticide. However, this concentration is not recommended as it is not effective in the first larval instars (I and II) and thus allows them to develop into later instars (III and IV) which require a higher concentration in order to eliminate them. In addition to causing a lot of pollution, especially water pollution and its accumulation, thus affecting the balance of the water environment used there. Therefore, the use of a rusticide with the active substance ACETAMIPRID 20% at a specific concentration can be considered very effective in eliminating mosquito larvae and thus getting rid of harmful mosquitoes without harming the environment or non-target organisms.

**Keywords**: acetamiprid, Culex pipiens, ecotoxicity, rustile

# DETERMINATION OF FRUIT QUALITY CHARACTERISTICS AND BIOACTIVE CONTENTS OF YEŞILGÜZ AND DÜRDANE FIG (FICUS CARICA L.) CULTIVARS GROWN IN SAMSUN CONDITIONS

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## ABSTRACT

In this study, the quality characteristics and bioactive contents of two fig cultivars, namely Yeşilgüz and Dürdane (Bursa Siyahı), grown in Samsun, were investigated. The bioactive analyses included the evaluation of antioxidant activity (FRAP and DPPH assays), total phenols, and total flavonoids. Additionally, measurements were taken for fruit quality characteristics such as average fruit mass, fruit width and length, neck length, ostiole width, soluble solids content (SSC), and titratable acidity (TA). According to the obtained results, significant differences were observed in the biochemical contents and physical properties of the fruit skins between the black-skinned Dürdane and the green-skinned Yeşilgüz cultivars. In fact, the Yeşilgüz cultivar exhibited a total phenol content of 847 mg GAE kg-1 and a total flavonoid content of 535 mg QE kg-1. Furthermore, the FRAP activity was determined as 20.41 mmol TE kg-**1** and the DPPH activity was measured as 3.07 mmol TE kg-1 for Yeşilgüz. On the other hand, the Dürdane cultivar displayed a total phenol content of 1155 mg GAE kg-**1** a total flavonoid content of 552 mg QE kg-**1** an FRAP activity of 34.75 mmol TE kg-**1** and a DPPH activity of 7.70 mmol TE kg-1. When comparing the physical characteristics of Yeşilgüz and Dürdane cultivars, it was observed that the Dürdane cultivar exhibited approximately 1.32% higher fruit mass, 1.54% longer fruit neck length, 1.07% wider fruit width, 1.31% longer fruit length, and 1.11% wider ostiole width. Conversely, Yeşilgüz cultivar had higher SSC content (24.5%) and TA content (0.51%). As a result, significant differences were determined between the fruit quality characteristics and bioactive contents of Yeşilgüz and Dürdane fig cultivars grown in Samsun conditions.

**Keywords**: antioxidant, phenol, ficus carica, fruit mass, SSC

# TOXIC IMPACT OF AN AGRICULTURAL INSECTICIDE RUSTILE ON A NON-TARGET SPECIES DAPHNIA MAGNA STRAUS, 1820 (CRUSTACEA, CLADOCERA).

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## ABSTRACT

Aquatic organisms are used to assess the health of aquatic systems. Extensive use of pesticides in agricultural and public health programs causes many environmental problems and toxic effects on aquatic animals, especially against non-target organisms such as non-target organisms for *Daphnia magna* mosquito larvae. These biological models were chosen for their importance in the food chain and in maintaining balance. Rustile is a pesticide multipurpose insecticide, manufactured by SARL DEKACHIM, consists of 20% of the active ingredient Acetamipride. The lethal doses used in the treatment of this non-target group were LC50 mL/L and LC90 mL/L. The overall objective of this work is to study the toxicity of Rustile in freshwater crustaceans in order to assess the risk of this pesticide to aquatic organisms. To investigate this, we chose *Daphnia magna* as a study model, because due to its key role in the food chain, this species was treated with two lethal doses of each. The first test involved 20 individuals of *Daphnia magna* in five replicates in 150 ml filtered perching water and 1.45 ml/L insecticide. The second test included 20 individuals of *Daphnia magna* in five replicates in 150 ml filtered perching water and 1.90 ml/L insecticide. The tests consisted of five replications and a control, and were carried out in food-preserving plastic containers. *Daphnia magna* deaths have been recorded after one, two and three days. The toxicity study showed variable sensitivity of the treated species, which led to mortality rates, with a maximum mortality value of 86% for the first dose and 97% for the second dose. With little stability between the effects of the two studied doses, this indicates that the pesticide «Rustile» is a more toxic element.

**Keywords**: *Daphnia magna*, insecticide, ecotoxicity, rustile, cladoceran

# IDENTIFICATION AND GENETIC VARIABILITY OF COLLETOTRICHUM SPECIES ISOLATED FROM DIFFERENT HOST PLANTS IN BULGARIA

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## ABSTRACT

Fungi of the genus *Colletotrichum* are causal agents of plant diseases with constantly growing economic importance. A profound knowledge of the pathogens will allow their effective control, thus limiting the negative agricultural effects. Accurate identification of *Colletotricum* species requires implementation of morphological and genetic data. Our work was aimed at identification and characterization of *Colletotrichum* isolates pathogenic for different crops in Bulgaria, including vegetable, fruit and ornamental plants. *Colletotrichum*-realated diseases pose a serious threat to the yield and quality of production in Bulgaria, but are still largely unexplored. Classical phytopathological approaches have been applied for initial identification of the isolates on the basis of their morphological, cultural and pathogenic characteristics. The obtained results were complemented by DNA barcoding analyses, allowing the resolution of uncertainties in their morphological distinction and assisting their taxonomic determination. Molecular analyses were based on five fungal DNA barcode markers – the primary ITS barcode and the secondary marker regions ACT, EF-1α, TUB2 and CHS-1. Most of them have proven effective for reliable identification at the species level. The resolution power of ITS region was not sufficient to discriminate inter-species variations within coccodes, dematium and spaethianum complexes confirming the requirement for secondary barcodes to resolve the genetic variability of the *Colletotrichum* isolates. BLAST analyses assigned the studied *Colletotrichum* species to five different complexes – coccodes, acutatum, gloeosporioides, dematium and spaethianum. Several species such as *C. godetiae*, *C. salicis*, *C. cigarro* and *C. circinans* have not been previously reported in Bulgaria. Data obtained improve our understanding of the genetic diversity within the *Colletotrichum* population pathogenic on cultivated plants in Bulgaria and further enrich the knowledge about the biodiversity and specific features of *Colletotrichum* species, pathogenic to solanaceous and other hosts. Moreover, such studies may advance the scientific platform needed to develop new strategies for effective disease control and resistance breeding.

**Keywords**: plant diseases, pathogenic fungi, DNA barcoding, anthracnose

# RELATION BETWEEN SPECTRAL DATA AND EFFECT OF CYTOKININ APPLICATION ON UVB IRRADIATED YOUNG EINKORN (T. MONOCOCCUM) PLANTS

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## ABSTRACT

Crop monitoring is one of the key applications of remote sensing in whole and of spectrometric measurements in particular. Regarding growth and physiological characteristics of the cereals, aprimary goal is establishing the relations to spectral data. For the purpose of this work the following instruments will be used during the spectrometric measurements: (1) multi-channel system with high spectral resolution (1-10 nm), allowing for registration of fine details in the spectrum reflected by the studied objects; (2) a methodology for determining the relationship between the biophysicochemical parameters and their spectralreflectance characteristics in specific region of the electromagnetic spectrum in order to assess the current status of studied plants will be developed by the project team. The acquired spectral data closely correspond to the Land Monitoring service, part of the "Copernicus" program. The data obtained by remote sensing will be used for knowledge upgrading about relation between unfavorable stress factors and spectral data. The effect of the plant growth regulator 4PU-30 on young einkorn plants subsequently exposed toUVB irradiation was investigated. The plant regulator is applied by spraying, as an aqueous solution. The samples for analyses were collected when visible damage symptoms were observed, namely yellowing of the leaves of the UVB-irradiated plants, 3 days after the UVB irradiation. In order to evaluate the level of oxidative stress changes in the content of chlorophyll and carotenoids were determined. Together with biochemical criteria, the effect of impacts applied was evaluated using remote sensing, as a modern technology to assess the impact under normal and stressing conditions measuring spectral reflectance and establishing interrelationships applying statistical methods. The observed data showed that the foliar application of 4PU-30 reduced the damaging effect of applied UVB irradiation in young einkorn plants. This work is supported by the Bulgarian National Science Fund under Project KP-06-N56/15 (КП-06- Н56/15).

**Keywords**: UV B radiation, oxidative stress, phenylurea-type cytokinin 4PU-30, remote sensing, spectrometric measurements

# A PRELIMINARY STUDY ON THE EFFECTS OF MANURE AND ADDITIONAL PHOSPHORUS FERTILIZER IN DIFFERENT RATIO ON FOUR-WINGED SALTBUSH

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## ABSTRACT

Pasture improvement is carried out worldwide by using shrub species in regions with marginal climate and soil structure, such as drought and salinity. The four-winged saltbush *(Atriplex canescens* (Pursh) Nutt.) belonging to the *Chenepodiceae* family is one of the shrub species used in the world, especially in the improvement of pastures in arid regions, as it provides quality feed to animals by remaining green during the dry feed period. It is also used to reclamation saline soils by absorbing the salt in the ground. Various researchers have reported that phosphorus deficiency is observed in plants because agricultural soils of Türkiye generally contain high reaction and lime, low organic matter and especially in the pastures of Central Anatolia region because of the arid climate and low temperature, the diffusion coefficient in the soil decreases, and the plants cannot take phosphorus sufficiently. For this reason, in this study, which was established in three replications according to the randomized block design, manure and additional phosphorus fertilizer at different rates (Control, Manure (M), M + 40% P, M + 60% P, and M + 100% P) were applied to four-winged salt bushes. The study examined morphological characteristics such as plant height, canopy diameter, new shoot stem diameter, leaf length, and leaf width in the vegetative and generative stages of the four-winged saltbush. In addition, in this preliminary study, the N, P, and K contents of plants in the generative phase and the root contents of these elements at the end of the growing season were examined. In general terms, it can be stated that the morphological characteristics of plants grow more in the generative period than in the vegetative period. In addition, the highest plant height of 115 cm and the tallest plant diameter of 156.25 cm were obtained in the generative period only from manure (M) applications. As a result of the nutrient analysis of the samples taken from the young shoots of the plant during the generative period, the highest protein and N contents were obtained from M+60%P treatment with 18.63% and 2.98%, respectively, and the highest P content was obtained from manure (M) treatment with 0.31%. In the samples taken from the roots at the end of the growing season, the highest N content was obtained from M+60%P treatment with 2.49%, while the highest P content was obtained from manure (M) treatment with 0.357%. This situation can be explained by the fact that plants send the nutrients they produce at the end of the growing season to the root zones, their reserve nutrient stores. As a result of this study, which is a preliminary study for four-winged saltbush fertilization studies, it can be stated that only manure (M) application is sufficient to increase plant growth in phosphorus-deficient soils considering sustainability.

**Keywords**: four-winged saltbush, fertilizer, manure, pasture improvement, phosphorus, sustainability

# THE INVESTIGATION OF SOME MORPHOLOGICAL CHARACTERISTICS OF FORAGE KOCHIA GENOTYPES DETERMINED EMERGENCE RATIO

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## ABSTRACT

Forage kochia is a semi-shrub forage plant tolerant to drought, cold and soil salinity. In addition to being a quality feed source for livestock, with its ability to remain green in the dry feed period when other fodder plants dry up, it also offers the opportunity to fight wildfire during this season. Despite these advantages of forage kochia, the fact that it loses its seed viability in a short time causes the restriction of the cultivation of this plant. For this reason, the seeds of three different forage kochia genotypes (C**1** C2, M5) harvested in November 2018 and stored under room conditions were periodically sown at five different periods; the day after harvest, 4th months, 7th months, 10th months, and 13th months after harvest in greenhouse conditions. The study's first objective was to determine the genotype with the most prolonged viable period of seed viability. At this study stage, the M5 genotype, sown 10th months after harvest, was recorded as the highest value with a 35.7% emergence ratio. The survey also obtained C1 and M5 genotypes that retained seed viability one year after harvest. In the second phase of the study, plants showing emergence were planted in the field conditions in November 2020, and plant height, canopy diameter, stem diameter, leaf length, leaf width, leaf color, and hairiness of the plants were examined throughout 2021 and 2022. When the averages of the two-year data were analyzed, it was determined that genotype C1 had the highest plant height with 105 cm when sown 13th months after harvest. Although the genotype M5, which was also sown in this period, had the shortest plant height with a plant height of 42.5 cm, it can be stated that this genotype also had the darkest leaf color (Scoring 7.25; 1: Red-Grey, 3: Grayish Green, 5: Bluish Green, 7: Green, 9: Dark Green). As a result of the study, it can be stated that C1 and M5 genotypes, which were sown 13th months after harvest, stand out from the other genotypes in terms of their long seed viability period and morphological characteristics for use as a gene resource in forage kochia breeding.

**Keywords**: forage kochia, emergence, gen resource, seed viability, yield components

# ANTIFUNGAL POTENTIAL OF CRUDE EXTRACTS OF FENUGREEK SEEDS (TRIGONELLA FOENUM-GRAECUM).

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## ABSTRACT

Fenugreek (*Trigonella foenum-graecum*) (fabaceae) is commonly used as condiments, spices and in various medicinal purposes in traditional systems. The biological activity of fenugreek can be easily accessed from previous research conducted by several researchers. The present research was conducted to find out the antifungal potential of various extracts of dried powder of fenugreek seeds by means of paper disc diffusion method, with petroleum ether, ethyl acetate, ethanol, and aqueous solvents in 25 µml, 50 µml and 100 µml concentrations against *Microsporum canis*. Clotrimazole was used as a standard.

**Keywords**: Fenugreek, Trigonella foenum-graecum, antifungal potential

# CHEMICAL COMPOSITION OF GARLIC (ALLIUM SATIVUM L.) ESSENTIAL OIL.

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## ABSTRACT

Garlic *(Allium sativum* L.), is broadly used around the world for its numerous culinary and medicinal uses. The garlic essential oil obtained by hydrodistillation was analyzed by gas chromatography (GC) and (GC/MS). The highest yield was 0.5%. The essential oil was characterized by a high amount of sulfur compounds (84.5–98.0%) with diallyl trisulfide (37.0–45.5%), diallyl disulfide (17.5–35.0%) and methyl allyl trisulfide (7.0–10.5%) being the major components. The compositions of garlic essential oil are consistent with their use as flavoring agents in foods as well as their uses as herbal medicines. However, quantitative differences are likely to affect the flavor and bioactivity profiles.

**Keywords**: garlic, *Allium sativum* L., essential oil, chemical composition, GC, GC/MS

# SUSTAINABILITY ASSESSMENT OF ANIMAL HUSBANDRY IN TURKEY

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## ABSTRACT

This study covers analysis of the sustainability of the animal husbandry activities in Edirne and Kastamonu provinces of Turkey through a thermodynamic sustainability assessment technique, emergy analysis (EA). By classifying energy and material flows as renewable, non-renewable and purchased from economy, EA defines metrics to evaluate the sustainability of a system. This metrics provide insight about evaluated system's renewability, environmental loading and dependence on external inputs. In analyzed systems, 3 breeders raise both cows and sheep; 3 breeders raise cows, only. Systems having renewability of lower than 20%,emergy yield ratio (EYR ) of lower than 4, environmental loading ratio (ELR) of higher than 2 and environmental sustainability index (ESI) of lower than 1 are classified as unsustainable systems. In cow breeding systems, renewability changes between 0.42% and 15.9%. In case of sheep, this change is between 1.69 % and 12.1%. The main factor affecting renewability of cow systems is how much of the feed is grown by the farmer. As the integration level of cow rearing and feed crop cultivation systems (feed crops are fertilized with animal manure) increase, renewability of cow rearing increases. The same inclination is also true for sheep rearing, as the portion of farmer grown feed or grazing increases, sheep rearing systems become more renewable. EYR changes between 1.10 and 1.26 in cow breeding systems. In case of sheep, this change is between 1.02 and 1.17. System renewability and EYR go hand in hand. As renewability increases, system EYR also increases. Here, again how much of the feed is grown by the farmer and level of integration of cow rearing and feed crop cultivation systems are the determining factors that increase EYR value (preferred). For sheep cases as the portion of farmer grown feed or grazing increases, sheep rearing EYR also increases. Environmental investment ratio (EIR) that shows system fragility due to high dependence on external inputs changes between 5.36 and 197 in cow breeding. In case of sheep, this change is between 5.91 and 13.7. For EIR, dominance of purchased animal feed is the main reason behind high EIR values both for cow and sheep breeding. Environmental sustainability index (ESI) changes between 0.01 and 0.24 in cow cases. In case of sheep, this change is between 0.02 and 0.16. ESI is the ratio of EYR to ELR, hence it represents production per environmental loading. Low ESI values obtained both for cow and sheep breeding show that all of the animal breeding systems analyzed are unsustainable. All animal breeding systems studied in this work has renewability lower than 20%, ELR higher than 2 and ESI lower than 1. Consequently, they are found to be unsustainable. Purchased animal feed is determined to be the main factor behind the systems' unsustainability. Integration of animal breeding systems with feed crop cultivation and increasing the ratio of farmer grown food in diets of animals can enhance sustainability performance of animal breeding systems.

**Keywords**: emergy analysis, system renewability, environmental loading, sustainable animal husbandry, system integration

# FIELD PERFORMANCE OF TUBER YIELD AND QUALITY CHARACTERISTICS IN POTATO BREEDING LINES

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## ABSTRACT

Potato is an essential crop of global importance for its food security role. Field evaluation of breeding lines gives breeders the opportunity to identify genotypes with consumer-desirable traits and quality. The present study evaluated the yield and quality performance of 9 advanced potato breeding lines and three standard cultivars. The study was conducted in a randomized complete block design with 4 replications. The field study was conducted for two potato-growing seasons at Nigde Omer Halisdemir University's experimental area, located in Nigde, Türkiye following standard agronomical practices. There was no statistically significant difference between the years for all the parameters. Among the genotypes, there were significant variations ($P< 0.05$) for all the traits except the marketable tuber ratio ($P>0.05$). Genotype MEC17011.17 was the most yielding, whereas Agria was the least yielding. For tuber number per plant, MEC17078.06 and Alegria exhibited higher and lower tuber numbers per plant respectively. MEC17011.17 had the highest DMC while MEC17024.02 exhibited the lowest DMC. On the other hand, genotypes MEC17011.03 and Alegria respectively recorded the highest and lowest specific gravity. Very high correlations were found between yield and quality traits. Low correlation associations were observed between yield and quality traits. The high correlation associations among yield traits and quality traits indicate that these traits are controlled by the same genetic factor separately. The correlation association among yield traits and quality traits suggests that these traits are controlled by different multigenic characters. MEC17011.03, MEC17011.17, and MEC17011.18 exhibited superior yield, higher tuber number per plant, high dry matter contents, and higher specific gravity, and have been identified as genotypes with consumer-desirable yield and quality traits.

**Keywords**: Potato, yield, quality, breeding line

# EVALUATING THE ETHNOCLIMATOLOGICAL KNOWLEDGE AND ITS APPLICATIONS FOR MITTIGATION OF CLIMATE CHANGE IMPACT ON THE UVA HIGH GROWN ORGANIC TEA ECOSYSTEM IN SRI LANKA

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## ABSTRACT

The organic tea cultivation sector is confronted with significant challenges due to the adverse effects of climate change, necessitating the urgent implementation of effective adaptation strategies. Ethno-climatology, an interdisciplinary field, focusing on understanding how diverse cultures and communities perceive, adapt to, and interact with the climate and weather patterns in their environment. This study aims to evaluate the extent of ethno-climatology knowledge among organic tea farmers in the Uva High Grown region and examine their implementation of adaptation measures to address climate change challenges. Utilizing a cross-sectional and exploratory research design, this study employed a diverse data collection method, including interviews, questionnaires, in-depth interviews, focus group discussions, expert consultations, field observations, and surveys, to ensure a comprehensive and multifaceted approach to data gathering. These methodological approaches facilitated the collection of valuable insights into farmers' awareness levels and their adoption of mitigation practices. Subsequently, the collected data were analyzed to discern the farmers' knowledge and implementation of adaptation measures in response to climate change challenges. The findings revealed a substantial majority of farmers displaying a notable level of awareness regarding ethno-climatology, with scores exceeding 75%. Additionally, approximately 37 farmers demonstrated a high level of awareness, scoring above 85%. These findings indicate a promising trend of increasing awareness among farmers. Multiple regression analysis was employed to identify independent variables that significantly influence farmers' awareness of ethno-climatology, explaining a substantial 96.2% of the observed variance in the dependent variable. Correlation analysis further revealed that factors such as age, experience, and practical knowledge, experience, observations, personal beliefs, and cultural practices played pivotal roles in shaping farmers' awareness and comprehension of ethno-climatology. Conversely, variables such as education level and the number of information sources exhibited weak or non-significant relationships with awareness levels in the specific field of ethno-climatology. The perception of the organic farming community, as revealed by this research, offers valuable insights into the current status of ethno-climatology knowledge and the adoption of adaptation measures within the organic tea ecosystem. In conclusion, this study emphasizes the importance of implementing effective adaptation strategies in the organic tea cultivation sector in the Uva High Grown region, given the challenges posed by climate change. The findings contribute valuable insights into the current state of ethno-climatology knowledge among organic tea farmers and informs the implementation of adaptation measures. This research supports sustainable practices within the organic tea ecosystem and aids policymakers and stakeholders with a basis for developing effective strategies to address climate change impacts.

**Keywords**: climate change; ethno-climatology; organic tea farmers; awareness levels; adaptation measures

# EXPLORING THE FACTORS INFLUENCING EFFECTIVENESS OF ORGANIC TEA FARMER ORGANIZATIONS: A CASE STUDY RELATED TO THE SUPPLY CHAIN OF THE MARGINALIZED ORGANIC PRODUCERS ASSOCIATION IN SRI LANKA

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## ABSTRACT

The organic tea industry in Sri Lanka has witnessed remarkable growth owing to the increasing demand for organic products. However, ensuring sustainability of organic farming system amidst the current economic crisis scenario becomes challenges. This study aims to assess the factors that influence the effectiveness of Marginalized Organic Producers Model for the sustainability of agribusiness supply chain of Bio Foods (Pvt) Ltd, by employing a qualitative approach for examining farmers' perceptions. The study evaluates farmers' perceptions on the effectiveness through an index score encompassing satisfaction, relativeness, impact, efficiency, and sustainability. Data on socio-economic status, environmental sustainability, institutional involvement, farmers' compliance, and economic viability were collected by administrating a field survey and focus group discussions conducted among bio tea farmers attached to green tea leaves supply chain of Avonleahill Organic & Biodynamic Tea factory in Diyathalawa, Sri Lanka. The questionnaire instrument was validated by pretesting and applying reliability and normality tests. To establish relationships among variables, descriptive statistics, correlation analysis, and regression analysis were conducted. The results of the reliability analysis indicated that the survey instrument used in this study demonstrated acceptable levels of reliability, with Cronbach's alpha coefficients exceeding 0.8 for all variables confirming collected data were consistent and reliable for further analysis. Correlation analysis revealed significant positive relationships between variables such as educational status, experience in the organic tea farming, environmental sustainability, institutional involvement, compliance of farmers, and economic viability with farmer satisfaction about the organization. Conversely, age and gender showed weak negative relationships with farmer satisfaction. The regression model for the effectiveness demonstrated a strong relationship between the predictors and the dependent variable. The model accounted for approximately 88.6% of the variance in qualitative effectiveness, as indicated by the high adjusted R-squared value of 0.871. The overall model was statistically significant, as evidenced by the significant F-change statistic ($F = 61.946$, $p < 0.001$), suggesting that at least one predictor significantly influenced the qualitative effectiveness. The Durbin-Watson value of 1.606 confirmed the absence of substantial autocorrelation in the residuals, meeting the assumption of independence. The findings of this study provide valuable insights into the factors that contribute to the qualitative effectiveness of organic tea farmer organizations. These insights can inform policymakers, organizations, and farmers in developing strategies to enhance the effectiveness and success of these organizations, ultimately leading to the growth and sustainability of the organic tea industry in Sri Lanka.

**Keywords**: organic tea, farmer organizations, qualitative effectiveness, biodynamic

# EVALUATION OF ORGANIC CROP PRODUCTION EFFICIENCY IN TURKEY WITH DATA ENVELOPMENT ANALYSIS

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## ABSTRACT

Due to rapid population growth worldwide, the usage rate of chemical and genetic inputs in agricultural production has significantly increased in order to achieve high yields. Consequently, the adverse effects of these chemicals and genetic inputs on human health and the natural environment have begun to emerge. In order to mitigate these negative effects, the approach of organic farming has emerged and is increasingly gaining importance in the present day. Similar to global trends, developments in science, technology, and industry in Turkey, coupled with changing rural development and production practices, have transformed the manner in which agricultural activities are conducted. The adoption of new production methods has led to environmental degradation and impacts on human health, prompting both producers and consumers to shift towards organic farming. This study aims to examine the development of organic crop production, which is one of the sub-fields of organic agriculture, by using Data Envelopment Analysis (DEA) to assess Turkey's organic crop farming efficiency between 2002 and 2022. Relevant years have been considered as Decision Making Units (DMUs), with organic agricultural area (hectares) and the number of farmers (number) as inputs, and the number of products (number) and production amount (tons) as outputs. According to the Charnes, Cooper, and Rhodes (CCR) model, the years 2002, 2008, 2011, 2016, and 2022 were found to be efficient, while the other years were classified as inefficient DMUs. The Super Efficiency (SE) model was utilized to rank the efficient DMUs.

**Keywords**: organic agriculture, organic crop production, data envelopment analysis, efficiency

# DETERMINANTS OF SRI LANKA'S EXPORTS OF DESICCATED COCONUT AND COPRA: A TIME-SERIES ANALYSIS

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## ABSTRACT

The coconut and coconut-based products sector contributes significantly to foreign exchange earnings by providing a diverse range of products to the global market. In 2020, Sri Lanka's total export earnings from coconut products were USD 664.58 million. Desiccated coconut and copra are two of the major products of the coconut processing industry in Sri Lanka. Given its significant role in the Sri Lankan export sector, it is important to determine the trade potential between Sri Lanka and its trading partners. The objectives of this study were therefore to analyze the factors determining Sri Lanka's exports of DC and copra employing dynamic time series models and to empirically examine the short-run and long–run relationship of exports of DC and copra. Annual time series data for the period of 1989-2019 extracted from the publications of the Coconut Development Authority and the Central Bank of Sri Lanka, were used for the analysis. The Augmented Dickey-Fuller (ADF) unit root test confirmed that the explanatory variables are a mix of both I(0) and I(1). The ARDL bound testing procedure was employed to test for cointegration relationships followed by the Unrestricted Error Correction Model (UECM) approach to obtain consistent short-run and long-run estimates in a single equation framework. The bound test provided evidence of a significant cointegration relationship between variables. According to the long-run results of the DC, the previous year's export volume, production and exchange rate significantly affect the exports of DC at 5%, 10% and 5% respectively. The results revealed that in the long-run of Copra, the previous year's export volume, production, real GDP and exchange rate positively and significantly affect the exports of Copra at 1%, 5%, 1%, and 5% significant levels respectively. As in the long run, the significant factors in the short run were also identified. These findings are crucial for trade analysts and policymakers in formulating policies that enhance DC and copra export of the country.

**Keywords**: bound testing, export supply, long-run, short-run, unrestricted error correction model

# ASSESSMENT OF THE ECONOMIC EFFECTIVENESS OF THE USE OF BIOSTIMULANTS IN SPRING RAPE

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## ABSTRACT

The use of biostimulants in agriculture is a significant challenge for achieving the EU's Green Deal objectives. The use of a biostimulant could increase the yield of a particular crop, but not necessarily increase the profit of the farm as a whole. This study aims to evaluate the economic efficiency of the application of biostimulants in spring rape. An optimization model based on linear programming is applied. The analyzes of the scientific team are based on the hypothesis that it is possible to apply a given biostimulator to significantly increase the yield of spring rape per unit area, but not to increase the profit of the agricultural holding as a whole. Therefore, the usefulness of biostimulants is established in the development of optimization of the production structure of a selected agricultural holding. The research team accepts that those biostimulants that increase the economic efficiency of the farm are considered useful. It was derived conclusions. The present study was carried out with the financial support of the Project "Use of biostimulators in biological cultivation of agricultural crops - evaluation of the contribution to the bioeconomy", financed by Contract No. KP-06-H46/6 of 27.11.2020 from Nauch. Scientific Research Fund of the Ministry of Education and Science.

**Keywords**: economic effectiveness, biostimulants, spring rape

# EFFECT OF FOLIAR TREATMENT WITH BIOSTIMULANTS ON GROWTH AND PRODUCTIVITY IN OATS

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## ABSTRACT

In modern technologies of plant production, oriented towards environmentally friendly practices, guaranteeing healthy production and stabilization of yields, the application of biostimulants is a promising prospect. The conducted research presents results on the influence of different categories of biostimulants on the growth, biometric indices, physicochemical characteristics of grain and yield in oat variety Alexi. For 2 harvest years, field experiments have been done, according to the randomly assessed block design, with plot size of 10 m2 and 4 replications per variant. The effect of foliar treatment with biostimulants developed on the basis of chitosan, vermicompost extract and naturally-identical growth regulator was tested. The obtained results found that the studied treatments had a different strength of positive impact on biometric indicators and yield depending on the type of stimulant and the harvest year. For stimulants based on vermicompost and chitosan, doses ensuring a sustainable positive effect during the two harvest years have been identified.

**Keywords**: oat, vermicompost extract, chitosan, foliar treatments, biometrics, yield

# THE EFFECTS OF STREW MULCH IN THE LOW IMPUT CULTIVATION OF TWO PARSLEY VARIETIES (PETROSELINUM CRISPUM (Mill.) Fuss)

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## ABSTRACT

Leafy parsley (*Petroselinum crispum* (Mill.) Fuss) is an aromatic herb from the Apiaceae family, widely used in culinary, cosmetic, and pharmaceutical applications. It is distributed across all continents and is one of the oldest herbs used as a spice in food, with its leaves commonly utilized in fresh, frozen, or dried forms. Organic mulch is applied in the ecological cultivation of parsley to protect, maintain, and improve soil quality, as well as to reduce weed growth and erosion. The study was conducted on two parsley varieties, 'Domaći lišćar' as flat-leaf parsley and 'Moos curled', as curly parsley. The field experiment was carried out in the region of Pamići in Istria, on red soil with shallow to moderately deep depth and low to moderate rockiness. Organic mulch, in the form of straw, was applied in a 10 cm thick layer between the rows of parsley plants. The research investigated the effects of straw mulching on yield components and leaf quality, including vitamin C, chlorophyll, carotenoids, and the content of essential oil in the leaves of both parsley varieties. Initially, straw mulching slowed down the growth of parsley, but ultimately resulted in increased fresh herb yield. It was observed that straw mulching affected leaf quality, as the parsley leaves contained more water compared to those from the non-mulched control plots. There was a tendency of reduced vitamin C and pigment content, while the content of essential oil remained unchanged.

**Keywords**: leafy parsley, ecological cultivation, strew mulch, yield, quality

# IMPACT OF DIFFERENT WEED MANAGEMENT METHODS ON THE SOIL BACTERIAL DIVERSITY IN SAGE

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## ABSTRACT

The soil microorganisms, which play crucial role in soil fertility and crop productivity, is influenced by the agricultural practices. The weed management methods, as part of agricultural practices, may affect bacterial diversity. The aim of this study was to determine the impact of chemical and nonchemical weed management methods on soil bacterial diversity in Anatolian sage (*Salvia fruticosa* Mill.). The chemical management methods consisted of three pre-emergence soil applied herbicides (oxyfluorfen, pendimethalin and metribuzin) while, non-chemical management methods including hand weedling, mulching and flaming. The soil samples were taken from the surface to the root area before the harvest of the sage. A total of 173 endophyte and epiphyte bacterial isolates were obtained from soil samples. The bacterial diversity was higher in the soil of the weedy-check (without management) than in the soil with weed management applied. The chemical management methods have reduced the bacterial diversity in the soil compared to the non-chemical management methods. Among the non-chemical weed management methods, the flaming application was the one that caused the least decrease in soil bacterial diversity. These findings emphasize the importance of considering the potential effects of different weed management approaches on soil bacterial communities to promote sustainable agriculture and maintain soil health. Further research in this area could provide valuable insights for developing more environmentally-friendly and effective weed management strategies while preserving soil bacterial diversity.

**Keywords**: weed management, bacterial diversity, endophyte, epiphyte

# BIOCHEMICAL PROPERTIES OF SOME MINOR FRUIT SPECIES GROWN IN ALTINORDU (ORDU)

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## ABSTRACT

This study, carried out in Altınordu district of Ordu province in 2022, aimed to determine the biochemical contents of the minor fruits of persimmon (*Diospyros kaki* Thunb.), autumn olive (*Elaeagnus umbellata* Thunb.*)*, jujube (*Ziziphus jujuba* Mill.), and medlar (*Mespilus germanica* L.) species grown in the region. Within the scope of the study, total phenolic, total flavonoid, and total antioxidant activities (according to DPPH and FRAP assays) were determined in fruit. In the study, statistically significant differences were found between the species in terms of total phenolic, total flavonoid, DPPH and FRAP at p≤ 0.05 level. According to the research findings, total phenolics varied between 2440 mg kg-1 (Medlar, large fruity)-8275 mg kg-1 (Persimmon), total flavonoids 878 mg kg-1 (Medlar, large fruity)-3855 mg kg-1 (Persimmon), and antioxidant activity between 1187 µmol kg-1 (Medlar, large fruity)-23980 µmol kg-1 (Persimmon) according to the DPPH test, and 8329 µmol kg-1 (Autumn olive)-47999 µmol kg-1 (Persimmon) according to the FRAP test. It was observed that the species examined in the study were generally rich in biochemical contents. In addition, as a result of the study, it can be stated that persimmon, which has the highest values in terms of total phenolics, total flavonoid and antioxidant activity, comes to the fore.

**Keywords**: Total phenolics, total flavonoids, DPPH, FRAP

# TRICHODERMA ATROVIRIDE STRAIN TR58-INDUCED DISEASE RESISTANCE IN STRAWBERRY (FRAGARIA X ANANASSA DUCH.) AGAINST SOIL PATHOGENS

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## ABSTRACT

Plants exist within a dynamic and intricate environment characterized by ongoing interactions with both biotic factors and abiotic factors. These factors exert detrimental effects on plant growth and development, resulting in oxidative stress and ultimately leading to crop losses. Among the biotic stressors, soil-borne pathogens represent a significant threat, exacerbating the overall negative impact. In response to pathogen attacks, plants employ a combination of biochemical and molecular mechanisms to mount defense responses. Moreover, Trichoderma species are also very highly effective in suppressing plant diseases. The beneficial effects of *Trichoderma atroviride* on plant health involve its antagonistic activity against various pathogenic fungi and its ability to stimulate the defense system in plants. However, there are many gaps in the physiological, biochemical, and molecular changes related to Trichoderma-induced defense responses providing resistance in plants. In this study, we aimed to explore the potential alleviative role of a new isolate *T. atroviride* TR58 in mitigating the detrimental impacts of soil pathogen infections on strawberry plants. To investigate this, strawberry plants were pre-treated with *Trichoderma atroviride* TR58 and subsequently exposed to *Fusarium oxyporum*, *Rhizoctonia solani* and *Macrophomina phaseolina* infections. We assessed the effects of *T. atroviride* TR58 on lipid peroxidation, H2O2 content, the activities of cell wall peroxidase and the expression of MYB30 and PRI (pathogen-related gene) genes in the leaves of strawberry plants, as indicators of the alleviation of *F. oxyporum*, *R. solani* and *M. phaseolina* infections. Compared to untreated seedlings, Trichoderma-pretreated seedlings exhibited reduced lipid peroxidation and $H_2O_2$ accumulation when subjected to soil pathogen infection. The response of Trichoderma-pretreated and untreated plants to soil pathogen infection differed in terms of the CWPOX activity. Treated seedlings displayed significantly higher activity of CWPOX, under all soil pathogen infection. Moreover, T. atroviride TR58 pretreatment caused a significant increase in the expressions of MYB30 and PRI genes in the leaves of all strawberry plants when exposed to *F. oxyporum*, *R. solani* and *M. phaseolina* attacks. These findings suggest that the inoculation of *T. atroviride* TR58 has the potential to mitigate the detrimental consequences of soil pathogen such as *F. oxyporum*, *R. solani* and *M. phaseolina*.

**Keywords**: Biotic stress, Rhizoctonia solani, Fusarium oxyporum, Macrophomina phaseolina, Trichoderma atroviride, Strawberry

# WHEAT BIOFORTIFICATION IN TURKEY: CURRENT STATUS, CHALLENGES, AND PROMISING OPPORTUNITIES

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## ABSTRACT

Wheat biofortification is a promising strategy to address nutrient deficiencies and improve nutrition security in Turkey. This comprehensive review analyzes the current status, challenges, and opportunities in wheat biofortification. The findings demonstrate the potential of biofortified wheat varieties in delivering essential micronutrients to vulnerable populations, thereby improving public health outcomes. Interdisciplinary collaborations among researchers, breeders, policymakers, and farmers are crucial to develop and disseminate locally tailored biofortified wheat varieties. Optimization of breeding strategies ensures high nutritional quality, yield potential, and agronomic suitability across diverse regions of Turkey. Farmer engagement, capacity building, and knowledge dissemination through extension services are essential to promote awareness and acceptance of biofortified wheat. Active involvement of farmers in the development and evaluation process, along with training programs and knowledge exchange, facilitates widespread adoption. Additionally, integrating biofortification with sustainable agricultural practices and crop management techniques enhances the nutritional value and climate resilience of wheat production systems. Overall, this review emphasizes the significance of wheat biofortification as a solution to nutrient deficiencies, highlighting the importance of interdisciplinary collaborations, farmer engagement, and sustainable approaches.

**Keywords**: wheat biofortification, nutrient deficiencies, nutrition security, interdisciplinary collaborations, farmer engagement

# INNOVATIVE IRRIGATION MANAGEMENT IN AEROBIC RICE CULTIVATION: A COMPREHENSIVE REVIEW OF TECHNOLOGIES AND PRACTICES

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## ABSTRACT

Aerobic rice cultivation has gained recognition as a promising approach for sustainable agriculture. This review paper provides a comprehensive assessment of innovative irrigation management in aerobic rice cultivation, focusing on technologies and practices that optimize water use efficiency, enhance nutrient management, and promote sustainable crop production. The paper examines various aspects of aerobic rice systems, including water-saving strategies, integrated nutrient management, and the challenges in adopting these practices. The review highlights the significant role of innovative irrigation technologies in water conservation. Techniques such as drip irrigation, alternate wetting and drying (AWD), and precision irrigation have shown substantial water savings compared to traditional flooding. Studies have reported reductions in water consumption ranging from 30% to 50% through the adoption of these technologies, while maintaining or even improving crop yields. Furthermore, innovative irrigation management practices improve nutrient availability, uptake, and utilization. Proper irrigation scheduling based on crop water requirements and soil moisture monitoring optimizes nutrient uptake efficiency, leading to enhanced nitrogen, phosphorus, and potassium utilization. Despite the potential benefits, the adoption of innovative irrigation management practices faces challenges. Technical barriers, economic limitations, and policy-related constraints hinder widespread adoption. Farmers may lack knowledge and training in these technologies, and the initial investment and operational costs may pose financial challenges. Inadequate policy support and limited access to extension services further impede adoption. To overcome these challenges, the review suggests the need for capacity building programs, supportive policies, and collaborations among stakeholders.

**Keywords**: aerobic rice, innovative irrigation, water use efficiency, nutrient management, sustainable agriculture

# EVALUATION OF ORGANIC LIVESTOCK FARMING EFFICIENCY IN TURKEY WITH DATA ENVELOPMENT ANALYSIS

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## ABSTRACT

In recent times, consumers have been placing great importance on the consumption of healthy, high-quality, and safe food. Opting for organic products to protect human health and raise healthier generations has been increasing the significance of organic agriculture and livestock day by day. The primary objective of organic agriculture and livestock is to preserve the environment, plants, animals, and human health without polluting soil, water resources and compromising air quality. Organic livestock farming is a production method where chemical inputs are avoided, and all stages, from production to consumption, are controlled and certified. Residues of feed and additives used in industrial livestock farming leave significant traces in animal-based food products, causing significant health issues for consumers. Hence, an alternative organic livestock farming approach based on pasture and chemical-free feed is proposed, as it is a more environmentally and ethically sound production system. While plant-based organic production predominates organic agriculture in our country, significant advancements are also occurring in organic animal production due to an increase in demand. In this study, the efficiencies of organic livestock farming in the seven regions of Turkey were evaluated using Data Envelopment Analysis (DEA). The regions were considered as Decision Making Units (DMUs), with the inputs determined as the number of poultry, the number of small ruminants, the number of large ruminants, the number of beehives, and the number of farmers. As outputs, the amount of produced meat (tons), milk (tons), eggs (number), and honey (tons) were taken into account.

**Keywords**: organic livestock, organic livestock farming, data envelopment analysis, efficiency

# SEROLOGICAL ANALYSES OF VIRUSES PRESENCE ON TOMATO COLLECTION FROM THE GENE BANK OF THE REPUBLIC OF SRPSKA

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## ABSTRACT

Testing for virus presence on tomato (*Solanum lycopersicum* L.) collection from the Gene Bank of the Republic of Srpska was conducted during 2023 in greenhouse of the Institute of Genetic Resources. Thirty samples were taken and preliminary tested for presence of 3 viruses: TSWV (Tomato spotted wilt virus, Tospovirus), TBRV (Tomato black ring virus, Nepovirus), ToBRFV (Tomato brown rugose fruit virus, Tobamoviruses) with ELISA (Bioreba) test. Fourteen samples were positive for TSWV presence and negative for other two viruses. The previous investigations have been conducted on the presence of TSWV on conventional tomato varieties in the open field and in the greenhouse, but never on the tomato accessions from the Gene Bank that represent domesticated germplasm.

**Keywords**: TSWV, TBRV, ToBRFV, tomato, Gene Bank

# TOBACCO BREEDING FOR LEAVES AND YIELD

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## ABSTRACT

The aim of this work is to investigated the mode of inheritance for the number of the leaves per stalk, area of the leaves from the middle belt and yield of dry leaf mass per stalk, in four F1 tobacco hybrids obtained by crossing five varieties, four of which are Oriental in the role of mother and one Broadleaf as a father, in 2020 and 2021. The most common mode of inheritance for the first trait is negative dominance, for the second trait partial dominance and for the third trait intermediate. There is no heterosis. The best results for the size of the leaves from the middle belt and for the yield of dry mass gave P-76/86 x B-1/91. The obtained mode of inheritance is an indicator of good selection of individuals in future generations and quick fixation and stabilization of the traits. The four hybrid combinations represent very interesting starting material for tobacco breeding.

**Keywords**: *Nicotiana tobacum* L., hybrids, inheritance, F1 generation, quantitative traits

# THE EFFECTS OF DIFFERENT ROW SPACING ON AGRICULTURAL CHARACTERISTICS OF SAFFLOWER (*CARTHAMUS TINCTORIUS* L.) GROWN IN DRY CONDITIONS

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## ABSTRACT

This research was carried out to determine the effect of different row spacing on agricultural characteristics of some safflower cultivars under Ölmezler District in Konya Province dried conditions during the safflower vegetation period of 2022 (April-August). As used material to three different safflower varieties (Göktürk, Olein, Servetağa) were used for different row spacing (20 cm, 30 cm, 40 cm). In all these applications, the distance intra-row was kept constant to 10 cm. The experimental design was "Randomized Complete Block Design in Split Plots" with three replications. In the study, row spacings were placed in main plots and varieties were placed in sub-plots for ease of application. Seed yield, plant height, first branch height, branch number, head number were examined and significant interactions were noted among all evaluated parameters for row spacings × varieties. When the average values were taken into consideration, the highest seed yield was found in 30 cmxGöktürk as 138.6 kg da-1. When looking at the average of row spacings × varieties; there were determined between that the number of plant height was 65.7-87.7 cm, first branch height was 54.0-72.9 cm, the number of branch per plant was 5.3-6.9 pieces, the number of table per plant was 8.1-15.0 pieces, seed yield 83.3-138.1 kg da-1. As a result, Göktürk variety showed more advantageous results than the other varieties in Konya Province dried conditions, and 30 cm row spacing was the most appropriate row spacing.

**Keywords**: Safflower, *Carthamus tinctorius* L., row space, yield, agricultural characteristics

# USING DATA FROM THE SENTINEL-2 SATELLITE TO IDENTIFY DIFFERENCES IN WHEAT CROP DEVELOPMENT FROM ORGANIC EINKORN

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## ABSTRACT

The study was conducted during the 2020-2021 agricultural year in the area of Byala Reka village, Parvomai municipality, in central southern Bulgaria. The study was conducted in an organically certified einkorn production field of 13.6 ha. To determine the phenology of the crop, the BBCH scale was used. Ground data were collected in phases BBCH 29, 45 and 75. In the BBCH 29 phase, three pixels with different Normalized Difference Vegetation Index (NDVI) values (NDVI of 0.86, 0.74 and 0.63 respectively) were identified within the field. The EOS Crop-monitoring platform was used to generate the NDVI image. The pixels are 20 × 20 m2 in size, and in each of them a permanent test site with dimensions of 10 × 10 m2 was organized. The four corners of each test site were marked on the field with markers and their GPS coordinates were measured. From these four permanent markers, during the phenological phases BBCH 29, 45 and 75, all plants were taken from plot with size 0.50 × 0.50 m2. The einkorn plants in the plots were first counted, weighed, dried and weighed again (dry matter). The weeds were also counted and weighed (fresh and dry weight). The obtained values are recalculated to 1 m2 by multiplying by four. EOS Crop-monitoring (EOS Data Analytics inc., CA, USA) is a specialized platform for agricultural crop monitoring that uses data from the Sentinel-2 satellite. The *.kmz file created in Google Earth is imported into it, and a file with the name of the field is created in it. After creating the field vector files, the corresponding field to be surveyed is selected and after its appearance on the screen, the date of sowing and the date of harvesting, respectively, are entered. The function for generating NDVI is set in the system. After calculating the NDVI, the function is set to calculate the percentage area distribution of each NDVI value in the surveyed field. The resulting images are saved in *.TIF files. Images for each of the phenophases studied are downloaded from the adjacent image timeline. To establish statistically reliable influences of the studied factors and differences between the tested variants, a multifactor analysis of variance was applied. The data were recorded and processed with the statistical package SAS JMP Statistical Software, in which a Fit Model analysis was performed to statistically prove the differences. In conclusion, it can be summarized that the field with einkorn organic production has a heterogeneous composition of plants and weeds, in different proportions depending on the differences in sowing and the phase of development of einkorn. Based on the NDVI values at BBCH 29, it was identified differences in crop condition from areas with high yield potential to weaker areas. The yield obtained and the values of the productivity elements follow the established differences across the development phases from BBCH 29-75. Statistical processing of the data proves that differences in sowing existed. This suggests that vegetation indices can be generated and studied from Sentinel-2 satellite data to describe the state of the crop as the ground measured weight values describe it.

**Keywords**: remote sensing, satellite data, Santinel-2 data, organic farming, einkorn

# DISTRIBUTION OF PHYTONEMUS PALLIDUS FRAGARIAE (ACARI: TARSONEMIDAE) ON THE DIFFERENT SURFACES AND PARTS OF THE DIFFERENT AGE LEAVES OF ALBION, MONTEREY AND SAN ANDREAS STRAWBERRY CULTIVARS

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## ABSTRACT

Strawberry, *Fragaria x ananassa* (Rosaceae) is one of the most economically important berry fruits worldwide. *Phytonemus pallidus fragariae* (Acari: Trombidiformes: Tarsonemidae) also known as the strawberry mite is a serious pest in the strawberry farm. This study aimed to determine the distribution of *P. p. fragariae* on the young folded, middle-aged and old (fully developed) leaves, as well as the upper and lower surface of the leaves and their different parts (apex), middle, lateral, base). The research was carried out on the greenhouse-grown Albion, Monterey and San Andreas strawberry cultivars. Once per week for 8 weeks, 30 leaves were collected from different leaf age groups of each cultivar in 2023 (May-July). A total of 720 leaves (80 folded, 80 middle-aged and 80 old leaves from each strawberry cultivar) were examined during the study. The egg, larva, nymph (quiescent), adult female and males of *P. p. fragariae* on different surfaces and parts of leaves in each age group were separately counted under a stereomicroscope (Leica DM 2500). Results showed that, *P. p. fragariae* preferred young-folded leaves of Albion, Monterey and San Andreas strawberry cultivars (77.6%, 79.5%, 82.3%, respectively) rather than their middle-aged leaves (22.4%, 20.5%, 17.7%, respectively). No mites were found on the old-fully-developed leaves during the study. The lower leaf surface of each strawberry cultivar was generally much more preferable than the upper leaf surface in both leaf age groups**.** Additionally, *P. p. fragariae* was mainly found at the base of the leaves compared to the other parts of the leaves.

**Keywords**: Fragaria x ananassa, leaf infestation, preference, strawberry mite, young folded leaves

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# PHYTOSANITARY PRACTICES AND OPERATOR EXPOSURE LEVELS

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## ABSTRACT

Terrestrial ecosystems are polluted by pesticide residues due to intensive use of phytosanitary products, mainly on cereal crops. In order to assess the level of exposure of farmers to pesticides and to estimate their potential impact on human health, we carried out a 14-month survey in the wilaya of Khenchela on phytosanitary practices among 368 farmers, including the commune of Remila among 63 farmers (17.11% of farmers). This enabled us to collect data on the phytosanitary practices of farmers in the region through a questionnaire and observations used to estimate risks via the use of mathematical models. We listed the majority of registered pesticides, and calculated a toxicity risk index for each active ingredient, taking into account both acute and chronic toxicity. Several cases of exceedance of the exposure limits set by legislation reflect the anomalies in the phytosanitary practices of these farmers, most of whom neglect to wear PPE during the preparation of the spray mixture and the application of the treatment.

**Keywords**: Phytosanitary treatment, risk assessment, exposure, active ingredient, Remila.

# THE EFFECT OF SEWAGE SLUDGE UTILIZATION ON FORAGE CROPS CULTIVATION

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## ABSTRACT

Sewage sludge is the name given to the wastes that arise as a result of the processes in solid waste facilities, which are in liquid or semi-solid form and at the same time contain many beneficial microorganisms. The amount of sewage sludge generated in Turkey is estimated to be 1.38 million tons and this rate continues to increase day by day. Various researches have been carried out for many years on the utilization of sewage sludge generated in settlements. The most emphasized issue is the disposal of treatment sludge by giving it to the soil. Thus, it both contributes to the soil and provides benefits to plant production as fertilizer. The use of sewage sludge in agriculture has also started to be applied in the field of forage crops production. This application area is quite new for our country's agriculture. In this article, the presence of sewage sludge in Turkey and its use in forage crops agriculture are discussed.

**Keywords**: sewage sludge, forage crops, fertilizer

# IMPACT OF THE HYDROCHEMICAL PROPERTIES OF THE GROUNDWATER RESOURCE ON THE HYDRO-AGRONOMIC DEVELOPMENT IN THE GHRISS PLAIN IN ALGERIA

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## ABSTRACT

The availability of water resources in dry areas is crucial for socioeconomic development in general and agricultural activities in particular. This resource is the primary one for personal, agricultural, and industrial applications in the Ghriss plain. The factors determining the activities to be promoted are determined by its quality.In recent years, many sources of pollution (urbanization, industry, livestock, wild dumps, etc.) have multiplied in the region without any environmental protection measures threatening the future of local populations, adding to this the degradation of the environment through intense agricultural practices causing soil erosion, the siltation of hill reservoirs and the enrichment of surface water by silt drained by water erosion favoring the reduction of water infiltration in the plains, which led to a massive preference and irrigation with groundwater. Extensive pumping has caused serious quantitative and qualitative problems in the aquifer, the suitability of the water for irrigation as well as the pollution by nitrates are assessed,it appears that the gradient of salinity increases from East to West, this salinity is defined by the chemical elements incorporated in the fertilizers used in agriculture (calcium, magnesium, potassium and sodium).This trend is supported by the gradient of nitrate pollution which also increases from east to west, which refloats the anthropogenic and agricultural nature of the pollution. This western part of the Ghriss plain in Algeria with high agricultural potential is fragile and vulnerable,it requires in-depth studies in the social-hydro-agro-climatic field, endowing more than climatic disturbances only accentuate the risks and degradation of the environment and the socio-economic quality for life of local populations.

**Keywords**: Groundwater, Pollution, Hydro-Agricultural, Algeria

# REGRESSION ANALYSIS BETWEEN AGRICULTURAL PRODUCTS AND ATMOSPHERIC CONDITIONS

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## ABSTRACT

Number of factors effects agricultural products. Controlling some of them can be relatively easy for instance irrigation is possible if water available or you can improve the quality of soil by supplying appropriate minerals and/or fertilizers. On the other hand, farming threatened by several uncontrollable issues. Atmospheric conditions are one of these tough issues that consists of many parameters such as temperature, wind and air content. In this paper, outcomes of atmospheric issues studied to understand effects to farming. Satellite-based observations utilized in evaluations. Paper presents regression between agriculture and different parameters of atmosphere. Analysis utilizes Copernicus Atmosphere Monitoring Service, Climate Change Service and EUMETSAT.

**Keywords**: Threatening issues of agriculture, Satellite-based atmospheric analysis, Climate change.

# ASSESSMENT OF TURKEY'S PROVINCES IN TERMS OF GOOD AGRICULTURAL PRACTICES WITH DEA AND WASPAS

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## ABSTRACT

Today, with the rapid increase in the global population, food security and the sustainability of agriculture are becoming increasingly important. However, considering the adverse effects of traditional farming practices on ecosystems and natural resources, the concept of good agricultural practices is gaining significance over time. Good agriculture can be defined as an environmentally friendly, socially just, and economically sustainable farming model. It encompasses various agricultural practices and emphasizes the balance among soil, water, plants, animals, and workers, while prioritizing the conservation of the environment and natural resources. In this context, controlled use of chemical fertilizers and pesticides, as well as the preference for organic fertilizers, are fundamental steps to preserve the health of soil and water resources. The importance of good agriculture goes beyond the preservation of natural resources and the balance of ecosystems. It also supports the production of healthy and nutritious food and aims to leave a sustainable environment for future generations. Good agricultural practices contribute to long-term food security by enhancing soil productivity and increasing efficiency in the agricultural sector. In this study, the efficiencies of 70 provinces that implemented good agricultural practices in Turkey in 2022 have been examined by Data Envelopment Analysis (DEA). When considering the provinces as Decision-Making Units (DMUs), we selected the inputs as "the number of producers" and "cultivated area (ha)", and the output as the "production quantity (kg)". Furthermore, using similar criteria, we also ranked the same provinces through the Weighted Aggregated Sum Product Assessment (WASPAS) method, one of the Multiple-Criteria Decision Making (MCDM) approaches, and compared the results.

**Keywords**: Good agricultural practices, Data envelopment analysis, Multi-criteria decision making, WASPAS

# COMPARATIVE EVALUATION OF WINTER WHEAT CULTIVARS FOR QUANTITATIVE AND QUALITATIVE TRAITS in BURSA, TÜRKİYE

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## ABSTRACT

Climate change and more recently the conflict between Russia and Ukraine have directly affected the wheat supply chain. Various climate models project that wheat productin could decrease due to climate change. Higher grain yield and better quality grain production requires the use of appropriate wheat cultivars. Yield components and quality traits of four winter wheat cultivars were studied in Karacabey region in Bursa, Türkiye during the 2021-22 and 2022-23 production seasons. In each year, the experiment was conducted in two different production areas. One is in a randomized block design with three replications and the other one is 400decar production field (1600 decar total production field) and total production, quality and yield components were determined. Belongs to the breeders of the cultivars; Hamza and Mihelca resistant to leaf rust,. LG59 is resistant to drought and rust, and Masaccio is resistant to lodging. Seven different agronomic characters (plant height, spike lenght, spikelet number per spike, grain number per spike, grain weight per spike, 1000 grains weight and grain yield) and four different quality characters (protein content, gluten, sedimentation and hectoliter) were measured. The four cultivars differed significantly in all agronomic and qualitative traits. Similarly, signficant differences were found in protein content, gluten, zeleyn sedimentation and for hectoliter. The results from this study indicated the four cultivars diferend in yield and quality . LG 59 and Hamza were found to be suitable for Karacabey/Bursa growing conditions followed by Michelca. Mihelca was found to be resistant to leaf rust during the both production year more than the other cultivars. Mihelca performed better under heavly rainy after sun shinig seasons as like on May and June of 2021-22 and 2022-23 . Mihelca can be more useful cultivars fort he resistans, high yield and quality.

**Keywords**: wheat production, climate change, wheat quality

# DIAGNOSIS OF WEED PLANT DIVERSITY IN AGROSYSTEMS: CASE OF WHEAT FIELDS IN SOUK-AHRAS (NORTHEASTERN ALGERIA)

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## ABSTRACT

The study of weed plant in the cereal agrosystems of the Souk-Ahras region (northeastern Algeria), based on 100 floristic records, distributed over the entire study area so as to take into account the variability of ecological and agronomic factors, made it possible to inventory 112 weed species spread over 22 botanical families. The quantitative analysis of the identified weeds revealed a significant specific richness. We noted the dominance of the Asteraceae (27%), Poaceae (14.5%), Apiaceae (13%) and Fabaceae (11%) families; they alone determine 45% of weed species, i.e. 66% of the total specific number. The biological type shows that annuals dominate (61%) compared to perennials (35%) and biennials (4%). Dicotyledonous are dominant with 95 species while monocotyledonous have 16 species. The results obtained were processed by ecological indices of composition and structure. The comparison of the average density of the total weed of the study region with that of the culture in the whole of the study region, shows the superiority of the latter, of which the majority of the species inventoried are accessory and regular species. This strong infestation can be explained by the strong adaptation, the strong competitive and colonizing power of these species, especially in the absence of competitors, their emergence which takes place as soon as the cereal germinates and also by the absence and lack of control of chemical treatments. Biodiversity diagnostic of weeds in the agroecosytems studies constitute a main tool of integrated pest management and favouring the most environmentally friendly practices for the protection and enhancement of agricultural biodiversity.

**Keywords**: weeds, cereal agrosystems, specific richness, Souk-Ahras, Algeria

# GERMINATION METHODS AND APPLICATIONS IN GIANT NETTLE (Girardinia diversifolia)

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## ABSTRACT

The Giant Nettle, scientifically known as *Girardinia diversifolia* L., originates from Asia and the Himalayas. It belongs to the Urticaceae family and is also known as "Himalayan Nettle" or "Nepal Nettle." Naturally, it can be found in the Himalayan Mountains, as well as in regions of Nepal, Bhutan, India, China, and Tibet. Besides its high-quality fibers, the plant's leaves are used for medicinal purposes. The chemical compounds found in the leaves are believed to have anti-inflammatory, analgesic, and antipyretic (fever-reducing) effects. Traditionally, the dried and powdered leaves are used in teas, meals, and ointments. The height of the plant can reach around 2-3 meters. Its seeds are quite small, and their germination success rate is relatively low. In this study, pre-germination treatments are planned to be used to increase the yield and optimize the germination success rate. The factors used in the study are different salt (NaCl) concentrations (12.5, 25, 37.5mM), +20°C and -20°C temperatures, pre-treatments with 1% Hydrochloric acid (HCl) and 70% Ethyl alcohol (C2H5OH) for 5 minutes. The study investigates the effects of these factors on germination, as well as the growth of the hypocotyl and epicotyl, and explores the correlations between the parameters. The most effective germination and epicotyl length were obtained from a salt concentration of 12.5 mM and a temperature of +20°C. Significant and highly significant correlations were found among the parameters.

**Keywords**: Girardinia diversifolia, Germination, Fibre crops, Gıant nettle

# USE AND APPLICATIONS OF CURRENT BIOTECHNOLOGICAL CULTIVATION METHODS IN HEMP(*CANNABIS SATIVA*)

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## ABSTRACT

Hemp (*Cannabis sativa*) is an industrial plant with a deep-rooted history and a wide range of applications. Through biotechnology, the synthesis and extraction of active compounds from hemp have been developed, providing various treatment options in the medical field. Additionally, hemp is utilized in approximately 60 different industries, including cosmetics, textiles, food, paper, bioenergy, and biocomposites. Industrial hemp varieties have been developed with low THC (tetrahydrocannabinol) content. Biotechnological methods are of significant importance for preserving and developing new hemp varieties with desired characteristics. Using these methods, purposes such as micropropagation, optimization, material conservation, production, and breeding are served in hemp. In this study, biotechnological research conducted with hemp in recent years has been examined from a broad perspective.

**Keywords**: Hemp, Genotype, In vitro culture, Biotechnological methods

# EVOLUTION OF AMPELOGRAPHIC TECHNIQUES FOR CHARACTERIZATION BETWEEN VINE GRAPE VARIETIES

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## ABSTRACT

Viticulture has a long history. The species, Vitis vinifera includes thousands of varieties with similarities, hence the birth of a discipline called ampelography whose objective is to distinguish and identify the different grape varieties. The characterization of vine varieties by ampelography was based on description using morphological characters called descriptors concerning the organs of the plant (vegetative, floral, and fruit), each parameter is codified for a single universal language established by the International Vine Office OIV. The application of this visual and subjective method on many individuals is quite difficult and takes years. The morphological description was supplemented by ampelometric studies by carrying out measurements of interest mainly to the adult leaf, these measurements are combined with advanced statistics for differentiation between varieties. The influence of environmental factors severely limited these methods, forcing laboratory studies with biochemical internal markers, such as isoenzymes, polyphenols, flavonoids, proteins, and carbohydrates. To use the most precise tools, genome sequencing projects become the techniques of choice; especially with high-multiplication technologies; for the search for relationships between varieties. However, the application of these techniques had the disadvantage of expensive cost, the dependence on laboratory techniques and products. Despite the high precision of these biochemical and molecular methods, ampelographers have subsequently used technological means such as electronic imaging, artificial intelligence, and machine learning due to the large amount of data that these tools can contain and the large number of samples that can be studied. This makes it possible to structure the information in the form of ampelographic data banks that lead to the construction of computerized identification systems and to use them in an updated way. An ampelographer will obviously be able to couple several methods, to highlight the discrimination between similar varieties.

**Keywords**: vine varieties, ampelography, characterization

# DETERMINATION OF SUSCEPTIBILITY LEVELS OF SOME PLANT PATHOGEN BACTERIA TO COPPER HYDROXIDE

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## ABSTRACT

Since there is no bactericide against bacterial diseases in agricultural areas, it is very difficult to control of bacterial diseases.. Copper preparations in the protective fungicides group are widely used against diseases caused by plant pathogenic bacteria. Copper-resistant bacterial isolates may develop as a result of long-term and continuous use of copper compounds. In this study, it was aimed to determine the susceptibility levels of *Pseudomonas syringae* pv. *tomato* (*Pst*), *Clavibacter michiganensis* subsp. *michiganensis* (*Cmm*), *Xanthomonas arboricola* pv. *juglandis* (*Xaj*) and *Xanthomonas euvesicatoria* (*Xe*) to copper hydroxide. Sucrose peptone agar medium was used in the study, which was carried out as a Petri experiment *in vitro*. Media sterilized in autoclave at 121 °C for 20 minutes. When the medium were at 40 °C, it was adjusted to 30, 100, 150 and 300 ppm doses by adding copper hydroxide. As control, media was used without copper hydroxide. The prepared media were poured into petri dishes with a diameter of 90 mm. Bacterial suspensions prepared at a density of 1x10-6 cfu/ml were spread on the media. Then, the petri dishes were incubated at 27 °C for 2 days and bacterial growth was examined at the end of the incubation period. The experiment was designed with 5 petri dishes for each bacterium in each application and was repeated twice. As a result of evaluation, all of the bacteria grew in the medium with 30 ppm dose and tested bacteria showed resistance to 30 ppm copper hydroxide. It was observed that *Pst*, *Xaj* and *Xe* isolates were sensitive to copper hydroxide at 100, 150 and 300 ppm, and *Cmm* isolate was sensitive to copper hydroxide at 150 and 300 ppm. As a result, it will be important to test the susceptibility obtained in the petri test at the plant and the obtain the isolates used from the areas with intense copper application in order to obtain more effective results.

**Keywords**: Resistance, copper hydroxide, plant pathogenic bacteria

# IMPACT OF THE TREE OF HEAVEN COMPOST ON WEED GERMINATION AND EMERGENCE

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## ABSTRACT

The tree of heaven is native to Southeast Asia and considered an invasive alien plant. It is used in many regions of the world as a windbreaker or ornamental plant because it can vigorously grow and create strong roots and stems. In this scope of the project, the usability of plant biomass as the raw material in various compost types was investigated. The compost treatments were composed of the biomass of the plant, biomass of the plant+chicken manure, and biomass of the plant+cattle manure. Weed seeds in the mixtures were kept for 7, 14, 21 and 28 days, and the effect of these durations on the viability of the seeds was determined by a 28-day petri experiment. The number of decayed weed seeds in the compost changed depending on the time, but this difference was not statistically significant. The impact of compost containing 2.5, 5, 7.5 and 10 cm thick heaven on weed emergence as mulch material was investigated in a study conducted in a climate-controlled room. As the mulch thickness increased, the number of weeds emerging on the compost decreased, and mulch cover of at least 5 cm thickness should be used for weed control. This study was supported by the Bilecik Şeyh Edebali University Coordinatorship of Scientific Research Projects Commission. Project Number: 2021-01.BŞEÜ.06-01

**Keywords**: Ailanthus altissima, compost, weed control, manure, germination, emergence

# THE EFFECTS OF SAMPLE HAZELNUT ORCHARD PRACTICES ON PRODUCTIVITY: TRABZON PROVINCE, THE CASE OF ARSIN DISTRICT

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## ABSTRACT

In this study, it is aimed to emphasize the importance of agricultural practices carried out by the chambers of agriculture under the name of "sample hazelnut garden" in terms of yield and to compare them with the practices of farmers who produce hazelnuts using traditional methods. In order to achieve this goal, farmers who have a sample garden registered with the chamber of agriculture were interviewed using the full counting method, information was obtained about their gardens from agricultural engineers within the chamber of agriculture, and this information was supported by various survey results and photos. For example, pruning methods, fertilization methods, weed control and maintenance practices were examined on behalf of hazelnut garden applications, and it was investigated which application was made for what. In particular, it was emphasized that one of the biggest problems of hazelnut orchards in Turkey is that they are old and the vast majority of them should at least be subjected to rejuvenation pruning. From the information obtained through the survey from the sample hazelnut orchard owners, it has been determined that the hazelnut productivity is quite high compared to the average of Turkey. As a result of the research, it has been determined that farmers are satisfied with the sample hazelnut orchard applications. It has been determined that the average hazelnut yield of enterprises with sample hazelnut orchards is quite high compared to the general average of the research region. For this reason, it is recommended to support the dissemination of sample hazelnut gardening practices in order to increase the average hazelnut yield throughout the region. It may be recommended to increase the sensitivity of competent authorities such as the Ministry of Agriculture and Forestry on hazelnuts, and in particular to disseminate such practices, agricultural publication activities may be increased in the region.

**Keywords**: Example hazelnut orchard, yield, Trabzon, Türkiye.

# TRABZON PROVINCE TEA PRODUCTION COST AND PROFITABILITY ANALYSIS

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## ABSTRACT

Turkey ranks 4th in the world in tea production in 2020. All of Turkey's tea production is in the Eastern Black Sea Region; It is carried out in the provinces of Rize, Trabzon, Giresun, Artvin and Ordu. 20.46% of Turkey's total tea production in 2022 is produced in Trabzon. For the research area, Sürmene, Of and Araklı districts of Trabzon province were preferred. This study was carried out in order to examine the current situation of tea production in Trabzon and to reveal the costs and profitability of tea garden establishments within the scope of tea production. The necessary information for the research was obtained from 99 tea growers in the province of Trabzon, Sürmene, Of and Araklı districts, in February and March 2023. In the study, in order to determine the tea production costs, the data of the physical input use and the transactions for the production year of 2022-2023 were obtained and the single budget approach was used. In the study, at the end of the 3-year tea garden establishment period, the total cost of the tea garden establishment was determined as 42967.32 TL/da. The average gross production value of the enterprises was determined as 15104.92 TL/da, gross profit 3191.48 TL/da, and net profit -3025.28 TL/da. When we proportion the gross production value to the total costs, the relative profit is found to be 0.83. The fact that the relative profit is below 1 TL indicates that there is no excessive profit in tea cultivation. It is concluded that tea production activity is not a profitable production branch in most enterprises. However, it should be noted that the net profit figures also include nominal costs such as interest on variable costs, general administrative expenses, and land capital interest. According to the results of the survey, it is seen that women do this job more in tea production. The reason for the lower proportion of men in the tea harvest in the region is that they tend to work in another sector that will bring more and continuous economic income. Although tea production continues, the income from tea has ceased to be the main source of income for most businesses, and tea production has become a family profession. As a result, tea production is an important source of income for the local people. For this reason, the tea price announced by the state should be determined to satisfy the producer and the support premium should be increased.

**Keywords**: Tea production, Tea Garden Establishment Cost, Cost Analysis, Profitability Analysis, Trabzon

# ASSESSING THE IMPACT OF IRRIGATION WATER SALINITY ON MINERAL COMPOSITION IN DIFFERENT PART OF TOMATO

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## ABSTRACT

This study aimed to determine the effects of different irrigation water salinity on the mineral contents (nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), and sulfur (S)) in the leaves, stems, fruits, and roots of tomato plants at the end of the growing period. The research was conducted in two growing seasons between March 2021 - July 2021 and September 2021 - February 2022 under greenhouse conditions. In this study, a randomized block experimental design was used to examine the effects of three different levels of saline irrigation water (EC=0.7-control, 2.5, and 5.0 dS m-1). The result showed that the effects of saline irrigation water differed in both growing seasons. The different salinity levels of irrigation water significantly affected the mineral content of leaves, particularly N ($p<0.01$), K ($p<0.05$), Mg ($p<0.05$), and S ($p<0.05$); the roots, particularly K ($p<0.05$) and Ca ($p<0.05$); and stems, particularly N ($p<0.05$), K ($p<0.01$), and Mg ($p<0.01$), during the fall season. On the other hand, there were no significant differences in the fruit during the fall season. In the spring season, different salinity treatments resulted in significant variations in leaf P ($p<0.05$), K ($p<0.01$), Mg ($p<0.05$), and S ($p<0.001$) contents, fruit N ($p<0.01$), Ca ($p<0.001$), and Mg ($p<0.05$) contents, root Ca ($p<0.001$), and stem S ($p<0.01$) contents. When both growing periods were considered, the differences in mineral content of tomato plants with an increase in salt concentration were in the form of a decrease in N, K, Ca, and P content and an increase in Mg and S content.

**Keywords**: Abiotic stress, ECi, greenhouse, salinity stress

# CLIMATE CHANGE EFFECT ON THE BUD BREAK AND FLOWERING DATES OF THE APPLE TREES IN MOUNTAINOUS AND PLAIN REGIONS OF ALGERIA

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## ABSTRACT

Global warming is a strongly felt reality in recent years in Algeria. The fruit trees crop is particularly exposed to the impact of this warming, especially apple trees. A comparative study has been realized between a chronological daily temperature series from 1980 to 2016, and phenological data series (budburst and flowering) from 2000 to 2016, regarding the apple tree variety of *Golden Delicious* in two zones of Northern Algeria, Sidi Lakhdar (town of Ain Defla, in an altitude of 211 m) and Benchicao (town of Médéa, in an altitude of 1133 m). Some contrasting tendencies according to sites and periods have been demonstrated: very significant warming at Sidi Lakhdar site in autumn and spring, in particular in October and April, disturbing thus the entrance of the buds in the endodormancy and ecodormancy. The result is a late action of the cold until February, which proved to be insufficient. However, no average warming has been demonstrated at the Benchicao site, where the temperatures between November and January were cold enough to satisfy the need of cold units and raise the endodormancy. It seems that the failure to fulfill the need of cold units at Sidi Lakhdar site has strongly affected the goodness of fit of the classic phenological models, confirming indirectly the existence of more complex physiological processes (not taken in consideration by models), which manifest themselves in limited zones such as Sidi Lakhdar site.

**Keywords**: Budburst, flowering, Golden delicious, modelling, temperature

# MONITORING OF THE BUDBURST KINETICS OF THE GOLDEN DELICIOUS VARIETY FLOWER BUDS UNDER THE EFFECT OF COLD WEATHER REQUIREMENTS IN TWO REGIONS WITH CONTRASTING CLIMATES IN ALGERIA

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## ABSTRACT

The climate variations currently felt could lead to a decrease in cold units, which would prevent fruit trees from meeting their cold needs and subsequently hinder the resumption of growth. Knowledge of the evolution of the inertia of buds and the characteristics of their bud burst is essential and constitutes a basis for understanding physiological determinism to better understand the action of climatic factors on the evolution of rest in order to be able to control it. It is in this context that our work fits, it is a follow-up study of the kinetics of bud burst in the laboratory of the flower buds of the apple tree, variety Golden Delicious during four successive years (2015/2016 to 2018/ 2019), in two regions of Algeria contrasted by their climate, Benchicao in Médéa (1133m) and Sidi Lakhdar (211m) in Ain Defla. The aim of this study is firstly to follow the spatiotemporal evolution of budburst with respect to cold and heat requirements accumulated over periods staggered over time, and secondly to try to determine the best formula for accounting for the quantities of cold and heat accumulated, which will be appropriate for the climate of each region. To this effect, quantities of cold and heat accumulated were calculated from daily hourly temperatures by recommended software (cold models; Weinberger, Utah, Dynamics and North Carolina and GDH heat model), for subsequent comparison. Two-year-old cuttings were taken during the autumn-winter period from two apple orchards were carried out and staggered from the end of November to the end of March, with the aim of extracting cuttings with isolated nodes for exposed to thermal forcing at the laboratory level, according to the isolated node test of (Nigond, 1967 and Crabbé, 1968). The results of the samples taken during the autumn-winter periods show that the values of mean time of budburst (TMD) in the region of Sidi Lakhdar proved to be high during all the years for all the samples taken at the combined positions of the flower buds compared to those of Benchicao region. With regard to the correlations between the TMDs and the different models for calculating cooling needs, the dynamic model is the most suitable for the climate of the two regions and for all the years studied.

**Keywords**: Apple tree, Golden Delicious, average bud burst, cold model, heat model

# A REVIEW ON TRENDS AND CASE STUDIES IN SMART AGRICULTURE

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## ABSTRACT

Smart agriculture is an approach that aims to increase efficiency, sustainability and profitability in agricultural production through the use of digital technologies in the agricultural sector. Smart agriculture applications include sensors, satellite and drone technology, artificial intelligence and machine learning. These technologies make farming operations more efficient, increasing productivity by getting more products and using fewer resources. Smart agriculture applications help increase the sustainability of the agricultural sector by using less water, fertilizer, and pesticides. These applications enable production at lower costs by reducing labour and energy costs; enable more crops with less water consumption by automating irrigation systems. Smart agriculture technologies optimize the use of chemicals according to the needs of the crops, resulting in less chemical use, monitoring the growth and health of crops, leading to better crop quality, and helping make better decisions by analyzing soil and plant analysis.These advantages are expected to make smart agriculture more widespread and the agricultural sector more sustainable in the future. This study discussed trends in smart agriculture (sensors, IoT, artificial intelligence, drone technology, etc.) and case studies.

**Keywords**: smart agriculture, IoT, AI, drone technology, VRT

# DETERMINATION OF SOME WILD PLANT SPECIES CONSUMED AS VEGETABLES IN FETHIYE (MUĞLA)

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## ABSTRACT

Some plants that spread spontaneously in nature and are not cultivated are important in terms of human nutrition and their contribution to the economy locally. There are many plant species that grow naturally in Fethiye and its surrounding vegetation and are considered vegetables. In this study, the plants considered vegetables, the general characteristics and consumption patterns of these plants were determined by conducting field studies in Fethiye and its surroundings. In the region, *Amaranthus retroflexus* L, *Asparagus acutifolius* L, *Chenopodium album* L, *Malva sylvestris* L, *Mentha longifolia* L, *Nasturdium officinale*, *Papaver rhoeas*, *Portulaca oleracea* L, *Rumex acetosella*, *Rumex crispus*, *Salicornia europes*, *Silene vulgaris* and *Urtica dioica* L are some of the plant species considered as vegetables. Seasonally, these plants are collected by the public, mostly in the spring, they are sold in the markets and consumed. Some of these plants are dried, frozen, canned, but most of them are consumed raw.

**Keywords**: Fethiye, vegetable, wild plants, types of consuming.

# DRY SEED CHARACTERISTICS OF LOCAL PEA LINES SUITABLE FOR CENTRAL BLACK SEA REGION CONDITIONS

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## ABSTRACT

Pea is a plant originating from the geography in which our country is located. It's widely cultivated and used in developed world countries but not attracting much attention in agricultural production in Turkiye. This study was carried out because we think it is necessary to develop local varieties of pea, which we consider an important plant, considering the compatibility of its ecological demands with the conditions of our region and the type of agricultural production. In the study, 30 lines and 6 control varieties, which we have selected from local materials for many years, were grown in 4 different locations (Amasya, Gelemen, Atakum, Tokat) and 2 sowing times (winter and early spring) in 8 experiments, in Augmented Design with 3 replications. Agro-morphological measurements were carried out at fresh pod and dry seed harvest times. However, only dry seed properties will be given in this article. As a result of the analysis of variance, it was determined that height, number of pods, dry seed yield and 100 seed weight were statistically affected by the genotype, location, sowing time and interactions of locationXgenotype, locationXgenotypeXtime. The average plant height of the control cultivars used ranged from 46.6-127.7 cm, and the genotypes ranged between 38.8-179 cm. While the number of pods was 22.4, the average of all trials, this value was higher (26.1) in the control cultivars. The average hundred seed weight was determined as 19.73 g in all lines and 20.98 g in control varieties. The average dry seed yield of the control cultivars used was 267.1 kg in all environments, and lines exceeding this value were found among the genotypes. In the evaluation of the dry seed characteristics, it was concluded that the B6, B40, B15, B18, B17, B32 lines came to the fore. It has been concluded that winter sowing is more appropriate in terms of both the data and early leaving the land and then allowing to sow the second crop in regional conditions.

**Keywords**: Pea, sowing time, genotype, dry yield

# AGROHOMEOPATIC REMEDIES EFFECT OF BEAN (Phaseolus vulgaris L.) SEED INSECTS (BRUCHUS)

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## ABSTRACT

It is a natural treatment method based on the principle of treatment homoeopathy. Homoeopathy was developed by the German doctor Hahnemann. The use of homoeopathic principles and remedies in controlling plant diseases, pests and damages is called agro-homoeopathy. Agrohomeopathy is a safe, chemical-free, permanent and effective treatment method in natural, organic, and biodynamic agriculture. Beans are an essential raw material of Turkish cuisine. Bean is a susceptible plant in the legume family in terms of both diseases and seed pests. Especially in dry grain cultivation, Bruchus (seed beetles) can cause very significant damage to the use of grain as food or seed. This study aimed to investigate the possibilities of controlling seed beetles with the agro-homoeopathy method in beans. For this reason, 2 different remedies (Bruchus-C30, Bruchus-D12) prepared from Bruchus collected from beans grown in Samsun conditions, 4 remedies, Sulfur-C200, All-C, and control plots, 5 treatments, 3 replications, were included in the study in a randomized block design. Zülbiye variety was used in the experiment and, each plot consisted of 4 rows planted on 13 May 2022 with 50 cm row spacing. Remedies were applied 3 times when the plants started to bloom. After the harvest and threshing in September, the samples taken from each parcel were stored in 2 different environments (glass jar and plastic bottle) for 6 months, closed for 3 months, the lids were opened and the tulle was placed on the cover of the container and they stored in room conditions. Insect observations in the samples were made when it was time to plant beans in 2023. According to the results of the analyses of the morphological characteristics of the plants (height, number of pods, biological yield, grain yield) were not find statistic differences. For insects stored in two different environments, the number of insect-bearing in a hundred seeds, the number of holes in the medium, the maximum number of holes in a single seed, and the percentage of perforated seeds in total were determined. It has been determined that there is a statistical difference between storages, and storage in plastic media gives fewer insect numbers. It has been determined that the percentage of insect grains varies between 4.6-29.3% and the maximum number of holes in a single grain varies between 1.6-9 in the remedies used. Interpretation and conclusion of all features together are not yet complete.

**Keywords**: agrohomeopaty, bruchus, bean

# L-DOPA CONTENT OF BROAD BEAN (Vicia faba L.) GROWING IN DIFFERENT WEED DENSITY

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## ABSTRACT

Due to plants cannot relocate, they adopt allelopathy as a survival strategy when environmental conditions are unfavourable. This ecological phenomenon consists of releasing chemical compounds into the environment that can positively or negatively affect the growth and development of neighbouring plants. One of these chemicals is L-Dopa (L-3,4-dihydroxyphenylalanine), which is not an amino acid and is mostly in mucuna and broad bean plants. Weeds are an important problem in regions like Samsun, where winters and springs are rainy and warm. However, the broad bean has less weed density than other plants. This study was planned to determine the relationship of this situation with the L-Dopa production feature of broad beans. In the experiment, Lara variety, 5 different treatments (weedless control, weed control, 1 time hoe, 2 times hoe, 3 times hoe) were used in a randomized block design with 3 replications. Sowing was done on November 3, 2022, with 50 cm row spacing. One week after the last hoeing (April 4, 2023), samples were taken from the roots and stem parts of the plants for L-Dopa analysis. Both fresh pod and dry seed observations were made in the plots. In the observations, weeds belonging to other families (*Veronica sp, Scandix pecten-veneris, Lupinus sp, Cirsium arvense, Fumaria officinalis* etc.) were more common than grasses. It has been determined that the plant height is 99-131 cm, and it is the longest in weed control. The fresh pod yield was between 5186-7504 kg per decare, and the highest was obtained from the weedless control, the dry seed yield was between 375.9-481.5 kg, and the highest in hoeing 3 times. L-Dopa analyses are not yet complete.

**Keywords**: Broad bean, weed density, L-Dopa

# EFFECT OF TRIBOLIUM CONFUSUM'S TOXICATION INFESTATION ON AVENA SATIVA FOR HUMAN AND ANIMAL NUTRITION

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## ABSTRACT

*Avena sativa*, commonly known as oats, is a cereal grain that belongs to the family Poaceae and is grown for its edible seeds. Oats are a popular food worldwide and are commonly consumed as oatmeal or used in baked goods, granola, and other foods. Oats are rich in nutrients such as fiber, protein, vitamins, and minerals. They are particularly high in beta-glucan, a type of soluble fiber that has been shown to lower cholesterol levels and improve heart health. Oats also contain antioxidants, which can help protect against chronic diseases. In addition to their nutritional value, oats have been used in traditional medicine for their various health benefits. They are believed to have anti-inflammatory and anti-itching properties and may help improve skin health. Oats are also used as a natural remedy for anxiety, depression, and insomnia, but plant breeders have been working hard to incorporate resistance. The devastation caused by any one disease will depend upon the susceptibility of the variety being grown and the environmental conditions during disease development. Serious diseases of Oats include powdery mildew caused by Flour beetle (*Tribolium confusum*). The presence and adverse effects of certain toxic compounds in flour as a result of insect pest infestation during storage has been of growing international concern. Previous studies have indicated that flour extracted from Oats that has suffered infestation by insect pests such as *Tribolium confusum* could be affected in its nutritional, chemical and rheological characteristics. Fifty bowls, 2 kilogram, of flour were used filled with wheat flour 85 % extraction. A 40 larvae of *Tribolium confusum* were put into each bowl and 20 jars, for 2 months at 25 0C and 50% of relative humidity. At the end of this period, all samples were sieved to recover the insects and then analyzed. Mutagenic and Carcinogenic compounds, increased by the rate of 28831.187 and 28.82% compared to 1.4687 and 3.09% for the uninfected samples, respectively.

**Keywords**: Avena sativa, Insects' infestation, Flour beetles, Mutagenic and Carcinogenic

# THE MAJOR OILSEED CROPS OF TURKEY: A REVIEW

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## ABSTRACT

Soybean is the most cultivated and produced oilseed crop in the world (371.693.592 t). It is followed by cottonseed (73.736.194 t), rapeseed (71.333.434 t), sunflower (58.185.633 t) and groundnut (53.926.894 t) in 2021. The oilseed crops cultivated in Turkey are sunflower, cottonseed, groundnut, soybean, rapeseed, safflower, sesame, poppyseed, hempseed and linseed. However, the major oilseed crops of our country are sunflower, cottonseed, groundnut, soybean and rapeseed. According to 2022 data of Turkey, 4.75 million tons of oilseed crops were produced which 2.35 million tons were obtained from sunflower (for oil) and 1.65 million tons from cottonseed. Both crops account for almost 85% of our country's oilseed production. In Turkey, sunflower is produced mostly in Tekirdağ (335.561 t) and cottonseed is produced mostly in Şanlıurfa (661.716 t). Although Turkey is suitable for the production of oilseed crops in almost every region, it is still a major importer of oilseed crops. Our vegetable oil deficit is increasing year by year due to the lack of coherent agricultural planning for oilseed crop production. By developing planned and programmed strategies, our country will be able to become self-sufficient in major oilseed crops and export its surplus production. This review evaluates the production and potential of major oilseed crops and their role in oil production in Turkey.

**Keywords**: major oilseeds, sunflower, cottonseed, groundnut, soybean, rapeseed

# FUMIGANT TOXICITY OF DAPHNE ESSENTIAL OIL ON TWO-SPOTTED RED SPIDER MITE TETRANYCHUS URTICAE (ACARI: TETRANYCHIDAE)

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## ABSTRACT

*Tetranychus urticae* Koch (Acari: Tetranychidae) is a dominant species that causes many serious damages. Adults and nymphs damage the lower surface of the plant leaf by sucking sap. It is known to cause serious damage in all countries on the Mediterranean coastline. Generally, chemical control is preferred by the farmers in the control against pests. This harms human and environmental health. In this study, the effectiveness of daphne oil against *T. urticae* was investigated as an alternative to the chemical. The mite material was reared in the Bati Akdeniz Agricultural Research Institute (BATEM) climate chambers at 24 ± 2°C, 16 : 8h (light : dark) and 55 ± 5% relative humidity conditions. Fumigant effect trials were conducted in hermetically sealed glass desiccators. Petri dishes on which bean leaves were placed were placed in each desiccator and 25 adult female spider mites were placed in each petri dish. The study was carried out at four different doses (2, 4, 8 and 10 µl/l). Fumigation was continued for 12 hours, taking into account the application conditions. After 12 hours of fumigation, the cover of the desiccator was opened and dead-alive individual counts were made at 12th 24th 48th and 96th hours. At the end of the study, at the end of the 96th hour, it was determined that the dose of 10 µl/l was highly toxic on *T. urticae*. As a result, it was concluded that daphne oil can be used within the scope of integrated pest management (IPM) in the fight against *T. urticae*.

**Keywords**: daphne, essential oil, fumigant toxicity, Tetranychus urticae

# PAKISTAN AGRICULTURE OUTLOOK 2035: ANALYSIS AND WAY FORWARD

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## ABSTRACT

Pakistan is endowed with many natural resources and covers many ecological and climatic zones with diverse climates, geography, wildlife, arable land, and water, ranging from the Himalayas at an altitude of 8000 meters above sea level, with sea level to the southern coast of Gwadar. Pakistan is a semi-industrialized economy with a well-integrated agricultural sector. Agriculture contributes 22.9% to GDP and creates 37.4% jobs, ensuring food security and providing raw materials for industry. The total land area of Pakistan is 79.60 million hectares, the cultivated area is 24.16 million hectares, and the forest accounts for 3.92 million hectares, while 8.19 million hectares are arable land and 19.34 million hectares of land—irrigated cropland. An estimated 8.3 million farms (89%) have an area of less than 5 hectares, accounting for 48% of the national agricultural area. Livestock accounts for 62.68% of agriculture and 14.36% of GDP. Thus, growth in the production of wheat (5.4%), sugarcane (2.8%), and maize (6.9%) more than offset the negative growth of cotton (41.0%) and rice. (21.5%). If we look at agriculture in the past 10 years, the cultivation of wheat, rice, and maize has increased production, while the area and production of cotton and sugarcane decreased due to many factors. Cultivation of major crops, namely cotton, and rice, decreased by 41.0% and 21.5%, respectively, excluding maize and sugarcane. But it is interesting to note that three of the five major crops have reached the highest levels of production on record. The country has the largest contiguous irrigation system in the world. Pakistan can earn 200 billion dollars instead of a maximum of $31.55 billion in 2021 if the irrigation system in agriculture is managed and improving labor force efficiency. Significant development and expansion of agricultural production have taken place in recent decades; however, Pakistani agriculture is still far from reaching the potential output that the fertile and well-watered soil of the Indus irrigation system can produce compared with the yields of similar agricultural systems in the world, regional and global. Pakistan's overall agricultural growth rate is the lowest in the region. Agriculture transformation through cluster development can also help to improve productivity and supply chain efficiency. In short, the major instrument of agriculture policy must focus on commercialization, sustainability, and inclusive growth of all sectors through Iot based precision agriculture technologies, vertical farming, value chain management, and market integration.

**Keywords**: Pakistan, Agriculture, Climate change, Crop yield, Food transformation system, Trade

# DETERMINATION OF LOW TEMPERATURE RESISTANCE IN LOLIUM PERENNE L. GENOTYPES COLLECTED FROM HIGH ALTITUDE REGION

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## ABSTRACT

Perennial ryegrass (*Lolium perenne* L.) is an important species both as a forage plant and as a turfgrass. One of the most important reasons limiting the use of the plant is low temperatures. This research is planned to provide material for the breeding program to be started for low temperature resistance in perennial ryegrass. For this purpose, approximately 1000 clones of genotypes were collected from the high altitude regions of the Eastern Anatolia Region (Erzurum, Erzincan, Kars, Bayburt, Ardahan, Ağrı) in 2019. These clones were planted in Atatürk University Plant Production and Research Center experimental field and evaluated in terms of turfgrass and forage plant parameters for two years (2020 and 2021). Considering the two-year results, 46 turfgrass type and 62 forage type plants were selected from these genotypes. These selected plants were cloned and grown in viols in 2022 and subjected to cold resistance tests together with control cultivars. As a result of the test carried out in the growth chamber, the deaths of the genotypes from low temperature were between -1 oC and -15 oC. Forage type control variety (Lipresso) was completely damaged by cold at -9 oC, and 43 lines more resistant than this variety were determined. On the other hand, the control variety (Esquine), which is a turfgrass type, was frozen at -13 oC, and 5 lines were determined that were based on a lower temperature than the control variety. Studies should continue to develop new varieties related to these lines that are more resistant to low temperature than control varieties.

**Keywords**: Perennial ryegrass, genotypes, cold resistance

# EFFECT OF ANIMAL and PLANT BASED BIOSTIMULANT ON TOMATO SEEDLING

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## ABSTRACT

In this study, it is investigated that effect of animal and plant based biostimulant on tomato seedling. This research was made at greenhouses of United Genetics Seeds Co. Bursa/Turkiye in 2023. The Albeni® F1 (*Lycopersicon esculentum* L.) tomato used as vegatable materials. 25 days old seedlings were used as starting material. The control group was subjected to a routine feeding program, while the treatment group received the routine feeding program along with 250 mL of Orgastar and 250 mL of Orgaroot biostimulants applied in 100 L of water. The application process was repeated four times at 5-day intervals. At 40 days of age, the root length, root weight, shoot length, and shoot weight of seedlings in both groups were measured. At the conclusion of the investigation, the control group exhibited the following mean values for certain characteristics: root weight (0.476 g), root length (8.50 cm), shoot weight (0.765 g), and shoot length (11.82 cm). Conversely, in the treatment group where Orgastar and Orgaroot protein-based biostimulants were applied, the mean values for these characteristics were determined to be as follows: root weight (0.549 g), root length (8.42 cm), shoot weight (0.827 g), and shoot length (12.69 cm).Moreover, it was observed that the application of Orgastar and Orgaroot protein-based biostimulant significantly increased the root weight, shoot weight, and shoot length, as demonstrated by the findings of this study.

**Keywords**: Tomato, Animal Based Biostimulnat, Rooting, Seedling

# THE COMMUNICATION LEVEL WITH THE SOURCES OF AGRICULTURAL TECHNOLOGY INFORMATION BY FARMERS IN ZOMMAR REGION / NINEVEH GOVERNORATE / IRAQ

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## ABSTRACT

Aim of the current research is to know level of connection with sources of agricultural technological information and farmers of Zmmar district / governorate of Nineveh in general, define level of connection for farmers with agricultural technological information in every resource of connection in research, know the correlation between level of connection with agricultural technical information and independent variables of research. Place of research Zommar district – governorate of Nineveh. Limits: All (500) farmers of Zommar, (50) of which were simply randomly chosen as the sample to represent (10%). Tool a two-section questionnaire, first section included personal and social information about farmers (age, academic achievement, willingness to be farmer, area of cultivated land, nature of estate, and social life). The second included (20) sources of agricultural information and knowledge, specially connection with sources of agricultural technical information level of farmers with resources of agricultural technical information in Zommar district, generally speaking, is moderate with bias towards low . researcher concluded that farmers need to promote their connection level with their sources of agricultural information. Variables of ( age, academic achievement, willingness to be a farmer) play role in increasing communication of respondents with their sources of agricultural technical information.

**Keywords**: Sources, Technologies, information, communication, agriculture

# TOXICITY OF A NEONICOTINOID INSECTICIDE (THIAMETHOXAM) AGAINST THE ADULT FEMALES GAMBUSIA AFFINIS: IMPACT ON METRIC INDICES AND BIOMARKERS DURING A SEXUAL REST PERIOD

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## ABSTRACT

The contamination of water by insecticides is mainly due to intensive agriculture combined with surface runoff and subsurface drainage. Among these insecticides, Thiamethoxam (Actara 25 WG) is a second-generation neonicotinoid insecticide, which belongs to the subclass of thianicotinyl. The fish are particularly sensitive to pollution. Among the fish species used to evaluate the quality of freshwater systems, the mosquitofish, Gambusia affinis (Poeciliidae, Cyprinodontiformes). Therefore, the main goal of the present study is to investigate the effects of thiamethoxam on metric indexes and enzymatic activity of Glutathione S-transferase in adult females of a G. affinis after chronique exposure (28 days) at different concentrations (10, 20 and 40 mg $L^{-1}$) under laboratory conditions. Statistical analysis by the tukey test showed a significant increase in the enzymatic activity of GST on the 14th and 21st days and significant deacrease in the enzymatic activity of AchE from the first day of the treatmant; however, the results showed no significant differences in metric indexes (CF, GSI and HSI). We can deduce that the effect of Thiamitoxam is greater at the high concentration 40 mg $L^{-1}$ compared to the others and it can affect this non-target fish species.

**Keywords**: Thiamethoxam, Gamubias affinis, Metric indices, GST, AChE

# IMPACT OF ENVIRONMENTAL STRESS ON SHRIMP SPECIES: BIOLOGICAL AND BIOCHEMICAL ASPECTS

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## ABSTRACT

This work focuses on the morphological and biochemical characterisation of shrimps from the Gulf of Annaba to the National Park of El Kala in the state of El Taref (Eastern Algeria). This study was performed during spring and autumn of the years 2019-2021. It consists in assessing morphological variations, reproductive parameters and biochemical responses of some environmental biomarkers in shrimp populations. The analysis of the three species of shrimp (*Palaemon adspersus, Palaemon elegans, Atyaephyra desmaresti*) revealed a high correlation of the weight variables with the linear variables. These results demonstrated the contribution of linear parameters in inter-species differentiation while weight parameters contributed to intra-species differentiation. Thus, the growing process is similar in the analysed populations, except for rostrum malformations in *A. desmaresti* from Oubeira Lake, which are probably due to the bioaccumulation of pollutants. The abundance of shrimp depended on species, site and sex due to the effect of migration and environmental preferences. Furthermore, the results explain the phenotypic plasticity of the Palaemons and their high capacity to adapt to the environment compared to *A. desmaresti* which is more stable. Analysis of the biochemical responses of environmental stress biomarkers revealed an inhibition of specific AChE activity, an induction of GST, MTs and MDA, and a decrease in lipid levels. The biomarker response reflects neurotoxicity and induction of the detoxification system and oxidative stress in shrimp populations. Thus, the seasonal variation of enzymatic activities is linked to the qualitative and quantitative abundance of pollutants as well as to the physico-chemical parameters of the water that have an effect on their availability. The sum of the results shows that even sites far from pollution sources and classified as RAMSAR sites are also affected by pollution, and shrimps are sensitive species and excellent bio-indicators which reflect the quality of the environment.

**Keywords**: Hinda BERGHICHE, Asma AMEUR, Choukri BAROUR & Salima CHOUAHDA

# INVENTORY OF THE FRESHWATER CRUSTACEANS (CRUSTACEA) OF NORTH-EAST ALGERIA: TAXONOMY AND DISTRIBUTION.

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## ABSTRACT

Our study aimed the systematic inventory of freshwater crustaceans insampled in northeast Algeria: Tonga lake (site 1) located in El Kala National Park, Bird lake (site 2) is situated 44 km from Lake Tonga in a strictly agricultural region and El Kennar Lake (site 3) at Jijel, which is rich in floristic and faunistic diversity. Species were collected using the kick sampling (pond net with a mesh of 250 µm) during the period from may to december 2022. The identification was made according to Amoros (1984), and Rybak & Bledzki (2016). Then ecological indices were determined. The results obtained showed that a total of 4171 crustacean specimens were collected at the various study sites. These individuals have been divided into 11 species, subdivided into 7 genera and 5 families. Analysis of the crustaceans captured revealed that only 1.25% of the total fauna belonged to the Decapod class (*Atyaephyra desmaresti*). 2.66% belonged to the Ostracod class (Cypris sp), while the Copepod class (*Cyclops fuscus,* and Cyclops sp) accounted for 36.90%. The most abundant order was Cladocera (*Ceriodaphnia* sp, *Chydorus brevilabris*, *Daphnia atkinsoni*, *Daphnia magna*, *Daphnia pulex*, *Simocephalus expinosus*, and *Simocephalus vetulus*) which represented 59.19%. The results of the inventory of the freshwater crustacean fauna of eastern Algeria are very important for understanding the specific composition and distribution, as well as biomonitoring and the information that they provide about the overall state of these aquatic ecosystems in the region.

**Keywords**: Inventory, Crustaceans, Ecology, Water, Lakes, Algeria

# BIOMASS PRODUCTIVITY OF SALICORNIA EUROPAEA L. IN HYDROPONIC OF A PILOT INTEGRATED MULTI-TROPHIC AQUACULTURE SYSTEM OPERATED FULL-STRENGTH SEAWATER

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## ABSTRACT

This study investigated the biomass productivity of *Salicornia europaea* under different nutrient loading conditions of a pilot-scale saline aquaponic system. The system was operated with full-strength seawater between 38 and 40 ppt by supplying from the eastern Mediterranean Sea. The hydroponic unit based on the Deep-Water Culture technique was composed of 6 rectangular polyester tanks with a surface area of 1.5 m2 each. The planting density was 56 seedlings per m2. A water depth of 33 cm was provided supporting 1 m3/h hydraulic retention time while no nutrient addition was supplied. Triplicate hydroponic tanks were fed by aquaculture wastewater: outflows of protein skimmer (PSO) and biofilter (BFO). After 16 weeks of cultivation, the survival rate was calculated as 91.0 ± 4.6 % in PSO treatment and 86.5 ± 9.3 % in BFO treatment, without any significant difference. The higher average fresh weights of specimens (shoot + root) in PSO and BFO treatments were 11.1 ± 5.9 g/plant and 5.6 ± 2.1 g/plant, respectively. There was not a significant difference between PSO and BFO treatments (t=2.568, df=2.306, P=0.1077) in the fresh weight of roots while a significant difference in terms of shoot fresh weights was in the case (t=4.783 df=2.329, P=0.0302) with lower weights in BFO treatment. Although higher shoot/root (S/R) ratios were recorded in the plants grown in PSO treatment (25.2 ± 10.3), no significant difference in S/R ratio in the fresh plants between the two treatments was recorded (t=1.876, df=2.083, P=0.1964). The biomass production (shoot + root) was 557.8±231.7 g FW/m2 (72.1±24.4 g DW/m2) in PSO treatment and 262.0±92.5 g FW/m2 (35.9±10.6 g DW/m2) in BFO treatment. The nitrogen uptake was estimated as 0.34±0.12 g N/m2 in PSO treatment and 0.20±0.06 g N/m2 in BFO treatment while phosphorus uptake was 0.05±0.02 g P/m2 and 0.02±0.00 g P/m2, respectively. A relatively lower biomass production and nutrient uptake in the study than in general could probably be related to higher salinities and no macro- and micronutrient supplementation.

**Keywords**: Sea asparagus, saline aquaponics, productivity, nutrient uptake

# BIOLOGY OF THE BLUE CRAB CALLINECTES SAPIDUS -INVASIVE SPECIES NEWLY INTRODUCED IN ALGERIA-

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## ABSTRACT

The blue crab *Callinectes sapidus* Rathbun, 1896 is a coastal catadromous species included among the 100 worst invasive alien species in the Mediterranean Sea, this invertebrate can be found also in fresh water. The species is native to the Western Atlantic; recently, different scientific papers and communications reported its arrival in several places in Europe and has also been reported in other African Mediterranean countries in brackish and coastal waters. *C. sapidus* know no borders and was signaled in the Pacific Ocean. In Algeria, it was founded in the brackish water since 2019 and in fresh water in 2022. The purpose of this investigation is to explore the growth of this species by analyzing the growth parameters of 41 specimens captured during 8 months (November 2021 to June 2022). The correlation between the width and the weight of the specimens revealed a positive and negative allometry for males and females respectively. It is worth noting that there were also differences in the ratios that is in favor of females (78.05%).

**Keywords**: Calinectes sapidus, ecology, growth, Algeria

# GROWTH ASSESSMENT OF THE COMMON SOLE SOLEA SOLEA FISHED IN THE SOUTH WESTERN MEDITERRANEAN SEA

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## ABSTRACT

The Common Sole *Solea solea* is a flatfish native to the Mediterranean Sea and belonging to the Solenidae family. This species spends most of its time lying on shallow sandy bottoms. This species is very interesting for marine aquaculture because it is a species of great value with a great market. It is a relatively slow growing and demanding species relatively low stocking density. So far, very little attention has been paid to this species in Algeria; that is in fact why this study seeks to obtain data which will help to address these research gaps. Here, the biology of 51 specimens fished from the Algerian Mediterranean coasts, was examined between October 2022 and February 2023.What emerges from the results reported here is that the demographic structure of the *S. solea* population on the Mediterranean coast is made up of small individuals that grow faster than they put on weight. In addition, growth parameters estimated using the Von Bertalanffy equation are: $L\infty$ = 18.90cm; K= 1.02; to = -0.87.

**Keywords**: flatfish, growth, length frequency, Algeria

# THE DIVERSITY OF FISHERY TARGET SPECIES IN THE COASTAL ZONE IN FRONT OF PATOKU LAGOON, CAUGHT WITH FENCES

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## ABSTRACT

The Albanian coast of the Adriatic is generally low and flat, formed as a result of continuous and uninterrupted accumulation of solids from rivers. The main rivers of Albania flow on this coast, such as Vjosa, Semani, Shkumbini, Erzeni, Ishmi, Mati, Drini and Buna. Between the mouths of the rivers, on the shores of the Adriatic Sea, there are coastal lagoons, such as Narta, Karavasta, Patok, Viluni, etc. The study was carried out in the coastal area along the Patok lagoon. The data on caught species and the amount of caught fishes were collected periodically, in a series of 31 days from august to the end of September. The fish species were caught with two type of fences. Their sizes vary from fences with two fishing rooms measuring 19 x 9 m and a total area of 342 m², to fences with two fishing rooms measuring 21 x 11 m and a total area of 462 m². The number of fishermen employed was from 3-5 fishermen. The fences were located near the mouth of Mat River and near the channel connecting the sea with the lagoon at a depth of about 8-9 meters and at a distance of 3-4 km from the seashore. The average number of fishing days was relatively high at around 25 days per month. The qualitative evaluation of the fish species showed a number of species with relatively high economic value caught with fences, such as *Sphyraena sphyraena, Lichia amia, Sarda sarda, Loligo vulgaris, Pomatomus salttrix, Octopus vulgaris, Scomber scombrus, Solea solea, Dicentrarcus labrax, Mugil cephalus, Mullus barbatus, Belone belone, Dentex dentex, Sparus aurata*. CPUE values were between 0.59 kg fish/hour for the fences located near the mouth of Mat River to 0.95 Kg fish/hour for the fences near the channel connecting the sea with the lagoon.

**Keywords**: fences, CPUE, lagoon, target species

# THE INFLUENCE OF GRASS CARP ON THE SPECIES COMPOSITION AND BIOMASS OF PHYTOPLANKTON

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## ABSTRACT

The grass carp, brought from China, has been part of the ichthyofauna of the inland waters of Albania since the beginning of the 60s of the last century. The purpose of its introduction has been the cultivation in the polyculture system with other species of the carp family (*Cyprinidae*) for human consumption and the use of this species for the control and management of aquatic *macrophytes*. The tests to prove the influence of grass carp on the composition of phytoplankton were carried out in Experimental Didactic Center of Tapiza in two ponds with a surface area of 1000 m² and a water depth of 1.0-1.2 m, during a period of 12 months (April - March). The taxonomic study of phytoplankton showed that in both ponds, before grass carp introduction, the dominant groups were green algae (*Clorophyta*) and diatoms (*Bacillariophyta*). After the introduction of the grass carps in one of the test ponds, some changes were observed, which are mainly related to the shift of algae dominance. The average value of the concentration of *chlorophyll-a*, according to the tests carried out before grass carp introduction, was 10.92 mg/m³. The measurements performed after the introduction of grass carp in the pond showed that the average value of this indicator was 11.73 mg/m³. The increase of the *chlorophyll-a* concentration was also accompanied by the decrease of water transparency. Before the introduction of grass carp, the average value of water transparency was 43.4 cm, while after the introduction of the fish, the transparence value decreased to 32.8 cm.

**Keywords**: grass carp, phytoplankton abundance, polyculture

# CULTURAL ENERGY USE AND ENERGY USE EFFICIENCY OF PARTIAL HARVESTS OF EUROPEAN SEABASS AND MEAGRE IN EARTHEN POND AQUACULTURE

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## ABSTRACT

In this study, cultural energy (CE) use and energy use efficiency of four different partial harvests of European seabass and meagre aquaculture in earthen ponds with a flow-through water system in which well water was pumped were determined. European seabass with an initial stock weight of 17 g reached its highest weight of 1,512.19 g at the last harvest after **1**061 days, while meagre with an initial stock weight of 16.32 g reached its highest weight of **1**577.79 g at the last harvest after 633 days. Total CE expended values consisting of CE expended on consumed compound diet (CECD), CE expended on general management (CEGM), CE expended on transportation (CET), and CE expended on machinery, equipment, and construction (CEMEC) for each harvest were calculated according to the method suggested by Diken and Koknaroglu (2022) by considering the unit values in the literature reports. The total CE expended average value of European seabass increased from 15.21 Mcal per 1 kg of fish in the first harvest to 19.76 Mcal in the last harvest, while this value of the first harvest of meagre decreased from 12.83 Mcal to 11.01 Mcal in the third harvest. The average value of the last harvest increased to 12.91 Mcal kg-1. The CECD, CEGM, CET and CEMEC shares of all harvest averages were 37.78%, 60.69%, 0.16% and 1.37% for European seabass and 38.59%, 59.75%, 0.16% and 1.50% for meagre, respectively. The average shares of electricity in the production of European seabass and meagre in the CEGM were 98.17% and 98.04% respectively, while their shares in the general budget were 59.58% and 58.58%. The total average values of CECD and CEGM, which had the highest share in earthen pond aquaculture, were 17.24 Mcal kg-1(98.47%) for European seabass and 11.84 Mcal kg-1 (98.34%) for meagre. The average value of energy deposited in harvested fish during feeding increased from 2.50 Mcal kg-1 in the first harvest to 2.73 Mcal kg-1 in the last harvest in European seabass. The value of energy deposited in harvested fish during feeding was 1.58 Mcal kg-1 in meagre. While the average value of protein energy production efficiency in harvested fish (Mcal input/Mcal protein energy output) increased from 15.61 to 20.27 in European seabass, the value of 12.17 in the first harvest of meagre decreased to 10.44 in the third harvest. The last harvest value increased to 12.24. The mean value of CE energy use efficiency for harvested fish (Mcal input/Mcal output) increased from 6.08 to 7.25 in European seabass, while the value of 8.10 in the first harvest of meagre decreased to 6.95 in the third harvest. The value of the last harvest increased to 8.16. Since the cultivation period between the third harvest and the last harvest covered the winter period for a meagre, the decrease in the development rate due to the decreasing water temperature caused an increase in the last harvest values. This situation is a species-specific feature related to the decrease in feed intake in the face of decreasing water temperature. We strongly recommend to policymakers that cultural energy use and energy use efficiency, which are sustainability indicators of aquaculture, should be assessed on a species-specific basis in aquaculture.

**Keywords**: Mcal, Mcal input, Mcal output, Policymakers, Protein, Sustainability

# A RESEARCH ON GROWTH AND MEAT QUALITY PARAMETERS AND ECONOMIC CONVERSION RATES OF DIFFERENT FEEDING REGIMES APPLIED TO CULTURED LARGE RAINBOW TROUT IN NET CAGES IN THE BLACK SEA

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## ABSTRACT

This research aimed to evaluate the effects of fasting on specific quality parameters in large rainbow trout (*Onchorchynus mykiss*) with different feed regimes. The research was carried out in a commercial fish farm (SAGUN Aqua) in Sinop, Turkey's Black Sea region. The large rainbow trout (1045.12±43.51g body mass) were obtained from the Samsun-Bafra. Fish were produced in Sinop, Turkey's southern Black Sea in nine open sea cages under natural photoperiod between December 2018 and May 2019. Each cage contained approximately 16000 fish that were fed commercial diets (4.5–6mm pellets, BioMar-SAGUN). Three groups (3 replicates) were distributed into nine sea cages and fed two times a day: according to the feeding table (1% of fish weight) (R), 1 day feeding/1 day of starvation (D), 6 days feeding/1 days starvation (E) for 5months. At the end of the study, the best growth and feed conversion performance were obtained from E (3770.60±127.51g; 1.57±0.04) and R (3769.80±226.89g; 1.59±0.01) groups ($p<0.05$). The R group (17.43±0.01g/100g) in total amino acid values and E group (40.93±0.21%) in total polyunsaturated fatty acids were prominent ($p<0.05$). In terms of the economic conversion ratio, it was determined that the E group was statistically different from the other two groups. Consequently, based on fillet quality values, large rainbow trout (presented as Turkish salmon in the market) produced in the Black Sea, regardless of feeding regimes, are of good quality, nutritious, and healthful for human consumption.

**Keywords**: Onchorchynus mykiss, growth parameters, biochemical composition, amino acid, fatty acid, economic conversion rate

# RECENT OBSERVATIONS ON TURSIOPS TRUNCATUS (DELPHINIDAE) AT THE SEA-CAGE FISH FARMS IN THE TURKISH AEGEAN SEA

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## ABSTRACT

This paper reports on the recent observations on *Tursiops truncatus* displaying the opportunistic feeding behaviour at a sea-cage fish farm in the Aegean Sea. On 27 March 2022, at least ten specimens of *Tursiops truncatus* were observed during the SCUBA diving beneath a sea-cage of a fish farm in Gerence Bay, İzmir at a depth of about 60 m. The dolphins were taken by an underwater camera video. For details, we interviewed with diver as a staff of the fish farm. Occasionally, during the cleaning of the dead reared fish bag at the bottom of the sea-cage, bottlenose dolphins and bluefin tunas (*Thunnus thynnus*) are retrieved together around the diver. A part of dolphins and bluefin tunas seem to be cooperatively fishing. Then, bluefin tunas swim in the lower layer, while dolphins swim in the epi-layer. Namely, dolphins outperform in the race for grabbing bait versus tunas. Additionally, dolphins push wild fish into the cage net in a coordinated manner, and then, rip them out of the net and eat them one by one.

**Keywords**: Bottlenose dolphin, bluefin tuna, feeding behaviour, SCUBA, İzmir

# TESTING OF AN EXTRACT OF ARTHROSPIRA PLATENSIS (SPIRULINA ISOLATED FROM TAMANRASSET REGION) AGAINST SOME MICROBIAL ACTIVITIES.

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## ABSTRACT

The aim of this study is to evaluate the antimicrobial activity of the hydro-methanolic and hydro-ethanolic extract of spirulina isolated from tamarasset against six bacteria and three fungi. The antibacterial and antifungal activity was evaluated by the solid medium diffusion method on three Gram-positive bacteria (Bacillus subtilis, Staphylococcus aureus and Listeria monocytogenes) and four Gram-negative bacteria (Escherichia coli, Klebsiella pneumonia, Agrobacterium sp. and Pseudomonas aeruginosa), on three fungi (Aspergillus flavus, Penicillium sp. and Candida albicans). The ethanolic and methanolic extracts gave a good antibacterial activity and a notable inhibition with diameters varying from 10=0.58 to 27=1.73 mm. The ethanolic extract recorded a strong inhibition on Aspergillus flavus and intermediate on Penicillium sp. On the other hand, no activity was detected on Candida albicans. The methanolic extract gave an inhibitory effect against the fungal strain Aspergillus flavus while the Penicillium sp. was resistant.

**Keywords**: Spirulina, Extract, Antimicrobial activity, Inhibition

# MEASUREMENT OF MALONDIALDEHYDE (MDA) AND LIPIDS IN LARVIVOROUS FISH GAMBUSIA AFFINIS AT THREE SITES IN THE ANNABA AND EL TARF REGIONS

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## ABSTRACT

Among the most common aquatic organisms in rivers is the western mosquito fish Gambusia affinis, a species introduced into rivers worldwide as a mosquito control agent and used as an excellent bioindicator of environmental pollution for its resistance to different types of pollution. Our study aims to evaluate the impact of pollution on the population of a non-target organism G. affinis in the resting period (November), at three sites different by their level of exposure to polluting sources: Sidi Brahim and El Karma (Annaba) polluted sites compared to Oued Messida (El Kala) which is far from any kind of pollution. For this, we measured the level of lipids and malondialdehyde (MDA) in the gonads of adult males and females and the whole body of juveniles. This study shows significant variation between the measured parameters (lipids, MDA) at the three sites, the highest level of MDA observed at the Sidi Brahim site in males. While females have the highest level of lipids at the site Oued Messida. All these results reflect that the site of Sidi Brahim is the most affected by pollution and the site of El Karma is less affected, although the site Oued Messida is largely less polluted. As well as MDA the main product of lipid peroxidation is an excellent biomarker of pollution in *G. affinis*

**Keywords**: Gambusia affinis, pollution, biomarker, malondialdehyde (MDA), lipids, lipid peroxidation.

# EFFECT OF ENDEMIC MYCORRHIZAL INOCULATION ON PLANT GROWTH AND YIELD IN ALGERIA

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## ABSTRACT

Our work focuses on contributing to food security through the development of endemic mycorrhizal agents in Algeria in partnership with the International Development Research Centre (IDRC) of Canada. This project has introduced a bio-input based on endemic mycorrhizae, which has been tested and approved by numerous farmers. The experiments using the developed endemic inoculum have shown positive results, with increased yield and significant improvement in measured parameters compared to the control, across various bioclimatic stages for different types of vegetables such as tomatoes, zucchinis, bell peppers, etc. The following steps were carried out during this four-year study: Isolation of spores from rhizospheres of wild plants; classification of spores by pheno-morphotypes in monocultures; Qualification of mono-action and synergistic strains; Experimentation and validation of final formulations with farmers. Figure 1 demonstrates that the application of the formulated bio-input based on endemic mycorrhizae has had a positive impact on all the experiments conducted across different bioclimatic stages, as evidenced by the significant increase in yield of mycorrhizal cultures compared to the controls. Figure 1 yield of mycorrhizal cultures (M+) compared to controls (M-) The use of bio-input based on endemic mycorrhizae instead of chemical inputs has allowed for: Increased improvement in the quality and yield of agricultural crops, with rapid growth of plants exhibiting dense foliage, enabling optimal photosynthetic activity and preventing flower and fruit abortion; Better resistance to insects, diseases, drought, and salinity, leading to reduced agricultural losses; Savings in irrigation water, fertilizers, and chemical treatments; Enhanced utilization of mineral and organic elements present in the soil, thereby respecting the environment and preserving consumer health and safety; Satisfaction of farmers and improved quality of life for female farmers.
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**Keywords**: mycorrhiza, endemic, food security, bio-input

# SIMULATION OF THE GRANULATED ORGANIC FERTILIZER CENTRIFUGAL SPREADING

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## ABSTRACT

Due to the continuous creation of organic granular fertilizers of the new composition, there is a lack of knowledge about their properties and the influence of the norm on spreading efficiency. To reduce the efficiency of the use of granular organic fertilizers, their spreading aims are to properly choose the most rational spreading parameters and fertilizer norms, considering the mechanical and other characteristics of the fertilizer. To determine this quickly and with lower costs, various theoretical models and computer programs are used to study the dynamics of fertilizer spreading. This work aimed to carry out theoretical and experimental comparative research on the influence of the characteristics and dosage norms of organic granular fertilizers of poultry manure on centrifugal spreading efficiency. During the investigations, the physical properties of organic fertilizer pellets were determined, which have an impact on the spreading DEM simulation. Experimental field studies of fertilizer spreading were carried out using two discs centrifugal spreader Amazone ZA-M-1201 (spreading dosage norm, 600 kg ha−**1,** 800 kg ha−**1,** and 1000 kg ha−1; movement speed, 5 km h−1). Before the fertilizer pellets were spread, measurements of the flow rate of the spreadable fertilizer through one bunker shutter were made. Fertilizer application simulations were performed using the discrete element simulation program EDEM.

**Keywords**: granulated fertilizer, properties of granules, centrifugal spreader, spreading DEM simulation

# HARD SEED FRUIT GENE RESOURCES OF TÜRKİYE AND MOLECULAR CHARACTERIZATION STUDIES

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## ABSTRACT

Türkiye has rich soils that offer suitable habitat for many plants. Our country, which is rich in gene resources, is the gene center of many plants. Fruits, which can be classified according to their different characteristics, are examined in seven groups when classified according to fruit characteristics. The most important stone fruits grown in our country are peach (*Prunus persica* L.), nectarine (*Prunus persica* var. *nectarina*), apricot (*Prunus armeniaca* L.), cherry (*Prunus avium* L.), sour cherry (*Prunus cerasus* L.), and plum (*Prunus domestica* L.). Many varieties of these fruits, which are widely consumed in the world, have been obtained by using both traditional and modern breeding methods. While applying modern breeding methods, it is very significant to use and protect natural populations in factors such as expanding the gene pools of this group, which have a lot of wild ones in our country, and resistance to biotic and abiotic stress. Molecular markers are the most efficient and reliable methods used in the genetic characterization and identification of wild varieties. RAPD, SSR, ISSR, AFLP, and SRAP markers, which are used for many purposes, such as the characterization of wild and cultivated fruits and advanced breeding programs, are just some of them. This review examines the molecular characterization studies of stone fruits carried out in Turkey via molecular markers.

**Keywords**: Breeding, Drupe fruits, Gene resources, Molecular characterization

# FORECASTING PESTICIDE USE IN TÜRKIYE WITH THE ARIMA MODEL

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## ABSTRACT

Pesticides are chemicals used to fight crop pests. There are many types of pesticides used to fight different organisms, such as herbicides, insecticides, bactericides, fungicides, and nematicides. Pesticides reduce agricultural products or yield losses caused by harmful organisms. However, besides the benefits, there are also disadvantages. Pesticides cause pollution and disturbance in the balance of the ecosystem by accumulating in water, air, soil, and plants. In addition, pesticide residues threaten human life throughout the food chain. In this study, the Autoregressive Integrated Moving Average (ARIMA) model was used to forecast pesticide use in Turkey for the next ten years (2023-2032). Considering the harms and importance of pesticide use, it is aimed to provide information for the decisions or plans to be made by the decision-makers. Pesticide use in previous years was obtained from literature data, United Nations Food and Agriculture Organization (FAO) and Turkish Statistical Institute (TUIK). These data cover 41 years between 1982 and 2022. The ARIMA model was run using *statsmodel*, a module in the *Python* programming language. As a result, it has been estimated that pesticide use will increase and vary between 56-68 thousand tons in the ten years covering 2023-2032. While the average change in the last ten years (2013-2022) tends to increase by 4.86%, it is predicted that the change in pesticide use in the next ten years (2023-2032) will tend to increase by 2.16%.

**Keywords**: Pesticide, ARIMA, Türkiye, forecast, prediction

# AGRICULTURAL WEED FLORA OF SUNFLOWER FIELDS IN TÜRKIYE

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## ABSTRACT

Weeds are a major threat to agricultural areas, causing significant losses in crop yield, quality, and economic returns. These losses occur because weeds compete with cultivated plants for essential resources such as nutrients, light, and water. It is crucial to accurately determine, identify, and prepare an inventory of weeds to implement effective management strategies. Sunflower is one of the most important oil crops in the world and in Türkiye, and it is mostly grown for cooking oil in Türkiye. Sunflower is significant in the edible or cooking oil industry and sectors such as livestock farming, chemistry, cosmetics, and biodiesel. Especially because of its high protein content, the remaining pulp after the oil is taken from the seeds is used as animal feed. This review study provides a comprehensive list of weeds detected in the sunflower fields of Türkiye, including an evaluation and distribution analysis of the current taxonomic categories of weeds. As a result of the literature review, 217 taxa have been compiled from 11 different sources to form a total of 390 weed records with regard to sunflower fields. While 196 of these taxa are naturally distributed throughout Türkiye, three have been introduced, and 12 have been naturalized. The existence of a taxon in Türkiye also needs additional confirmation. Weeds reported from sunflower fields mostly belong to the Asteraceae (37 taxa) and Poaceae (24 taxa). The genera most represented by taxa are *Orobanche* L., *Amaranthus* L., *Centaurea* L., *Galium* L., and *Euphorbia* L., with four taxa from each. *Chenopodium album* L., *Convolvulus arvensis* L., *Cynodon dactylon* (L.) Pers. and *Sinapis arvensis* L. are the most cited species. In addition, *Eryngium bithynicum* Boiss., which is endemic to Türkiye, has been reported as a weed in sunflower fields.

**Keywords**: Weed, Sunflower, Flora, Türkiye

# THE EFFECT OF CLIMATE CHANGE ON WEEDS

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## ABSTRACT

Climate; Production pattern is the main determinant of agricultural production regarding product quality. From the germination of any crop to be grown to the seed setting, all stages depend on the climate. Methane and greenhouse gas emissions, irregular irrigation systems, selection of crop plants and opening of new agricultural areas are the main factors that cause climate change in agriculture. Changes in leaves, physiological and phenological changes, allometric changes, changes in reproductive potential and an increase in invasive species are among the main effects of climate change on weeds that cause significant yield reductions in cultivated plants. The effects of temperature changes on a global scale, increase in CO2 level, and water scarcity are observed in such changes. When evaluated from a general perspective, it can manifest itself in the form of expansion in the geographical distribution of weeds, changes in species' life cycles and population dynamics. It is essential to foresee that changes in weed biology, ecology and control potential after climate change will cause complex weed-culture plant interactions that require alternative adaptive mechanisms and to take measures by creating the necessary strategies to increase the sustainability of weed control.

**Keywords**: Climate change, Weed, Weed management, Agriculture

# NEW GENERATION APPLICATIONS IN WEED CONTROL

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## ABSTRACT

Weeds are an important factor that triggers the decrease in yield in world agricultural production; If no control is made, they are the factors that compete with the yield elements of cultural plants such as water, nutrients and field, and cause product damage between 45-95% depending on ecological and climatic conditions. To prevent settlement in agricultural areas of weed species, minimized the loss of yield/quality of the spread of weeds, it is necessary to apply modern and technical control methods other than traditional ones. Robots, electromagnetic rays and unmanned aerial vehicles (UAV) used as current techniques in controlling weeds are effective methods for controlling weeds without manpower. Robots, necessary for increasing productivity and saving labour in the agricultural field, are examined under three main headings: sensing, planning and application. Six different types of electromagnetic rays are used for weed control: microwave, UHF, infrared, ultraviolet, gamma rays and laser. UAVs become capable of controlling weeds with the detections made by using cameras with different characteristics in field conditions, and it should be noted that the cameras used for detection are generally infrared (NIR) or NDVI (Normalized Difference Vegetation Index). Thanks to the new generation applications developed, it offers an environmentally friendly weed control approach by preventing herbicide resistance that may occur with low fuel consumption and labour, efficient operation, and less chemical application.

**Keywords**: Electromagnetic Rays, Management, Robotic, Unmanned Aerial Vehicles, Weed

# GENE TRANSFER METHODS IN AGRICULTURAL PRODUCTION

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## ABSTRACT

With the rapid increase in the world population, there is a direct increase in the need for food. Many limiting factors will affect the yield and quality, including biotic and abiotic stresses, in the plants produced. Although breeding studies have been carried out for thousands of years against these factors, the increase in productivity obtained from classical breeding studies; As arable land reaches critical limits, is not enough to meet the basic food needs of the growing world population. As a result of this situation, since the 1990s, various new and effective gene transfer methods have been developed to transfer foreign DNA to plant cells. Gene transfer to plants; It is the transfer of functionally determined natural or synthetic nucleic acid sequences into plant cells using genetic engineering techniques. The methods used in gene transfer are done in two ways: indirect gene transfer and direct gene transfer. Indirect gene transfer method via *Agrobacterium tumefaciens* and *A. rhizogenes*; The direct gene transfer method is performed using techniques such as biolistic, electroporation, macro injection, microinjection, pollen transformation, DNA impregnation to the zygotic embryo, DNA transfer through fibres, sonication, desiccation and electrophoresis. Gene transfer methods are one of the most important application areas of gene technology today in terms of gaining many features that are not naturally present in plants and cannot be obtained by traditional methods, they can be applied to various plant species, and effective results can be achieved in a short time. Yield and capacity increase can be achieved only with targeted gene changes. It promises great hope to meet the world's food needs in the near future.

**Keywords**: Agrobacterium, Genetic transformation, GDO, Agriculture

# THE USE OF WIND ENERGY IN PROVIDING CLIMATIC ENVIRONMENTAL CONDITIONS OF BARNS FOR SMALL CATTLE

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## ABSTRACT

In our country, the majority of the energy required is generated by using the fossil fuels like many other countries in the world. As a result of the use of fossil fuels, important environmental problems occur in the whole world. Although our country is insufficient in terms of fossil energy resources, it is quite advantageous in terms of wind and solar energy, which are renewable energy sources. Marmara Region is in a very good situation in terms of wind energy potential. For this reason, electrical energy can be obtained and used with the wind turbine system in agricultural enterprises in rural areas in Tekirdağ. By meeting the electrical energy needs of animal barns, mechanical ventilation and cooling are provided in the barns. Bringing the indoor air to optimum conditions by using green energy increases the yield and quality of the products to be obtained from animals. By making use of the wind turbine system, a ventilation and cooling system has been designed for a floor area of 490 m2 (14*35 m) and 400 head sheep pen. For this system, 4 aspirators with a power of 0.75 kWh and a pad system with a circulation pump with a power of 0.2 kWh are needed. Although the energy requirement of this system is 3.2 kWh, a 4-5 kWh wind turbine would be suitable for the system due to the intermittent and fluctuating wind energy. The excess energy to be produced from the wind turbine system can be stored in batteries and used for other works in the barn.

**Keywords**: Sheep-goat pen, wind energy system, fossil energy, fan-pad system

# ECOLOGİCAL MANAGEMENT OF WEEDS

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## ABSTRACT

In the face of the increasing world population, the areas that are still used as agricultural land are shrinking due to reasons such as not opening new agricultural areas, even erosion, industrial zones and opening new roads. For this reason, it is seen as the main target to provide the highest yield from the existing agricultural areas. Although it is known that weeds have benefits as well as harms, weeds are one of the most important factors that cause yield loss in crop plants. So against weeds It is absolutely necessary to apply an effective method of struggle. Chemical control is one of the most effective and widely used methods in the fight against weeds both in the world and in our country. In addition to the effectiveness of the methods and tools used in the fight against weeds, care should be taken not to disturb the ecological balance. This is important both for our world and for the future to avoid problems.

**Keywords**: Resistance, Herbicide, Weed control

# POSSIBILITIES OF USING WIND ENERGY FROM RENEWABLE ENERGY SOURCES FOR AGRICULTURAL PURPOSES IN WATER BUFFALO BARNS AND ENVIRONMENTAL EFFECTS

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## ABSTRACT

The continuous increase in the prices of fossil energy sources, which cause various environmental problems, directs humanity to renewable energy sources, which are clean and sustainable energy sources. Since agricultural enterprises are far from electricity networks, it is more appropriate to turn to renewable energy sources. In places with high wind energy potential, such as the Marmara Region, the electricity need of buffalo barns can be met with the wind turbine system. In this study, the use of electrical energy produced by wind turbines in buffalo barns is emphasized. It is difficult for buffaloes to balance their body temperature due to the lack of sweat glands in their skin and their thick skin. Also, buffaloes need water to cool off. Ventilation and cooling of buffalo barns can be provided by the fan-pad system. A pad area of 21.6 m2 is needed for the cooling system in the buffalo barn with a floor area of 540 m2 (11.1*48.6 m). For water circulation in the system, there should be a circulation pump with a power of 0.2 kWh. In the buffalo barn, it is appropriate to use 10 aspirators with a flow rate of 9500 m3h-1 for mechanical ventilation. The highest energy required by the fan-pad system is 5.7 kWh. Since wind energy varies randomly depending on climatic conditions, a wind turbine system such as 8.0 kWh should be used, 25-30% more than the required 5.7 kWh. With the use of Turkey's wind energy potential, the country will get rid of oil imports and the current account deficit will decrease. The energy left over from the wind turbine system can be stored in batteries and used when there is no wind.

**Keywords**: Anatolian water buffalo, Wind turbine, Water buffalo barn, Ventilation, Cooling

# TÜYAVE: A WEED DATABASE OF TÜRKIYE

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## ABSTRACT

Weed management is essential for the conservation of ecosystems and farmland. Accurate and effective control of weeds is essential to ensure the functionality and sustainability of the natural environment, biodiversity conservation, food security, and prevent economic problems. Databases play an important role in many areas today and help organizations work more effectively and efficiently by enabling the organization, management, and processing of big data. For these reasons, a weed database can be important for monitoring, early risk detection, and controlling weeds. TÜYAVE, an open-access weed database available at yabanciot.org, was prepared following the Biodiversity Information Standards (TDWG). This database includes taxonomic information, distribution status, whether they are invasive or not, synonyms, scientific Turkish names, images, and basic statistical information about weeds. Also, it includes records of literature data about the presence/absence status in farmland. The weed database parses current taxonomic information and images from plant databases (POWO, WFO, GBIF, iNaturalist, etc.). Weed databases can be significant in protecting natural habitats and reducing agricultural damage. The TÜYAVE can be a valuable resource for farmers, scientific researchers, habitat management, and environmental protection organizations. Also, it will inspire future studies.

**Keywords**: weed, database, Türkiye

# DIVERSITY AND COMPARISON OF LANDRACES AND COMMERCIAL DURUM WHEAT GENOTYPES (TRITICUM DURUM L.) ON AGRO-PHYSIOLOGICAL PARAMETERS

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## ABSTRACT

Türkiye is one of the genetically diverse countries where landraces and commercial varieties of bread and durum wheat are widely available and produced. The experiment was carried out to asses of agronomic and physiological parameters of durum wheat commercial cultivars and landraces under rainfed conditions. In the study, 35 durum wheat landraces and commercial cultivars were examined during the 2018-2019 growing cycles in the Edirne location in the Trakia region, Türkiye. The experiment was laid out in a randomized complete blocks design (RCBD) with three replications. Normalized difference vegetation index, chlorophyll content, canopy temperature, days of heading, plant height, peduncle length, spike length, spikelet number per spike, kernel number per spike, spike weight and flag leaf area were investigated. The number of stomata, stomata area, stomata width and height, and perimeter measurements were made on flag leaves during the heading (Z55) period. The results of variance analysis revealed significant differences ($p<0.01$) among local landraces and commercial cultivars for the parameters investigated except for chlorophyll content. While the NDVI value measured in Z45, Z55 and Z75 periods was the highest in Landraces, low NDVI was determined in commercial varieties. Higher canopy temperature (CT) was measured in commercial cultivars (G35: 27.2 oC) while lower CT was detected in landraces (G2: 22.1 oC). Flag leaf area significantly varied among landraces and commercial cultivars. Landrace G3 had the highest flag leaf area of 42.9 cm2, and commercial cultivar G27 had the lowest at 15.9 cm2. Landraces were found to have longer plant height and peduncle length than commercial cultivars. It was determined that the number of grains per spike was higher in commercial varieties. The number of stomata in genotypes was made during the heading period and it was determined that there were more stomata in landraces. It was determined that commercial varieties have higher values than landraces in terms of stomata width, height, area and perimeter.

**Keywords**: Durum wheat (Triticum turgidum L.), landraces, genotypes, agro-physiological component

# CHANGE OF SOME BIOACTIVE COMPOUNDS DURING COLD STORAGE OF NOVA MANDARIN VARIETY

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## ABSTRACT

In this study, changes in some bioactive compounds during cold storage of 'Nova' mandarin variety were determined. ‘Nova' mandarin variety fruits, which were harvested when the optimum 75% of the fruit peel turned yellow-orange, samples were stored at 4 (±0.5) °C and 85-90% relative humidity for 75 days, and were analyzed every 15 days during storage. Total antioxidant, total phenol, total flavonoid, total anthocyanin and vitamin C analyzes were made in fruit samples. According to the findings, an increase in, total phenol, total flavonoid, total anthocyanin and vitamin C, while decreases in total antioxidant amount were detected during storage.

**Keywords**: Mandarin, Nova, cold storage, bioactive compounds

# MORPHOLOGICAL CHARACTERISTICS OF GIANT STINGING NETTLE ( GIRARDINIA DIVERSIFOLIA) IN GIRESUN ECOLOGICAL CONDITIONS

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## ABSTRACT

Girardinia diversifolia are perennial herbaceous plants in the Urticaceae family, reaching a length of 1.5-3 m. Girardinia diversifolia, the giant nettle, is known as. Girardinia diversifolia grows naturally in the Himalayas, India, Srilanka, and China, at altitudes between **1**200 and 3,000 meters. It is abundant in woodlands, riverbanks, and moist habitats. The plant grows in a quarry, and each cluster has many stems. The stems are erect, 5-pointed, and branching from the base. The stems are also covered with burning spikes and soft hairs. Girardinia diversifolia is known as bast (sak) fiber. Bast fiber is of good quality: it is long, strong, smooth, and shiny. G. Diversifolia is used in the manufacture of various clothes, ropes, wicker, sacks, and various other household appliances. It is an important bast fiber used to generate income in rural areas. Considering the ecological demands and the conditions in which it grows, the evaluation of the Black Sea for fiber purposes by growing in rural areas, processing the obtained fibers locally, and converting them into gift weaving or qualified textile products will increase employment and contribute to the agriculture and socio-economic structure of the region.

**Keywords**: Bast fiber, Giant stinging nettle, Girardinia diversifolia, Giresun, Morphological characteristics

# ASHWAGANDHA AS A MEDICINAL PLANT

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## ABSTRACT

Ashwagandha (Withania somnifera) is a medicinal plant species belonging to the Solanaceae family. Withania somnifera contains therapeutically important secondary metabolites, alkaloids, and withanolides. Among the secondary metabolites found in the plant, phenolic compounds, sterols, glycovitanolides, and flavonol glycosides can be counted. The most potent part of Withania somnifera (L.) is its roots, which are rich in alkaloids, steroidal lactones, and saponins. The leaves of the plant are bitter and have some medicinal uses for fever and painful swelling. The flowers are astringent, depurative, diuretic and aphrodisiac. The anti-helminthic seeds remove white spots on the cornea and increase sperm count and testicular growth. The berries have traditionally been used as a topical treatment for tumors, tuberculous glands, carbuncles, and skin ulcers. This review study searched and presented literature on ashwagandha morphological features, secondary metabolites, and usage areas.

**Keywords**: Ashwagandha, medicinal plant, secondary metabolites, root

# EVALUATION OF THE RELATIONSHIP BETWEEN ANIMAL WELFARE STANDARDS AND CURRENT LIVESTOCK HUSBANDRY CONDITIONS

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## ABSTRACT

In discussions about the welfare of animals, some viewpoints place emp-hasis on particular issues. Every aspect of the life of the livestock animals is taken into consideration, including the availability of food and water, the environment, management, care, transportation, and slaughter conditions. The standards are designed to make sure that all animals raised in line with the requirements have everything they need for a better quality of life, regardless of whether they are housed on large or small farms or in indoor or outdoor production methods. While efforts are made to increase yields in cattle breeding, animal welfare should also be considered. Because there is a close relationship between welfare and productivity. The barn, the conditions in the barn, feeding, treatment of animals and the knowledge of the staff are factors that directly affect animal welfare. In this review, information will be given about the importance of animal welfare in cattle breeding and the necessary minimum criteria. To this end undertook a literature search and animal welfare standards and current relationship between livestock conditions is discussed.

**Keywords**: Animal welfare, livestock, welfare standards, cattle

# INFLUENCE OF ROOT RESTRICTION ON YIELD AND FRUIT QUALITY IN 'HAFIF ÇUKURGOBEK' LOQUAT TREES

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## ABSTRACT

In the study, the effect of root restriction treatment on fruit yield and quality of loquat (*Eriobotrya japonica* Lindl) trees was investigated. 'Hafif Çukurgöbek' loquat trees budded on seedling rootstock were planted within root restrictive plastic containers buried in the soil and compared with trees planted without containers(control). Yields per tree, per unit trunk cross-sectional area and per unit area, and pomological characteristics of fruits were determined according to the treatments. Root restriction treatment had no effect on the maturity period of the fruits. In trees with restricted root growth, yield per plant and yield per unit area were lower, while yield per trunk cross-sectional area was higher than the control trees. In terms of fruit weight, fruit size and seed weight, higher values were obtained from root-restricted trees compared to control ones. There was no significant difference between the treatments in terms of other fruit characteristics. As a result, positive effects of root restriction treatment were determined in loquat trees compared to control ones.

**Keywords**: Root restriction, fruit set, vegetative growth, yield, loquat

# EFFECTS OF ROOT RESTRICTION ON VEGETATIVE GROWTH AND PHENOLOGICAL CHARACTERISTICS IN LOQUAT TREES

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## ABSTRACT

The aim of the study is to determine the effect of root restriction treatment on vegetative growth and phenological characteristics in loquat trees (*Eriobotrya japonica* Lindl). 'Hafif Çukurgöbek' loquat trees budded on seedling rootstock were planted within root restrictive plastic pots buried in the soil and compared with trees planted without pots(control). Vegetative growth, flowering periods, inflorescence characteristics and fruit set rates of these trees were investigated. Although the flowering stages of the cultivar differed partially according to the applications, it was completed in the period between December 5 and February 10. The first flowering was took place on 5 December in the root restriction application and on 9 December in the control. The full bloom and the end of flowering phases occurred on January 18 and February 5, respectively, in root restraint application, and on January 29 and February 10, respectively, in control. Root restriction had no effect on the maturity period of the fruits. While there was no significant difference between the applications in terms of the length of the inflorescence and the number of panicle in the cluster; Statistically significant differences were determined between the treatments in terms of the numbers of flower buds, blooming flowers and inital fruit set in the cluster. Applications were not significant effect on the number of the small fruit and the number of fruits harvested in the cluster. In terms of annual shoot length, scion and rootstock diameter, and other vegetative parameters, lower values were obtained in root-restricted plants compared to the control. As a result, it was determined that root restriction treatment reduces vegetative growth in loquat trees.

**Keywords**: Eriobotrya japonica Lindl., root restriction, fruit set, vegetative growth

# MONITORING OF BRUCHUS RUFIMANUS POPULATIONS BOHEMAN WITH ITS HOST PLANT VICIA FABA VARIETY MAJOR ON TWO PLOTS SOWN AT TWO DIFFERENT ALTITUDES IN KABYLIA (TIZI-OUZOU, ALGERIA)

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## ABSTRACT

*Bruchus rufimanus* is a monovoltine Chrysomelid beetle whose larvae develop at the expense of the reserves contained in the cotyledons of the seeds of a legume, the broad bean or *Vicia faba* bean and make them unfit for human consumption. Adults show reproductive diapause upon formation and overwinter in seeds or in natural sites. The purpose of this study is to examine the processes and conditions of infestation of broad beans in the fields by this insect and to identify the bioecological characteristics of this pest linked to the particular conditions of our agrosystems and the factors likely to favor its dynamics from a practical point of view in Kabylia (Tizi-Ouzou) by a weekly monitoring at sight of the adults of *B. rufimanus* in two plots of *V. faba* major (Seville), of about 100m2 each, sown at the altitude difference of 800m. The results show that colonization of *V. faba* in the field by *B. rufimanus* coincides with full flowering and fruiting of the bean. It seems to be influenced by climatic conditions and trophic resources. After the bean blooms, the number of adults decreases as the pods approach maturity. Oviposition takes place over a period of about eight weeks on the two study plots. The females of *B. rufimanus* do not show any preference for laying eggs on the old pods from the first inflorescences and the young pods on the two study plots. Thus, altitude difference has no effect on pod infestation by *B. rufimanus* females. The host plant, as a food source, plays a determining role in the population dynamics of *B. rufimanuont* which has a migratory power from the plains, where the food source becomes scarce at the end of flowering, towards the heights to continue their cycle.

**Keywords**: Vicia faba major, Bruchus rufimanus, Oviposition, colonization of the host plant, Tizi-Ouzou

# EFFECT OF PHYSIOLOGICAL AND PROCESSING FACTORS ON GOAT MEAT QUALITY

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## ABSTRACT

The aim of the study is to inspect the effect of age, sex, and chilling method on meat quality attributes like temperature, ultimate pH (pHu), color, cooking loss, and tenderness of goats. In this study, 48 goats were procured and slaughtered according to Halal standards; one side of the carcass was immediately shifted to a walk-in chiller operating at 0 - 4℃ for 24 hours and treated as rapid chilling while the other side was kept at room temperature 26 ± 2℃ and treated as delayed chilling. Sirloin samples were analyzed from these goats and results revealed that Warner Bratzler Shear Force was affected by the chilling method and recorded higher in case of rapid chilling. Age affects cooking loss and color parameters except for lightness (L*) values which were higher in young animals. In case of sex, cooking loss % was more in males as compared to females. Based on the results, it has been a fact that chilling has a major effect on meat quality. Rapid chilling can lead to cold shortening of meat and as a result, the end product could become tougher. The delayed chilling method is advantageous to enhance the quality and tenderness of goat meat.

**Keywords**: Age, Sex, Rapid chilling, Delayed chilling

# THE SPIDER DIVERSITY OF SAMSUN PROVINCE

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## ABSTRACT

Spiders are capable of living in all types of habitats in the world except Antarctica. In the World the spiders have 51088 known species and in Turkey are represented by 1255 species in 54 family. In this study, we investigated diversity of the spider in Samsun province. Samples were collected by catching by hand and sweeping with insect net between the months of June-August 2015-2018 and they stored in 96% ethanol at -20 ˚C. The specimens were often caught from Astaraceae. Morphological identifications were based on reference publications on the taxonomy of Palearctic region spiders with species nomenclature following the World Spider Catalog. Spiders were deposited in the University of Gaziantep, Zoology Museum (GAUZM). In this study, 398 specimens belonging to 11 families were determined and the adult spiders were diagnosed on species basis. We identified 15 species *(Phylloneta impressa, Enoplognatha ovata, Heterotheridion nigrovariegatum, Phyllonetta impressa, Oxyopes lineatus, Pisaura mirabilis, Tetragnatha montana, T. extensa, Pulchellodromus pulchellus, Evarcha arcuata, Runcinia grammica, Argiope bruennichi, Neoscana adianta, N. bryzanthina, Araneus quadratus).* The species reported through previous studies was supported with new localities in this study.

**Keywords**: Araneae, Samsun, spider diversity

# THE IMMUNOTOXIC EFFECT OF ETHYLEN GLYCOL MONOMETHYL ETHER IN THE MALE RAT

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## ABSTRACT

The immune system is the target of a multitude of constituents of the environment, These include chemical substances foreign to the organism which are designated under the generic term of xenobiotics, including drugs and industrial pollutants (such as pesticides, heavy metals and solvents) and other agents that can act on components of the immune system and interfere with their protective functions in the body. Ethylene glycol monomethyl ether is one of the most widely used oxygenated solvents in industry. In this context, this study aims to evaluate the immunotoxic effects of sub-chronic exposure to EGME (Ethylen Glycol Monomethyl Ether) in male wistar rats. 24 adult male rats were divided into three equal groups: control group (T), group D1: treated with a first dose of EGME (250 mg/kg bw) and group D2: treated with a second dose of EGME (500 mg/kg bw), EGME is diluted in distilled water and administered by gavage over a period of 4 weeks. The results indicate that treatment with EGME resulted in a significant increase in the number of white blood cells, lymphocytes, eosinophils and granulocytes compared to the control group.

**Keywords**: EGME . rat. immunotoxicite

# MEDIUM EXPOSURE TO THE PROPINEB FUNGICIDE CAUSED HISTOLOGICAL DAMAGE ON TESTIS EPIDIDYMIS AND THYROID IN MALE RAT

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## ABSTRACT

Introduction: Ethylenebis(dithiocarbamate) (EBDC) as Propinebiswidely used in plant diseases control.This study aims to evaluate the toxic effect of this fungicide on the thyroid and testicular activity of male rats.Material and methods: Rats were divided equally into three groups; the control, and two treated groups treated with Propineb mixed with the diet at the doses of 1/90 (group 2) and 1/60 LD50 (group 3), respectively for 6 weeks. At the end of the treatment period, the rats were sacrificed, and the organs and blood were releveled. In addition, the histological profiles of thyroid, testis, and epididymis, the serum triglycerides, glucose, and cholesterol were evaluated. Results: Data showed a significant increase in total body weight particularly in the high dose, accompanied by a significant decrease in testicular and epididymis weight. A remarkable elevation of triglycerides and cholesterol concentrations were observed also in treated animals with the high dose. However, the histological examinations indicate alterations in the architecture of the testis, epididymis, and thyroid of the treated rats. Conclusion: We think that the repeated administration of the used fungicide Propinebacts as an endocrine disruptor has caused severe disorders in the hormonal system by affecting the activity of the thyroid and the reproductive parameters.

**Keywords**: Propineb, toxicity, thyroid, reproductive organs, histology

# SUITABLE CHELATING PROPERTIES OF OLIVE OIL AND VITAMIN C FOR THE REDUCTION OF LEAD LIPID PROFILE DISORDERS TO MALE WISTAR RATS

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## ABSTRACT

This study aim to attenuate lead acetate (Pb) toxicity at 500mg/kg bw by using olive oil 5% in diet and vitamin C at 300mg/kg bw to evaluate lipid profile and hepatic parameters in Wistar rat. Males were randomly divided into 5 groups; group 1 (C) served as control received tap water, group 2 (Pb), group 3 (Pb + vitamin C), group 4 (Pb + Olive oil) and group 5 (Pb +Vit C + OO) received a combination of vitamin C and olive oil and lead acetate orally, and then subjected to treatment for a period of 4 weeks. Results indicated a significant increase in cholesterol, triglycerides and low-density lipoprotein (LDL) concentrations in lead-exposed group, with a decreased high-density lipoprotein (HDL) value. However, the combined treatment resulted in significant inverse results, especially for HDL levels. Data also showed a decrease in albumin, iron and calcium concentrations in Pb intoxicated group. Hepatotoxicity and nephrotoxicity through the significant alteration in tissues architectures compared to the other groups. The alterations in hepatic and renal histological architecture observed in the Pb group were almost disappeared in rats of group 5 when virgin olive oil and vitamin C were added together. A mitigating activity of vitamin C and olive oil against Pb was suggested as these two nutriment products seem participated in protecting rat lipid profile and liver and kidney disorders.

**Keywords**: Olive oil, Vitamin C, Pb, lipid profile, hepatotoxicity, nephrotoxicity, rat

# AQUEOUS EXTRACT OF CISTUS MONSPELIENSIS MITIGATING HEMATOPOIETIC TOXICITY OF LEAD

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## ABSTRACT

Some animal studies suggested that orally supplementation of *cistus monspeliensis* flowers aqueous extract might chelate lead and reduce the risk of its toxic effects on hematopoietic system. In order to assess this relationship, male Wistar rats were randomly divided into 6 groups: group 1 (**T**) served as control received tap water. Group 2 (**CMD1**) as a positive control was received daily flowers aqueous extract of *cistus monspeliensis* (CM) at a rate of 2 g/kg of body weight, Group 3 (**CMD2**) as a second positive control was received daily flowers aqueous extract of *cistus monspeliensis* (CM) at a rate of 1 g/kg of body weight, the group 4 (**Pb**) is treated with Pb acetate at a rate of 50 mg/kg of body weight and the group 5 and group 6 (**CMD1 + Pb**) and (**CMD2 + Pb)** received by the combination of lead acetate with flowers aqueous extract of CM, and subjected to treatment by gavage for a period of 4 weeks. The blood total red blood cells, hemoglobin, HTC, VGM, CCMH and PLT levels were measured. Results have showed a decrease in all blood parameters levels in lead exposed group and an increased value of PLT in positive and combined groups with dose dependence. However, the combined treatment resulted in a significant inverse reaction against lead toxicity especially in red blood cells concentrations. The results, thus, indicate that there may be a protective effect of Group 2 (**CMD1**) as a positive control was received daily flowers aqueous extract of *cistus monspeliensis* extract in lead-poisoned rats by its suitable chelating properties for the reduction of lead hematopoietic disorders.

**Keywords**: Lead, cistus monspeliensis. Red blood cells, anemia. hematopoietic system

# HISTOLOGICAL AND BIOCHEMICAL EFFECTS OF GONADECTOMY ON EPIDIDYMIS IN NOCTURNAL SAHARAN RODENT (GERBILLUS GERBILLUS)

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## ABSTRACT

In dry and hostile spaces of the Saharan environment, animals develop both behavioral and physiological adaptation strategies to ensure not only the survival but also the sustainability of species. The seasonal variation in breeding reflects one of the adaptation strategies that allows programming the parturition only in the period to provide optimal conditions with available food. The aim of this study was to investigate the ponderal, the histological and the biochemical effects of gonadoctomy in Saharan gerbil (*Gerbillus gerbillus)* epididymis. Hormonal privation by bilateral gonadoctomy was realized during breeding season (spring) of adult male animals, captured live in Béni-Abbès area (30° 7' N, 2°10 W). The histological figures are obtained after organs fixation with Bouin Hollande and Masson's trichrome coloration. Homogenate soluble proteins of proximal epididymis and distal epididymis have been analyzed by monodimensional electrophoresis on denaturant conditions (SDS-PAGE). The maximum weight loss was 84.43% after 25 days of gonagoctomy in the proximal epididymis and 84.39% after 40 days in the distal epididymis. The significant histological changes are marked with tissue atrophy, reduction in cell height and supra-nuclear area, and condensation of connective tissue around the proximal and distal epididymal tubules. Electrphoretic results showed many proteins differently expressed by gonadoctomy and testosterone treatment: (i) androgenodependent proteins induced by testosterone in proximal epididymis (54.9, 17.8, and 16.0 kDa) and in distal epididymis (56.9 and 37.9 kDa); (ii) androgenodependent proteins suppressed by testosterone were present only in proximal epididymis (65.9, 33.4, 21.2 and 14.0 kDa). This study will provide valuable information about the effects of androgen deprivation on the epididymis of this nocturnal Saharan rodent and may contribute to our understanding of the mechanisms underlying male fertility.

**Keywords**: Gonadoctomy, Saharan rodent, epididymis, androgenodependent proteins

# PRELIMINARY STUDY ON HEALTH INDICATORS OF UNWEANED CALVES FED WITH A PREBIOTIC BASED ON SACCHAROMYCES CEREVISIAE (Aviator®)

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## ABSTRACT

The objective of this study was to investigate the effect of supplementation with a prebiotic *saccharomyces cerevisiae* yeast culture (Aviator®) on the health indicators of unweaned calves. The study involved 24 unweaned Holstein calves (average age = 15 days) over a period of 8 weeks (W1 to W8). The calves were assigned into three homogeneous groups. Each group was composed of 8 calves (4 males and 4 females). The first control group (C) received the conventional feed (milk without prebiotic). The second group (T1) received milk supplemented with 7g/calf/day of Aviator®, and the third group (T2) received milk supplemented with 14g/calf/day Aviator®. The Health parameters of the calves were noted such as coat condition, presence or absence of diarrhea and bronchitis. Calf feces were collected for bacteriological analysis. The results showed that 21% of the calves had an abnormal coat, while 46% had a coat soiled by feces. The rates of diarrhea and bronchitis were noted in 15% of and 17% of the calves, respectively. Besides, the rate of diarrhea occurrence in all calves decreased from W1 to W3 (8% *vs* 4%) and it was lower in the T1 and T2 groups compared to the C group (1.5% and 3% *vs* 8%, $p<0.05$). However, the rate of bronchitis cases ranged from 4.5% to 37% over the period of the trial. It was lower in the C group compared to the treated groups T1 and T2 (6.5% *vs* 12.5% and 31.5%). Bacteriological analysis of the calves' feces showed that the number of bacterial colonies was lower in the T2 group compared to the T1 and C groups ($p<0.01$). The number of bacterial colonies varied according to the weeks of the trial ($p<0.01$). Nevertheless, health parameters did not varied between male and female ($p>0.05$). The preliminary results of the study suggest that the supplementation with the prebiotic Aviator® improved some health parameters in unweaned calves, especially the diarrhea rate and the number of bacterial colonies in feces.

**Keywords**: saccharomyces cerevisiae, unweaned calves, diarrhea, bronchitis, bacteriological analysis

# INFLUENCE OF DIETARY SUPPLEMENTATION OF SACCHAROMYCES CEREVISIAE (A-MAX Ultra®) ON GROWTH AND DIGESTIBILITY OF WEANED CALFS

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## ABSTRACT

The study aimed to determinate the effect of diatery supplementation with prebiotic *Saccharomyces cerevisiae* (A-Max Ultra®) on Holstein calves growth parameters. Twenty three weaned calves aged 3 months were assigned into 3 groups: the control group (C, n=8) was fed with the conventional diet, and the 2 treated group (T1, n=8 and T2, n=7) with the conventional diet supplemented with 7g and 14g per calf and per day of *Saccharomyces cerevisiae* respectively, during 8 weeks. The height at withers (HT), chest circonfrence (CC) and the weight (W) were determined once a week using a tape. Then, the average daily gain (ADG) was determinated in each group. The digestibility (D) was studied at the end of the experiment at the week 8. ANOVA was carried out using the SAS software. The results showed that the ADG did not varied between groups. However, the HT, CC and W were higher in T1 compared to C and T2 groups ($p<0.01$). Moreover, the D was higher in T1 and T2 groups compared to C group ($p<0.05$). The findings suggest that the dietary supplementation with 7g of *Saccharomyces cerevisiae* (A-Max Ultra®) improved growth and digestibility in Holstein weaned calves.

**Keywords**: Saccharomyces cerevisiae, weaned calves, growth parameters, digestibility

# STEM CELL THERAPY IN IMPAIRED DIABETIC WOUND HEALING

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## ABSTRACT

Diabetes mellitus is a chronic disease that occurs when the pancreas is unable to produce enough insulin or the body is unable to use the insulin effectively. Chronic hyperglycemia in diabetes is associated with long-term damage, dysfunction and failure of various organs, especially the eyes, kidneys, nerves, heart and blood vessels. Diabetic wounds, one of these disorders, are a common complication of diabetes mellitus and the mechanism underlying impaired wound healing in patients with diabetes is not yet fully understood. Stem cells are a promising new therapy as they have the potential to promote cell regeneration, angiogenesis and tissue repair. Studies with various types of stem cells, such as bone marrow-derived stem cells, adipose-derived stem cells and umbilical cord stem cells, have reported that stem cells help to secrete growth factors and cytokines that promote wound healing and can also differentiate into different cell types involved in wound repair. However, although these studies are promising, more clinical trials are needed to confirm their safety and efficacy.

**Keywords**: diabetes mellitus, growth factor, stem cell, wound healing

# MARUBIUM VULGARE EXTRACT FROM CULTIVATED PLANTS – EFFECTS ON SCOPOLAMINE-INDUCED MODEL OF DEMENTIA IN RATS

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## ABSTRACT

*Marrubium vulgare* is known for its antioxidant, antimicrobial, antitumorand etc. properties. The different parts of the plant contain flavonoids, steroids, terpenoids, tannins, saponins marrubiin, marrubenol and etc. which contribute to its remarkable biological activities. Also there are data about highly acetylcholinesterase inhibitory activity, connected with neurodegenerative disorders. The aim of this study was to explore cognitive and antioxidant effects of *Marrubium vulgare* extract in rats with scopolamine (Sco)- induced dementia. Mail Wistar rats (200-250g) were divided into 4 experimental groups: 1) Control; 2) Sco; 3) *Marrubium vulgare; 4) Sco+Marrubium vulgare*. Sco (2 mg/kg) was applied via intraperitoneal injection for 11consecutive days. *Marrubium vulgare* extract was obtained from aerial parts (flowers and leaves) of the cultivated *in vitro* plants and applied orally for 21 days - 10 days before and 11 days simultaneously with/or without Sco. The effect of plant extract on exploratory activity, locomotion, rearing and spatial orientation was evaluated by the hole-board and T-maze tests after 11 days scopolamine treating. Antioxidant capacity was determined via spectrophotometrically measurement of main oxidative stress parameters – levels of lipid peroxidation and enzyme activities of superoxide dismutase, catalase and glutathione peroxidase in cortex and hippocampus. Our results showed that after 11 days treatment Sco caused cognitive decline and induced oxidative stress in cortex and hippocampus. *Marrubium vulgare* treatment increased exploratory activity, locomotion and rearing in Sco-treated and healthy animals. Furthermore, preserved spatial orientation to the control levels and normalized studied oxidative stress markers in cortex of dement rats. In conclusion: *Marrubium vulgare* treatment protect animal from Sco – induced cognitive deficits and cortex from oxidative damage. In healthy animals showed anxiolytic like effect and antioxidant properties most pronounced in cortex.

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**Keywords**: neuroprotection, memory, hole board, oxidative stress

# ANTIOXIDANT AND MEMORY PROTECTIVE EFFECT OF WATER EXTRACTS FROM CULTIVATED SIDERITIS SCARDICA AND CLINOPODIUM VULGARE IN ALZHEIMER'S TYPE DEMENTIA IN RATS

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## ABSTRACT

There are evidences that oxidative stress has been implicated in Alzheimer's disease (AD) cognitive decline. Enhanced lipid peroxidation (LPO) in combination with increased catalase (CAT), superoxide dismutase (SOD) and glutathione peroxidase (GPx) activity in hippocampus and amygdala of the AD patients in postmortem studies have been established. Family Lamiaceae plants are well known with their high polyphenols content and antioxidant properties. The aim of this study was to evaluate antioxidant and memory protective capacity of *Sideritis scardica* and *Clinopodium vulgare* water extracts in rats with scopolamine (Sco)-induced dementia. Mail Wistar rats (200-250g) were divided into 6 experimental groups: 1) Control; 2) Sco; 3) *Sideritis scardica; 4) Clinopodium vulgare;5) Sco+ Sideritis scardica and 6) Sco+Clinopodium vulgare*. The model was induced via intraperitoneal injection of Sco 2 mg/kg for 11consecutive days. Water plant extracts were prepared from aerial (flowers and leaves) parts of both species from in vitro obtained cultivated plants and applied orally for 21 days-10 days before and 11 days simultaneously with/or without Sco. The effect of plant extracts on memory performance was evaluated by Novel Object Recognition test. Their antioxidant capacity was determined by spectrophotometrically measurment of main oxidative stress markers - levels of LPO and total glutathioin, as well as enzyme activities of SOD, CAT and GPx in cortex and hippocampus. Our results showed that after 11 days treatment Sco caused memory impairment effect accompanied by induced oxidative stress - increased LPO levels and SOD and GPx activities. Both plant extracts enhanced memory performance and decreased brain oxidative damage in dement rats. The antioxidant effect of *Clinopodium vulgare* was better than the *Sideritis scardica* and for both was more pronounced in cortex. In conclusion: *Sideritis scardica* and *Clinopodium vulgare* have a potential to be useful in AD treatment and deserve more research.
**Funding:** This research was funded by NATIONAL SCIENCE FUND - BULGARIA, Grant number KP-06-N56/16

**Key words:** neuroprotective effect, oxidative stress, scopolamine, *Sideritis scardica, Clinopodium vulgare*

# HABITAT PARTIONING BETWEEN TWO NESTING SPECIES OF RALLIDAE: THE MOORHEN GALLINULA CHLOROPUS (LINNAEUS, C 1758) AND THE PURPLE SWAMPHEN PORPHYRIO PORPHYRIO (LINNAEUS, C 1758) AT TONGA LAKE (NORTH-EASTERN ALGERIA)

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## ABSTRACT

The surface area of wetlands in the Mediterranean region has decrease considerably in the last years. The El Kala region hosts one of the most important natural wetland complexes in the Mediterranean and the largest in North Africa. It is home to a special aquatic avifauna, including many protected species. The Rallidae family is represented in Lake Tonga (north-east Algeria) by five species: The Moorhen, The Sultana ptarmigan, The coot, The Water rail and The Spotted crake. The Sultana Duck and the Common Moorhen were the species studied. While the former is rare and protected by law, the latter is more of a generalist species, very common in the region and abundant. The results obtained showed that the two species could cohabit without difficulty in Lake Tonga, even though they share the same habitat and food resources. However, each species uses a different reproductive strategy. The Moorhen has an early laying date, a clutch size of 5.92 eggs per female, a chick weight of 15 g and a reproductive success rate of 64%. On the other hand, for the Sultana Hen, the laying date is late, the clutch size is 3 eggs, the weight of the chicks is 29 g on average and the reproductive success is 100%.

**Keywords**: Lake Tonga - Gallinula Chloropus – Porphyrio porphyrio - resources - species - strategy

# THE TAXONOMIC EVALUATION OF ENDEMIC ANATOLIAN VOLE (Microtus anatolicus KRYŠTUFEK AND KEFELIOĞLU, 2001) USING MITOCHONDRIAL GENE SEQUENCES

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## ABSTRACT

Anatolian vole *Microtus anatolicus* (Kryštufek and Kefelioğlu, 2001) was identified as a new and endemic rodent species from Konya, Cihanbeyli, Yapalı Village in Central Anatolia with 2n=60 diploid chromosome number, larger tympanic bulla and enlarged braincase compared to other *Microtus* species. However, molecular studies on *M. anatolicus* are really scarce and its taxonomic status is controversial. Therefore, in order to determine whether the Anatolian vole is a valid taxon and to reveal from which species it originates in Anatolia, comparative analyzes are needed, especially at the molecular level, with other *Microtus* species recorded from the same region. In this study, mitochondrial Cytochrome-*b* (*CYTB*) and Cytochrome c oxidase 1 (*COI*) genes were analyzed and phylogenetic relationships between *M. anatolicus* and *Microtus socialis* (Pallas, 1773), *Microtus mystacinus* (de Filippi, 1865), *Microtus hartingi* (Barret-Hamilton, 1903), *Microtus irani* (Thomas, 1921), *Microtus dogramacii* (Kefelioğlu and Kryštufek, 1999), *Microtus arvalis* (Pallas, 1779) and *Microtus guentheri* (Dandford and Alston, 1880) species were tried to be clarified. Phylogenetic dendrograms and genetic distance values showed that *M. anatolicus* separated from other *Microtus* species and was closer to *M. irani* and *M. socialis*. According to the obtained results, it can be suggested that *M. anatolicus* is a valid taxon distributed in Central Anatolia and originated from *M. irani/M. socialis* clade.

**Keywords**: Microtus anatolicus, Anatolian vole, mtDNA, Türkiye

# THE EFFECT OF DIFFERENT PROBIOTIC MIXTURES ADDED TO THE LAYERS' DIETS ON PERFORMANCE AND EGG QUALITY PROPERTIES

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## ABSTRACT

This study was conducted to determine the effect of adding two different types of probiotics and their mixtures to the diets of laying hens on performance and egg quality. In the study, a total of 105 laying hens at 59 weeks of age were fed with five different diets created by adding *Bacillus megaterium* (1x1010 cfu/g) and *Bacillus amyloliquefaciens* (1x1010 cfu/g) to the corn-soybean meal-based diet (positive control) and the diet containing 35% barley (negative control) at a level of 0.5 g/kg and equal amounts (0.25+0.25 g/kg) of these probiotics. The study was conducted for 43 days with 7 replicates in 5 treatment groups. As a result of the study, the initial body weight, final body weight, body weight change, feed intake, egg production, egg mass and feed conversion ratio of the treatment groups were statistically insignificant (P>0.05). Egg weight was significantly higher in groups containing *Baciillus megaterium* and *Bacillus amyloliquefaciens* compared to the positive control group (P<0.01). The rate of damaged eggs was higher in the group containing *Bacillus megaterium* than in both control groups (P<0.05). The addition of *Bacillus megaterium* and *Bacillus amyloliquefaciens* to laying hen diets did not significantly affect the lightness index (L*) and b* value from egg yolk color criteria, Haugh unit, shell breaking strength, egg shell weight, egg shell thickness and egg shell ratio examined while a* value was lower in all barley-containing groups (P<0.01). According to the results of the study, it can be said that adding both probiotics alone to the diet may be beneficial in terms of increasing egg weight in laying hens.

**Keywords**: Bacillus amyloliquefaciens, Bacillus megaterium, Performance, Laying hen, Egg quality

# FLEAS (SIPHONAPTERA) OF DOMESTIC AND WILD ANIMALS IN EXTREME NORTHEASTERN ALGERIA: FIRST INVENTORY , HOSTS AND MEDICAL IMPORTANCE

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## ABSTRACT

Fleas are an important member of the North African entomofauna. Surveys on the abundance, distribution, and hosts of these potential vectors of pathogenic bacteria are imperative tools for controlling and preventing epidemics. This study aimed to make an exhaustive list of the fleas (Siphonaptera) species and associated hosts in Algeria and debate their medical importance. To do so, an entomological survey was conducted on several animal species (goats, dogs, cats, rabbits, hedgehogs, and mongooses) in six El Tarf region locations in extreme northeastern Algeria. During the survey, flea specimens were collected straight on their hosts. They were then stored on alcohol and morphologically identified using phenotypic characteristics described in a specific taxonomic key. More than 1200 specimens were collected and identified; among them, four species: *Ctenocephalides felis, Ctenocephalides canis, Pulex irritans,* and *Archaeopsylla erinacei (s.l.)*. Goats and dogs were the most infested animals, followed by cats and hedgehogs. *Ctenocephalides felis* was the most prevalent flea among all infested animals, with 631 collected specimens, followed by *Pulex irritans* with 433 samples. Overall, this study represents the first inventory of flea species and updates the limited knowledge about their diversity in Algeria.

**Keywords**: fleas, hosts, inventory, diversity

# CHANGES IN THE NUTRIENT COMPOSITION OF RICE BRAN WITH THE USE OF RUMEN LIQUID IN SOLID STATE FERMENTATION

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## ABSTRACT

In this study, we aimed to improve the nutrient composition of rice bran, an agricultural waste product, through solid-state fermentation using rumen liquid as an inoculant. The research was conducted with five groups: Control (unfermented) and those fermented for one, three, five, and seven days, with three replicates in each group. Rice bran was ground to 1 mm in the laboratory and prepared for analysis. The rumen liquid used as an inoculant was obtained from 2-year-old cattle and prepared for analysis by filtration in the laboratory. Rice bran and nutritional salt were added to the fermentation medium and sterilized. The initial pH value of fermentation was then adjusted in the sterile medium using 1 *N* HCl. Rumen liquid was added to the fermentation medium at 1% per 100 g of rice bran, and the fermentation process began. Fermentation was carried out at 38 °C. The pH was measured in samples that completed the fermentation period. At the end of the study, the highest pH values were found on the first day ($P<0.001$). No difference was detected on other days of fermentation. Fermentation affected the nutrient composition of rice bran. The highest crude protein was found on the fifth day ($P<0.001$), the highest crude fat on the seventh day, and the lowest crude fiber and ash in fermented groups were found on the seventh day ($P<0.001$). Fermentation positively affected the nutrient composition of rice bran. The results indicate that fermenting rice bran with rumen liquid for five or seven days is effective.

**Keywords**: Rice bran, Solid-state fermentation, Nutrient composition, Rumen liquid

# SOLID STATE FERMENTATION OF PADDY WITH RUMEN LIQUID CAN POSITIVELY AFFECT NUTRITIONAL CONTENT

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## ABSTRACT

This study aimed to determine the effects of solid-state fermentation on the nutrient composition of paddy using rumen liquid as an inoculant. The study was divided into five groups: control, **1** 3, 5, and 7 days of fermentation, with three replicates per group, comprising 15 samples in total. Paddy was obtained from a local feed mill, ground to 1 mm, and prepared for analysis. Rumen liquid was collected from 2-year-old cattle and filtered in a sterile environment in the laboratory before being prepared for inoculation. After adding paddy and nutrient salt to the fermentation medium and maintaining 80% humidity, samples were sterilized by autoclave. The initial pH of the fermentation was adjusted with 1 *N* HCl in a sterile environment, and rumen liquid was inoculated at 1% per 100 g of paddy. The fermentation was carried out at 38 °C. After measuring the pH of the samples that had completed the fermentation period, the samples were dried at 60 °C and prepared for nutrient analysis. The highest pH value was determined on the first day and the lowest on the fifth day, and the difference was significant ($P<0.001$). The nutrient composition of the paddy was positively affected by fermentation. The content of crude protein, ether extract, and ash increased after five days of fermentation, and the difference was significant ($P<0.001$). The lowest crude fiber level was determined on the seventh day, and the difference was significant ($P<0.001$). In conclusion, the nutrient composition of paddy was improved by fermentation with rumen liquid. Based on the results, a five-day fermentation of paddy with rumen liquid was the most effective fermentation time.

**Keywords**: Paddy, Solid-state fermentation, Rumen liquid, Nutrient composition

# EFFECT OF USING PROBIOTICS SUPPLEMENTED WHEAT INSTEAD OF CORN IN THE DIET ON PERFORMANCE AND SLAUGHTERING CHARACTERISTICS OF BROILERS

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## ABSTRACT

The aim of this study was to determine the effects of diets using 1 g/kg probiotics supplemented 50 and 100% wheat instead of corn on the performance, carcass characteristics and visceral weight of broilers. In the study, a total of 120 male Ross 308 broiler chicks at the day-old were randomly allocated to 3 treatment groups with 4 replicates of 10 chicks each. Treatment groups were formed from diets using corn as a grain source (Wheat0), wheat with 1 g/kg probiotics added at the rate of 50% of maize (Wheat50), and wheat with 1 g/kg probiotics added at 100% of maize (Wheat100). Performance parameters were determined on the 10th, 25th and 42nd days, and carcass and visceral weights were determined at the end of the study (42nd day). Effect of using probiotics supplemented wheat in the diet on body weight, body weight gain, and feed intake of broilers was statistically insignificant ($P>0.05$). Compared the control group (Wheat0), 11-25th days for Wheat50 and Wheat100 groups, as cumulative for Wheat100 feed efficiency improved ($P<0.05$). Relative carcass decreased in Wheat50 group and relative abdominal fat decreased in Wheat100 ($P<0.05$). According to the results of this study, it was determined that the addition of probiotics and the use of wheat instead of whole corn (100%) in male broiler diets improved feed efficiency and reduced fattening.

**Keywords**: wheat, probiotics, broiler, performance, carcass

# WATERBIRD DIVERSITY AT A RAMSAR SITE (NORTHEASTERN ALGERIA)

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## ABSTRACT

During the annual cycle, the winter period is of vital importance for waterbirds. In this respect, Algeria is situated on one of the two main routes of the Eastern Atlantic Flayway, and the El Kala region with its complex of wetlands alone hosts almost 70% of all wintering Phalacrocoracids and Rallids in Algeria. Our study was carried out at the Ramsar site (Lac El Mellah), a wintering site for several species of waterbirds. Bimonthly monitoring of wintering species numbers and fluctuations during the study period, which ran from October 2022 to April 2023, was carried out using two counting methods: relative and absolute. The inventories carried out resulted in the census of 15 species divided into 08 families. The coot dominates, followed by the Great Cormorant and the Little Egret. The winter season is the most diverse and richest in waterbirds compared to the nesting period.

**Keywords**: Lake Mellah, waterbirds, distribution, fluctuation, inventory, wintering

# IMPACT OF HERD CHARACTERISTICS AND BREEDING PRACTICES ON THE REPRODUCTIVE PERFORMANCE OF DAIRY COWS IN NORTHEASTERN ALGERIA

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## ABSTRACT

The study investigated the effects of herd characteristics (breed, size, parity and study area) and husbandry practices (induced/ natural heats, flushing or not, and drying-off duration) on the fertility and fecundity rates of 721 Montbeliarde (n = 379) and Prim'Holstein (n = 342) dairy cows (DC) from 23 herds, born and bred in Algeria. Fertility parameters revealed an interval between calving and first heat of 86.8 ± 48 days, between calving and first artificial insemination (AI) of 108 ± 80.4 days, between first AI and fertilizing AI of 42.9 ± 85.2 days, between calving and fertilizing AI of 152 ± 116 days, and between calvings of 427 ± 122.8 days. A mean first AI success rate of 54.8% (DC) and 38.8 ± 20% (herd), an apparent fertility index of 1.83, and 19.3% DC inseminated three times or more (in 16.2 ± 11 of the herds) were recorded. Fertility was far from the objective. Breed had no significant effect on fertility ($p>0.05$), but reproductive performances varied varied significantly ($p<0.05$) with herd size, parity, study region, induced or natural heat, and whether or not flushing was practiced. Fecundity was significantly decreased in animals that had a drying-off period lower than 60 days ($p<0.05$). The extended waiting period is the major parameter that affects the reproductive performances of dairy cows in the study area.

**Keywords**: Milk cows, fertility, fertility, herd size, type of estrus, Algeria

# ALTERNATIVE ANIMAL PROTEIN PRODUCTION SYSTEMS WITHIN THE SCOPE OF COMBATING CLIMATE CHANGE IN TURKEY

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## ABSTRACT

In recent years in Turkey, agricultural production resources such as soil, water, pasturelands, etc. have been rapidly depleting due to various negative factors, primarily climate change. According to climate change scenarios by the General Directorate of Meteorology, droughts are expected at low to high levels across Turkey until the year 2099. Indeed, agricultural/animal production has been adversely affected by droughts and irregular rainfall in many regions in recent years. Since the early 2000s, numerous institutions in Turkey have been carrying out mitigation and adaptation efforts in agriculture regarding climate change. Particularly after the publication of the European Green Deal (December 1**1** 2019) and the signing of the Paris Agreement (Paris, France, 2015) (October 2021), these efforts have gained momentum. It is emphasized that the target and action plans to combat climate change in the livestock sector, at the global level, must also include models that ensure sustainable food security and safety. Therefore, in recent years, studies have intensified on the development of alternative animal production systems with low greenhouse gas emissions and better resilience against the adverse effects of climate change. Based on this perspective, this paper aims to discuss policies related to the development of alternative animal production systems in Turkey that have low greenhouse gas emissions and are adaptable to climate change.

**Keywords**: Climate change, food security and safety, alternative animal food production

# EXPOSURE ASSESSMENT OF SHEEP TO PESTICIDES IN ARID REGIONS ACCORDING TO THE LEVEL OF PHYTOSANITARY PRESSURE

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## ABSTRACT

Pets can be poisoned by exposure to pesticides through contamination of food and water sources. Namely, grazing animals that may be most exposed to the harmful effects of pesticides via their diet, and therefore serve as indicators of environmental exposure. Indeed, the activity of serum or plasma butyrylcholinesterase is a common tool for rapid detection of poisoning and a marker of the persistence of the toxicant in the body. The measurement of this is indicated as a witness of poisoning by anticholinesterase pesticides. The objective of this work is to measure the activity of serum butyrylcholinesterase in sheep fed with treated cereals and their by-products at the level of cereal farms in the region of Biskra and to use it as a bioindicator of poisoning by phytosanitary products applied to cereals in this region. The dosage of Butyrylcholinesterase activity reveals the presence of the inhibitory effect of this activity depending on the intensity of phytosanitary pressure. However, phytosanitary pressure seems to have an influence on this enzymatic activity even at moderate intensity. The results of the evaluation of the risk of exposure of sheep fed on a basis of treated cereals and their by-products is determined by the dosage of the activity of serum Butyrylcholinesterase according to the colorimetric method of Ellman, reveals the presence of inhibitory effect on the activity of Butyrylcholinesterase by the pesticides used with an inhibition rate greater than (20%) in the site with very high phytosanitary pressure. A strong dependence (r=0.80) links the level of phytosanitary pressure (PPI) and the rate of inhibition of Butyrylcholinesterase. In addition, a significant difference (P= 0.015) between the inhibition rates in the sites at different levels of phytosanitary pressure carried out by the student's t test, confirms the influence of phytosanitary pressure on the activity of Butyrylcholinesterase in sheep. However, the comparison of the means of serum Butyrylcholinesterase activity in the three levels of phytosanitary pressure with the value of this activity in sheep in the normal state showed a highly significant difference ($P < 0.0001$), which means that the level of phytosanitary pressure has an important influence on the activity of serum Butyrylcholinesterase in sheep. Therefore, we find that Butyrylcholinesterase activity appears to be a suitable biomarker for determining exposure of non-target animals to anticholinesterase pesticides in ecotoxicological and environmental studies.

**Keywords**: cereals, phytosanitary pressure, exposure, sheep, Butyrylcholinesterase activity, arid region

# ENHANCING REPRODUCTIVE PARAMETERS IN OUT-OF-SEASON OULED DJELLAL EWES THROUGH MELATONIN

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## ABSTRACT

One of the most remarkable features of ovine reproduction is its seasonality, which is mediated by photoperiod. Seasonal anoestrus reduces reproductive efficiency and hampers productivity; hormonal treatment to control ovulation and reproduction is a prerequisite for successful reproduction and increasing the number of pregnant females. The objective of this study was to evaluate the effect of using melatonin implants on reproductive parameters in Ouled Djellal ewes out of season. 18 mg of melatonin was administered subcutaneously to 45 ewes divided into two groups (treated group with 25 ewes and control group with 20 ewes). All ewes were bred together in the presence of 16 fertile rams. The results showed that the melatonin treatment significantly improved fertility rates (vs), fecundity (80% vs 45%), and prolificacy (1.30 vs 1).

**Keywords**: Melatonin, ewes, Ouled Djellal, reproductive fitness

# CHELIPED ANOMALY ACCORDING TO GENDER OF CARCINUS AESTUARI NARDO, 1847 DISTRIBUTED IN ÇARDAK LAGOON, ÇANAKKALE STRAIT

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## ABSTRACT

In this study, the anomalies of the cheliped morphometries of *Carcinus aestuarii* were to be determined. A total of 240 crabs were collected seasonally in Çardak Lagoon in June 2018, October 2018, February 2019 and May 2019. Crab individuals were collected from the lagoon area with traditional eel pinter. The morphometric measurements of the crabs (carapace width, right cheliped length and width, left cheliped length and width) were measured in mm using a digital caliper. The mean carapace width was calculated as 40.51±0.38 mm for females and 48.82±0.16 mm for males. The mean right cheliped length was calculated as 21.66±0.31 mm for females, and the mean left cheliped length was 19.98±0.29 mm. The length of the right cheliped was 30.5±0.51 mm, and the length of the left cheliped was 28.82±0.48 mm in males. It was observed that the right chelipeds were missing to a large extent in both males and females, and it was concluded that the left cheliped were generally small. A high degree of correlation was found between in females the width of the carapace and the width of the right cheliped ($r_s$= 0.754; $p<0.05$). It is thought that cheliped deficiency in female crabs may be caused by cannibalism and may cause adverse effects on nutrition.

**Keywords**: cheliped, anomaly, gender, Carcinus aestuarii, Çardak Lagoon, Çanakkale Strait

# INVESTIGATION OF MORPHOMETRIC VARIATIONS ON PTEROCHLOROIDES PERSICAE (CHOLODKOVSKY, 1898) (HEMIPTERA: APHIDIDAE) DEPENDS ON HOST PLANT PREFERENCES

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## ABSTRACT

The brown peach aphid *Pterochloroides persicae* distributes in Southern Europe, North Africa, Southwest and Central Asia, Indonesia, Turkey, India, and Pakistan. This aphid species cause serious damage to *Prunus* members (*Prunus persica, P. dulcis, P. domestica, P. armeniaca, P. salicina*). Although they show both holocyclic and anholocyclic life cycles, this species shows monoecious holocyclic life cycles in cooler climates. In recent years, it gradually widened its geographic distribution and prompted more financial destruction, becoming an important threat to peach and almond trees. So far, there is no study has been conducted in Turkey with *P. persicae* related to its host plant preference or agricultural importance. The speciation process of *P.persicae* populations might occur based on their host plant preferences. In this context, this study aimed to find out morphometric variations of *P.persicae* depending on host plant usage. The study was conducted in Adıyaman, Malatya, Şanlıurfa, Afyonkarahisar, Kütahya, Uşak, Antalya, Muğla, Karaman, Erzurum, and Nigde provinces, and the samples collected from *Prunus* spp. The 25 morphometric characters and 7 morphometric ratios were evaluated for statistical analyses from 228 aptera individuals of *P. persicae*. As a result of the study, 23 morphometric characters and 2 morphometric ratios were statistically important among populations. It was determined that host plant preference plays an important role in morphological variations observed in *Pterochlorides persicae* populations.
**Acknowledgment:** Authors thank to TUBITAK (Project number:115Z325, 119Z250) for partial support of the study.

**Keywords**: Morphological variation, Prunus spp, Pterochlorides persicae, Turkey

# COMPLEMENTARITY BETWEEN ATTACHEMENT MODE OF THE INTESTINAL PARASITES FROM DIPTURUS AND THE STRUCTURE OF THEIR MICROHABITAT

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## ABSTRACT

During a parasitical survey of Elasmobranchs Cestoda from the Algerian basin, the morpho-histological study of the intestinal microhabitat, established for the first time, reveals that the structure of the spiral intestine of *Dipturus batis* (Linnaeus, 1758) and *Dipturus oxirynchus* (Linnaeus, 1758) is formed by an internal layer lined with a membrane bearing numerous juxtaposed digitiform projections with very variable size and shape, which correspond to the villi. This structuring is remarkably complementary with the attachment mode of their *Echeneibothrium* Van Beneden, 1850 cestoda, where fixation is ensured mainly by bothridia. These devices either fold over the villi or envelop them partially or totally. This adaptive attachment mode ensures an immutable fixation and maintain these parasites efficiently in this dynamic microbiotope.

**Keywords**: Dipturus, Microhabitat, Villi, Cestoda, Echeneibothrium, Fixation, Complementarity, Algeria, Mediterranean sea

# MORPHO-HISTOLOGICAL STUDY OF THE COW OVARY DURING THE ESTRUS CYCLE

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## ABSTRACT

The objective of our work was to study principally the morphometric changes of the morpho-histological of the ovaries during the different stages of the estrus cycle in cows. The experiment was carried out on genital apparatus collected from slaughterhouses of the Algiers wilaya (Algeria). The determination of the estrus cycle stages was based on the presence and size of ovarian structures, particularly on size and color of the corpus luteum. The morphometric study revealed : 1/ an insignificant difference (13.48%; P>0.05) of the mean weight of the ovaries in favor to the right ovary; 2/ a significant difference (29.79%; p<0.05) of the mean weight of the ovaries in favor to the ovaries with a corpus luteum ; 3/ an insignificant difference (P>0.05) of the mean ovarian weight between the metestrus (11.72±4.33 g), dioestrus (12.98±1.27g) and proestrus (14.25 ± 3.15g) stage; 4/ the presence of a corpus luteum localized in 61.5% of cases in the right ovary. Histological examination showed a variable tissue organization of the corpus luteum depending on the stage of the estrous cycle. In the metoestrus stage, the number of small luteal cells was higher than for large luteal cells. In the dioestrus stage, the number was higher of large luteal cells than for the small luteal cells. In the proestrus stage, the regressing corpus luteum was characterized by a cellular disorganization, resulting in greater interstitial space, a decrease of luteal cells number and an increase of fibroblasts cells number between luteal cells and at the connective tissue septa level.

**Keywords**: Morphometry, histology, ovary, estrus cycle, cow

# DETERMINATION OF THE EFFECTS OF WIND POWER PLANTS ON BATS (MAMMALIA: CHIROPTERA) IN ÇANAKKALE

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## ABSTRACT

Bats (Chiroptera) are the only order of mammals (Mammalia) in the animal kingdom (Animalia) that are capable of flight. The mammal class is represented by 6,596 species in the world. Approximately 20% of these mammal species are bats. Bats in the mammal class are represented by **1**447 species. Due to their biological characteristics, bats play an important role in keeping insect populations in balance, pollinating plants and dispersing seeds. Except for one of the 39 species of bats living in Turkey (Rousettus aegyptiacus), these 38 species are nocturnal and active from early evening to early morning between April and September when they do not hibernate. Although electricity generation from wind is known as renewable and generally clean energy, many bird and bat deaths caused by wind farms have been recorded around the world. Bat mortality caused by wind power plants started to attract attention in 2003 when between 1400-4000 individuals died at the Mountaineer Wind Energy plant in North America. Monitoring studies were carried out in the spring and autumn periods for three years, before and after the installation, in order to determine the bat species found in the Üçpınar, Kocalar and Hasanoba Wind Power Plant sites of Akfen Holding located within the borders of Lapseki district of Çanakkale province, the activities of these species depending on time, wind and temperature, and to determine whether they are affected by the in-forest logging activities carried out for the wind power plant. In the studies conducted within the boundaries of three different wind power plant sites, similar species were found since Üçpınar and Kocalar WPP sites are located in the same region and close to each other. During the three-year study period at the WPP sites, the number of species detected decreased each year compared to the previous year. However, this situation does not fully reveal that bat species are negatively affected by wind turbines. Carcasses of endangered species were not detected in the carcass scans, and it is thought that these species moved away from the area and moved to alternative areas. With this study, it has been determined that the bat activities in two WPP sites close to each other in the same region and in regions with elevation differences and the effects of turbines in these regions on bat species are different. As a result of three-year monitoring studies conducted in three different WPP sites, it was determined that wind power plants directly or indirectly affect bats. In this respect, it would be more beneficial for bat species to establish wind power plants in low-risk areas with low bat activity.

**Keywords**: Bat, Echolocation, Wind Power Plant

# EFFECT OF TRIBOLIUM CONFUSUM'S TOXICATION INFESTATION ON AVENA SATIVA FOR HUMAN AND ANIMAL NUTRITION

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## ABSTRACT

Avena sativa, commonly known as oats, is a cereal grain that belongs to the family Poaceae and is grown for its edible seeds. Oats are a popular food worldwide and are commonly consumed as oatmeal or used in baked goods, granola, and other foods. Oats are rich in nutrients such as fiber, protein, vitamins, and minerals. They are particularly high in beta-glucan, a type of soluble fiber that has been shown to lower cholesterol levels and improve heart health. Oats also contain antioxidants, which can help protect against chronic diseases. In addition to their nutritional value, oats have been used in traditional medicine for their various health benefits. They are believed to have anti-inflammatory and anti-itching properties and may help improve skin health. Oats are also used as a natural remedy for anxiety, depression, and insomnia, but plant breeders have been working hard to incorporate resistance. The devastation caused by any one disease will depend upon the susceptibility of the variety being grown and the environmental conditions during disease development. Serious diseases of Oats include powdery mildew caused by Flour beetle (Tribolium confusum). The presence and adverse effects of certain toxic compounds in flour as a result of insect pest infestation during storage has been of growing international concern. Previous studies have indicated that flour extracted from Oats that has suffered infestation by insect pests such as Tribolium confusum could be affected in its nutritional, chemical and rheological characteristics. Fifty bowls, 2 kilogram, of flour were used filled with wheat flour 85 % extraction. 40 larvae of Tribolium confusum were put into each bowl and 20 jars, for 2 months at 25 0C and 50% of relative humidity. At the end of this period, all samples were sieved to recover the insects and then analyzed. Mutagenic and Carcinogenic compounds, increased by the rate of 28831.187 and 28.82% compared to 1.4687 and 3.09% for the uninfected samples, respectively.

**Keywords**: Avena sativa, Insects' infestation, Flour beetles, Mutagenic and Carcinogenic

# COMPARATIVE METHODS FOR DETECTION OF SUBCLINICAL MASTITIS AT DAIRY COWS IN ORDER TO IMPROVE MILK QUALITY

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## ABSTRACT

The control of the health status of the udder is a significant element for obtaining a hygienically and safety milk. The aim of our research was to make a comparative analysis of the methods for determining subclinical mastitis, such as CMT and somatic cell count (SCC/mL) in comparison with electrical conductivity (EC) and lactose as an indirect method for detection of subclinical mastitis. It was determined that by increasing the number of somatic cells in milk (SCC/mL), the percentage of lactose in milk decreases from 4.80% to 4.13%, and the electrical conductivity increases from 4.21 mS/cm to 4.95 mS/cm. The number of somatic cells obtained using the MKC EN ISO 13366-2:2010 method was taken as a standard method for determining the somatic cells in milk, and based on these results, the sensitivity of the other methods was further determined. The results indicate that the California mastitis test (CMT) has 57% sensitivity and 88% specificity, while measuring the electrical conductivity (EC) has a sensitivity of 82% and a specificity of 50%. Whereas the sensitivity of the lactose is 79%, and the specificity is 60%. The sensitivity of the test, the so-called true positive rate, or probability of detection, expresses the percentage of correctly identified infected quarters. According to this with determination of EC and the percentage of lactose, more reliable results are obtained compared to the CMT test. On the other hand the specificity of the test, the ability to detect all negative samples, i.e. healthy cows, better results were obtained with the CMT test.

**Keywords**: mastitis, California mastitis test (CMT), electrical conductivity (EC), lactose

# THE EFFICIENCY OF USING THE PARAMETRIC AND NON PARAMETRIC INDICES AS INDICATORS OF BREAD WHEAT GENOTYPES (TRITICUM AESTIVUM L.) GRAIN YIELD STABILITY UNDER RAINFALL CONDITIONS.

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## ABSTRACT

The aims of this study are the selection of adapted and stable bread wheat genotypes based on the using of some parametric and non-parametric index. To calculate the parametric and non-parametric index we use the program STABILITYSOFT. The values of the coefficient of variance (CVi) classified G1 and Hidhab as the most recommended genotypes. The association between Wricke's ecovalence ($Wi^2$), the mean variance component ($\theta_i$) and the Stability variance ($\sigma^2_i$) indices with the grain yield proved that the best genotypes for growing under these conditions are G**1** G2, Hidhab, Arz, Wifak and Ain Abid. In addition, the selection based on the non-parametric index and the combination selection based on highest grain yield with the parametric and non parametric indices proved that the genotypes G**1** G2 and Wifak are the more stable and adapted genotypes under semi-arid conditions. In addition, based on the static and dynamic concepts, the parametric indices bi and CVi are related to the dynamic concept, while the other indices are associated with static stability concept. Overall, the results of this study confirmed that the parametric and Non-parametric methods are the suitable tools to identify the most stable bread wheat genotypes at various environmental conditions.

**Keywords**: Bread wheat, Stability, Parametric, Non-parametric, Grain yield.

# PERFORMANCE OF TEA (CAMELLIA SINENSIS L.) VARIETIES UNDER DIFFERENT SOIL MEDIA

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## ABSTRACT

The research work was carried out at National Tea & High Value Crops Research Institute, Shinkiari, Mansehra, Pakistan to check the performance of different tea varieties under different soil media at nursery stage. The experiment was laid out on Randomized Complete Block Design having three replications. Experimental material comprises of three tea varieties (JueKing, Qimen and Japanese) and four soil media (FYM, tea waste, clay and sand). The data was recorded on days to germination, plant height (cm), number of branches per plant, root length (cm), shoot length (cm), stem diameter (mm), root-shoot ratio, inter-node distance (cm), number of primary shoots per bush, leaves per bush, leaf width (cm), leaf length (cm), fresh plant weight (g) and dry weight of the plant (g). The results of the study showed that the varieties of tea were significantly different for the most parameters except days to germination. Maximum plant height (21.41 cm), number of branches per plant (5.08), root length (9.50 cm), shoot length (21.41 cm), leaf width (3.00 cm) and leaf length (6.01 cm) were recorded for variety Qimen. While, maximum stem diameter (2.22 mm), root-shoot ratio (0.25: 0.41), inter node distance (1.47 cm), number of primary shoots per bush (5.67), leaves per bush (5.67), fresh plant weight (1.51 g) and dry weight of plant (0.66 g) were recorded for variety JueKing. Whereas, minimum days to plant height (17.75 cm), number of branches per plant (3.58) and root length (7.41 cm), shoot length (17.75), stem diameter (1.85 mm), root-shot ratio (0.18: 0.30), number of primary shoots per bush (3.97), leaves per bush (3.97), leaf width (2.30 cm), leaf length (4.61 cm), fresh plant weight (1.11 g), dry weight of plant (0.48 g) were recorded for Japanese variety. The variety Qimen is best suited to be grown at soil media farmyard manure under the agroclimatic conditions of Shinkiari Mansehra.

**Keywords**: Tea; farmyard manure; tea waste; growth

# EXOGENOUSLY APPLIED SULFUR AND ZINC IMPACT ON GROWTH AND YIELD OF SUNFLOWER HYBRIDS

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## ABSTRACT

Zinc (Zn) and sulfur (S) are essential elements and plays an important role in enhancing the yield and quality of oilseed crops. The research study was conducted to evaluate the effect of exogenously applied sulfur and zinc on growth and yield of sunflower hybrids. The experiments were laid in RCBD having 3 factor factorial arrangements with three replications (Factor 1 = Sunflower hybrids [H1 = PARSUN-**1** H2 = PARSUN-3], Factor 2 = Sulphur levels (S1= 0 kg ha-**1** S2 = 20 kg ha-**1** S3 = 40 kg ha-**1** S4 = 60 kg ha-1), Factor 3 = Zinc levels (Zn1 = 0 kg ha-**1** Zn2 = 10 kg ha-**1** Zn3 = 15 kg ha-**1** Zn4 = 20 kg ha-1). Results revealed that application of Sulphur @ 60 kg ha-1 resulted in maximum plant height (159.6 cm), number of leaves plant-1 (27), fresh and dry weight (1324.6 and 357.3 g respectively), crop growth rate (17.1 g m-2 day-1), Number of achenes head-1 (1290), thousand achene weight (52.3 g), biological and grain yield (12489.5 and 2907.1 kg ha-1), oil content (44.6%), protein content (22.1%), oleic acid content (32%) and linoleic acid content (54.7%). Higher zinc concentration also resulted in improved growth and yield of sunflower hybrids. Zinc @ 20 kg ha-1 improved plant height, grain yield, biological yield, oil and protein content. Higher zinc concentrations resulted in lowering palmitic acid content (6.1%) and stearic acid content (3.3%). Sunflower hybrid Parsun-3 resulted in maximum growth, yield and quality as compared with Parsun-1. It has been concluded from the research work that sunflower hybrid Parsun-3 showed promising results regarding growth, yield and quality. Application of Sulphur significantly enhanced production of sunflower as well as its oil quality and application of zinc resulted in improved growth, maximum grain yield, enhanced quality of sunflower seeds as well as oil.

**Keywords**: Fatty acid profile; grain yield; biological yield; protein content.

# EVOLUTION OF SUNFLOWER YIELD IN THE REPUBLIC OF MOLDOVA IN THE CONTEXT OF CURRENT CLIMATE CONDITIONS

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## ABSTRACT

Current climate change affects agricultural production worldwide. In this context knowledge of relationships between the temperature variation and changes in the precipitation profile are useful for agricultural planning and design of adaptation measures. Here, we analyse crop yield and weather available datasets to evaluate the effect of climate variables on sunflower yield in the Republic of Moldova during 2003–2021. Practically a half of the years from the last two decades were the warmest during the period of 1871-202**1** which reveals the acceleration of warming at the level of the Republic of Moldova. The average amounts of precipitation during sunflower's vegetation period ranged between 315 and 410 mm in the Northeast Moldavian Plateau area and between 290 and 335 mm in the southern half, being sufficient to cover the water needs of the crop. It has been established that the main problem is not the amount of precipitation, but their distribution during the year - absence of precipitation for a long period followed by occurrence of extreme precipitation events. Due to sunflower's great ability to adapt to warmer and drier weather, the effects and consequences of climate change are less obvious in this species compared to other crops. According to the Mann-Kendall test, sunflower yield showed a positive statistically significant trend. In the last five years, the average values ranged between 2,11 and 2,53 t/ha, with the highest values in the northern part of the country. It is found that the analyzed climate variables, in particular, the amount of precipitation during the vegetation period, explain a maximum of 30% of the variation in sunflower yield, indicating that the productivity of the crop is probably attributed to other factors, such as soil fertility, planting data, agricultural technologies, control of weeds, pests and diseases etc. A different situation was observed in the years with extreme droughts. Thus, the regression analysis of the data set from the years with severe drought (2007, 2012 and 2020) revealed an essential influence of climate factors on crop productivity. Results show that the climate variable can explain overall 57-69% of the variation in sunflower yield, the determinant factor being air temperature. So, high negative correlations (*r=-0,83; - 0,72* and *-0,75*) between temperature and yield was found. The seed yield has decreased substantially, by 37-50% depending on the hydrometeorological conditions of each year.
**Acknowledgments**: This work was supported by the research project 20.80009.5107.01 „Genetico-molecular and biotechnological studies of the sunflower in the context of sustainable management of agricultural ecosystems", funded by the NARD.

**Keywords**: sunflower, yield, climate change, climate variables

# EFFECTS OF CYCOCEL (CCC) DOSES AND APPLICATION STAGES ON YIELD AND YIELD COMPONENTS OF MUNG BEAN (Vigna radiata ( L.) Wilczek)

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## ABSTRACT

The aim of this study was to reveal the effects of different cycocel doses and application stages on yield and yield components in mung beans. The field experiment was conducted in Adana, Turkey during summer season of 2020 and 2021. Experimental design was split plots based on randomized complete blocks with three replications. The main plots were application stages (seedling and beginning of flowering) and sub-plots were cycocel doses (0, 500, 750, 1000 ppm). In present study, KPS1 excotic genotype was used as a research material. As mean of the years the highest pods per plant, branches per plant, seed weight per plant were observed at 1000 ppm CCC. Cycocel application reduced the plant height and the first podding height. According to combined analysis, greatest seed yield was produced by cycocel application of 1000 ppm with 2530 kg ha-1 at seedling stage while minimum seed yield was found in control dose (no cycocel) at seedling stage with 1944 kg ha-1.

**Keywords**: Cycocel, Mung bean, Seed yield, Yield components

# GAMETOPHIC SELECTION AND BIOMETRIC INVESTIGATION OF GENETIC DIVERSITY IN THE ANNUAL MEDICAGO SPECIES UNDER NACL STRESS

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## ABSTRACT

To select tolerant and sensitive ecotypes; a selective pressure was applied to seven ecotypes of annual species of the genus *Medicago*. To do this, we measured at the gametophyte stage, the germination rate of pollen grains and the length of pollen tube growth under various concentrations of NaCl (0.4%, 0.6% and 0.8%). The results of biometric approach for both parameters germination rate and pollen tube length, the ecotype Acl209 appeared the most tolerant, and the ecotype Cil252 is the most sensitive. The ANOVA analysis of the measured characters in haploid stage noted the existence of genetic diversity for tolerance to salt stress in this stage. We would consider the possibility of applying the gametophytic selection for this trait in others legume species.

**Keywords**: Medicago - salt stress- - gametophyte – tolerance- germination rate- pollen tube length

# SEMI-ARID-HABITAT-ADAPTED PLANT-GROWTH-PROMOTING RHIZOBACTERIA ALLOWS EFFICIENT WHEAT GROWTH PROMOTION

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## ABSTRACT

Plant-growth-promoting bacteria (PGPR) are exogenous bacteria introduced into agricultural ecosystems that positively affect plant development and are an ecological alternative to the use of chemicals in agricultural production. This study highlights the effect of two PGPB strains *Pantoea agglomerans* Pa and *Bacillus thuringiensis* B25 individually or in consortium on the growth of two durum wheat varieties Bousselam and Boutaleb, and on the composition, the diversity and functionality of the bacterial community of the cultivable rhizosphere. Inoculation was carried out by coating the seeds with cellulose carboxymethyl.The survival of strains on seeds during storage in the rhizosphere and in roots was assessed.The results showed that germination was not affected by inoculation, while morphobiochemical parameters are improved by inoculation, in a sterile compost, where increases of more than 24.78% in root length, 60% in the fresh weight of the roots and 45% in the dry weight of the leaves and roots of Boutaleb were observed. Chlorophyll a, total and carotenoïdes pigment levels were significantly increased, mainly in Bousselam. While those of proline and MDA were greatly reduced by inoculation in the same variety. In non-sterile soil, inoculation with Pa and B25 strains improved leaf and root lengths by more than 22%, and fresh leaf and root weight by 30% in Bousselam. Inoculation also increased chlorophyll pigments and total sugars in both varieties, and decreased proline and MDA levels in Bousselam leaves. The effect of inoculation and co-inoculation on the bacterial density of the cultivable community was negligible, while the diversity of the rhizobacterial and endophyte population with PGP activities (AIA production, ACC deaminase and siderophores, nitrogen fixation and phosphate solubilization) has been significantly improved.

**Keywords**: PGPR; inoculation; durum wheat; germination; plant growth; seed coating

# CRITICAL EVALUATION OF BIOCONTROL ABILITY OF BAYOUD INFECTED DATE PALM PHYLLOSPHERIC BACILLUS SPP. SUGGESTS THAT IN VITRO SELECTION DOES NOT GUARANTEE SUCCESS IN PLANTA

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## ABSTRACT

The vascular wilt of date palm (Phoenix dactylifera L.), also known as Bayoud and caused by Fusarium oxysporum f.sp. albedinis (FOA), is the most destructive disease in North Africa. The disease has resulted in huge economic losses due to declining crop yield and quality. The use of potential biocontrol agents is a sustainable and environmentally friendly strategy compared to synthetic fungicides. The use of date palm-associated microflora for the screening of native antagonistic bacteria with potential applications is the most promising way to control this disease. Thus, the epidemic palm groves (in the valley of M'zab-Ghardaia-Algeria) were chosen for the isolation of rhizospheric bacteria and endophytes from the soil and roots of healthy or infected plants. A total of 8 bacterial isolates (83, 84, 300, 333, 322, 260, 249, and 227) selected from 75 FOA-active strains, showed strong activity against several strains of FOA and other major plant pathogens. Their phylogenetic identification proved they belong to the genus Bacillus (*Bacillus* sp., *B. subtilis*, *B. atrophaeus*, *B. halotolerans*, *B. amyloliquefasiens*, and B. paralicheformis). Bacterial cultures and a cell-free culture supernatant tested alone or in co-culture showed FOA inhibitory activity. However, the effect of the co-culture did not show any synergy in both cases. Unlike diffusible compounds, volatile organic compounds did not show a significant antifungal ability. To evaluate the biocontrol effect in vivo, germinated seeds of date palm were treated with bacteria, infected with the pathogen, and then incubated for 45 days at room temperature in the dark. The majority of the strains tested showed moderate fungistatic effects and the protection rate reached an average of 60%. In particular, promising results were obtained with B. paralicheniformis strain 260 which significantly protected palm seeds up to 85%, compared to its in vitro test where a low inhibition rate (27.77%) was recorded.. Furthermore, these bacteria have shown other potentialities to improve plant growth and resist stressful conditions. Thus, an effective biocontrol agent must combine several beneficial characteristics to be used successfully in situ. In this respect, Bacillus remains the best candidate for biological control.

**Keywords**: Phoenix dactylifera; Bacillus; Fusarium oxysporum f.sp. albedinis; Bayoud disease; secretome; volatilome; antagonism; PGP activities

# FEASIBILITY OF SAFFRON (CROCUS SATIVUS L.) CULTIVATION IN AEGEAN REGION, TÜRKIYE

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## ABSTRACT

In the past few years, an increasing interest in saffron **(***Crocus sativus* L.) **c**ultivation has been observed due to its high economic value and low requirements to agronomical inputs. Based on this, a study was done to investigate the climatic parameters in Aegean region (Türkiye) for the development of saffron cultivation using spatial analysis of geographic information system (GIS). Some climatic parameters including annual rainfall, annual average temperature, minimum temperature, maximum temperature, sunshine hours, relative humidity and number of frost days were chosen for saffron-land suitability analysis in Aegean region. This climatic data was obtained from metrological stations located within the study area. The total data was averaged from 1991 to 2020. In this research, the climatic requirements of saffron were determined and classified based on scientific sources and the opinions of local experts. The final land suitability map indicated that the most suitable areas for growing saffron were located in the south, central and western Aegean region. Also, in the viewpoint of the number of frost days, the north of this region was located in non-suitable zone especially Kütahya. The results highlighted that in the areas with limited saffron production potential across the region, the main limiting features were number of frost days and minimum temperature. In general, development of saffron cultivation is possible in the southern part of Aegean region especially İzmir and Denizli. In addition, Aydın, Manisa, Uşak and Muğla provinces were classified as moderately suitable zone. These results can be useful as a planning support tool for decision makers and farmers to determine feasibility of saffron cultivation in Aegean region.

**Keywords**: Aegean, Climatic parameters, GIS, Saffron

# AMMI ANALYSIS FOR YIELD PERFORMANCE IN MAIZE MULTI-ENVIRONMENT TRIALS GROWN IN CROATIA AND TURKEY

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## ABSTRACT

Genotype by environment interaction (GEI) analysis can help in understanding how different crop varieties respond to diverse environmental conditions leading to the development of more resilient and productive crops. No comprehensive GEI analysis was published in maize grown parallel in multi-environment trials in Croatia and Turkey. GEI decomposition was carried out by the Additive Main effect and Multiplicative Interaction (AMMI) model. The AMMI analysis was based on full orthogonal matrix with 22 hybrids over 18 environments. Missing values were imputed using an expectation maximization algorithm based on singular value decomposition (EM-SVD) The AMMI analysis was based on the methodology where the GEI is partitioned to signal (GEIS) and noise (GEIN) based on analysis of variance. According to the positioning of hybrids in AMMI**1** the hybrid P1921 could be designated a “work-horse” type of hybrid displaying static stability with above average performance over the assessed environmental scenarios. Contrarily, the hybrid Albayrak, showing significant positive GEI response to increasing environmental quality could be designated as a “race-horse” type of hybrid displaying dynamic stability, with above average performance, but best performance in best environments. Our study demonstrates the ability to efficiently carry out hybrid breeding for very diverse agricultural areas (hot, water managed vs. temperate, rainfed), based on breeder’s expertise combined with sufficient genetic diversity and proper GEI analysis.

**Keywords**: GEI, adaptation, fitness, maize

# INFLUENCE OF MANUAL SEEDING MODES AND MECHANICAL SEEDING DOSES ON THE NITROGEN LEVELS OF THREE VARIETIES OF QUINOA

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## ABSTRACT

Quinoa is a pseudocereal native to Latin America cultivated since the civilization of the Incas. It is characterized by its high nutritional value and its great adaptive power to agro-ecological conditions. Quinoa was officially introduced in Algeria in 2014. The aim of this work is to study the effect of three manual sowing methods (pocket, row, line) and three doses of mechanical sowing (D**1** D2, D3) on the nitrogen and protein levels in the seeds of three varieties of quinoa (Giza; black quinoa; quinoa 105). This study was based on the kjeldahl method applied to cereals. Our results reveal that the seeding dose has no significant effect on the nitrogen rate and therefore on the protein rate. Regarding the variety effect, we found that there is a significant influence. So, to have quinoa grains richer in protein, you have to choose the variety that gives the highest nitrogen rate. On the other hand, the manual sowing methods have no effect on the rate of nitrogen and protein in the seeds of quinoa, as well as the varieties. However, consideration should be given to the influence of vegetation density directly related to seeding rates which may promote higher protein levels in quinoa a and to nitrogen fertilization which may also contribute to higher protein rates. nitrogen and therefore the protein level. Therefore, farmers interested in improving the rate of protein or nitrogen in quinoa should undertake technical support measures (irrigation, fertilization, phytosanitary treatment) and review the methods and doses of sowing used. Finally, we draw attention to the advantages of mechanical sowing in terms of saving quinoa seed.

**Keywords**: Quinoa, mechanical seeding rate, manual seeding method, nitrogen, protein, variety

# IMPACT OF GROWTH REGULATORS ON SPAD READINGS IN SESAME (SESAMUM INDICUM L.)

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## ABSTRACT

The SPAD-502 meter is a widely used instrument for the quick, precise, and safe measurement of chlorophyll content in leaves. It provides relative SPAD meter readings that exhibit a direct correlation with the chlorophyll content This study aimed to examine the response of two sesame cultivars, Muganli-57 (shattered capsule type) and PI 599446 (non-shattered capsule type), to treatments of paclobutrazol (C15H20ClN3O) and mepiquat chloride (C7H16ClN). The primary objective was to assess the impact of these growth regulators on leaf chlorophyll content, an indicator of leaf greenness. The findings showed that the application of paclobutrazol treatment led to a noticeable reduction in chlorophyll levels (42.2) in comparison to the control group (46.2). Similarly, the mepiquat chloride treatment demonstrated a reduced chlorophyll concentration (44.1), whereas the treatment combining paclobutrazol and mepiquat chloride (39.1) exhibited a significant negative effect on chlorophyll level compared to the control group (46.2). The results of this study indicated that the application of paclobutrazol, mepiquat chloride, and combined treatments leads to a moderate reduction in chlorophyll synthesis in comparison to the control group. There is also a need additional research to understand the molecular and physiological mechanisms of photosynthetic activity with the use of plant growth regulators.

**Keywords**: Chlorophyll, Growth regulators, Sesame, SPAD

# DEVELOPMENT AND VALIDATION OF INDEL MARKERS IN SORGHUM

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## ABSTRACT

Sorghum (*Sorghum bicolor* (L.) Moench) is a diploid C4 cereal crop which is predominantly self-pollinated. It is a model crop with multiple uses, including food, feed and fuel. Sorghum was domesticated in Africa and it is currently the fifth major cereal produced in the world. In sorghum breeding, the use of molecular markers for genetic analysis and manipulation of agronomic traits is an increasingly useful tool for sorghum improvement. They are frequently used in the genotyping of plant material to map QTLs and evaluate population diversity. Molecular markers based on insertion-deletion (InDel) are currently the most widely used polymorphisms, known for their codominance and genome-wide distribution. They are easy to use, PCR-based and suitable for low-cost gel-based genotyping. From this perspective, this study was aimed to develop and validate InDel markers by bioinformatics analysis of DNA sequencing data associated with the double digestion restriction site (ddRADSeq) of 11 sorghum genotypes from different origins. DNA isolation was performed with the CTAB protocol and the resulting sequences were used for analysis. All 47 InDel sites with length ≥ 10 bp were developed. To validate these InDels, a total of 19 InDel regions were selected and primers were successfully amplified. After amplification, 16 genotypes were used in validation. This research shows that sequencing technologies can facilitate the development of genome-wide molecular markers. These agarose-resolvable InDel markers are expected to be useful for sorghum breeding studies in the future.

**Keywords**: ddRADSeq, DNA, population diversity, QTLs

# ASSESSMENT OF GERMINATION AND SEEDLING DEVELOPMENT OF SOYBEAN UNDER DIFFERENT LEVELS OF SALINITY.

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## ABSTRACT

Salinity is one of the significant abiotic stress factors that has detrimental effects on plant growth during germination and early seedling stages. The global prevalence of high salt concentration has transformed salinity into a serious problem, impacting vast expanses of land worldwide, including 2.5% of rain fed areas and more than 19% of irrigated area soils. In this study, early-stage seed development and germination performance of six soybean genotypes were investigated at various sodium chloride (NaCl) concentrations, including 200 mM, 150 mM, 150 mM, 50 mM, and 0 mM (control). The parameters considered for measurement included relative injury rate, mean germination time, germination index, germination percentage, water uptake percentage, seedling height reduction. Among these parameters, seedling height was highly affected with up to 72.58% reduction in 200 mM, followed by fresh weight and water uptake percentage. The mean germination time and relative injury rate the lowest variation at different salt concentrations. By assessing these characters, a comprehensive understanding of the effects of salinity on soybean genotypes can be obtained. In conclusion, the study suggests that seedling traits are a reliable way to identify genotypes with increased tolerance to salinity stress.

**Keywords**: NaCl, tolerance, germination, salinity, salt stress

# ASSESSMENT OF HEAT TOLERANT BREEDING LINES FOR CLIMATE RESILIENCE BREEDING: A PHYSIO-BIOCHEMICAL APPROACH

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## ABSTRACT

Heat stress is a major impact of climate change that limits potato yield and quality. Climate-resilient plant breeding is imperative to develop heat-tolerant cultivars that adapt to current and future heat stress. The current study evaluated 29 potato genotypes to high temperatures under field conditions to identify heat-tolerant potato breeding lines using a physio-biochemical approach. Heat and control treatments were laid out in split plots and randomized complete blocks with four replications. Heat treatment was applied from planting to harvest by creating a high-temperature gradient using a transparent plastic tunnel. The physio-biochemical traits evaluated include photosynthetic rate (Pn), transpiration rate (Trn), stomata conductivity (SC), leaf chlorophyll (SPAD), leaf temperature (CT), leaf area index (LAI), relative water content (RWC), proline, hydrogen peroxide (H2O2) and malonaldehyde (MDA). All potato genotypes showed differential responses to heat stress. LAI, CT, SPAD, Pn, Trn, and SC were significantly ($p \leq 0.05$) impacted by heat stress. Heat stress significantly affected secondary metabolites hydrogen peroxide (H2O2) and malonaldehyde (MDA). RWC and proline were not adversely affected by heat stress. 4 PCs accounted for 67.69% of the total variation for LAI, CT, SPAD, RWC, Pn, Trn, SC, proline, H2O2, and MDA. Physiological selection tools (LAI, CT, SPAD, PN, SC, and Trn) and biochemical selection tools (H2O2 and MDA) may be useful in heat-tolerant potato breeding. Genotypes MEÇ08, MEÇ12, MEÇ13, MEÇ16, MEÇ17, MEÇ19, MEÇ20, MEÇ22, and MEÇ24 expressed heat tolerance behaviour based on their physio-biochemical traits response. These resistant potato breeding lines could be used by potato breeders to develop heat stress tolerance. A climate-resilient breeding program for potatoes could use the results of this study to develop potatoes with features ideal for heat-stress environments.

**Keywords**: potato, breeding line, physio-biochemical, climate-resilient breeding, heat stress

# MULTI-ENVIRONMENT EVALUATION REVEALS IMPACT OF GENOTYPE BY ENVIRONMENT INTERACTION ON THE QUALITY TRAITS OF ADVANCE POTATO BREEDING LINES.

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## ABSTRACT

Quality traits are essential industrial attributes for consumer preferability. Environment plays a significant role in potato quality traits due to its interaction wif genotype. dis study evaluated the effect of genotype-by-environment interaction on quality traits of 6 advanced potato breeding lines and 4 commercial cultivars. The study was conducted in a randomized complete block design wif 4 replications in 2019 (Sivas, Niğde, Konya), 2021 (3 locations in Niğde), and 2022 (3 locations in Niğde). Genetic variation and genotype by environment interaction showed significant variation (P< 0.001). Except for French fries, the environment had a significant (P< 0.01) impact on dry matter content (DMC), specific gravity (SG), starch content (STC), and chips quality. The 6 improved breeding lines and two standard cultivars (Petek and Zirve) produced tubers wif > 1.080 gcm-3, > 20% and > 18% specific gravity, dry matter, and starch content, respectively, that were suitable for French fries and chips processing, while two standard cultivars (Agria and Russet Burbank) produced tubers wif <1.080 gcm-3 specific gravity and < 20% dry matter content. Tuber starch content was highly expressed by specific gravity and dry matter content wif a strong correlation of r>0.99 and r=0.62 respectively. Dry matter content also has a strong correlation of r=0.63. PCA biplot analysis revealed a very strong positive correlation between quality traits (DMC, SG, and STC). There was a low or no correlation between French fries, chips and the DMC, SG and STC. 71.5% of the variation in tuber chips, French fries, dry matter content, specific gravity, and starch content was explained by the first 2 PCs. The results suggest that selecting potato varieties wif high tuber quality, it can be beneficial to measure tuber-specific gravity. Since genotype x environment interaction impacts specific gravity, dry matter content, and starch content, it is imperative to test varieties across locations for high-performance and widely adaptable cultivars that can benefit producers, processors, and consumers.

**Keywords**: Potato, breeding line, quality trait, environment, genotype by environment interaction

# FIRST EVIDENCE OF THE INSECTICIDAL EFFECT OF LAVANDULA MAIREI (VAR. ANTIATLANTICA) ESSENTIAL OIL AGAINST SITOPHILUS ORYZAE (COLEOPTERA: CURCULIONIDAE)

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## ABSTRACT

*Lavandula mairei* Humbert *Var. antiatlantica* is an exclusive and scarce plant variety native to the southern region of Morocco. Its historical usage in various domains of Moroccan traditional medicine for treating diverse ailments has been well-documented, although, no insecticidal reports was elucidated. The primary objective of our study was to assess the insecticidal activity of *Lavandula mairei* essential oil on *Sitophilus oryzae* adults using two distinct exposure methods: fumigation and topical application. The essential oil was obtained by hydrodistillation of the aerial part. To evaluate its insecticidal potential, we conducted bioassays using a fumigation chamber consisting of a 120 ml plastic container to assess fumigant toxicity. Additionally, we tested contact toxicity by directly applying the essential oil to the insects' bodies. The mortality rate was recorded for both bioassays at 24, 48, and 72h of exposure, and probit analysis was used to calculate LC50. Our investigation unveiled that *Lavandula mairei* essential oil demonstrated a substantial yield of 1.13%. Moreover, it exhibited remarkable insecticidal activity against adult Sitophilus oryzae in both fumigation and application bioassays. In the fumigation bioassay, the EO achieved an impressive mortality rate of 78% at a concentration of 66.66 µl/L of air after a 72-hour exposure period. Similarly, in the topical application bioassay, a concentration of 9 µL/mL resulted in a significant mortality rate of 76% after 3 days. Furthermore, the LD50 values for fumigant and topical application were determined to be 142.9µL/L of air and 9.1µL/mL, respectively, after 24 hours. Notably, these values decreased significantly to 83.4 µL/L of air and 6.4 µL/mL, respectively, after 72 hours, indicating an enhanced insecticidal effect over time. This study represents the first empirical evidence of the insecticidal activity of Lavandula mairei essential oil, and it advocates for its potential use as a bio-insecticide in managing stored products to combat pest insect invasions.

**Keywords**: Essential oil, Lavandula mairei (var. antiatlantica), Sitophilus oryzae, Fumigation, Topical application

# EFFECT OF HETEROSIS ON SOME BIOMETRIC CHARACTERISTICS AND GRAIN YIELD OF MAIZE HYBRID KNEJA 435

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## ABSTRACT

The heterosis is the most commonly used method in maize breeding. In competitive field trial the effect of heterosis on some biometric characteristics and grain yield of maize hybrid Knezha 435 and its parent components was determined. We didn't find significant differences between biometric characteristics for parental inbred lines, but there was significant exceeding for hybrid plants of F1. Strong heterosis effect was found for grain yield. The grain yield obtained from the hybrid was two times higher as compared to the parental inbred lines.

**Keywords**: maize, heterosis, grain, yield

# VALORIZATION OF THREE AROMATIC PLANTS (ROSMARINUS OFFICINALIS, SALVIA OFFICINALIS AND THYMUS CAPITATUS): INSECTICIDAL AND ALLELOPATHIC EFFECTS

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## ABSTRACT

This study deals with the valorization of three aromatic plants: *Rosmarinus officinalis* (rosemary), *Thymus capitatus* (thyme) and *Salvia officinalis* (sage) through the assessment of their insecticidal and allelopathic effects. Aqueous extracts retrieved from dried leaves of each species were used to test their insecticidal effect against *Oulema spp*. and their allelopathic potential on *Hordeum vulgare* variety 'Manel' at the concentrations of 15 g/l, 25 g/l and 50 g/l. The screening of the insecticidal activity was carried out on *Oulema spp* larvae (second instar) and adults aged between 24 and 48 hours. The results showed that the aqueous extract of the three aromatic plants have a significant ($p<0.05$) insecticidal effect against larvae and adults compared to the control (distilled water). Indeed, the highest larval mortality rate (69.30%) was obtained with the sage aqueous extract at the concentration of 15 g/l. However, in case of adults the highest mortality (46.66%) was obtained with aqueous thyme extract at the concentration of 50 g/l. Calculation of the 50 and 90% lethal concentration showed that aqueous extract of *R. officinalis* have the lowest lethal concentration on larvae (31 and 137 g/l respectively) and *T. capitatus* aqueous extract had the lowest one on adults (59 and 155 g/l respectively). The study of the plants allelopathic potential was based on bioassays of the *H. vulgare* growth radicle variety 'Manel'. The results revealed that the three plants have a significant ($p<0.05$) inhibitory effect on the radicles growth proportional to the concentration of each aqueous extracts. However, the sage leaves aqueous extract expressed the most important inhibitory effect on radicles length (2.96 cm) compared to the control (5,60cm). According to these findings, rosemary, thyme and sage expressed insecticidal and allolopathic activities. Consequently, such plants cannot be used for their insecticidal activities because they can affect the plant growth. Further studies are required to identify the insecticidal and allelopathic compound.

**Keywords**: Allelopathic effect, insecticidal activity, Oulema spp, Salvia officinalis, Rosmarinus officinalis and Thymus capitatus. Hordeum vulgare

# DISTRIBUTION AND VARIETAL EFFECT ON THE FEEDING BEHAVIOR OF THE CEREAL CASEBEARER: COLEOPHORA PERPLEXELLA (TOLL, 1960) (LEPIDOPTERA; COLEOPHORIDAE)

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## ABSTRACT

*Coleophora Perplexella,* a microlepidoptera of the *Coleophoridae* family, is a new cereal pest detected for the first time in December 2015 in the Kef region, Northwestern Tunisia. It caused major damage on oats and barley crops. Since 2015, monitoring of *C. Perplexella* distribution has been carried out in the Kef and Jendouba regions. Besides, the host cereal species have been determined. A multiple-choice test for cereal species and varieties including durum wheat var. Karim and Razzek, soft wheat var. Hidra and Utica, barley var. Raihan and Kounouz, Fritissa and AL-Alya oats and TCL82 triticale was performed. The results of cereal crops monitoring revealed a geographical distribution of this pest in the areas of Kef-Est and Nebeur, Hamide (Jendouba), Oued Melize and Bou Salem on Wheat, barley and oats with variable degree of damage intensities. Indeed, in Oued El Ain and Eddir the damage on oats and barley was very important and was estimated at 60% loss of plant cover. Samely, in the Hamide region the damage of barley was estimated at 50% due to the attacks of *C. Perplexella*. Moreover, damage to wheat was less significant in the both study areas (Le Kef and Jendouba). The assessment of the feeding behavior of *C. Perplexella* on cereal species and their varieties showed that oats var. Fritissa was the most apreciated by *C. Perplexella* larvae, from the first day, with an average of 1.66 caterpillars per plan followed by barley var. Rihan and wheat var. Razzek (1.3 caterpillar/plane). On the fourth day, the caterpillars settled on oats var. Fritissa (1.4 caterpillar/plan) and barley var. Rihan (1caterpillar/plan). The determination of plaques diameter caused by the attack of the caterpillars highlighted that the most significant food intake ($P<0.05$) is recorded on the leaves of oat var. Fritissa with an average of 4 mm followed by oats var. Al Aliya (2mm). No attack was recorded on soft wheat var. Hidra and Utica, Karim durum wheat and barley var. Kounouz. According to these preliminary findings, it will be interesting to consider a more in-depth study on the resistance mechanisms of soft wheat var. Hidra and Utica, Karim durum wheat and barley var. Kounouz to *C. Perplexella*. Similarly, a study of the number of generations of the form and hibernation duration in the absence of a host plant and the mode of dispersion of this pest will be very important to consider its control means.

**Keywords**: Coleophora perplexella, cereals, species, varieties, distribution, insect pest, wheat, barley, oats

# EFFECT OF PEA AS COVER CROP ON SOME MORPHOLOGICAL AND PHYSIOLOGICAL PARAMETERS OF ALFALFA

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## ABSTRACT

Resource efficiency is an important element in the means of achieving a balance between a growing population, global climate change and ecological agriculture. One of the practices for land use efficiency is the sowing of some crops under cover. Thus, the crops are more effective than pure grown in using environmental resources, better withstand adverse conditions and are more productive. This method of sowing involves different components that enter into competitive relationships and many morphological and physiological parameters are changing. This study aimed at investigating the changes in some morphological and physiological parameters of alfalfa pure sown and under the cover of pea. Both are importany agricultural crops. Alfalfa is the most widely grown forage crop species in the world. It has both high forage yield and quality. The pea is a plastic crop, suitable for cultivation in different soil and climatic conditions. Peas were sown as a cover crop in the first-year perpendicular to the main crop with a sowing rate of 75% of the sowing rate. Plant height, leaves/stems ratio, length/width leaves, relative water content of alfalfa was reported. The characteristics studied were found positively influenced by the cover crop due to the fixed nitrogen. Nitrogen obtained by symbiotic fixation is transferred between the root systems, both after release from the nodules and after they have disappeared and roots degraded and are used directly by the plants. It is concluded that the sowing of alfalfa under the cover of spring forage pea is a possible agrotechnical measure and a response to the concepts of agriculture towards ecologically oriented.

**Keywords**: cover crop, alfalfa, pea, mixtures

# ETHNOBOTANICAL TREATMENT OF ORAL DISEASES IN THE HIGHLAND REGION OF SETIF (NORTHEAST ALGERIA)

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## ABSTRACT

Oral health's represents the third global scourge after heart problems and cancerous diseases. Therefore, it is one of the diseases treated by popular practices which are based on medicinal plants. A series of ethnobotanical surveys was carried out using 368 questionnaire sheets in the region of Sétif with herbalists and populations, to identify the medicinal plants most requested for the treatment of the most common oral pathology. Information is divided into two parts. The first is about the herbalist as the sole owner of the information, and the second is about collecting information about medicinal plants. A total of 143 plants species belonging to 60 families have been identified. The obtained results have revealed that 86 plant species were used for gum diseases, 74 were used for dental pain, 35 were used for halitosis (bad breath), and 53 plant species were used for oral ulcer. *Syzygium aromaticum* (UV = 0.96), *Juglans regia* (UV = 0.91) and *Salvadora persica* (UV = 0.84) were the species most commonly prescribed by local herbalists and rural populations. The plant preparations used for the treatment of oral diseases in a traditional way are often used in the form of mouthwash (122 species), direct application (28 species) and by chewing (26 species). They are also used by brushing (6 species). Especially the roots of some plants that are used in the form of a toothbrush stick like the root of *Salvadora persica*. Our study revealed also nine species against gum diseases with 100 % Fidelity level (FL), three species against halitosis and oral ulcer with highest FL (100%) and two species against tooth decay with highest FL 100%. Based on the results, it can be concluded that the frequency of use of medicinal plants in the regions of Setif is strongly linked to the profile of the people surveyed, gender, age, academic level and marital status. The analysis of the data collected may allow the transformation of the popular oral knowledge into a transcribed knowledge.

**Keywords**: Ethnobotany, Medicinal plants, Oral diseases, Setif, Syzygium aromaticum

# SERUM CA19-9 LEVEL RELATE TO METABOLIC CONTROL AMONG DIABETIC PATIENTS

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## ABSTRACT

**Objective**: CA19.9 (carbohydrate antigen 19-9, also called Cancer Antigen 19-9 or sialylated Lewis a antigen), is a well-known marker for diagnosis of pancreatic cancer, but the serum CA19-9 level is reported to be elevated in patients with poorly controlled diabetes. The objective of our study is to determine the role of CA19-9 in diabetics.
**Methods**: CA19.9 levels was evaluated using the sandwich technique using specific antibodies and HbA1c was determined on a Bio-Rad liquid chromatograph with standard kits (France).
**Findings**: Our results showed that (71.42%) are type I diabetics and (28.58%) are type II diabetics. The high rates in CA19.9 are observed in men are diabetic (71.42%) compared to women (28.58%). The age range between (40-50) years old has high rates in CA19.9 with (22.85%) then comes the age group (30-40) years with (17.14%). Low levels in CA19.19 are recorded in age groups between 10-20 years and over 50 years with about (11-13%). Mean serum levels in CA19.9 vary between (854.4 ± 201.6) IU / ML in type 1 diabetics and (71.67 ± 10.32) IU / ML in type 2 diabetics with differences between the two averages that are statistically highly significant ($p > 0.0001$).
**Novelty/improvement:** This study clearly showed that CA19.9 increased in pancreatic tumors and pancreatitis and may also be related to the type 1 and type 2 diabetes.

**Keywords**: **Keywords**: CA19.9- HbA1c- Type 1 and Type 2 Diabetes

# THE ETHNOBOTANICAL STUDY AND EVALUATION OF BIOLOGICAL ACTIVITIES REGARDING MEDICINAL PLANTS IN THE CITY OF ANNABA, ALGERIA.

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## ABSTRACT

The use of medicinal plants has been growing in Algeria. Consumers believe that natural equals harmless. But a plant can be both useful and toxic at the same time. A survey that was carried out in the region of Annaba in east Algeria, using a questionnaire on a random selection of 200 medicinal plant users, including mothers, individuals from different age groups (young, old), students, and 12 medicinal plant sellers, was conducted between January 2022 and May 2022. The outcomes of this study revealed that women (90%) use these plants more compared to men. The dominant age group was individuals between 24 and 30 years old, constituting 64% of the respondents. The majority of respondents turned out to use medicinal plants due to their belief of them being natural (60%) and phytotherapy allows them the possibility of self-medication. Almost 80% of people have learned to use herbal medicine through family traditions or personal circles. The study of the medicinal flora made it possible to identify 17 species which are the most used by the respondents. *Aloysia citriodora, Petroselinum crispum and Matricaria recutita (L)* turned out to be the most frequently cited. Half of the respondents (50%) make use of the leaves. This can be explained by the fact that the leaves contain the most active ingredients and are the seat of photosynthesis, followed by the aerial part of the plant at 20%. The highest percentage of plant usage was observed for addressing respiratory system issues (36%), and the digestive system issues (26%). It was also noticed that individuals reported employing medicinal plants for managing chronic diseases such as diabetes and hypertension.The majority of remedies are prepared in the form of decoctions and infusions

**Keywords**: Medicinal plants, phytotherapy, ethnobotany study, Annaba

# PAPILLOMAVIRUS AND CERVICAL CANCER: EPIDEMIOLOGICAL STUDY IN A POPULATION OF WOMEN IN EASTERN ALGERIA

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## ABSTRACT

Currently, it has been well proven that the human Papillomavirus is the main pathogenic agent of cervical cancer since it is sexually transmitted. Nevertheless, other sexual and non-sexual factors take part as cofactors in the evolution of HPV infection towards cervical cancer. In Algeria, cervical cancer is in second place among the most common cancers in the female population with an estimated incidence of 15.6 per 105,000 women per year, it is a real public health problem and is one of the main causes of morbidity and mortality. The objective of our study is to determine the main risk factors that are involved in the appearance and development of this cancer in Algeria. The sample on which our study was carried out includes 54 women with a lesional cervico-vaginal smear secondary to an infection with the human Papillomavirus. These women have an average age of 42.29 years with a minimum of 25 years and a maximum of 65 years of which 7.40% of menopausal women. The age of women at marriage varies from 18 to 30 years with an average of 22.52 years, 14 women (25.92%) were married before the age of 25 and a percentage of 37.037% represents women married between [20 and 25]. The parity is varied, between 1 and 10 children with an average of 4.96 births per woman. We note cofactors in the women studied, 48.14% have an erosive cervix. 37.03% presented with a fragile cervix bleeding on contact. 11.11% have a polypoid lesion. 7.4% are diabetic and 7.4% of women carrying the notion of recurrent genital infection. Cervical cancer is a preventable cancer, but we must remain vigilant. The later its diagnosis, the higher the human and financial costs will be. Screening and early diagnosis are an obligation and an emergency. Currently, it has been well proven that the human Papillomavirus is the main pathogenic agent of cervical cancer since it is sexually transmitted. Nevertheless, other sexual and non-sexual factors take part as cofactors in the evolution of HPV infection towards cervical cancer. In Algeria, cervical cancer is in second place among the most common cancers in the female population with an estimated incidence of 15.6 per 105,000 women per year, it is a real public health problem and is one of the main causes of morbidity and mortality. The objective of our study is to determine the main risk factors that are involved in the appearance and development of this cancer in Algeria. The sample on which our study was carried out includes 54 women with a lesional cervico-vaginal smear secondary to an infection with the human Papillomavirus. These women have an average age of 42.29 years with a minimum of 25 years and a maximum of 65 years of which 7.40% of menopausal women. The age of women at marriage varies from 18 to 30 years with an average of 22.52 years, 14 women (25.92%) were married before the age of 25 and a percentage of 37.037% represents women married between [20 and 25]. The parity is varied, between 1 and 10 children with an average of 4.96 births per woman. We note cofactors in the women studied, 48.14% have an erosive cervix. 37.03% presented with a fragile cervix bleeding on contact. 11.11% have a polypoid lesion. 7.4% are diabetic and 7.4% of women carrying the notion of recurrent genital infection. Cervical cancer is a preventable cancer, but we must remain vigilant. The later its diagnosis, the higher the human and financial costs will be. Screening and early diagnosis are an obligation and an emergency.

**Keywords**: Cervical cancer, human papillomavirus, HPV, Precancerous lesions, Cervicovaginal Smear, Diagnosis, Prevention

# CELIAC DISEASE AND THE GLUTEN-FREE DIET: INVESTIGATION CONDUCTED IN THE CITY OF ANNABA, ALGERIA.

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## ABSTRACT

Gluten belongs to the storage proteins found in wheat, barley, rye, and oats. Specifically, it is the prolamins responsible for the toxicity of these grains. Celiac disease is an autoimmune enteropathy that develops in genetically predisposed individuals to gluten ingestion. The only treatment for these conditions is the implementation of a gluten-free diet. It is a restrictive diet, challenging to follow as gluten hides in many food products. An epidemiological survey is being conducted in the Annaba-Algeria region, between January 2023 and May 2023, involving 100 confirmed celiac disease patients of both sexes, to estimate the prevalence of this disease and assess the relationship between certain risk factors and the occurrence of celiac disease. Our study reveals that celiac disease is more common in women (65%). The age of the surveyed patients ranges from 6 to 73 years, with the highest affected age group being 20 to 30 years (27%), and 55% of cases have a familial form of this disease. The presence of underweight patients is significant (57%), while 5% are overweight. Numerous associated conditions are observed, including vitamin deficiencies (79%), anemia (53%), osteoporosis (28%), delayed growth, and short stature (14%). Most patients were breastfed for more than 18 months up to 2 years, with a percentage of 77%. The majority of patients (92%) adhere to a gluten-free diet, which is considered challenging for 61% of patients, especially children. It appears to be effective for 71% in terms of clinical improvement, while 29% experienced the ineffectiveness of this diet. The high cost of gluten-free products is the main difficulty for patients, with a rate of 81%. The lack of palatability of gluten-free products is reported by 50% of patients, and the unavailability of these products in certain regions (16%). Early diagnosis of celiac disease and lifelong adoption of a gluten-free diet often lead to the complete disappearance of symptoms, treatment of deficiencies, prevention of potential complications, and ensuring a normal life.

**Keywords**: Gluten, celiac disease, prevalence, risk factors, gluten-free diet

# PREVALENCE OF INTESTINAL PARASITIC INFECTIONS IN HOSPITAL

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## ABSTRACT

Diarrheal diseases are the major causes of morbidity and mortality in the developing world. To assess the prevalence of intestinal infections, a stool examination was performed in 548 subjects hospitalized outside or in the various departments of a hospital in Blida. An infectious etiology was identified in 26.38% of cases. From the total 548 subjects, 39.26% had one or more intestinal parasitic infections. The most common pathogens were parasites (41.96% of cases) including protozoa represented by: Giardia intestinalis, Endolimax nana, Entamoeba histolytica histolytica, Entamoeba coli, Pseudolimax butschlii, Chilomastix mesnilii and Blastocystis hominis. In addition, Enterobius vermicularis and Taenia saginata were the only diagnosed helminths.

**Keywords**: Diarrhea, Infectious, hospital, parasites, stool

# CHEMICAL CONSTITUENTS AND HRMS ANALYSIS OF AN ALGERIAN ENDEMIC PLANT–VERBASCUM ATLANTICUM BATT. – EXTRACTS AND THEIR ANTIOXIDANT ACTIVITY.

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## ABSTRACT

This is the first report on the phytochemistry and antioxidant activity of *Verbascum atlanticum* Batt. (Scrophulariaceae) extracts collected from El Kala region, Algeria. The ethyl acetate (VAA) and *n*- butanol (VAB) extracts of *V. Atlanticum* Batt. Were subjected to a phytochemical study which led to identifying nine compounds of fatty acid esters, diterpenes, phenylpropanoid glycosides and saponin glycosides type. In addition, both extracts were analysed by LC-UV-MS and HR-ESI-MS. This later revealed, on the basis of in-house library, the presence of eight other known bioactive microbial metabolites. All these compounds were identified for the first time in *Verbascum atlanticum.* Finally, both extracts were evaluated for their phenolic and flavonoid contents as well as their antioxidant activity. The results showed that the VAA extract, which was richer in flavonoids, had the most antioxidant effect.

**Keywords**: Verbascum atlanticum, Phenylpropanoid glycosides, Saponin glycosides, HR-ESI-MS, Antioxidant activity

# PHENOLIC PROFILING, ANTIOXIDANT POTENTIAL, AND ANTIMICROBIAL ACTIVITIES OF HONEYS FROM THE TLEMCEN REGION

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## ABSTRACT

Honey is a complex natural food renowned for its therapeutic properties in traditional medicine. Our study aimed to investigate the in vitro susceptibility of methicillin-sensitive and methicillin-resistant *Staphylococcus aureus* to 18 different types of Algerian honey collected in the province of Tlemcen, located in the North-West of Algeria. We also determined the phenolic and flavonoid contents of the honeys and evaluated their antioxidant properties. Significant variability was observed in the bioactive compounds. Total phenolic content (TPC) ranged from 23.38±0.30 to 121.72±4.90 mg GAE/100g of honey, while total flavonoid content (TFC) varied between 0.08±0.014 and 30.71±1.33 mg EQ/100g of honey. Antioxidant activity was assessed using four spectrophotometric methods: β-carotene, DPPH, ABTS, and FRAP. Additionally, the antibacterial activity was evaluated against both methicillin-sensitive and methicillin-resistant *S. aureus* strains using the agar diffusion method. The results revealed that six out of the 18 tested honeys exhibited activity against methicillin-sensitive *S. aureus* at concentrations of 50% and 80%. Furthermore, multifloral honey (S14) demonstrated an inhibitory effect at the higher concentration (80%). In the case of the methicillin-resistant strain, only two tested honeys derived from mild white mustard (S6) displayed activity. Notably, these honeys exhibited the largest zones of inhibition against both methicillin-sensitive and methicillin-resistant *S. aureus* strains. In conclusion, our findings highlight the variability in bioactive compounds among Algerian honeys and their potential antimicrobial activity against *S. aureus*. These results support the traditional medicinal use of honey and provide a basis for further exploration of its therapeutic applications. Honey is a complex natural food renowned for its therapeutic properties in traditional medicine. Our study aimed to investigate the in vitro susceptibility of methicillin-sensitive and methicillin-resistant *Staphylococcus aureus* to 18 different types of Algerian honey collected in the province of Tlemcen, located in the North-West of Algeria. We also determined the phenolic and flavonoid contents of the honeys and evaluated their antioxidant properties. Significant variability was observed in the bioactive compounds. Total phenolic content (TPC) ranged from 23.38±0.30 to 121.72±4.90 mg GAE/100g of honey, while total flavonoid content (TFC) varied between 0.08±0.014 and 30.71±1.33 mg EQ/100g of honey. Antioxidant activity was assessed using four spectrophotometric methods: β-carotene, DPPH, ABTS, and FRAP. Additionally, the antibacterial activity was evaluated against both methicillin-sensitive and methicillin-resistant *S. aureus* strains using the agar diffusion method. The results revealed that six out of the 18 tested honeys exhibited activity against methicillin-sensitive *S. aureus* at concentrations of 50% and 80%. Furthermore, multifloral honey (S14) demonstrated an inhibitory effect at the higher concentration (80%). In the case of the methicillin-resistant strain, only two tested honeys derived from mild white mustard (S6) displayed activity. Notably, these honeys exhibited the largest zones of inhibition against both methicillin-sensitive and methicillin-resistant *S. aureus* strains. In conclusion, our findings highlight the variability in bioactive compounds among Algerian honeys and their potential antimicrobial activity against *S. aureus*. These results support the traditional medicinal use of honey and provide a basis for further exploration of its therapeutic applications.

**Keywords**: Honeys, Tlemcen region, bioactive compounds, antioxidant activity, Staphylococcus aureus

# ANTITUMOR ACTIVITY OF HEMOCYANINS FROM HELIX LUCORUM, HELIX ASPERSA AND RAPANA VENOSA AGAINST PIGMENTED MELANOMA CELLS

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## ABSTRACT

Hemocyanins are oxygen-carrying glycoproteins of molluscs and gastropods which are of scientific interest as potential agents for immunotherapy of oncological diseases. The aim of the present study was to determine the phototoxicity and antiproliferative activity of hemocyanins isolated from *Helix lucorum*, *Helix aspersa* and *Rapana venosa*. Cytotoxicity/phototoxicity determinations were performed by the BALB/c 3T3 Neutral Red Uptake Assay using an LED light source. Human cutaneous melanoma tumor cell line SH-4 and normal fibroblasts (BJ) were used as *in vitro* models in the study of antiproliferative activity. The effects of hemocyanins on cell viability were analyzed by MTT assay. Acridine orange/ethidium bromide and DAPI staining were used to visualize cytomorphological changes occurring in the tumor cells after treatment. The results show that the studied hemocyanins are photosafe, non-cytotoxic and can be applied as antitumor agents without causing unwanted side effects. The evaluation of the antitumor activity on the SH-4 skin melanoma cell line showed that the mucus isolated from *Helix aspersa* exhibited the highest degree of selectivity. Microscopic analysis revealed typical morphological features of apoptosis in tumor cells. Therefore, more detailed studies are needed on the mucus from *Helix aspersa* and its potential for use in the therapy of melanomas. The studied hemocyanins show a high level of safety and can be applied in medicine and cosmetology.

**Acknowledgement:** This study was supported by contract № D01-217/30.11.2018 and agreements DO1-323/18.12.2019, DO1-358/17.12.2020 and DO1-278/03.12.2021 program BioActiveMed, Ministry of Education and Science of the Republic of Bulgaria.

**Keywords**: hemocyanins, antitumor activity, SH-4 skin melanoma cell line

# IN VITRO AND IN VIVO ANTITUMOR ACTIVITY OF HEMOCYANINS FROM HELIX LUCORUM, HELIX ASPERSA AND RAPANA VENOSA ON A BREAST CANCER MODEL

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## ABSTRACT

Bioactive compounds isolated from molluscs have attracted considerable interest as potential drugs for the therapy of tumor diseases. Studies show promising antitumor activity of hemocyanins. The aim of the present study was to evaluate the *in vitro* and *in vivo* antitumor activity of hemocyanins isolated from *Helix aspersa*, *Helix lucorum* and *Rapana venosa* on a breast cancer model. *In vitro* antiproliferative activity of hemocyanins was determined by MTT test. Morphological changes induced by hemocyanins in tumor cells were analyzed by fluorescence microscopy. The *in vivo* effects of hemocyanins were investigated after immunization with preparations containing hemocyanin in a mouse model of breast cancer (Ehrlich ascites carcinoma). Survival of immunized animals was evaluated. The titer of specific antibodies against hemocyanins cross-reacting with tumor antigen isolated from Ehrlich's tumor was determined by indirect ELISA analysis. Morphological evaluation of toxicity, immune system response and antitumor effect was performed by histopathological analysis. The results of the *in vitro* studies showed that the tested hemocyanin samples induced significant antiproliferative and apoptogenic effects. *In vivo* studies demonstrate a protective antitumor effect, expressed in a prolonged survival time of the experimental animals. In the histopathological analysis, no pathohistological signs of toxic damage were found in the parenchymal organs. The biological, histological and serological studies conducted reveal the studied hemocyanins as promising candidates for antitumor therapy in breast cancer.

**Acknowledgement:** This study was supported by contract № D01-217/30.11.2018 and agreements DO1-323/18.12.2019, DO1-358/17.12.2020 and DO1-278/03.12.2021 program BioActiveMed, Ministry of Education and Science of the Republic of Bulgaria.

**Keywords**: Ehrlich ascites carcinoma, in vitro and in vivo antitumor activity, hemocyanins

# ASSESSMENT OF THE ANTITUMOR ACTIVITY OF NOVEL FIBROUS MATERIALS LOADED WITH 5-NITRO-8-HYDROXYQUINOLINE VIA ELECTROSPINNING/ELECTROSPRAYING

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## ABSTRACT

Electrospun drug-delivery systems have been regarded as one of the most effective approaches for local cancer treatment, allowing the delivery of anticancer agents to the tumor site and reducing systemic toxicity and side effects to the normal tissues. The present study aims to assess the *in vitro* antitumor activity of novel fibrous materials based on cellulose acetate (CA) or CA and water-soluble polymers (polyvinylpyrrolidone, PVP or poly(vinyl alcohol), PVA), loaded with the model drug 5-nitro-8-hydroxyquinoline (5N) via electrospinning or electrospinning in conjunction with electrospraying. The effects of the polymeric materials on the cell viability of human cervical carcinoma cell line HeLa and non-tumorigenic fibroblast cell line BALB/3T3 were evaluated by the MTT assay. The cytomorphological changes in the cells cultivated in the presence of fibrous materials were studied by fluorescent microscopy. Acridine orange/ethidium bromide and 4′,6-diamidino-2-phenylindole (DAPI) stainings were used to determine the ability of the materials to induce cytotoxic damage in cancer cells and to analyze the possible mechanisms of their *in vitro* anticancer activity. The performed cell viability assay of the fibrous mats based on CA demonstrated the complete absence of cytotoxic effects, while the 5N-containing mats induced a significant and time-dependent reduction in cell growth and viability. Comparative assessment of the effects of 5N-conaining fibrous materials on HeLa and BALB/3T3 cell lines indicated that the cancer cells are more sensitive to their cytotoxic effects than the non-cancer cells. Fluorescent microscopy analysis of the cancer cells incubated in the presence of 5N-containing fibrous materials showed marked nuclear polymorphism, chromatin condensation, nuclei pyknosis, nuclei fragmentation, and the formation of apoptotic bodies that are typical morphological features of the apoptosis. The presented results reveal the potential of the novel 5N-containing fibrous materials for application in local cervical carcinoma therapy.

**Acknowledgment:** Financial support from Bulgarian National Science Fund (Grant KP-06-N39/13/2019) is gratefully acknowledged.

**Keywords**: Drug-delivery systems, fibrous materials, electrospinning, antitumor activity

# ANTITUMOR ACTIVITY OF HEMOCYANINS ISOLATED FROM GARDEN AND MARINE SNAILS IN MYELOID CANCER MODEL

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## ABSTRACT

Hemocyanins are oxygen-transporting glycoproteins in the hemolymph of some invertebrate species that attracted the scientific interest as potential anticancer agents. The present study aims to assess the immunomodulating and anticancer activity of hemocyanins isolated from the garden snails *Helix aspersa*, *Helix lucorum* and the marine snail *Rapana venosa* in Graffi myeloid tumor model. The *in vitro* antitumor activity of the hemocyanins was determined by MTT test and cytomorphological analysis by fluorescent and transmission electron microscopy. The *in vivo* effects of the hemocyanins were examined in hamsters transplanted with Graffi tumor. The serum antibody titers against the tested hemocyanins and against the tumor antigen were determined by ELISA. Histopathological analysis of the morphological features related to antitumor effect, immune system response and toxicity was performed. The results of *in vitro* studies indicated that the tested hemocyanins suppress the proliferation of the tumor cells and induce apoptotic cell death. The *in vivo* investigations showed significantly increased titers of antibodies cross-reacting with the Graffi tumor antigen, a reduced transplantability, suppression of tumor growth and metastasis, reduced mortality, prolonged survival time and absence of toxic side effects. The present study indicated that the antitumor activity of the studied hemocyanins was due to both immune stimulation and direct effects on the tumor cells and showed their potential as therapeutic agents against hematological malignances.

**Acknowledgment:** This research was funded by the Bulgarian Ministry of Education and Science (Grant DO1-217/30.11.2018) under the National Research Programme “Innovative Low-Toxic Bioactive Systems for Precision Medicine” (BioActiveMed).

**Keywords**: Hemocyanins, myeloid tumor, antitumor activity, immunomodulating activity

# COMPARISON OF TOTAL PHENOLIC AND TOTAL FLAVONOID CONTENTS OF BOTH AQUEOUS AND METHANOLIC EXTRACTS OF MARRUBIUM VULGARE L.

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## ABSTRACT

*Marrubium vulgare* L. *is* a member of the Lamiaceae family, which is significant in medicine. It was defined by Paracelcus as the "doctor of the lung". Traditionally, it was applied externally to treat skin conditions as well as ingested for disorders of the mouth, respiratory system, and digestive system, jaundice, menstrual pain and as a stimulant. In the past, In Tunisia, this plant is used to treat hypertension, diabetes, and heart disease; in Mexico, its decoction is known for its antidiabetic properties. İn our country, it is traditionally used as a diuretic, carminative, pain killer, antipyretic, and appetite stimulant. The major compounds of the plant are known to be the phenolic compounds and flavonoids, which are categorized as natural sources of antioxidants and the goal of this study is to determine the total phenolic and total flavonoid contents of both aqueous and methanol extracts of aerial parts of *M. vulgare* L. Total phenolic content was calculated by using the Folin Ciocalteu method. The absorbance of the samples was measured at 750 nm using a spectrophotometer. The results were given as gallic acid equivalents. The total flavonoid content was measured using the aluminum chloride colorimetric method and was calculated as quercetin equivalent. The absorbance of the mixtures was measured at 415 nm in a spectrophotometer. In conclusion; it was determined that the methanolic extract of the aerial part of the plant had a higher phenolic content (38.60 mg ± 4.8 mg GAE/g) than the aqueous extract (27.83 mg± 4.61mg GAE/g). On the other hand, it was determined that the aqueous extract of the plant (4.02 mg± 0.1mg QE/g) had a higher total flavonoid content than the methanol extract (3.25 mg ± 0.19mg QE/g).

**Keywords**: Marrubium vulgare L., total flavonoid, total phenol content

# ACETYLCHOLINESTERASE INHIBITORY ACTIVITY OF CITRUS RETICULATA ESSENTIAL OIL.

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## ABSTRACT

In recent years, the interest in medicinal plant research and in the aroma therapeutic effects of essential oils in humans has increased, especially for Alzheimer's disease (AD). This study aim to investigate the acetylcholinesterase (AChE) inhibitory activity of the essential oil from *Citrus reticulata*. The essential oil was analyzed by gas chromatography-mass spectrometry (GC-MS) and confirmed by Fourier transform infrared spectroscopy analysis (FT-IR). With the purpose of investigating its relationship with the observed activity. Among the identified constituents, Limonene (67.04%), γ.-Terpinene (15.40%), α.-Pinene (2.75%) and Sabinene (1.49%). Assay of acetylcholinesterase (AChE) activity plays an important role in treatments for Alzheimer's disease. Acetylcholinesterase activity was evaluated by Ellman method. IC50 was determined to be about 146.26±2.19 µg/mL to 6.27 ± 1.15 µg/mL for Galantamine. The results confirm that acetylcholinesterase inhibitors as alternatives for preparation of phytomedicines are used in therapeutic treatment of Alzheimer's disease, being plants the principal source of these inhibitors.

**Keywords**: Citrus reticulate, essential oil, chemical composition, acetylcholinesterase activity

# ALLERGIC CONTACT DERMATITIS FOLLOWING EXPOSURE TO CINNAMON ESSENTIAL OIL.

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## ABSTRACT

Allergic contact dermatitis from the topical use of essential oils is not widely recognized as a hazard, even if old studies have addressed this subject for a long time. The aim of the present study was to determine the cutaneous toxicity of Ceylon cinnamon (*Cinnamomum zeylanicum* Blume) essential oil in rabbits (*Oryctolagus cuniculus*). Cinnamaldehyde and Eugenol is a major volatile constituent of cinnamon essential oil obtained through hydrodistillation of barks. They are a remarkably versatile molecules incorporated as a functional ingredient in numerous products and has found application in the agricultural, cosmetic, flavour, fragrance, pharmaceutical and various other industries. Cinnamaldehyde and Eugenol is considered safe as a food additive but due to the wide range of different applications, extensive use and availability of cinnamon essential oil, it is pertinent to discuss the general toxicity with special reference to contact dermatitis.

**Keywords**: Ceylon cinnamon, essential oil, organoleptic characteristics, physico-chemical indices, chemical and spectral profile, rabbit, skin toxicity

# OIL AND PROTEINS OF SARDINE (SARDINA PILCHARDUS) COMPARED WITH CASEIN OR MIXTURE OF VEGETABLE OILS IMPROVES DYSLIPIDEMIA AND REDUCES INFLAMMATION AND OXIDATIVE STRESS IN HYPERCHOLESTEROLEMIC AND OBESE RATS.

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## ABSTRACT

**Background:**Obesity results from a prolonged imbalance between energy intake and energy expenditure, as depending on basal metabolic rate. Oils and proteins from sea have important therapeutic (such as obesity and hypercholesterolemia) and antioxidant effects. Sardine are a widely consumed fish in the Mediterranean region. Its consumption provides humans with various nutrients such as oils (rich in omega 3 plyunsaturated fatty acids)) and proteins.
**Methods:** Sardine oil (SO) and sardine proteins (SP) were extracted and purified. Mixture of vegetable oils (olive-walnut-sunflower) were prepared from oils produced in Algeria.
Eighteen wistar rats are fed a high fat diet enriched with 1% cholesterol for 30 days to induce obesity and hypercholesterolemia. The rats are divided into 3 groups. The first group consumes 20% sardine protein combined with 5% sardine oil (38% SFA (saturated fatty acids), 31% MIFA (monounsaturated fatty acids) and 31% PIFA (polyunsaturated fatty acids)) (**SPso**). The second group consumes 20% sardine protein combined with 5% of a mixture of vegetable oils (VO) containing 13% SFA, 58% MIFA and 29% PIFA (**PSvo**), and the third group consuming 20% casein combined with 5% of the mixture of vegetable oils and serves as a semi-synthetic reference (**CASvo**).Body weights and glycaemia are measured weekly After 28 days of experimentation, the rats are sacrificed, the blood and the liver removed. Serum assays of total cholesterol (TC) and triglycerides (TG) were performed by enzymatic colorimetric methods. Evaluation of lipid peroxidation was performed by assaying thiobarbituric acid reactive species (**TBARS**) and **hydroperoxides,** values. The protein oxidation was performed by assaying **carbonyl derivatives** values. Finally, evaluation of antioxidant defense is made by measuring the activity of antioxidant enzymes, the superoxide dismutase (**SOD**) and the catalase (**CAT**).
**Results:** After 28 days, the body weight (BW) of the rats increased significantly in SPso and SPvo groups compared to CAS group, by +11% and 7% respectively. Cholesterolemia (TC) increased significantly in the SPso and SPvo groups compared to the CAS group ($P<0.01$), while **triglyceridemia (TG)** decreased significantly in the SPso group compared to SPvo and CAS groups ($P<0.01$). Albumin (marker of inflammation) increased in the PSs group compared to SPvo and CAS groups, by +35% and +13% respectively. The serum TBARS levels are -40% lower in SPso group compared to SPvo group, and they are -80% and -76% lower in SPso compared to SPvo and CAS groups respectively. The level of **carbonyls derivatives** in the serum and liver are significantly reduced in the SPso group compared to the SPvo and CAS groups. Superoxide dismutase (**SOD**) activity decreased in liver of SPso group compared to SPvo group ($P<0.01$). While that of CAT is increased in liver tissue of SPso group compared to SPvo group ($P<0.01$).
**Conclusion:** Sardine oil combined with sardine protein has a hypotriglyceridemic effect reduces body weight, attenuates inflammation and seems to protect against lipid peroxidation and protein oxidation and increases antioxidant defense in hypercholesterolemic and obese rats. This could be in favor of a protective effect against obesity and cardiovascular diseases.
**Keywords**: Rat- Obesity- Hypercholesterolemia- Sardine protein- Sardine oil- Vegetable oils mixture- Lipid peroxidation- Protein oxidation- Antioxidant defense

# IMPACT OF LEPTIN ON UTERINE HISTOLOGY AND HISTOMORPHOMETRY IN ADULT FEMALE WISTAR RATS

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## ABSTRACT

Leptin is an adipose tissue biomarker involved in many physiological functions including reproduction. The aim of this study was to investigate the impact of leptin on the uterine structure in female pubertal Wistar rat. 60-day-old experimental females were administrated 8 µg/100 g body weight intraperitoneal leptin injections daily for 5 days while control females received the same volume of NaCl solution. The uterine horns were collected after sacrifice and fixed in 10% formaldehyde for histological and histomorphometric analyses. The histological study showed a significant number of epithelial invaginations and endometrial glands in the leptin-treated group compared with the control group. The histomorphometric measurements revealed a highly significant increase in endometrial thickness ($p < 0.001$***), a marginally significant increase in myometrial thickness ($p < 0.05$*), and a non-significant increase in the thickness of the perimetrium ($p > 0.05$). In the endometrium, the increase in epithelial lining thickness and the decrease in glandular diameter were not significant ($p < 0.05$*), whereas the increase in glandular epithelium thickness was highly significant ($p < 0.001$***) after leptin treatment. These results suggest that at supraphysiological level, leptin could induce histological changes in the uterine structure in female pubertal Wistar rats.

**Keywords**: Leptin, uterus, histology, histomorphometry, female rat

# IN VITRO AND IN VIVO ANTICANCER ACTION MECHANISMS OF ETHANOL EXTRACT FROM THE ROOTS OF GERANIUM SANGUINEUM L.

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## ABSTRACT

*Geranium sanguineum* L. extracts are used in traditional and modern medicine as anti-inflammatory medications in different diseases, including cancer. Our previous studies showed that the aqueous ethanol extract from the roots of *G. sanguineum* L., inhibits tumour cells growth. Additionally, it inhibits prolyloligopeptidase (POP, EC EC 3.4.21.26) –an enzyme, involved in tumorigenesis and tumor growth. The aim of the present study is to explore *in vitro* and *in vivo* mechanisms of the antitumor activity of the extract. *In vitro* experiments were performed on HeLa and HT-29 cell lines - models of cervical and colorectal cancer. The influence of the extract on the cell cycle and apoptosis/necrosis were investigated by means of flow cytometry (FC). The possible DNA damage of the cells was studied using the alkaline comet assay. POP activity was determined using the fluorogenic substrate benzyloxycarbonyl-glycyl-prolyl-4-methylcoumarin-7-amide. Ehrlich Ascites Carcinoma was used as a model of tumor disease *in vivo*. The results from FC showed that the extract caused a slight accumulation of cells in G1 phase of the cell cycle (about 10% more than the control), followed by a low level of cell survival with high percentages of cells in early and late apoptosis. The results of the comet assay showed a low genotoxic activity. The effect on POP inhibition was different depending on the cell line origin. *In vivo* studies of the ascites smears showed that *per os* application of GSA prevented metastasizing of tumor cells and directed them to apoptosis. On the bases of the above results we concluded that extract from *G. sanguineum* can cause a temporary block in G1 phase of the cell cycle and a steering of the cells to apoptosis.

***Acknowledgement.*** This work is financially supported by the National Science Fund of the Bulgarian Ministry of Education and Science, Grant Nr KP-06-N31/1.

**Keywords**: Geranium sanguineum L., antitumor activity, in vitro, *in vivo*

# ANTITUMOR ACTIVITY OF EXOPOLYSACCHARIDES ISOLATED FROM COELASTRELLA SP. BGV. IN A PANEL OF HUMAN TUMOR CELL LINES

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## ABSTRACT

Green microalgae are a valuable source of biologically active substances with antitumor effects. *Coelastrella* sp. BGV is a strain of *Coelastrella*, isolated from a metal trough near Varvara village, Bulgaria (N 42° 10′; E 24° 0–7′). *In vitro* studies of different extract and culture medium from *Coelastrella* sp. BGV showed antiproliferative and proapoptotic activity against HeLa tumor cells. The aim of the present study was to investigate the antitumor activity of exopolysaccharides (EPSs) isolated from *Coelastrella sp.* BGV on a panel of human tumor cell lines. *In vitro* antiproliferative activity of the extracts was determined by NRU-test, and their influence on the distribution of cells in different phases of the cell cycle was investigated using flow cytometry. The morphological changes in tumor cells induced as a result of treatment with EPSs was studied by fluorescence microscopy. Evaluation of antitumor activity on a panel of cell lines showed that EPSs isolated from *Coelastrella* sp. BGV is highly active at low concentration and selective in the breast cancer cell line. EPS causes S phase arrest of the cell cycle in MDA-MB-231 cells. Cytomorphological studies show that the decrease in cell viability of tumor cells is due to both suppression of proliferative activity and induction of apoptosis. The investigation EPSs isolated from *Coelastrella sp.* BGV have potential for use in breast cancer therapy.

**Acknowledgement:** This work was supported by the Bulgarian Ministry of Education and Science under the National Research Program "Young scientists and postdoctoral students -2" approved by DCM 206 / 07.04.2022

**Keywords**: Coelastrella sp. BGV, exopolysaccharides, antitumor activity

# THE IMPACT OF HOMOERIODICTYOL ON PROSTATE CANCER CELL THERAPY

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## ABSTRACT

**Introduction:** Prostate cancer remains a significant contributor to global mortality, and existing treatments, while extending survival, often come with complications. There is a need for innovative approaches that can preserve prostate function while minimizing adverse effects. Flavonoids, compounds found in plant-based products, are being investigated as potential non-invasive treatments due to their ability to inhibit cell growth, induce apoptosis, and impede cancer cell migration. Homoeriodictyol (C16H14O6), a member of the flavanone subgroup, has drawn specific attention.
**Objective**: This study aims to explore the impact of homoeriodictyol on cell survival, apoptosis, migration, and proliferation of prostate cancer cells, both when administered alone and in conjunction with the chemotherapeutic agent docetaxel.
**Methods:** Androgen-resistant prostate cancer PC3 cells were subjected to varying concentrations of homoeriodictyol, docetaxel, or a combination of both for a duration of 72 hours. The effects of these treatments on cell survival, migration, apoptosis, and relevant gene expressions were assessed through MTT test, wound healing assay, Hoechst staining, and real-time PCR experiments, respectively.
**Key Findings**: Homoeriodictyol induces apoptosis in a dose-dependent manner. Notably, the combined application of docetaxel and homoeriodictyol demonstrates a more potent effect than their individual administration. The mechanism of homoeriodictyol-induced apoptosis operates via an intrinsic caspase-dependent pathway, leading to significant upregulation of caspase 3, caspase 8, P53, BAX and cytochrome c, while downregulating Bcl-2 mRNA. Additionally, homoeriodictyol exhibits anti-migratory properties, linked to increased expression of E-cadherin, vimentin, and fibronectin, alongside decreased N-cadherin expression. Furthermore, homoeriodictyol plays a role in diminishing epithelial-mesenchymal transition by suppressing Twist, Snail and ZEB1 expression, aligning with the observed anti-migratory effects in wound healing experiments. Visualization of apoptotic prostate cancer cells is enabled by Hoechst staining.
**Conclusion**: Homoeriodictyol displays promise as a potential compound for curtailing cancer cell proliferation and migration
This study was supported by TÜBİTAK 2209-A University Students Research Projects Support Program (Application no: 1919B012202093).

**Keywords**: Homoeriodictyol, Docetaxel, PC3, Prostate cancer

# VARIANTS IN THE GHRELIN GENE GHRL ARE NOT ASSOCIATED WITH PROSTATE CANCER

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## ABSTRACT

Ghrelin has been widely investigated in food intake, control of energy homeostasis, and obesity. However, the role of genetic variations in the ghrelin precursor gene (*GHRL*) on prostate cancer (PCa) is not clear in humans. Hence, the aim of this case/control study was to determine the associations of ghrelin *GHRL* gene polymorphisms at SNPs rs696217, rs4684677 and rs34911341 with PCa. A total of 120 PCa patients were enrolled as the disease group, while 95 healthy people were enrolled as the control group. Peripheral venous blood was collected from both groups, and the ghrelin gene polymorphisms at rs696217, rs4684677and rs34911341were detected through genotyping using TaqMan method. The allele frequencies of the studied variants were G (78,5%), A (99,5%), C (100,0%), respectively. The genotype distribution at ghrelin gene loci in the disease group was not significantly different from that in the control group. The Odds Ratio for both SNPs rs696217 and rs4684677 were 0,736 (0,409 – **1**326); $p$ = 0.307 and **1**211 (0,074~19,663); $p$ = 0.892, respectively. A large number of the *GHRL* haplotypes indicate no association with PCa. The two SNPs rs696217 and rs4684677 were in linkage disequilibrium with each other, suggesting independent effects. In conclusion, this study documented an important negative finding: the lack of an association of PCa in Algeria.

**Keywords**: Ghrelin, GHRL, Polymorphisms, Prostate cancer

# BIOLOGICAL FUNCTION AND BIOSYNTHESIS OF ELEMICIN IN DAUCUS CAROTA

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## ABSTRACT

Alkenylbenzenes are a group of naturally occurring substances synthesized as secondary metabolites in various plants, including nutmeg, basil, and carrot. Many alkenylbenzene-containing plants are common spice plants used for flavoring purposes. Carrots different tissues produce an excess of volatile aromatic compounds involved in several important roles in planta. We found that the leaves of the red carrot cultivars and the fruits of wild carrot accessions produce a high level of phenylpropanoids, including elemicin and its derivatives [**1** 2]. We have shown that elemicin and its derivatives have an agricultural application, making these compounds potential and novel targets protecting carrots against carrot psylla attack [3]. Additionally, these compounds have an inhibition effect against the root fungi *Sclerotium rolfsii*. Although many of the genes and enzymes involved in phenylpropanoid biosynthesis are known in many plant species, the specific reactions that lead to the biosynthesis of elemicin and its derivatives are unknown. To identify genes involved in the synthesis of elemicin, we performed RNA sequencing from leaf tissues of the red carrot genotype with elemicin and its derivatives production. Herein described the isolation functional characterization of carrot cDNAs encoding isoeugenol synthase (DcIGS1), an NADPH-dependent enzyme that converts coniferyl acetate and sinapyl acetate to isoeugenol and 6-methoxy isoeugenol, respectively. Also, we found that the previously characterized DcE(I)GS1 can convert sinapyl acetate to 6-methoxy eugenol [1]. Furthermore, we isolated and identified a cDNA encoding S-adenosyl-L-methionine:6-methoxy eugenol/6-methoxy isoeugenol *O*-methyltransferase (Dc6-MeOE(I)OMT) that produces elemicin and isoelemicin via methylation of the para-OH-group of their respective precursors. Expression analysis of the carrot DcIGS1 and Dc6-MeOE(I)OMT genes revealed that their transcripts showed significant variation in different tissues but were expressed when expected for involvement in elemicin formation. Alkenylbenzenes are a group of naturally occurring substances synthesized as secondary metabolites in various plants, including nutmeg, basil, and carrot. Many alkenylbenzene-containing plants are common spice plants used for flavoring purposes. Carrots different tissues produce an excess of volatile aromatic compounds involved in several important roles in planta. We found that the leaves of the red carrot cultivars and the fruits of wild carrot accessions produce a high level of phenylpropanoids, including elemicin and its derivatives. We have shown that elemicin and its derivatives have an agricultural application, making these compounds potential and novel targets protecting carrots against carrot psylla attack [3]. Additionally, these compounds have an inhibition effect against the root fungi *Sclerotium rolfsii*. Although many of the genes and enzymes involved in phenylpropanoid biosynthesis are known in many plant species, the specific reactions that lead to the biosynthesis of elemicin and its derivatives are unknown. To identify genes involved in the synthesis of elemicin, we performed RNA sequencing from leaf tissues of the red carrot genotype with elemicin and its derivatives production. Herein described the isolation functional characterization of carrot cDNAs encoding isoeugenol synthase (DcIGS1), an NADPH-dependent enzyme that converts

coniferyl acetate and sinapyl acetate to isoeugenol and 6-methoxy isoeugenol, respectively. Also, we found that the previously characterized DcE(I)GS1 can convert sinapyl acetate to 6-methoxy eugenol. Furthermore, we isolated and identified a cDNA encoding S-adenosyl-L-methionine:6-methoxy eugenol/6-methoxy isoeugenol *O*-methyltransferase (Dc6-MeOE(I)OMT) that produces elemicin and isoelemicin via methylation of the para-OH-group of their respective precursors. Expression analysis of the carrot DcIGS1 and Dc6-MeOE(I)OMT genes revealed that their transcripts showed significant variation in different tissues but were expressed when expected for involvement in elemicin formation.

**Keywords**: Carrot, Biosynthesis, Elemicin

# L-ASPARAGINASE PRODUCTION BY STREPTOMYCES HYDROGENANS CA04 ISOLATED FROM THE DJURDJURA MOUNTAIN IN ALGERIA: OPTIMIZATION USING BOX BEHNKEN DESIGN (BBD)

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## ABSTRACT

L-Asparaginase is used in the inhibition of the proliferation of tumoral lymphocytes by depletion of L-Asparagin which stops the protein biosynthesis. Among the organisms producing this enzyme, actinomycetes especially *Streptomyces* genus, are an interesting source. The aim of this work is to optimize the production of L-asparaginase by our strain. Our actinomycete strain was isolated from Djurdjura mountains in Algeria; it has been identified based on its morphological, biochemical and her 16S rDNA sequence as *Streptomyces hydrogenans* CA04. The production of extracellular L-Asparaginase has been highlighted. On the other hand, the conditions of the enzyme production: temperature, substrate concentration and glucose concentration were optimized using the RSM method with the Box Behnken Design. The optimal conditions of the enzyme production were (g/L): L-asparagine 7.5; glucose 1.0; in the basis medium containing (g/L): K2HPO4 0.5; MgSO4,7H2O 0.1 which gave an enzymatic activity of 5.9812IU/ml at the temperature 25,76°C. The ANOVA test (*P* value < 0.05) and adjusted R2 values close to the experimental R2 showed that the model of the enzyme production is significant. Strain *Streptomyces hydrogenans* CA04 is producing L-asparaginase with a variable yield and strongly dependent on the 03 factors selected in this study.

**Keywords**: L-Asparaginase, Streptomyces hydrogenans CA04, Optimization, Box Behnken Design

# EVALUATION OF A TOPICAL CREAM INCORPORATING ROSMARINUS OFFICINALIS ESSENTIAL OIL AS A THERAPEUTIC AGENT FOR ENHANCING CUTANEOUS WOUND HEALING.

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## ABSTRACT

The aim of this study was to assess the chemical composition of essential oil extracted from Rosmarinus officinalis and investigate its in vivo wound-healing properties. Gas chromatography coupled with mass spectrometry (GC/MS) was used to determine the chemical composition, revealing that the major compounds in *Rosmarinus officinalis* essential oil were **1**8-cineole (64.4%), α-pinene (13.9%), and camphor (7.4%). To evaluate the wound-healing activity, a topical cream containing *Rosmarinus officinalis* extract was prepared and tested using a circular excision wound model in vivo. The wound area was measured on various days (0, 3, 6, 9, 12, and 15) to assess the progress of healing. The results demonstrated that the *Rosmarinus officinalis* cream formulation exhibited superior wound-healing effects compared to the reference product Madecassol®. Animals treated with the *Rosmarinus officinalis* cream showed a significant reduction in the time taken for epithelization, wound area, and scar thickness. Additionally, the rate of wound contraction significantly increased. Treatment with the *Rosmarinus officinalis* cream also led to a decrease in inflammation and an enhanced rate of tissue perfusion, proliferation, remodeling, and re-epithelization. Based on these findings, *Rosmarinus officinalis* shows promising potential for the development of pharmaceuticals for wound management and inflammatory-related diseases. However, further studies are needed to elucidate the exact mechanisms underlying its pharmacological activity.

**Keywords**: Rosmarinus officinalis, wound healing, essential oil, topical cream

# IDENTIFICATION OF A NEW TOXIN LIKE DEFENSIN FROM ANDROCTONUS AUSTRALIS SCORPION VENOM

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## ABSTRACT

Natural extracts are considered the primary source for the development of therapeutic tools. Indeed, the majority of current drugs are from natural sources, or from an improved prototype of a natural biomolecule and produced by biotechnological means. In this light, scorpion venoms are an interesting example of rich sources of structurally and functionally diverse biomolecules that could be of great therapeutic potential. This work aims to investigate the antimicrobial activity of the endemic scorpion venom in Algeria, *Androctonus australis hector*. Antimicrobial activity of venom was tested on various bacterial and fungal strains. Moreover, venom was fractioned, and the active fraction was tested in a murine infection model using the most sensitive strain. To further explore this activity, the antibacterial component in this fraction was purified and analyzed by mass spectrometry completed by an *in-silico* study. Obtained results show that venom inhibits the proliferation of both Gram-positive and Gram-negative bacteria, and without any effect on fungi. The active fraction is able to reduce bacterial growth, lung damage, and inflammatory profile in a murine model of infection. Proteomic analysis of this fraction reveals that the antibacterial molecule is a sodium channel inhibitor only automatically annotated by gene model, under the name of G-TI. This latter was automatically annotated in the TrEMB part of the UniProt database, which contains automatic translations of genomic sequences without associated additional expertise. G-TI is classified by *in silico* similarity as a sodium channel blocker. It includes a "Knot" domain rich in cysteines and also present in defensins, trypsin inhibitors of the "Kunitz" family and other protein families. This study reveals the antibacterial activity of *Androctonus* scorpion venom. Proteomic and bioinformatics analyses proved for the first time the proteomic evidence of the sodium neurotoxin G-TI, thus giving a considerable added value to its annotation through characterization of its function, as an antimicrobial peptide with anti-inflammatory properties.

**Keywords**: Scorpion venom, Antibacterial, Defensin, Anti-inflammatory, G-TI

# PHYTOCHEMICAL SCREENING AND TOPICAL APPLICATION ON BURN WOUND HEALING ACTIVITY OF CARTHAMUS CAERULEUS , IN MICE.

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## ABSTRACT

*Carthamus caeruleus* belongs to the Asteraceae family and has a long history of traditional use in Northern Algeria for various ailments, including wound healing. The present study aimed to investigate the burn wound healing activity of the aqueous extract derived from the rhizome of *Carthamus caeruleus* in mice. Phytochemical analyses revealed the presence of tannins, carotenoids, saponins, terpenoids, steroids, flavonoids, glycosides, coumarins, and quinones in the rhizome of *Carthamus caeruleus*. In the acute toxicity test, oral administration of the plant extract to mice showed no signs of toxicity. Our findings demonstrate that treatment with the aqueous extract of *Carthamus caeruleus* resulted in a significant reduction in epithelization time, wound area, and scar thickness (75.3%) compared to the standard *BIAFINE* ® (50.6%). These results suggest that the aqueous extract of *Carthamus caeruleus* holds promise as a potential therapeutic agent for wound healing. Further preclinical and clinical trials are warranted to explore its efficacy and safety in this context.

**Keywords**: Phytochemical screening, burn wound healing, Carthamus caeruleus

# THE IN VITRO AND IN VIVO ANTI-INFLAMMATORY ACTIVITY OF A PLANT

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## ABSTRACT

Although a large number of plant species have been traditionally used for the treatment of various diseases and for many other beneficial activities, most of them have not been scientifically studied. Indeed, many of these species are chemically unknown and may be hazardous to human health. In this study we'll be working on one of the species native to north Africa. In order to ensure the safety use of this plant in traditional medicine, the study aims, in the first step to the extraction of the plant, and the evaluation of its anti-inflammatory activities. The objective of this study is to determine the content of total phenolic compounds, flavonoids in the aqueous extract and evaluate the anti-inflammatory activity. The phenolic content was determined by the Folin-ciocalteu method, the flavonoid content was determined by the Aluminuim trichloride method, The aqueous extract showed a high in polyphenols, with a value of 549.551 ± 0.018 µgEAG/mg of extract, the value of flavonoids is 15.466 ± 0.007 µgEQ/mg of extract. The anti-inflammatory activity was evaluated by two ways: to investigate the anti-inflammatory activity in vitro we used the bovin serum albumin method. The extract possesses anti-inflammatory effect in vitro with value 0.113+0.0018mg/ml compared with standard Aspirine 0.097+0.005mg/ml. In vivo anti-inflammatory activity was testing topically in mice models using xylene induced ear edema assay. The activity in vivo is 72.72% at concentration of 200mg/kg and 77.27% at concentration 400mg/kg compared with standard Voltarene 66.28%. The aqueous extract had a strong anti-inflammatory activity, this could be related to its high contents in phénolic compounds.

**Keywords**: Plant, Aqueous extract, Phenolic compounds, Anti-inflammatory activity

# PHYTOCHEMICAL PROPERTIES OF NUTMEG (MYRISTICA FRAGRANS)

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## ABSTRACT

*Myristica fragrans* (fam. Myristicaceae) – the source of the spice nutmeg, is evergreen tree widespread in warm and humid tropical climate. Indonesia is the largest nutmeg world producer. Nutmeg seeds are valuable due many uses: in cooking (spice in sweet or salt dishes), traditional medicine (diseases of the nervous, digestive and dentistry), additive in the products of the pharmaceutical and perfumery industry. Nutmeg seed is a good source of primary (carbohydrates, lipids, proteins, vitamins) and secondary metabolites (terpenes, phenolics, organic acids). The main components are lipids (30-40%) and essential oil (10-15%). Scientific sources indicate on many pharmacological effects of nutmeg: antidepressant, hepatoprotective, antioxidant, anticancer, etc. Climatic conditions have significant impact on flavor and therapeutic effect of nutmeg. In this research the content of total phenolics (TPC), total flavonoids (TFC), total hydroxycinnamic acid derivatives (THCAs) and total carotenoids (TCC) was determined by spectrophotometrically methods, in order to evaluate the potential healing effect of nutmeg. Tested extracts were prepared from dried and ground nutmeg seed commercially purchased, using two solvents (80% acetone and warm water - 50°C) and two extraction techniques (solvent extraction (SE) and ultrasound assisted extraction (USE)). The obtained results indicate a rich content of carotenoids and phenolics in acetone extracts. Precisely, the TCC was 49.94 ± 0.70 μg/g in extract prepared by SE and 53.01 ± 1.28 μg/g in extract prepared by UAE. The TPC in acetone extracts prepared by SE and UAE was similar, 28.93 ± 0.18 mg GAE/g of DW and 28.78 ± 0.07 mg GAE/g of DW, respectively, which is statistically significantly higher than the TPC achieved in water extracts (2.97 ± 0.14 mg GAE/g of DW for SE extract and 3.00 ± 0.21 mg GAE/g of DW for UAE extract). The TFC and THACs achieved in acetone extracts was statistically significantly higher than TFC and THACs observed in water extracts, where in the case of both solvents, the extraction technique does not influence statistically significantly on the TF and THACs content. The TFC and THACs in acetone extracts prepared by SE was 1.50 ± 0.06 mg CE/g of DW and 6.13 ± 0.08 mg CGAE/g of DW, while acetone extracts prepared by UAE contained TF 1.59 ± 0.00 mg CE/g of DW and THACs 5.96 ± 0.27 mg CGAE/g of DW, respectively.

**Aknowlegment:** This work was supported by Ministry of Education, Science and Technological Development of Republic of Serbia through Grant No. 451-03-47/2023-01/200116.

**Keywords**: nutmeg, phytochemical properties

# ANTIOXIDANT PROPERTIES OF BROCCOLI (BRASSICA OLERACEA VAR. ITALICA) GROWN UNDER DIFFERENT FERTILIZER TREATMENTS

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## ABSTRACT

In the modern world, many diseases that occur in the human population, such as cancer, cardiovascular disease, diabetes, brain stroke, skin diseases, as well aging, are caused by oxidative stress. An adequate and balanced diet can help to avoid the negative effect of free radicals and prevent the occurrence of potential diseases. Food of plant origin, especially vegetables, is an excellent natural source of compounds with antioxidant activity. Broccoli (*Brassica oleracea var. italica*) is vegetable plant from Brassicaceae family, native to the eastern Mediterranean. Broccoli is a valued vegetable due to the high nutritional value of its edible parts (fleshy stems and the compact inflorescences), which are used fresh or thermally processed. This vegetable is widely cultivated throughout the world, but the top producers in 2021 were China and India. In Serbia, hybrids with good technological processing properties are mainly produced and the areas under them have been increasing in recent years. In this research broccoli hybrid *Parthenon* F1 (*Sakata Seed*), grown in open field conditions, was examined with the aim of evaluating the antioxidant properties of the edible parts. During plant production, six different mineral starter fertilizer (*Super Star*, Elixir Zorka, Šabac, Serbia, in doses 0, 15, 20, 25, 30, 35 kg/ha) in combination with four treatments of biostimulator (*Kelpak*, Kelp Products Ltd., South Africa, without, once, twice and three times) was applied at different stages of plant development. Antioxidant properties of 80% acetone extracts of edible parts were determined using CUPRAC, FRP, TAC and DPPH• assays, whose procedures were previously described by Kilibarda *et al*. The obtained results, as ranges, are shown in Table 1.

Table 1. Ranges for antioxidant properties of edible parts of broccoli

| Hybrid | Biostimulator | Start fertilizer (kg/ha) | DPPH• % Inh | TAC mg/g AAE* | CUPRAC mg/g AAE | FRP mg/g AAE |
|---|---|---|---|---|---|---|
| Parthenon F1 | Control | 0-35 | 5.43-11.38 | 3.66-4.49 | 3.87-6.09 | 0.55-0.67 |
| | Once | 0-35 | 8.47-13.87 | 3.23-3.80 | 4.96-5.87 | 0.52-0.63 |
| | Twice | 0-35 | 4.59-15.17 | 3.81-4.26 | 6.03-7.33 | 0.65-0.78 |
| | Three time | 0-35 | 11.55-18.38 | 3.21-3.52 | 5.95-7.44 | 0.61-0.84 |

*AAE – ascorbic acid equivalents.

The obtained results, observed as the highest values, showed that in the DPPH•, CUPRAC and FRAP assays, the highest antioxidant activity was measured in the treatment in which biostimulator, in combination with start fertilizer, was applied three time. Contrary, the highest antioxidant activity in TAC assay, was recorded in control variant. Further research should point out need to expand the range of fertilizer doses as well as the inclusion of other hybrids, with the aim of producing broccoli as a functional food.

**Acknowlegment:**This research was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia, grant numbers 451-03-47/2023-01/200116 and 451-03-47/2023-01/200054.

**Keywords**: antioxidants, broccoli, Brassica oleracea var. italica

# TOTAL PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY OF THE AQUEOUS EXTRACT FROM THE ALGERIAN GLOBULARIA ALYPUM L.

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## ABSTRACT

**Background:** Species *Globularia alypum L* belonging to the Globulariaceae family, his plant is used in traditional Algerian medicine for the treatment of Diabetes.
**Objective:** The objective of the present research was to evaluate the content of polyphenols, flavonoids and condensed tannins compounds and to assess *in vitro* the antioxidant activity of the Aqueous extract of this plant.
**Methods:** Polyphenols, flavonoids and condensed tannins were evaluated spectrophotometrically using Folin-Ciocalteu, the Aluminum chloride and vanillin methods, respectively. The antioxidant activity using DPPH radical scavenging, ABTS and Ferric reducing antioxidant power.
**Results:** the contents of polyphenols and flavonoids were found to be 140,87 ± 01.52 µg GAE/mg µg GAE/mg extract and 8.09±0.79 µg QE /mg extract, respectively, Whereas the amount of tannins was 36.12±1.32 µg Cat E/ mg of dry extract.
The DPPH scavenging capacity showed a significant reduction of the DPPH radical with IC50 inhibitory concentrations equal to 46 ± 0.996 µg/ml against 6.32 ± 0.89 µg/ml for BHT. For the ABTS test, the IC50 value is around 23.07±2.18 µg/ml against only 2.25±0.38 µg/ml for BHT. The reducing power is evaluated by the test of thiocyanate ferric, the IC50 is 19.59 ± 0.241 µg/ml.
**Conclusion:** The present study revealed that the extract is rich in phenolic compounds, which play a really important role in the scavenging of free radicals, making a major contribution to the justification of the antioxidant activity. This plant can be considered as a source for natural compounds that can be incorporated into our diet and pharmaceutical applications.

**Keywords**: Total phenols; flavonoids; tannins; antioxidant activity

# BIOCHEMICAL VARIABILITY OF PISTACIA ATLANTICA DESF IN DIFFERENT CONDITIONS ENVIRONMENTAL IN ALGERIA

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## ABSTRACT

The fundamental biochemical characterization for species selection and improvement was studied in different conditions environmental "Tissemssilt (T) and Laghouat (L)" for the leaves of *Pistacia atlantica*. The extraction of healthy leaves from three trees (A) per site made by solvents of different polarities, a thin layer chromatographic analysis (TLC) and a gas chromatographic analysis coupled to the mass spectrum (GCMS). The TLC results show that the best solvent allowing the extraction of a high number of compounds at the level of TA1 and TA2 is butanol. For TA3, it is Petroleum Ether. For LA1 and LA3 it is methanol and for LA2 it is ethanol. Observing the best separation system at Tissemssilt, Hexane/Ethyl Diether/Acetic Acid and Chloroform/Ethyl Diether separated 03 molecules, while Hexane/Ethyl Acetate separated 04 molecules at TA1. For TA2, 03 molecules are separated by Hexane/Diether ethyl. At TA3, 02 molecules by Chloroform/Ethyl Diether and Hexane/Ethyl Acetate. Regarding Laghouat, the best separation system is Hexane/Ethyl diether/Acetic acid separating 03 molecules in LA1 and LA3 and Hexane/Ethyl diether/Acetic acid in LA2. For GCMS, 43 compounds present in the methanolic extract in LA1 are identified. α-Pinene, β-Pinene, Camphene, δElemene and verbenole trans with 21.7%, 12.8%, 5.0%, 5.0%, 4.9% respectively are the predominant constituents. This preliminary study shows a biochemical variability of *Pistacia atlantica* Desf inter and intra site constituting an essential tool to ensure a sustainable management of this biological resource and to preserve its threatened biodiversity.

**Keywords**: Pistacia atlantica (Desf), ecological variability, biochemical characterization, Algeria

# ALZHEIMER DISEASE ENVIRONMENTAL AND MOLECULAR FACTORS

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## ABSTRACT

Alzheimer's disease (AD) is considered a major public health problem, it is a progressive neurodegenerative condition that occurs in certain structures of the human body, responsible for cognitive and behavioral disorders that affect the body and the autonomy of the subject. Currently, no treatment can cure this disease, but knowledge of its risk factors and mechanisms has evolved dramatically in recent years. This pathology can therefore be due to multiple environmental factors (for example the age, sex, cardiovascular diseases such as cholesterol, diabetes, etc. which can affect the disease in a positive or negative way by allowing its evolution or the opposite, we have also the diet; for example if you have a diet that is not healthy, that is to say foods rich in antioxidants or omega 3 such as fish, the patient has a greater chance of being affected by this type of condition "dementia". Or molecular (study of genetic mutations, the study of genes such as the precursor protein of the amyloid peptide (APP) or presenilin 1 or presenilin 2, the amyloid cascades...). In this context, the objective of our doctoral work will be to characterize these factors in patients with Alzheimer disease in our region.

**Keywords**: AD (Alzheimer disease) - environmental factors - molecular factors

# HORMONAL AND METABOLIC VARIATIONS IN BUCKS NATIVE TO ALGERIAN SAHARA DESERT

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## ABSTRACT

Like many animal species, the Buck raised in Algerian arid areas (Béni-Abbès, 30°07' N, 2°10' W), has developed physiological strategies, including neuroendocrine and metabolic variations, in order to adapt to the harsh environment. For a better understanding of these mechanisms, an exploration of gonadal, adrenal and thyroid axes was conducted using respective measures of testosterone, cortisol, and pituitary-thyroid hormones (TSH, FT3 and FT4), using automated radioimmunological or immuno-enzymatic assays. Urine catecholamines were analysed by HPLC and metabolites by commercial biochemical kits. Furthermore, experiments reproducing the effect of stress on these endocrine axes were conducted by injection of ACTH and/or after water deprivation. The results showed seasonal variations in body weight, rectal temperature, basal metabolism and different endocrine activities. A positive correlation between testicular and glucocorticoid activities has been revealed by parallel or slightly staggered annual cycles. While a negative correlation has been observed between thyroid and testicular activities. These hormones exert coordinated actions on energy and hydromineral metabolisms revealing nycthemeral and seasonal variations, both at the basal state or after stimulation by ACTH and/or during water deprivation. In conclusion, the cycles of endocrine activities are accompanied by significant metabolic changes, allowing to maintain the homeostasis of internal environment, which is necessary for the survival and the sustainability of this indigenous goat breed.

**Keywords**: Rhythm, Testosterone, Cortisol, Thyroid hormones, Buck, Sahara desert

# POTENTIAL APPLICATION OF CANNABIS AND CANNABIS DERIVED COMPOUNDS AGAINST BIOFILM

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## ABSTRACT

Many plants including *Cannabis Sativa* are known for their medicinal uses. Cannabis Sativa is an annual plant known for centuries for its different medicinal benefits including antimicrobial effects. Until 2017, this plant has been reported with more than 500 natural constituents 120 of which are cannabinoids. Even if the antimicrobial effects of this plant and its extracts have been shown, studying all its natural constituents in this context of antimicrobial agents is still not enough. In addition, antimicrobial resistance constitutes an important public health problem. Microorganisms still develop this mechanism and cause difficulties in treating many infectious diseases. One of the virulence factors in microorganisms is the ability to form biofilm. Biofilm, as a microbial community in which different substances are secreted, is a highly protective form of the microbial community against antimicrobial agents. This highly protective structure should be studied alone for obtaining alternative antimicrobial agents against a such structure. This review resumes information about the response of biofilm structure to antimicrobial agents, and the use of *Cannabis Sativa* as an alternative anti-biofilm agent to fight infectious diseases caused by biofilm-forming bacteria.

**Keywords**: Antimicrobial resistance, Antimicrobial agent, Biofilm, Cannabis Sativa

# BDELLOVIBRIO BACTERIOVORUS IN BIOFILM AND MICROBIOLOGICALLY INFLUENCED CORROSION INHIBITION

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## ABSTRACT

Metal corrosion is one of the major global economic issues. Consisting of destruction of the metal and metal properties, this electro-chemical process is caused by different factors including microorganisms. Even if some microorganisms can influence the metal corrosion without adhering the surface of the metals, biofilm formation on the metal surface is known as one of the influence factors of microbially influenced corrosion (MIC). In this context, inhibiting the MIC can be processed by inhibiting the biofilm formation on the metal surface. Different methods like using antibiotics and biocides are used to fight this community formations. However, resistances to these substances are still developed in the environment and cause high costs in industrial and health fields. By this fact, it is thought that using predator bacteria which can feed themselves on the biofilm forming bacteria or metal corrosion influencing bacteria can be an environmentally friendly method and reduce the cost damage in the industries. In this review, the Gram-negative bacterium *Bdellovibrio bacteriovorus* is the main focused predator bacteria thought to be used to fight against biofilm formation and MIC. This bacterium isolated from different ecosystems (aquatic and soil), has as hosts both gram negative and Gram-positive bacteria. This study helps to understand in general the MIC, biofilm, MIC inhibition (MICI), and the role that can play the *B. bacteriovorus* in the inhibition of both biofilm formation and MIC.

**Keywords**: Bdellovibiro bacteriovorus, Biofim, Corrosion, EPS, Microbially Influenced Corrosion

# STUDY OF THE NUTRITIONAL VALUE OF SEEDS AND LEAVES OF SOME QUINOA CULTIVARS CHENOPODIUM QUINOA WILLD

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## ABSTRACT

The aim of this study is knowing some of the chemical properties of four quinoa plant varieties (white, red, black and V2). Where we focused on the chemical and nutritional compositions of the quinoa plant, and the changes are represented in the elements of nutritional value (compounds of primary metabolism, secondary metabolism and mineral content). In addition to determining electrical conductivity and acidity (pH). The results showed that white quinoa seeds are characterized by a high content of proteins compared to the other three varieties. The fat and carbohydrate content were better in red quinoa followed by black quinoa while V2 variety was the lowest content. Regarding the value of the mineral content, the content was somewhat weak for the four studied varieties, within the range of 3.5%. The results of the study on the leaves show that the mineral content is high in the range of 35%. Whereas the highest protein content was found in black quinoa leaves. The content of carbohydrates and fats was relatively high for the white quinoa, followed by the red quinoa. All of this is due to genetic factors related to the quality of seeds, plant morphology, the extent of their adaptation and tolerance to various stresses and the various influences of climatic factors.

**Keywords**: Quinoa, nutritional value, seeds, leaves

# RETROSPECTIVE STUDY OF THE EVALUATION OF SCREENING ACTIVITIES FOR PRECANCEROUS LESIONS OF THE CERVIX IN EASTERN ALGERIA (OUM EL BOUAGHI).

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## ABSTRACT

Cervical cancer comesin second place among cancers that target the female population in Algeria with an estimated incidence of 15.6 per 105,000 women per year, it is considered asa real public health problem.It is one of the main causes of morbidity and mortality.Our work consistsona retrospective study of 148 cervico-vaginal smears(CVS)or pap smears, carried out in the laboratory of the Slimane Amirat maternity in Oum El Bouaghi, during a period of 3 months between October 2020 and December 2020.The objective of our study is to assess the impact of screening activities for this cancer, and to show the interest of CVSin the screening of cervical lesions. Out of the overall sample, a rate of 70% indicates women who presented for screening for the first time, at an advanced age, where more than 50% did so before age 45, which represents a very high rate. compared to those who made a control (30%), The quality of the smears were satisfactory at 90%, 11% of the FCVs performed were normal, The inflammatory lesions represent 89% of the mild reaction changes and are mainly non-specific inflammations. Concerning epithelial cell abnormalities: atypical squamous cells of undetermined significance (ASC-US) represent 27%, and atypical glandular cells of undetermined significance (ASC-H) 49%. Low grade intraepithelial lesions (LIEBG) represent 5%, while high grade intraepithelial lesions (LIEHG) 19.5%, and the age group of 50 to 54 years which represents a percentage of 32%, whose smear is ASC-US. In pathological smears, it is recommended to perform a smear after 6 months in 75% of cases. The rate of pathological smears found in this study confirms the value of continuing to screen for cervical cancer at its initial stage using FCV examination. This problem may be solved in the future by creating a center for monitoring pathological FCVs in order to have a successful screening program.

**Keywords**: Screening, precancerous lesion, cervical cancer, Pap smear

# MOLLUSCICIDAL ACTIVITY OF THE NATURAL EXTRACT OF ARUM MACULATUM LEAVES AGAINST A TERRESTRIAL GASTEROPOD, CORNU ASPERSUM

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## ABSTRACT

Agriculture is one of the main sectors of activity contributing to the socio-economic development of populations. Snails and slugs can cause considerable damages to plants and the non-negligible costs of controlling them in agricultural production. The use of conventional molluscicides to control these species remains a restrictive and less effective method. The aim of our study is to find a natural phytosanitary molluscicide that can be considered an alternative to conventional chemical products. This study consists of determining the LC50 and LC90 of *Arum maculatum* leaf extract on the most dominant snail in north-east Algeria, *Cornu aspersum*. In addition, the acute toxicity of this extract was evaluated on the biochemical composition of foot of this species. The toxicological tests showed a positive relationship between mortality and the doses tested. The LC50, LC90 and LC25 concentrations determined from the regression line expressing mortality as a function of the decimal logarithms of the doses of the alkaloid extract are 27.128 g/L, 44.639 g/L and 6.688 g/L respectively. The biochemical assay results indicate that treatment of *Cornu aspersum* adults with *Arum maculatum* plant extract for 96 hours causes disturbances in the biochemical composition of the foot of this species.

**Keywords**: Arum maculatum, Cornu aspersum, mortality, acute toxicity, natural extract

# EFFECTS OF CADMIUM EXPOSURE ON COPPER AND MANGANESE CONTENTS OF WEDGE CLAM (DONAX TRUNCULUS)

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## ABSTRACT

Cadmium (Cd) is a transition metal, very toxic and ranked seventh on the list of hazardous substances. Previous studies have reported markedly increased levels of metal pollution in the Gulf of Annaba, especially by Cd. The present study was carried out in order to study under laboratory conditions the impact of acute toxicity (96h) of cadmium on the Mn and Cu in a edible species and bio-indicator of pollution, *Donax trunculus* (Mollusca, Bivalvia). Samples were collected in El-Battah, a site far from the pollution sources, and then reared in the laboratory. Cadmium was added to the rearing water at two sublethal concentrations (LC10-96h= 0.94 mg/L and LC25-96h= 1.60 mg/L); previously determined by Merad and Soltani (2015). Our results showed that cadmium causes a decrease in Mn and Cu levels in female *Donaxtrunculus*. The results revealed significant effects of Cd concentrations and exposure time on studied parameters.

**Keywords**: Nutritional value, bivalve mollusc, Donax trunculus, Manganese, Copper, cadmium

# UNVEILING THE PROMISING METABOLIC CAPABILITIES OF ACTINOPHYTOCOLA ALGERIENSIS DSM 46746T BOUZNADA ET AL., 2016 THROUGH IN SILICO GENOME MINING

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## ABSTRACT

This study aims to investigate the biosynthetic potential of *Actinopyhtocola algeriensis* DSM 46746T, an actinobacterium isolated from Saharan soil. Traditional biochemical characterization approaches have faced limitations in producing or extracting many microbial secondary metabolites (SMs) under laboratory conditions. In this research, in silico genome screening using antiSMASH 6.0 and PRISM 4 was conducted to identify biosynthetic gene clusters (BGCs) in *A. algeriensis* DSM 46746T. The analysis predicted a total of 31 BGCs using antiSMASH, with 27 clusters showing similarities to known gene clusters producing specific SMs. Four remaining clusters had unknown functions, one of which shared similarities with gene clusters from related families, suggesting a conserved function inherited vertically from a common ancestor. PRISM4 identified 24 BGCs, including non-ribosomal peptides (NRPS), polyketide synthases (PKS), hybrid clusters, ectoines, lasso peptides, lantipeptides, and phenazines. These BGCs may be silent or cryptic under laboratory conditions, or the synthesized compounds may not exhibit antimicrobial activity against the tested microorganisms in previous studies. Interestingly, a comparison with the MiBiG revealed a gene in one of the predicted BGCs (NRPS) with similarity to the AM-toxin synthetase gene found in the fungi *Alternaria alternata*. However, further investigation is needed to validate this connection. While the presence of these BGCs suggests the potential for diverse SM production in *A. algeriensis* DSM 46746T, it should be noted that their expression may be influenced by environmental conditions. Additionally, the lack of antimicrobial activity against the tested microorganisms indicates alternative biological functions of the synthesized compounds. Experimental studies are required to characterize the SMs produced by *A. algeriensis* DSM 46746T in greater detail.

**Keywords**: A. algeriensis DSM 46746T, in silico genome mining, BGCs, SMs, NRPS, PKS

# STUDY OF THE HARD TICK HYALOMMA DROMEDARII (ARTHROPODA, IXODIDAE) IN CAMELS IN SOUTHERN ALGERIA

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## ABSTRACT

Camels can have internal pathologies or be infested by external parasites such as hard ticks, these could constitute a real problem for breeders given the cost of the drugs used to eliminate them but also to possibly treat the dromedaries because the Ticks are vectors of various pathologies. In Algeria, work has shown the existence of several species infesting dromedaries, among them *Hyalomma dromedarii* which was once considered not to be a vector of germs but according to a recent study, (Perveen, N et al., 2020) *Hyalomma dromedarii* can have a rich and diverse microbiota with potential to harbour pathogenic bacteria, which could pose a serious health risk to camels and humans (Perveen N et al., 2020), and as this species is common in southern Algeria, we are interested in identifying it and studying its presence at the same time as other species of ticks on camels, so a study was conducted between 2020 and 2022 in the region of ElOued, Ghardaia and M'sila, our results show the presence only of species of the genus *Hyalomma* correctly: *H. dromedarii* (7.14%), *H. impeltatum* (10.71%), *H. lusitanicum* (40.82%), *H. anatolicum excavatum* (31.12%), *H. anatolicum anatolicum* (4.08%), H. detritum detritum (3.06%), H. marginatum turanicum (0.51%), H. *marginatum marginatum* (2.55%).

**Keywords**: Hyalomma dromedarii, Algeria, dromedaries, association of ticks

# BIOLOGICAL CONTROL OF PICHIA ANOMALA AGAINST THE STORAGE FUNGUS ASPERGILLUS FLAVUS .

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## ABSTRACT

*Pichia anomala* (L1 and L2) is antagonistic yeast that has been shown high effectiveness against the fungus *A. flavus* isolated from poultry feeds in Algeria. Results indicate a very high inhibitory capacity of these isolates, particularly L2. This latter inhibited *A. flavus* with a rate ranging from 72, 22 to 77, 78% of mycelial growth in radial inhibition assay on PDA. In the volatile compounds inhibited of the fungus *in vitro* assays, *Pichia anomala* showed significant inhibitory activity against A. *flavus* when the mycelial growth decrease from 6**1** 90% for L1 and 60,75% for L2 compared with the control (71.66%). This yeast could be considered a potential biocontrol agent against the toxigenic mold *A. flavus* in poultry feeds. This inhibition action is probably due to the synergistic effects of the factors such as the production of killer toxins and the extracellular enzymes.

**Keywords**: Biocontrol, Poultry feeds, Pichia anomala, Aspergillus flavus

# STUDY OF THE WATER QUALITY OF LAKE OUBEIRA AND COMPARATIVE STUDY OF THE TRANSMISSION OF TOXINS BETWEEN TYPES OF FISH THAT POPULATE IT

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## ABSTRACT

At the beginning of spring, the surface waters of the countries of the Mediterranean basin, enriched with nutritive salts during the winter, see their phytoplankton multiply in geometric progression taking advantage of the renewed solar energy and the rising temperature. However, anthropogenic pressures lead to the excessive enrichment of waters with nutrient salts (mainly phosphorus and nitrogen), and consequently the rapid eutrophication of stagnant waters. This phenomenon has become a growing global problem. The availability of inorganic nutrients is one of the main factors that controls the growth, biomass and taxonomic composition of phytoplankton. Cyanobacteria form, under certain environmental conditions, foams on the surface of the water called "blooms". The massive development of these blooms in fresh waters across the globe has become a real threat to human health, but also to aquatic fauna and flora, in particular because of the production of toxins accompanying these cyanobacterial blooms. Cyanotoxins are toxins produced by 40 species divided into 22 potentially toxic genera of cyanobacteria as secondary metabolites. The term secondary means, on the one hand, that these components are not necessary for the primary metabolism (photosynthesis, respiration and the synthesis of macromolecules) On the other hand, that the biological components do not all have a known role suggest that the cyanotoxins of the microcystin and nodularin type could be primary metabolites, nitrogen compounds essential to cellular metabolism, which can serve as transmembrane transporters for certain metals. Organisms living in/near waters where microcystin-producing cyanobacteria proliferate can become contaminated directly by those dissolved in the water (or adsorbed on sediments) and by those intracellular (by consuming toxic cyanobacteria), and indirect by microcystins accumulated in their prey (trophic transfer). The relative importance of the different sources of contamination, varying according to the species. The excessive growth of a toxic cyanobacterial biomass (manifested or not by a bloom) in a hydro-system, used in the supply of drinking water or for other recreational or agricultural activities, poses a serious problem for human health. Processes for treating cyanotoxin-contaminated water should be reinforced with other prior measures incorporating direct and/or indirect interventions. Indirect intervention generally consists of implementing preventive actions at the level of the hydro-system. These actions aim to control the determining factors of eutrophication by controlling the parameters that regulate the growth of cyanobacteria such as light intensity, nutrient availability and physical stability of the environment. Direct actions correspond to techniques that minimize the transfer of cyanobacterial blooms to drinking water supply systems (treatment plant, etc.) The accumulation of cyanotoxins in the food chain is currently the issue of greatest concern. Numerous studies have suggested that cyanotoxins accumulate in aquatic organisms. Cyanobacteria are photosynthetic microorganisms that are characterized by their potential toxicity, as they are capable of producing a wide variety of toxins, including Microcystin. It has been proven that this toxic molecule can be accumulated in the trophic chain ranging from zooplankton and molluscs to carnivorous and herbivorous fish, causing chronic intoxication resulting in carcinogenic effects. A study was carried out at Lake Oubeïra (northeast of Algeria) on the existing toxic cyanobacterial community and their

impacts on aquatic organisms, revealed the presence of an immense health risk translated by the strong power of fish to accumulate cyanotoxins in their organs and especially in the flesh designated for human consumption. Organisms can be contaminated either transdermally or by ingestion through food intake. In order to understand this process, two species of fish Cyprinus carpio and Anguilla anguilla were sampled during a year of study. The results obtained show that these two species can accumulate different doses of MCs in the three organs (liver, viscera and muscle).

**Keywords**: Cyanobacteria, microcystins, water quality, bioaccumulation in flesh

# STUDY OF THE ANTIMICROBIAL ACTIVITY OF ESSENTIAL OILS FROM FIVE MEDICINAL AND AROMATIC PLANTS ON THREE REFERENCE STRAINS.

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## ABSTRACT

The use of Essential oils is deeply rooted in traditional practices, all over the world. However, scientific studies are mandatory to prove their application in folk medicine. In the present work, a series of antimicrobial tests were conducted on five essential oils (Eucalyptus (*Eucalyptus globulus*), Cinnamon (*Cinnamomum verum*), Lemon (*Citrus limon*), Lavender (*Lavandula angustifolia*), and Tea (*Camellia sinensis*)) in order to evaluate their effectiveness against various referential microorganisms (*Staphylococcus aureus* ATCC 29213, *Escherichia coli* ATCC 25922, *and Pseudomonas aeruginosa* ATCC 27853). In this context, disc diffusion, MIC, and MBC tests were assessed. With the exception of Lemon, all tested essential oils showed good antimicrobial potential, with various degrees of inhibition. However, Cinnamon oil demonstrated the highest activity. On the other hand, *P. aeruginosa* was considered the most resistant bacterial strain. Although, Cinnamon or Eucalyptus oils showed a bacteriocidal effect on this bacterium. Further research is needed to test the antimicrobial activity of these essential oils on other pathogens that have developed resistance to conventional antibiotics.

**Keywords**: Essential oils, Antimicrobial activity, Staphylococcus aureus ATCC 29213, Escherichia coli ATCC 25922, Pseudomonas aeruginosa ATCC 27853

# DETERMINATION OF EXTENDED SPECTRUM BETA-LACTAMASE PRODUCTION AND ANTIBIOTIC RESISTANCE OF ESCHERICHIA COLI AND KLEBSIELLA SPP. ISOLATED FROM FOODS OF ANIMAL ORIGIN

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## ABSTRACT

The frequent use of antibiotics as growth factors, prophylaxis, and treatment in veterinary medicine increases the transmission of resistant bacteria to humans through foods of animal origin. *Escherichia coli* and *Klebsiella* spp. are found in foods from animal origin and cause various infections in humans. ESBL enzymes cause hydrolysis of antibiotics such as penicillin, cephalosporin, and monobactams, making it difficult to treat infections caused by ESBL-positive bacteria in humans and animals. Therefore, identification and monitoring of foodborne ESBL-producing *E. coli* and *Klebsiella* species is very important for public health. In this study, *E. coli* and *Klebsiella* spp. were isolated from 24 raw milk, 26 cheese, and 20 meat samples sold in Ankara. Various biochemical tests were performed for preliminary identification of the isolates. Identification at the species level was performed by MALDI-TOF-MS. Antibiotic resistance of *E. coli* and *Klebsiella* spp. isolates were investigated by the Kirby-Bauer Disk Diffusion method, the presence of ESBL was investigated by Double Disk Synergy Test (DDST). Antibiotic resistance was evaluated according to EUCAST (2022) and CLSI (2020). In our study, 44 *E. coli* and 36 *Klebsiella* spp. strains were isolated from foods from animal. ESBL production was detected in 24 (54,5%) *E. coli* strains and 24 (66,6%) *Klebsiella* spp. strains. *E. coli* and *Klebsiella* spp. strains were found highly resistant to ampicillin and amoxacillin-clavulanic acid. The results of our study show that antibiotic-resistant and ESBL-producing *E. coli* and *Klebsiella* spp. can be transmitted to humans from animal foods. It also shows that uncontrolled and high amount of antibiotic use in veterinary medicine and food production in our country should be avoided and food processing and hygiene practices should be carried out correctly for food safety. Acknowledgments: We would like to thank Gazi University Scientific Research Projects Coordination Unit for their support (FYL-2022-8310).

**Keywords**: Foods of Animal Origin, ESBL, Antibiotic resistance, Escherichia coli and Klebsiella spp.

# ANTIBACTERIAL ACTIVITY OF 6 ESSENTIAL OILS ON FOOD CONTAMINATION ISOLATES

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## ABSTRACT

Alteration caused by the activity of microorganisms leads to a deterioration in the organoleptic and sanitary qualities of foodstuffs. It is characterized by a change in the structure, color and taste of the food. Over the past two decades, studies have been carried out into the development of new applications and the exploitation of the natural properties of essential oils (EO) in the food industry. To this end, we isolated and identified 5 bacterial strains ( E,coli, Proteus penneri, Proteus vulgaris, Staphylococcus capitis, and Salmonella sp) isolated from spoiled foods (ground turkey and chicken meat, and cheese), and we studied the antibacterial activity of 6 commercially available aromatic and medicinal plant EOs (Eucalyptus, thyme, lavender, spearmint and clove), using disk diffusion tests, MIC and BMC. We then studied the resistance of these isolates to 13 common antibiotics, and investigated the synergy of action between 4 EOs and 12 antibiotics on one isolate (S captis), which showed multi-resistance to these antibiotics and sensitivity to these essential oils. The results showed that Clove EO was the most effective on the 5 isolates, with MICs and BMCs ranging from 0.625µL/mL for 4 isolates to 1.25µL/mL for *P penneri*, followed by Thyme EO with MICs and BMCs ranging from 2.5µL/mL for *Salmonella sp* to 5µL/mL for the other 4 isolates. Antibiotic susceptibility testing of the 5 isolates showed that *S capitis* was the strain most resistant to all antibiotics except Gentamycin, whereas it was sensitive to all EOs except Lavender EO and Rosemary. A study of the synergy between these EOs and antibiotics in this isolate showed a strong synergy between some EOs and antibiotics. These results suggest the potential use of these EOs, which are currently employed as food flavourings, as food preservatives.

**Keywords**: essential oils, bacteria, food spoilage, antibacterial activity, multidrug resistance

# INVESTIGATION OF PALM OIL GENOTOXICITY IN DROSOPHILA MELANOGASTER

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## ABSTRACT

The relationship between dietary fats and cardiovascular diseases has led to increased interest in the palm oil, which is the second largest vegetable oil consumed in the world. Palm oil is efficient in production and included in many products in food industry. Frequent consumption of the products containing palm oil increases the exposure to it. In this study, we determine the genotoxic effect of the palm oil (**1,** 2, 5, and 10%) using the somatic mutation and recombination test (SMART) in *Drosophila melanogaster*. For this test, eggs that are transheterozygous for *multiple wing hairs (mwh*, 3-0.3) and *flare (flr*$^3$, 3-38.8) genes, which are recessive on the third chromosome, were fed with different doses of palm oil until pupa formation. Although the data obtained casused an incerase in clone frequencies depending on the dose, it was determined that it did not cause a genotoxic effect as a result.

**Keywords**: Drosophila, palm oil, genotoxicity

# INNOVATIVE BIOTECHNOLOGICAL PROCESS FOR MICROCYSTIN DECONTAMINATION IN PLANT-SOIL COMPLEX USING RHIZOBIA AND RHIZOBACTERIA

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## ABSTRACT

Cyanobacterial blooms have been increasing in freshwater ecosystems worldwide in the last century, mostly resulting from eutrophication and climate change. These blooms are able to produce a wide variety of toxic secondary metabolites, i.e., cyanotoxins, with microcystin-LR (MC-LR) being the most studied one due to its global distribution, ubiquity, and toxicity. Repeated use of MC-contaminated water can alter the nutritional quality and yield of crops, contaminate agroecosystems, and inhibit plant growth, raising concerns about health risks and food safety. The specific aim of this work was to investigate the potential role of rhizospheric microorganisms in acting as a bioremediation tool to protect soil-plant systems from microcystins and mitigate toxin-related health risks. To this purpose, *Vicia faba* plants were co-inoculated in sterile soil with MC-resistant rhizobia and rhizobacteria with growth-promoting traits in a greenhouse pot trial. The plants were exposed to MC-contaminated water at a concentration of 200 µg of MCs for one month. Growth and physiological indicators, and plant antioxidant status were evaluated to investigate the phytotoxic impact of MCs on *Vicia faba* plants in the presence and absence of MC-resistant bacterial strains. The results of this experiment could contribute to our understanding of the complex interactions between microorganisms, plants, and MCs in contaminated environments and may have implications for the development of strategies to mitigate the harmful effects of MCs in agricultural settings.

**Keywords**: Microcystin-LR (MC-LR); MC-contaminated water; plant growth; health risk; rhizospheric microorganisms; bioremediation tool; Vicia faba; Rhizobium; PGPR

# EVALUATION OF THE WATER QUALITY OF THE ALGERIAN WEST COAST BY METAL POLLUTION THROUGH A BENTHIC INDICATOR, THE EDIBLE SEA URCHIN P. LIVIDUS (LAMARCK, 1816)

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## ABSTRACT

The objective of this study is a presentation of a diagnosis on the state of health of the aquatic ecosystems of the Algerian west coast. Our study includes two parts, the first concerns the study of physiological indices, namely the gonadal index (IG) and the repletion index (IR) in the edible sea urchin Paracentrotus lividus inhabiting three rocky sites: Mostaganem (Sidilakhder), The bay of Arzew (Cap Carbon) and the harbour of Benisaf, based on the characteristics linked to the socio-economic activities near each zone, the second part consists of a spatio-temporal evaluation of the metal contamination by cadmium (Cd ), copper (Cu), lead (Pb) and zinc (Zn) in the considered tissues and seawater. gonadal and the repletion index, thus, the measurement of the temperature parameter revealed two major periods which had a role in triggering spawning. Regarding the mineral composition of the species, all the pollutants sought are present with very heterogeneous concentrations and that this marine species accumulates relatively large quantities of these toxic metals in proportion to their bioavailability in the surrounding environment. It seems that the levels of zinc and cadmium do not constitute a danger for the consumer, on the other hand, the average doses of the metals lead and copper compared to the D.M.A and the values of the A.I.E.A are worrying.

**Keywords**: Physiological indices; Paracentrotus lividus; Temperature; Algerian West Coast, Heavy Metals

# CHOLESTEROL CONTENT OF FOLLICULAR FLUID DURING THE ESTROUS CYCLE IN COWS

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## ABSTRACT

The aim of our work was to study changes in ovarian weight and cholesterol content in follicular fluid during the different stages of the estrous cycle in cows. The experiment focused on genital apparatus collected from Algiers slaughterhouses. The stages of the estrous cycle were determined on the basis of the presence and size of ovarian structures, in particular the size and color of the corpus luteum. The biometric study revealed: 1/ a non-significant difference (13.48%; $p>0.05$) in mean ovarian weight in favour of the right ovary; 2/ a significant difference (29.79%; $p < 0.05$) in mean ovarian weight in favour of ovaries with a corpus luteum; 3/ a non-significant difference ($p>0.05$) in mean ovarian weight between the metoestrus (11.72±4.33g), dioestrus (12.98±1.27g) and proestrus (14.25±3.15g) stages. Evaluation of the mean cholesterol content of the follicular fluid showed that : 1/ the right ovary (63.5±3.76 mg/dl) had a higher content than the left ovary (55.0±3.69 mg/dl). 2/ a variation in levels according to the stage of the cycle in favour of the right ovary and the ovary with a corpus luteum. 3/ a non-significant difference ($p>0.05$) in mean ovarian weight between the metestrus (11.72±4.33g), dioestrus (12.98±1.27g) and proestrus (14.25±3.15g) phases. Evaluation of the mean cholesterol content of the follicular fluid showed that 1/ the right ovary (63.5±3.76 mg/dl) had a higher content than the left ovary (55.0±3.69 mg/dl).2/ a variation in levels according to the stage of the cycle in favor of the right ovary and the ovary with a corpus luteum.3/ a variation in content according to follicle size, with medium-sized follicles (72.4±6.83 mg/dl) showing a higher content than small (56.7±4.14 mg/dl) and large (56.6±4.35 mg/dl) follicles.4/ Small follicles showed no variation in cholesterol content according to the stages of the estrous cycle; on the other hand, medium and large follicles showed a decrease in cholesterol content from metoestrus stage to proestrus. In conclusion, ovaries showed changes in weight and cholesterol content of follicular fluid as a function of ovarian follicle size and stage of the estrous cycle in cows.

**Keywords**: Estrous cycle, ovarian weight, follicular fluid, cholesterol, cow

# INACTIVATION OF LISTERIA MONOCYTOGENES ATCC 7644 AND SALMONELLA ENTERIDIS ATCC 13076 STRAINS BY OZONE GAS APPLICATION

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## ABSTRACT

Ozone application can be an alternative method to improve food quality and health by reducing the viability of pathogenic microorganisms that have negative effects such as bad odour, taste and poisoning in foods. For this purpose, in the study; the inhibitory and/or destructive effects of ozone against Gram (+) *Listeria monocytogenes* ATCC 7644 and Gram (-) *Salmonella enteridis* ATCC 13076 pathogenic microorganisms in the stock culture collection of Gazi University, Faculty of Science, Biology Department, Biotechnology Laboratory were investigated. Ozone gas was given to pathogenic microorganisms whose densities were adjusted to McFarland 5 and 10 by making experiments with the ozone device at different flow rates (4, 5, 6 kHz) and durations (**1** 5, 10, 15, 20 min). Samples were incubated at 37°C for 24 hours to determine the number of viable microorganisms. According to the results of the analysis, no growth was observed in both pathogenic bacteria at 10, 15 and 20 minutes ozone application times in all flow rate applications, while less bacterial growth was observed in both pathogens than the control group at the end of 1 and 5 minutes. The ozone method, which is used to inactivate pathogenic microorganisms, may have the potential to be an alternative to traditional methods with its various advantages such as high effect in a short time and low cost.

**Keywords**: Ozone gas, food pathogen, Listeria monocytogenes, Salmonella enteridis

# LETHAL EFFECTS OF LAUREL, SENNA AND FENNEL PLANT EXTRACTS ON TENEBRIO MOLITOR

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## ABSTRACT

*Tenebrio molitor* is a stored product pest that is particularly harmful to flour. This study was designed to determine the effects of laurel (Laurus nobilis), senna (Cassia angustifolia) and fennel (Foeniculum vulgare) plant extracts on lethality, larval and pupal development time, adult development time, adult longevity on *T. molitor*. Trials were carried out under laboratory conditions of 26±2 and 75±5% relative humidity. Five experimental groups were formed for each plant extract. 10 *T. molitor* larvae were placed in each experimental group (in petri dishes). Flour+wheat flour was added for nutritional needs and potatoes were added for water needs. On the first day, small cotton pieces impregnated with 10% plant extract were placed in the experimental groups and the petri dishes were wrapped with parafilm. After 24 hours, the numbers of surviving and dead larvae in the petri dishes were recorded. After pupae become adults, each one was taken into a separate petri dish to prevent intraspecific cannibalism. The longevity of the adult insects was calculated by recording the day they died. According to statistical analysis, the rate of dead larvae in the first 24 hours was 83.32±8.43% in laurel, 48.88±11.45% in cassia, and 62.00±18.54% in fennel. Pupal development time was 37.63±3.69 in laurel, 39.60±1.78 in senna, 34.05±1.05 in fennel, while the adult development time was 8.60±0.77 in laurel, 8.96±0.33 in cassia, 8.29±0.43 in fennel. The longevity was 37.87±2.52 in laurel, 28.28±2.71 in senna and 31.94±1.35 in fennel. No statistical difference was observed between other parameters except mortality percentages. This study reveals that plant extracts can be developed as new environmentally friendly control agents against stored product pests.

**Keywords**: Laurus nobilis, Cassia angustifolia, Foeniculum vulgare, Pests, Herbal Essential Oils, Ecological Insecticide

# THE IMPORTANCE OF LAUREL PLANT EXTRACT IN FIGHTING HARMFUL INSECTS

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## ABSTRACT

Stored product pests are responsible for the loss of significant amounts of product in silos. Pests cause a great deal of damage and economic loss to the harvested crop every year. Many control methods are used in the fight against these pests, both in the field and in the warehouses. Due to the easy and economically cheap application of pesticides, it forces the producers to figth with insecticides. However, in recent years, with the development of insect resistance to insecticides and the understanding of their damage to the environment, many producers and researchers are looking for alternative ways to figth these harmful insects. One of these alternative methods is the use of plant essential oils to figth harmful insect species. Aromatic plants have been used as insect repellent and killer since ancient times. Laurel (*Laurus nobilis* L.) belongs to the Lauraceae family and is an evergreen tree. Its leaves and fruits are used extensively in the pharmaceutical and perfumery industries. The most important product of laurel is its oil and essence. Its fruit contains 17-25% fixed oil. Fruits contain more oil than leaves. 41 different compounds were detected in essential oils obtained from laurel leaves. The main components of laurel extract are eucalyptol (**1**8 cineole, 52.88%), terpinyl acetate (α-terpinyl acetate 11.77%) and sabinene (8.05%). Laurel essential oil has attracted a lot of attention in recent years due to the repellent and lethal effect of these compounds on harmful insects. In this study, the biological properties of the laurel plant and its extracts are emphasized, especially in the fight against harmful pests.

**Keywords**: Plant Essential Oils, Pests, Insecticide, Pesticide, Odor

# CREATION OF THE DIGITAL GLASS-SLIDE ARCHIVE OF THE BIOLOGY DEPARTMENT OF TRAKYA UNIVERSITY

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## ABSTRACT

Research conducted in the field of Biology is filled with important data and information that enable us to understand the complexity and diversity of the natural world. This data is obtained through the examination and analysis of biological materials, such as tissue samples, microscopic images, microbiological samples, and genetic sequences. Traditionally, this type of biological data has been stored and archived in physical environments, specifically on glass slides as tissue preparations. However, it is known that traditional physical archives carry the risk of deterioration, loss or damage over time. Furthermore, sharing and processing such data in physical form can pose challenges. Therefore, digital archives have emerged as a modern approach that allows for the secure, durable and effective preservation of biological data. Digital archives facilitate the processing, organization, storage and sharing of biological data in a digital environment. In this study, the glass-slides used in the laboratory applications of Trakya University Biology Department were cast and a digital archive was created. The slides used in the education of students were categorized as Cytology (487 pcs), Histology (765 pcs), Plant Anatomy (475 pcs), Animal Anatomy (229 pcs), Plant Embryology (270 pcs), Animal Embryology (242 pcs) and Parasitology (109 pcs). The created digital archive has been opened to internet access on the "preparatarsivi.trakya.edu.tr" web page. This advancement will provide students with increased opportunities to complete their laboratory work and enhance their learning experience. In other words, the utilization of digital technologies will facilitate students easier and faster access to information, thereby making their education more efficient and effective. This study highlights the potential of digital archives for the modern approach to securely managing, accessing and sharing biological data.

**Keywords**: Digital Archive, Biological Material Archive, Virtual Microscopy, Biological Data

# INVESTIGATION OF FORENSIC ENTOMOLOGY IN TERMS OF CASES WORLDWIDE AND IN TURKEY

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## ABSTRACT

The determination of time elapsed from the egg laying of Diptera and Coleoptera species, the most important insect orders used in elucidation of forensic cases, on human and animal bodies to the discovery of the body is defined as the Post Mortem Interval (PMI). The PMI represents the fundamental application method of Forensic Entomology. Some significant families of Diptera and Coleoptera, along with their respective species, are among the key organisms used in PMI estimation. This study introduces Forensic Entomology, which holds importance in the resolution of forensic cases, and discusses its status worldwide and in Turkey. It elaborates on entomological descriptions and morphologies, the most encountered important insect families in forensic cases, their respective species, morphologies, developments, feeding habits, and forensic significance. Additionally, the study includes exemplary cases that have been resolved using entomology.

**Keywords**: Forensic entomology, Diptera, Coleoptera, corpse, decay stages

# CYNOGLOSSUM CRETICUM MILL. AND ECHIUM ARENARIUM GUSS EXTRACTS AS AN ALTERNATIVE TO CONTROL WEEDS

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## ABSTRACT

The aim of this study was to compare the effect of pure plant extracts (obtained from *Cynoglossum creticum* Mill. and *Echium arenarium* Guss.) or incorporated in a formulation (composed of the extracts at 500 mg/L and adjuvants and vegetable oil) on seedlings of *Phalaris minor* L. The use by spraying, of a commercial bioherbicide or distilled water or the formulation without the extracts (adjuvants and vegetable oil only) served as controls. The treatments were carried out on 3-week-old plants and lasted seven days. The percentage of efficacy determined showed necrosis and wilting of seedlings. The study of the effect of allelochemicals compounds that exists in *C. creticum* and *E. arenarium* showed the existence of oxidative stress in *P. minor* seedlings, reflected by the accumulation of phenolic compounds (TPC and TFC) and malondialdehyde (MDA), accompanied by the inhibition of catalase (CAT) activity and the stimulation of ascorbate peroxidase (APX) activity, with an increase in total antioxidant activities.

**Keywords**: Allelochemical compounds, Phalaris minor L, phenolic compounds, antioxidant activities

# GENOME MINING REVEALS A PROMISING METABOLIC POTENTIAL IN ACTINOPHYTOCOLA ALGERIENSIS DSM 46746T BOUZNADA ET AL. 2016

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## ABSTRACT

Biochemical characterization approaches have come to a bottleneck, where many microbial secondary metabolites (SMs) can't be produced or extracted under laboratory conditions. *Actinopyhtocola algeriensis* DSM 46746T, a rare actinobacterium isolated from a Saharan soil sample, didn't exhibit any antimicrobial activity against several target microorganisms. This study aims to investigate the biosynthetic repertoire of *Actinopyhtocola algeriensis* DSM 46746T. *In silico* genome screening of *A. algeriensis* DSM 46746T for biosynthetic gene clusters (BGCs) using antiSMASH 6.0 and PRISM 4 revealed its potential to produce several SMs. A total of 31 BGCs were predicted by antiSMASH, among which 27 clusters showed different similarities to gene clusters with a known product. One of the four remaining clusters with unknown function was found to share 25-40 % of similarity with other gene clusters from organisms belonging to the phylogenetically related *Pseudonocardiaceae* and *Actinosynnemataceae* families, suggesting the belonging of this BGC to the 'core' set of BGCs with a conserved function, likely to be maintained through exclusive vertical inheritance from a common ancestor. Using the PRISM4 tool, a total of 24 clusters were identified. Among them, 6 non-ribosomic peptides (NRPS), 5 polyketide synthases (PKS), 7 hybrid clusters, 2 ectoines, 1 lassopeptide, 1 class II lantipeptide, 1 class III/IV lantipeptide, and 1 phenazine. These BGCs could be silent or cryptic under laboratory conditions or involved in the production of compounds that show no activity against the used target microorganisms in past investigations. Interestingly, the MiBiG comparison of one of the predicted BGCs (NRP) highlighted a gene sharing a similarity score of 0.71 with the AM-toxin synthetase gene, part of the AM-toxin BGC found in the fungi *Alternaria alternata*.

**Keywords**: Actinophytocola algeriensis DSM 46746T, Genomics, Biosynthetic gene clusters (BGCs), antiSMASH 6.0, PRISM4

# EXTREMOPHILIC, THERMOHALOTOLERANT MYCELIAL BACTERIA FROM ALGERIAN SOILS: ISOLATION, TAXONOMY AND ANTAGONISTIC PROPERTIES

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## ABSTRACT

The objective of this research work is to isolate rare mycelia bacteria from extreme environments capable of synthesizing new bioactive molecules, we were interested in the thermo-halophilic mycelial bacteria from some Algerian soils. Using the suspension-dilution technique, we isolated 55 thermohalophilic strains (actinobacteria and firmicutes) from 11 soil samples on "nutrient agar" medium supplemented with 10% Nacl, an antifungal (actidione, 50mg/1), with or without a selective agent (novobiocin, 25mg/l) and incubated at 52°C in a humidified environment. Thus, on the basis of the morphological and physiological similarities of the 55 isolates, 15 of them were selected for the molecular study (sequencing of the gene encoding 16s rRNA). The phylogenetic trees showed that the THI0 strain is close to Saccharopolyspora rectivirgula (99.3% similarity). Five strains (denoted TV, belonging to the Thermoactinomycetaceae family and selected by novobiocin) are similar to the species Melghirimyces algeriensis (99.5 to 99.7% similarity). The TH28 strain is related to Saccharomonospora azured (99.9% similarity) and the TH33, TH42 and TH44 strains to Saccharomonospora cyanea (99.9% to 100%) similarity. However, the THI, TH6, TH3**1** TH35 and TH46 strains stand out from Saccharomonospora cyaned with only 98.8% similarity, hence the possibility of having a new species that should however be confirmed by DNA- DNA hybridization. The antagonist activity of the 15 isolates against 15 target strains was studied by the technique of agar cylinders according to the percentage of Naci (1% and 5%) and the culture media (Gyea and Benett), two strains noted TNV7 and TH28 have been proved to be very interesting by exhibiting very good activity against pathogenic germs for humans Listeria monocytogenes and Staphylococcus aureus.

**Keywords**: Mycelial Actinobacteria, Mycelial Firmicutes, thermo-halophiles, antagonistic properties

# HEAVY METAL RESISTANCE OF MULTIDRUG RESISTANT Staphylococcus aureus ISOLATED FROM MEAT

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## ABSTRACT

*Staphylococcus aureus* is widespread in the environment. It is an opportunistic pathogen that causes a wide variety of infections in humans and animals, resulting in severe morbidity and mortality. *S. aureus* found in food, including meat and meat products, is the common cause of foodborne diseases, which are important public health issues. Various virulence factors, antimicrobial and heavy metal resistance play important roles in expressing the pathogenicity of *S. aureus.* The emergence and dissemination of antimicrobial and heavy metal resistance in foodborne pathogens such as *S. aureus* pose a potential threat to human and animal health as well as environmental pollution. Besides, the use and presence of heavy metals in food, agriculture, and animal farming might promote the development and spread of antimicrobial resistance through co-selection. This study aimed to evaluate the resistance of heavy metals among multidrug-resistant (MDR) *S. aureus* isolates from ground beef and chicken meat. The minimum inhibitory concentration (MIC) of six heavy metals was determined by using the broth microdilution method. MDR *S. aureus* isolates were resistant to chromium (Cr), copper (Cu), mercury (Hg), and zinc (Zn) in 81.8%, 72.7%, 54.5%, and 27.3%, respectively. However, resistance to lead (Pb) and cadmium (Cd) was not observed. The findings regarding heavy metal resistance among the MDR *S. aureus* isolates could be useful in assessing consumer health and food safety risks.

**Keywords**: Staphylococcus aureus, heavy metal resistance, multidrug resistance, meat, broth microdilution test

# HEAVY METAL RESISTANCE OF Staphylococcus aureus ISOLATES FROM SEAWATER FISH

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## ABSTRACT

*Staphylococcus aureus* is an important foodborne pathogen present in the aquatic environment. Seafoods, including fish and fish products, are frequently contaminated with this pathogen due to its high tolerance to salt stress. Heavy metals are widespread environmental pollutants. Heavy metal pollution in seawater fish has become a major global concern. Therefore, resistance to various heavy metals was investigated in the *S. aureus* isolates of seawater fish origin in this study. The heavy metals used in the present research included mercury (HgCl2), copper (CuCl2), zinc (ZnCl2), lead (Pb (NO3)2), chromium (Cr (NO3)2 9H2O), and cadmium (Cd (NO3)2 4H2O). The minimum inhibitory concentration (MIC) of the tested heavy metals against the isolates was determined quantitatively using a broth microdilution test. Among the seawater fish isolates, the highest resistances to chromium (Cr) (58.3%) at a MIC value of 3200 µg/ mL were found, followed by mercury (Hg) (25%) at a MIC value of 12.5 µg/ mL. However, none of the isolates were resistant to lead (Pb), cadmium (Cd), and zinc (Zn). This study documented the presence of resistance to heavy metals in some *S. aureus* isolates from seawater fish. As a result, it is important to monitor heavy metal resistance, which poses a significant risk to ecosystems and human health.

**Keywords**: Staphylococcus aureus, heavy metal resistance, seawater fish, minimum inhibitory concentration (MIC)

# PHENOTYPIC AND GENOTYPIC RESISTANCE OF MERCURY AMONG *Escherichia coli* ISOLATES FROM VEGETABLES

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## ABSTRACT

Vegetables are an important part of a healthy and balanced diet and are commonly consumed raw or undercooked by humans. Vegetables have been implicated in many foodborne outbreaks of *Escherichia coli* infections. The presence of *E. coli* in vegetables can indicate that fecal contamination has occurred. Heavy metals from polluted soils and environmental wastes enter via the roots of plants and accumulate in variable concentrations in the roots, leaves, and fruits of vegetables. The existence of heavy metal-resistant pathogens in vegetables contaminated with highly toxic heavy metals such as mercury poses a serious risk to human and environmental health. This study aimed to determine the resistance to mercury (Hg) phenotypically by the broth microdilution method and genotypically by PCR for the presence of the mercury reductase encoded by the *merA* gene. Out of the *E. coli* isolates from vegetables, five isolates (45.5%) were resistant to Hg. Furthermore, only one of these Hg-resistant isolates carried the *merA* gene, which is associated with mercury resistance. Consequently, it may be critical to evaluate the presence of mercury-resistant pathogens found in vegetables because they pose a human health risk.

**Keywords**: Escherichia coli, mercury resistance, merA gene, vegetables, broth microdilution method, PCR

# RESISTANCE TO LEAD AND CADMIUM HEAVY METALS IN BIOFILM PRODUCING Escherichia coli ISOLATED FROM VEGETABLES

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## ABSTRACT

*Escherichia coli* is a ubiquitous bacterium that can cause foodborne diseases and can survive in the environment and in foods for a long period of time, even under harsh conditions. Different strategies, such as forming biofilm, which is an important virulence factor in the survival and persistence of this pathogen via the food chain, could be involved. Biofilms play an important role in acquiring antimicrobial resistance which causes important problems for human health. Antimicrobial resistance and antimicrobial-resistant bacteria might rise because of the incorporation of antimicrobial-containing manure, sewage waste, or other pollutants to agricultural soils, such as heavy metals. In this study, biofilm producing *E. coli* isolates from vegetables were examined to determine resistance to the heavy metals lead (Pb) and cadmium (Cd) using the broth microdilution test. The minimum inhibitory concentrations (MICs) of biofilm producing *E. coli* isolates against heavy metals, including lead and cadmium, ranged from 100 to 1600 µg/ mL and 200 to 400 µg/ mL, respectively. Resistance to lead was found in only one *E. coli* isolate with a MIC value of 1600 µg/ mL. However, resistance to cadmium was not observed in any of the *E. coli* isolates. The results of this study may be useful in providing information on the resistance of lead and cadmium in the *E. coli* isolates obtained from vegetables.

**Keywords**: Escherichia coli, lead, cadmium, biofilm, vegetables, broth microdilution method

# STUDY OF BIOFILM FORMATION IN PSEUDOMONAS SAVASTANOI BY MICROTITER PLATE

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## ABSTRACT

Olive tuberculosis is a disease caused by *Pseudomonas savastanoi* pv. *savastanoi*. This bacterium often coexists with non-pathogenic bacterial species, forming multispecific biofilms responsible for nodule formation. The development of this biofilm leads to the synthesis of higher levels of 3-indoleacetic acid (IAA), which can lead to a significant increase in nodule size and disease progression. The aim of this research was therefore to evaluate the formation of *P. savastanoi* B97 biofilm over a period of 6 days using the microtiter plate (MTP) method. The results obtained were classified by comparing the optical densities of the bacteria studied and those of the control. The optical density measured reflects the intensity of the biofilm attached to the walls of the microtiter plate. Our results showed that *P. savastanoi* B97 is capable of forming biofilms and that this ability increases with the incubation time ($0.086 < OD600nm < 0.107$). Understanding the mechanisms of biofilm production by *P. savastanoi* B97, together with establishing the kinetics of biofilm formation on different parts of the olive tree, could help us to prevent and control the infection.

**Keywords**: Biofilm formation, Pseudomonas savastanoi, Olive tuberculosis, Microtiter Plate

# STUDY OF THE ADHESIVE BEHAVIOR OF ESCHERICHIA COLI AND STAPHYLOCOCCUS AUREUS ON GLASS

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## ABSTRACT

Bacterial adherence and growth on biotic and non-biotic surfaces, are considered to be the primary steps leading to pathogenic biofilms formation responsible of bacterial infections and contaminations in many fields. Therefore, the prevention of bacterial attachment remains the best strategy to face these problems. In this context, this in vitro investigation aimed to study predictive and experimental adhesion of two of the most common strains; *Escherichia coli* CIP54127 (Gram negative) and *Staphylococcus aureus* CIP5315 (Gram positive) on microscope slides, using the contact angle method. The physicochemical properties (hydrophobicity, electron donor/acceptor properties and free energy) were calculated by the XDLVO theory. From the results, both strains were classified as qualitatively hydrophilic with relatively low contact angles with water ($33.4° < \theta w < 48.3°$). In addition, *E. coli* CIP54127 showed a positive free energy value of the interaction between the bacterium and water ($\Delta Giwi = 56.6$ mJ.m-2 > 0), while a negative free energy value was observed for *S. aureus* CIP5315 ($\Delta Giwi = (-4.5)$ mJ.m-2). As a result, *E. coli* CIP54127 and *S. aureus* CIP5315 were characterized quantitatively hydrophilic and hydrophobic respectively. The electron donor (base) character of the bacterial surface of *E. coli* CIP54127 ($\gamma- = 63.7$ mJ.m-2) was more prominent than the *S. aureus* CIP5315 character ($\gamma- = 25.5$ mJ.m-2), yet the electron acceptor (acid) characters of both strains were weak (0 mJ.m-2 < $\gamma+$ < 1.6 mJ.m-2). Moreover, theoretical adhesion suggested that glass colonization by the tested bacteria was thermo-dynamically favorable in the case of *E. coli* CIP54127 ($\Delta Gtot = (-49.20)$ mJ.m-2) and relatively unfavorable for *S. aureus* CIP5315 ($\Delta Gtot = 5.79$ mJ.m-2). Subsequently, experimental adhesion on microscope slides revealed that the percentage of surface occupied by E. coli CIP54127 (53%) was higher than that occupied by *S. aureus* CIP5315 (28%). Thus, predictive and experimental adhesions were in the same direction. These results could later be applied in research aiming to understand and control interfacial phenomena in order to prevent biocontamination of various surfaces.

**Keywords**: Adhesion, physicochemical properties, Escherichia coli, Staphylococcus aureus, contact angle

# DETERMINATION OF HYDROPHOBICITY AND ELECTRON DONOR/ACCEPTOR CHARACTERS OF THE PATHOGEN RESPONSIBLE FOR OLIVE TREES TUBERCULOSIS

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## ABSTRACT

*Pseudomonas savastanoi* pv. *savastanoi* is the causal agent of olive tuberculosis, which is one of the major threats to olive tree (*Olea europaea* L.) production in most olive growing regions of the world, in particular Mediterranean region. The first stage of infection with this disease begins with microbial adhesion. Understanding of surface properties is very interesting in the control of interfacial phenomena. The aim of this study is to intervene in the first stage of the infection process, i.e. microbial adhesion to the olive tree, in order to predict infection. For this, we have studied for the first time the physicochemical characteristics of the cell sur-face of *P. savastanoi* B97 in King B media. The wettability θw, electron donor character (γ-), electron acceptor character (γ+) and Surface free energy ΔGiwi are determined using contact angle measurements. On liquid KB media, *P. savastanoi B97* strain develop a hydrophobic surface (θw=86.77°) with a weak electron donor character (γ-=7.66mJ.m-2) and a strong electron acceptor character (γ+= 71.57mJm-2) and a negative surface free energy (ΔGiwi=-77.67mJ.m-2). In addition, the importance of electron donor/acceptor characteristics was attributed to the presence of basic/acidic groups exposed on the cell surface. These physicochemical properties could increase the probability of the bacteria adhering to different parts of the olive tree. Finally, knowledge of the physicochemical characteristics of *P. savastanoi* B97, complemented by characterization of the different parts of the olive tree, could help us to model and predict its adhesion to the olive tree, so that we can intervene upstream to minimize or even prevent infection.

**Keywords**: Adhesion, Physicochemical properties, Pseudomonas savastanoi B97, Contact angle

# EFFECT OF CULTURE MEDIUM COMPOSITION ON THE ANTIBACTERIAL BEHAVIOR OF STREPTOMYCES GRISEORUBENS SP AGAINST STAPHYLOCOCCUS AUREUS

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## ABSTRACT

*Streptomyces* has been known for decades for its fascinating metabolic abilities. In fact, they produce a wide range of biologically active molecules with great potential in the fields of medicine, biotechnology, and agriculture, such as antibiotics and fungicides. However, the environmental conditions could influence the metabolic capacities of these bacteria. Thus, this study aimed to determine the impact of the composition of growth medium on the antibacterial activity of a *Streptomyces* strain against a gram-positive model bacterium *Staphylococcus aureus* ATCC 25923, using the agar plug technique. For this objective, a *Streptomyces griseorubens* sp isolated from an extreme environment was cultivated in two solid production media: nutrient agar (NA), and the international *Streptomyces* project 2 (ISP2) medium. After 24 hours of incubation, the evaluation of the antibacterial effect was conducted by measuring the inhibition diameter (Id). Based on our results, the difference in composition has directly affected the inhibitory effect against *Staphylococcus aureus* ATCC 25923. Consequently, *S. griseorubens* sp showed a higher activity a on the specific media ISP2 (Id = 26 mm) comparing to the nonspecific one NA (Id = 16 mm). So, by improving growth conditions, it is possible to optimize antibacterial activity in *Streptomyces*.

**Keywords**: Streptomyces, antibacterial activity, agar plug method, Staphylococcus aureus, inhibition diameter

# BRINE SHRIMP LETHALITY BIOASSAY OF ESSENTIAL OIL EXTRACTED FROM CITRUS SINENSIS

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## ABSTRACT

Medicinal plants are currently arousing major and growing interest given their great wealth in bioactive molecules that they contain. The economic importance of citrus fruits lies in their health benefits, probably attributed to the presence of the phenolic compounds, vitamin C and carotenoids.Also, Many natural products could serve as the starting point in the development of modern medicines because of their numerous biological and pharmacological activities. However, some of them are known to carry toxicological properties as well. The evaluation of the cytotoxicity of the of essential oils extracted by hydrodistillation (HD) and by microwave (MAHD) from the peels of *Citrus sinensis* by the method of Brine shrimp lethality shows that the two essential oils tested exhibit very good cytotoxic activity because no nauplii was observed alive. Calculation of the LC50 from the regression equation demonstrated an LC50 greater than or equal to 100µg / ml respectively for this oi.

**Keywords**: Citrus sinensis, Hydrodistillation, Microwave-assisted hydrodistillation, essential oil , cytotoxicity Saccharomyces cerevisiae

# EFFECT OF AQUEOUS EXTRACT OF SANGUISORBA MINOR L. ON SOME BIOCHEMICAL AND HISTOLOGICAL PARAMETERS IN MICE

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## ABSTRACT

A medicinal plant is considered as the plant that contains one or more chemicals in a low or high concentration that has the physiological ability to treat a specific disease or reduce the incidence of that disease by using this plant in the form of active substances. Among the medicinal plants found in the world, we have devoted this study on *Sanguisorba minor* L. Part of the Rosaceae family, this plant is generally used mainly for food purposes and traditionally used to treat diseases of the excretory system to treat skin infection. The objective of this study is to evaluate the acute toxicity of this plant *in vivo*, and its effects on body weight, internal organ weight, some biochemical and histological parameters. The extraction of active substances from the aerial part (leaves, flowers, and stems) of the plant is carried out by decoction; the yield of the extraction is 14.32%. The study of the acute toxicity of the aqueous extract of the plant *S.minor* L. was carried out by the oral administration of two different doses to male *Albino Wistar* (2g/kg and 5g/kg) for 14 days. The extract caused an increase in the amount of food consumed. For acute toxicity, the doses (2000 and 5000 mg/kg) of the aqueous extract (AQ) did not cause a change in body weight of the animals compared to the control lot. Changes in internal organ weights (increased liver weights) were also observed at 5000 mg/kg. Also, there was a disturbance in some biochemical parameters, such as significant decrease in aspartate aminotransferase (ASAT: 75 ± 0.02 U/L), alkaline phasphatase (ALP: 70.5 ± 8.70 U/L) and creatinine (CREAT: 3.25 ± 0.18 mg/L) for the 5 g/kg dose. However, histopathological examination confirmed the results of biochemical analysis by the observation of necrosis and vascular congestion in the liver and kidneys of mice treated with both doses. The use of *Sanguisorba minor* L.may cause hepatic or renal side effects after treatment with a high dose.

**Keywords**: Acute toxicity, Aqueous extract, Biochemical parameters, Histopathological study, Internal organs, *Sanguisorba minor* L.

# A PRELIMINARY STUDY ON THE DETERMINATION OF THE WATER QUALITY OF TÖDÜRGE (DEMİRYURT) LAKE WETLAND (ZARA-SİVAS, TURKEY) USING INDICATOR BENTHIC MACROINVERTEBRATES

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## ABSTRACT

This is a preliminary study to determine the water quality of Lake Tödürge using indicator benthic macroinvertebrates. For this purpose, 4 stations, which were thought to best characterise the lake, were selected in July 2023 and water and benthic macroinvertebrate sampling were carried out. Temperature, pH, conductivity, total dissolved solids, dissolved oxygen, salinity, chloride, calcium, magnesium, total hardness, sulphate, phosphate, nitrite nitrogen and nitrate nitrogen analyses were performed. The results obtained were evaluated according to the Surface Water Quality Control Regulation and the water quality class of the lake was determined. In addition to water sampling, benthic macroinvertebrate sampling was also carried out. The samples obtained were classified according to the smallest possible taxonomic category. In addition, the studies carried out by different researchers in different years in the lake were also evaluated. In the study, some suggestions were also given for the protection of the natural balance of Lake Tödürge Wetland.

**Keywords**: Tödürge Lake, water quality, benthic macroinvertebrates

# ACUTE TOXICITY OF THE MEDICINAL PLANT CRATAEGUS MONOGYNA (LEAVES AND FLOWERS) FROM TIZI-OUZOU

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## ABSTRACT

*Crataegus monogyna* is a medicinal plant belonging to the Rosaceae family, used since antiquity in traditional medicine for many diseases, for its healing properties. The aim of this study is the evaluation of the acute toxicity of the aqueous extract of the aerial part of this plant. The acute toxicity of the aqueous extract of the plant was carried out on female Albino Wistar mice by the oral route, dividing the mice into three groups; a control group receives distilled water and the other two groups receive the two doses of the aqueous extract of *C. monogyna* (2g/kg and 5g/kg). The toxicological evaluation of the extract has demonstrated that its acute administration does not induce mortality or adverse effects, indicating that the lethal dose50 (LD50) is greater than 5g / kg. in addition. There were no changes in the weight of the animals treated with the aqueous extract compared to the controls, even the relative weight of the internal organs was normal, except for the liver, where we recorded a significant increase with both doses. No alterations in the biochemical parameters were recorded (blood sugar test, cholesterol, triglycerides, Alaline aminotransferase, Aspartate aminotransferase, creatinine and Alkaline phosphatases), therefore the LD50 was greater than 5000 mg/kg. While the histopathological examination confirmed an increase in the size of the hepatocyte nuclei accompanied by the appearance of blood congestion in the liver during the use of the two doses (2 g/kg and 5 g/kg). The use of *Crataegus monogyna* can cause a hepatotoxic effect (cytolysis, necrosis and fibrosis) at a high dose.

**Keywords**: crataegus monogyna, traditional medicine, acute toxicity, aqueous extract, biochemical parameters, body weight, organ weights, wistar albino mice, histopathology

# CISTUS MONPELIENSIS LEAVES AGAINST LEUKOCYTE DISTURBANCES CAUSED BY LEAD POISONING IN WISTAR RATS

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## ABSTRACT

For a very long time, medicinal plants have played a decisive role in the preservation of human health and the survival of humanity, these plants are considered to be an inexhaustible source of secondary metabolites with structural diversity. As part of the research for new bioactive molecules extracted from plants, it seemed interesting to assess the protective effect of *Cistus monspeliensis* (CM) leaves against sub-chronic exposure to lead acetate in male wistar rats. The experimental study was carried out of 20 adult male rats which were divided into five groups: the control (C), the positive control (CM): received 500 mg/kg bw of (CM) leaves aqueous extract, group (Pb): treated with (100 mg/kg bw) of lead acetate and the combined treated group (Pb+CM) for 4 weeks by gavage. The blood-immune parameters (white blood cells, granulocytes, monocytes and lymphocytes) were evaluated. Results have showed a significant increase in WBC and granulocytes levels in lead exposed group and a decreased percentage of monocytes and lymphocytes. However, the combined treatment resulted in a significant inverse reaction against lead toxicity especially in WBC concentrations. On the other hand, no abnormalities where found in leukocyte parameters in combined treatment group when compared to control and positive control groups. The results, thus, indicate that there may be a protective effect of *Cistus monspeliensis* (CM) leaves aqueous extract in lead-poisoned rats by its suitable chelating properties for the reduction of lead blood-immune disturbances.

**Keywords**: Cistus monspeliensis leaves, lead acetate, Rats, leukocytes.

# ANTIMICROBIALACTIVITY OF ESSENTIAL OILFROMCYMBOPOGONCITRATUS

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## ABSTRACT

Aromatic and medicinal plants produce essential oilsassecondarymetabolites. These essential oils can be used in diverse applications in food, perfume, and cosmeticindustries. They have been also recognized for theirantibacterial, antifungal, antiviral, insecticidal and antioxidantpropertiesand are widelyused in medicine for thesepurposes. In this context, weare interested in evaluating theantimicrobialpotential of *Cymbopogoncitratus*essential oil. The antimicrobial activity of essential oil of *C. citratus*wastested by disk-diffusionmethodusing the different doses of 5 µl, 10 µl, 20 µl and 40 µl.This activitywasevaluatedtowardthreepathogenic bacteria:*Escherichia coli* (10536), *Pseudomonasaeruginosa* (CIP A22) and*Staphylococcus aureus* (44300) on Muller Hinton medium and against five fungi: *Aspergillusflavus*(NRRL 3251), *Aspergilluscarbonarius* (M333), *Aspergillusparasiticus* (CBS 100926), *Fusariumculmorum* (NRRL.1829) and *Umbelopsisramanniana* (NRRL 1829)on PDA medium. The results of this antimicrobial activity showed that this essential oil is very active against all testedfungal strains, from which we obtained. In fact, a total inhibition was observed against all targeted fungi with 10 µl dose. This essential oil also showed a good antibacterial activity, especially against the *S. aureus* strain with inhibition zones greater than or equal to 62 mm. While, this activity is less against *E. coli* and*P. aeruginosa*.

**Keywords**: Cymbopogoncitratus, essential oil, antimicrobial activity

# MORPHOLOGICAL AND MOLECULAR CHARACTERIZATION OF SPECIES OF GENUS BLEPHARISMA PERTY, 1849 AND GENUS FRONTONIA EHRENBERG, 1838 ISOLATED FROM İĞNEADA LONGOZ FORESTS (FLOODPLAIN) NATIONAL PARK (LONGOZ OF LAKE MERT)

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## ABSTRACT

İğneada Longoz forests are one of the biodiversity treasures of our country due to its ecosystem diversity, the combination of different vegetation types and its location on bird migration routes. This area, which has a structure similar to rainforests, forms a chain of ecosystems with the water resources it feeds around. The effect of microbial diversity on the functioning of this chain is great. However, until now, there is no data on ciliates (Ciliophora) belonging to the İğneada Longoz forests. In order to eliminate this deficiency, cultures were prepared from the soil samples taken from the dunes, reeds and deciduous forests of Mert Lake by applying the "non-flooded Petri dish" method to reactivate the ciliates from the cyst. The morphological characteristics of the populations of the genus *Blepharisma* (Heterotrichea) and genus *Frontonia* (Oligohymenophorea) isolated from the longoz forest soil were studied by methods in accordance with the literature. The in vivo cell sizes of the *Blepharisma* population at these stations averaged 88 × 28 µm (in vivo); in vivo cell sizes of populations belonging to the genus *Frontonia* were recorded as 94 × 59 µm (population **1** reed field), 86 × 57 µm (population 2, dunes), 90 × 50 µm (population 3, deciduous forest). The morphological data we obtained is a preliminary study that will help the taxonomic part of the study. This is the first study to evaluate the hidden ciliate diversity in the soil of İğneada Longoz Forests, which has a high biodiversity potential.

**Keywords**: Blepharisma, Ciliophora, Frontonia, Longoz forests, Mert Lake, dunes, reed field

# DETERMINATION OF SILVER NANOPARTICLE SYNTHESIS AND ANTIMICROBIAL ACTIVITY FROM POSTBIOTIC OF LIGILACTOBACILLUS SALIVARIUS KC66L THROUGH GREEN SYNTHESIS

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## ABSTRACT

Microorganisms and their metabolism products, metabolites, synthesize nanoparticles by converting metal ions into metals. Bacteria have been widely used in synthesising of nanoparticles (NPs) in recent years, thanks to their high efficiency, ease of application, metabolism and ability to eliminate the toxic effects of metals. Contrary to the traditional methods used for silver nanoparticle (AgNP) synthesis, the green synthesis method is fast and easy to apply, low cost, environmentally friendly, and does not contain toxic chemicals. In recent years, AgNPs have been preferred in various applications such as medicine, medicine and pharmacy due to their antimicrobial properties and ease of production. In this study, AgNP was synthesized by green synthesis from the postbiotic of the potential probiotic *Ligactobacillus salivarius* KC66L strain. The synthesized AgNPs were characterized by UV-Visible spectrophotometer, XRD and SEM. Antimicrobial activities of the obtained AgNPs against Gram (-) *Escherichia coli* ATCC 11229, *Pseudomonas aeuruginosa* ATCC 27853 and *Staphylococcus aureus* ATCC 25923 pathogenic microorganisms at three different concentrations (0.1; 0.3 and 0.5 mg/mL) by well diffusion method examined using It was determined that AgNPs showed the highest antimicrobial activity against *P. aeurginosa* ATCC 27853. As a result of the studies, it has been revealed that AgNP can be synthesized from the postbiotic of *L. salivarius* KC66L strain.

**Keywords**: Green synthesis, Ligilactobacillus salivarius, Silver nanoparticles, Antimicrobial activity

# A REVIEW OF AGATHIDINAE PARASITOIDS ASSOCIATED WITH LEPIDOPTERA (HYMENOPTERA: BRACONIDAE) IN TURKEY WITH A SUMMARY OF HOST BUTTERFLY FAMILIES AND THEIR HOST PLANTS

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## ABSTRACT

This study presents available data in Turkey about the members of the subfamily Agathidinae (Braconidae: Hymenoptera) determined as natural enemies of Lepidoptera in the country, the related Lepidoptera species and the host plants the butterflies damage. A total published literature search revealed of 19 Lepidoptera families as hosts of Agathidinae species found in Turkey (Arctiidae, Blastobasidae, Blastodacnidae, Coleophoridae, Depressariidae, Epermeniidae, Gelechiidae, Geometridae, Gracillariidae, Heliodinidae, Momphidae, Noctuidae, Psychidae, Pterophoridae Pyralidae, Sesiidae, Tineidae, Tortricidae, Yponomeutidae). Among the families, Tortricidae is the most diverse one with 35% number of host species. The survey also revealed that the determined butterfly species belonged to 87 genera. Among these genera, *Coleophora* was represented with 31 species, *Cydia* with 10 species while the other genera were represented with 4 or less species. There are total of 7 genus and 41 Agathidinae species in Turkey. The investigation of faunal, taxonomic, plant protection or plant-host-parasitoid based studies showed that 24 Agathidinae species recorded in Turkey as parasitoids of Lepidoptera. Among these, *Agathis* was represented with 13 species, *Therophilus* with 7 species while the *Bassus*, *Camptothlips*, *Cremnops* and *Earinus* were represented with 1 species. There is no Lepidoptera host record of the known species from Turkey belonging to the genus *Disophrys*. It has been revealed that the number of plant families hosted by butterfly species, whose parasitoid is Agathidinae, is 12. Compositae is the most common preferred family followed by Fabaceae, Lamiaceae, Juncaceae and Amaranthaceae. Determination of butterflies with their hosts, parasitoids and habitats and revealing data about their ecology and biology is concluded to be helpful to contribute required data in natural and agricultural ecosystems.

**Keywords**: Parasitoid, Turkey, Agathidinae, host butte rflies, host plants

# IMPACT OF HESPERIDIN AGAINST GENOTOXIC RISKS CAUSED BY SODIUM FLUORIDE IN MICE LEYDIG

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## ABSTRACT

Fluorine is an element with high electronegativity that we encounter in many areas of our daily lives. The element fluorine is found naturally in the air, soil, water, and food. In addition, fluorine is added to toothpastes, mouthwashes, and drinking water to reduce the incidence of dental damage. Although fluorine is among the trace elements necessary for human metabolism, its toxic effects have been determined when exposed to high amounts. The gastrointestinal, endocrine, musculoskeletal, and neurological systems are impacted by excessive fluorine exposure, according to research conducted on both humans and animals. There is also evidence to suggest that fluorine toxicity causes oxidative stress in cells, followed by DNA damage and apoptosis. In recent years, it has been understood that fluorine has toxic effects on the male reproductive system. Fluorine has been found to lower testosterone levels and cause spermatocyte differentiation. For this reason, it is of great importance to evaluate the risk and toxicity of fluorine. The protective effect of hesperidin, a subclass of flavonoid, against the genotoxic potential of fluorine was investigated for the first time in Leydig cells, which are the main cells of the male reproductive system. In this study, sodium fluoride (10 ppm) and hesperidin (20 μM) were applied separately and together for 24 hours to the TM3 Leydig cell line. The genotoxic potential of sodium fluoride was investigated by cell viability, micronucleus, and comet tests in the TM3 Leydig cell. The results indicate that sodium fluoride causes DNA damage by increasing the incidence of micronuclei and comet in Leydig cells. In addition, it has been determined that hesperidin, which has proven natural antioxidant properties, may play a protective role in sodium fluoride-induced genotoxicity.

**Keywords**: Sodium fluoride, Leydig cells, Hesperidin, Genotoxicity, DNA damage

# EFFECTS OF LUTEOLIN ON ACRYLAMIDE-INDUCED OXIDATIVE DAMAGE IN 3T3 EMBRYONIC FIBROBLAST CELLS

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## ABSTRACT

Acrylamide, which is used in various fields of industry (paint, textile, cosmetics), is a water-soluble white, odorless and crystal compound. Studies have indicated that high amounts of acrylamide are found in foods such as potatoes, bread, coffee and cereal products. Many studies have been conducted to investigate possible human health risks from acrylamide exposure, along with the determination of daily dietary intake. Previously studies have demonstrated that acrylamide has cytotoxic, neurotoxic, genotoxic and carcinogenic effects. In order to reduce the toxic effects of heat-treated food contaminants, foods with antioxidant properties should be consumed. Luteolin is an antioxidant compound found in significant concentrations in vegetables, fruits, and spices. Luteolin exerts its antioxidant effects by scavenging free radicals responsible for oxidative damage, inhibiting some enzymes that catalyze oxidation, and strengthening endogenous antioxidants. The purpose of this study was to examine the effects of acrylamide on the viability of 3T3 embryonic fibroblast cells, lipid peroxidation, and antioxidant enzyme levels (superoxide dismutase, catalase, and glutathione peroxidase), as well as to show how luteolin protects against acrylamide toxicity. For 24 hours, 2 mM concentrations of acrylamide and/or 10 µM concentrations of luteolin were applied to 3T3 embryonic fibroblast cells. The findings indicate that acrylamide significantly reduces cell viability and antioxidant enzyme activities and increases lipid peroxidation. As a result of the treatment of 3T3 embryonic fibroblast cells exposed to acrylamide with luteolin, it was found that cell viability and enzymatic antioxidant activities increased, and lipid peroxidation significantly decreased. This has led to the discovery that luteolin possesses potent antioxidant properties that protect embryonic fibroblast cells from the cytotoxicity and oxidative damage caused by acrylamide.

**Keywords**: Acrylamide, Luteolin, embryonic fibroblast cells, oxidative damage, antioxidant system

# INVESTIGATION OF THE RELATIONSHIP BETWEEN PRODUCTION OF BIOFILM AND EXOPOLISACHARIDE OF 37 LACTIC ACID BACTERIA

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## ABSTRACT

A biofilm is a community of microorganisms that adhere to a living or inanimate surface and live embedded in a polysaccharide matrix (biofilm matrix) that they produce. It is thought that there may be a relationship between the biofilm production abilities of microorganisms and the amount of exopolysaccharide (EPS) production. For this purpose, in our study, the biofilm production abilities and exopolysaccharide production amounts of 37 lactic acid bacteria (LAB) belonging to *Lactobacillus* and *Streptococcus* genera in Gazi University, Faculty of Science, Biology Department, Biotechnology Laboratory stock culture collection were determined and the relationship between biofilm production and EPS production of 37 LAB isolates statistically evaluated. While the biofilm production abilities of the isolates were determined as strong, moderate, weak, not biofilm producer according to their cut-off values, the amount of EPS they produced was determined according to the phenol-sulfuric acid method. It was observed that the amount of EPS produced by the isolates varied between 192 and 984 mg/L. IBM SPSS Statistics V22.0 program was used in statistical analysis to determine the relationship between EPS production and biofilm production of isolates, and it was determined that there was a strong and significant positive correlation between biofilm production of isolates and EPS production ($p<0.01$).

**Keywords**: Lactobacillus, Streptococcus, biofilm, microtitration, exopolysaccharide

# DETERMINATION OF OZONE GAS TREATED FOUNTAIN WATER ON THE DEVELOPMENT OF ESCHERİCHIA COLI O157:H7 AND STAPHYLOCOCCUS AUREUS ATCC 25923 PATHOGENS

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## ABSTRACT

Ozone is a powerful oxidant that can be used in wastewater treatment as well as in surface or groundwater treatment to remove microorganisms, inorganic ions and organic pollutants. One of the important applications of ozone is its use as a biocide in water samples. For this purpose, the effect of ozone-treated tap water on the growth of Gram (+) *Staphylococcus aureus* ATCC 25923 and Gram (-) *Escherichia coli* O157:H7 pathogenic microorganisms was investigated. With the ozone device, ozone gas was applied to the tap waters at different flow rates (4, 5 and 6 kHz) and durations (**1** 5, 10, 15 and 20 minutes). Pathogenic bacteria adjusted to McFarland 5 and 10 were combined with tap water to which ozone gas was applied at a ratio of 1:1 and spread cultivation was performed and the number of viable microorganisms was determined by incubating at 37°C for 24 hours. In the results of the analysis, it was observed that there was a decrease in the development of pathogenic microorganisms in both bacteria due to the increase in the application time and flow rate. The application of ozone gas to tap water may have the potential to be used as an alternative method to classical methods in the sterilization of drinking water and wastewater, especially the disinfection of microorganisms.

**Keywords**: Ozone gas, tap water, Staphylococcus aureus, Escherichia coli

# SYNTHESIZE CHARACTERIZATION AND DETERMINATION OF SOME BIOLOGICAL PROPERTIES OF TETRAZOLE-CONTAINING SCHIFF BASE LIGAND AND ITS Pt(II) COMPLEX

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## ABSTRACT

Pt based drugs are often used in cancer treatment. However, side effects and development of resistance mechanisms prevent the use of these drugs. Therefore, the use of new low-toxicity Pt carriers has gained importance. In the structure of the tetrazolato ligand used in the presented study is a Schiff base containing tetrazole ring. These structures are recommended to be used in drug development studies. According to our knowledge there is no similar structures in the literature that synthesized and genotoxic effects determined. For the synthesis of tetrazolato ligand (Tet-SalCl); 2.0x10-3 mol 5-chlorosalicylaldehyde mixture was added dropwise to 10 mL hot EtOH solution of 5-amino tetrazole ($HN_4CNH_2$, 2.0x10-3 mol) in EtOH (10 mL) and heated under reflux for 4 hours. The mixture was then filtered and allowed to stand. The crystals formed after four days were collected by filtration and dried in desiccators over CaCl2. For the Pt(II) complex [Pt(Tet-SalCl)], 1x10-3 mol tetrazolato ligand was dissolved in DMF/Ethyl alcohol (1/5) and placed in a reaction flask. To this solution medium, 1x10-3 mol PtCl2 solution dissolved in DMF was added dropwise and heated to boiling temperature at reflux on a magnetic stirrer. After 24 hours, it was filtered into a beaker and kept at room temperature. After about 2 days the precipitate formed was filtered off and the filtrate was washed with methyl alcohol/DMF (4/1) and dried in an oven (80°C). The structures of the synthesized (Tet-SalCl) and [Pt(Tet-SalCl)] molecules were characterized by FT- IR, 1H-NMR, 13C-NMR, LC-MS, UV-Vis-GB spectra and Elemental Analysis and TGA/DTA analysis methods. In order to evaluate the preliminary cytotoxicity of the synthesized molecules compared to Cisplatin(2.5µg/mL), mitotic index in human peripheral lymphocytes of two healthy female donors is carried out. Accordingly, 2.34; 4.68; 9.37; 18.75 and 37.5 µg/mL concentrations determined according to *in silico* tools were used for both 24 and 48 hours. Mitotic index provides information about the cytotoxic effect of test chemicals. (Tet-SalCl) only caused a significant decrease in mitotic index at 37.5 µg/mL concentration in 48 hour treatment whereas, [Pt(Tet-SalCl)] caused a statistically significant decrease in mitotic index at 9.37; 18.75 and 37.5 µg/mL concentrations for both 24 and 48 hour treatments. As a result, tetrazolato ligand has no cytotoxic effects in human peripheral lymphocytes. But Pt(II) complex has been inhibited cell division in concentration dependent manner. Although, these preliminary results will be re-evaluated and confirmed with a third donor, the cytotoxic properties of the [Pt(Tet-SalCl)] is found to be similar with Cisplatin and (Tet-SalCl) is not cytotoxic as expected. Therefore, the cytotoxicity and genotoxicity of the molecules will be elaborated with a battery of complementary tests.

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**Keywords**: Tetrazole ring, Schiff base, Pt (II) complex, In silico, Mitotic index

# CHEESE MADE FROM PASTEURIZED MILK AND LOCAL FERMENTS

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## ABSTRACT

Cheese making essentially depends on milk, which is an option for obtaining healthier cheese, and ferments which have technological food interests. In this respect, our study allowed the formulation of local lactic ferments, with native strains. The latter were used as starter cultures for the production of a semi-hard cheese made from pasteurized cow's milk. The physicochemical (pH, acidity, humidity, fat, protein, chloride and ash) and organoleptic analyzes (texture, color, taste, smell, aroma) have been carried out. The protein composition is very important (average of 24.18g/100g). The results of the sensory analyzes did not show any defects in the cheese studied. The taste is sweet, characteristic, the aroma pure, pleasant, well developed. The color is uniform yellowish, the crust is dry. The use of pasteurized milk and indigenous lactic ferments help to maintain the typical characteristics of cheeses.

**Keywords**: milk, ferments, cheese, semi-hard cheese, analyses, physicochemical, sensory

# HORMONAL AND HISTOLOGICAL EFFECTS OF CASTRATION ON THYROID GLAND IN SAHARAN RODENT (GERBILLUS GERBILLUS)

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## ABSTRACT

The hormonal deprivation by bilateral castration of the desert gerbil (*Gerbillus gerbillus*), captured live in Béni-Abbès area (30° 7' N, 2°10 W) during the breeding season, induced hormonal and histological modifications of the thyroid gland. Adult male rats were used in the present study. The experimental groups were tested after 25, 40, and 50 days of castration. The group tested after 50 days were divided into two groups, one of them was treated with the replacement of physiological doses of testosterone for 6 days. The histological figures were obtained after organs fixation with Bouin Hollande and Masson's trichrome coloration. Total plasma thyroxine (T4) and triiodothyronine (T3) were measured by RIA method (Kit Cis - RIA gnost). In the group of 25 days after castration, we observed stimulation of the thyroid gland characterized by an important and significant increase in cellular height (21 %, p=0.05) and an increase in total T3 level (26 %, p=0.05) compared to the control group. These effects were histologically inverted after 40 days of castration (respectively -19.5%, p=0.01). Nevertheless, total thyroxine (T4) levels changed slightly. Furthermore, testosterone treatment affects differently the plasma concentrations of total T3 and T4. We observed a significant increase in the T3 plasma level (21.5 %, 0.01 Total plasma level (T4) showed a decrease in comparison with the control and the castrated animals after 50 days (respectively –3**1**8 %, 0.02 Based on the results, we conclude that there is a strong testicular-thyroid interrelation in this species as it was supported by other studies.

**Keywords**: Thyroid gland, Thyroxine (T4), Triiodothyronine (T3), Castration, Interrelation

# SCREENING OF POLYPHENOL OXIDASE ENZYME IN LYCOPEN-RICH FRUITS

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## ABSTRACT

Polyphenol oxidases (PPOs), which have been the subject of numerous studies in recent years and have attracted the attention of researchers, are enzymes that catalyze the oxidation of phenolic compounds. Although PPOs are generally found in plants, they are also found in many microorganisms and fungi. Therefore, PPOs have a wide distribution. PPOs are used in many fields, especially in medicine, cosmetics, and industry. The aim of this study was to investigate PPO by selecting fruits with high lycopene content. For this purpose, 10 different fruits (watermelon, bell bell pepper, fig, pomegranate, blood orange, grapefruit, cranberry, rosehip, potency pomegranate) were extracted in vitro using 13 different extraction methods (10 mM ascorbic acid in extraction buffer, 2 mM phenylmethylsulfonyl fluoride, 1% polyvinylpolypyrrolidone (w/v), 1% Triton X-100 (v/v), pH 7.0) and enzyme activity was measured spectrophotometrically.

**Keywords**: Polyphenol oxidase, Lycopene, Spectrophotometer, Enzyme purification, Enzyme isolation, Industry

# PHYTOCHEMICAL STUDY AND ANTIMICROBIAL EFFECT OF THE HYDRO-ALCOHOLIC EXTRACT OF CALANINTHA NEPETA FROM WZESTERN ALGERIA

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## ABSTRACT

Plants constitute an enormous reservoir of potential new molecules that can be the source of new active ingredients and lead to drugs. Our study consists in researching the antimicrobial activity of a plant, Calamintha nepeta belonging to the Lamiaceae family. Results & Discussion: The yield of Calamintha nepeta leaves in crude hydroethanolic extract is 12.33%. Phytochemical screening of Calamintha nepeta leaves show the presence of phenols, flavonoids, tannins, coumarins, saponins, alkaloids, proteins and terpenoids and the total absence of carbohydrates, quinones and anthraquinones. The content of polyphenols, flavonoids and tannins is 138.66mg/mL, 34.03mg/mL and 0.017mg/mL respectively. The sensitivity of the microbial strains tested to standard antimicrobial agents varies between 7 and 30 mm. The antibiotics that gave the largest zones of inhibition are: pristinamycin (PT15), chloramphenicol (C), nalidixic acid (NA), spiramicin (SP), gentamicin (GM) and neomycin (N). The hydroethanolic extract of Calamintha nepeta exerted an antimicrobial power against the microbial strains tested, the diameters of the zones of inhibition vary between 8 and 29 mm. The most sensitive strains are C. albicans ATCC 1023**1** P. mirabilis ATCC 35659 and Proteus vulgaris ATCC 6380 with inhibition zone diameters of 29, 19 and 17 mm respectively. The hydroethanolic extract of Calamintha nepeta exerted activity against the microbial strains tested, the values obtained range from 0.781 to 3.125 µl/mL for the CMI and from 3.125 to 50 µl/mL for the CMB and the CMF. Conclusion: Indeed, the hydroethanolic extract showed bacteriostatic activity on the majority of microbial strains tested. The hydroethanolic extract of Calamintha nepeta showed better activity against Gram-negative strains than Gram-positive strains. This result is important since gram-negative bacteria are more resistant to antimicrobial agents than gram-positive bacteria.

**Keywords**: Calamintha Nepeta, hydro_ethanolic extract, nosocomial infections, antimicrobial activity

# ANALYSIS OF CADMIUM AND TOTAL HYDROCARBONS IN THE GONADS OF THE SEA URCHIN PARACENTROTUS LIVIDUS (LAMARCK, 1816) FROM THE COAST OF SKIKDA

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## ABSTRACT

The edible sea urchin *Paracentrotus lividus* is a very abundant species in Algerian waters. This species is widely used as a bioindicator of the level of contamination by metals because of its extreme sensitivity to metal pollution. This work aims to assess the quality of the coastal waters of the Skikda coast using an approach based on the determination of total hydrocarbons and a heavy metal (cadmium) and the monitoring of two biomarkers of environmental stress (Catalase and Acetylcholinesterase) in the gonads of female sea urchin *Paracentrotus lividus*. Our parameters were studied at two stations on the coast of Skikda. The biomarker study covers six months of sampling (from January to June 2022). The results obtained indicate the presence of pollution by hydrocarbons in the water and the gonads of the sea urchins, the origin of which is inevitably the petrochemical zone and urban discharges. In addition, the cadmium concentration is low in all the samples. The biochemical content shows a monthly effect where the highest levels are observed in the spring.

**Keywords**: Paracentrotus lividus, Total hydrocarbons, Cadmium, Biomarkers, Coastline of Skikda

# HISTOLOGICAL BIOMARKERS IN APIS MELIFERA L. DRONES FOR ENVIRONMENTAL POLLUTION

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## ABSTRACT

Bioindicators for environmental pollution are sentinel organisms that respond to any change in the environment at cellular, physiological, biochemical, genetic and histological level. The application of biomarkers for environment monitoring is essential in terms of ecotoxicological research. Biomarkers have been largely used for the assessment of negative effects induced by several classes of chemical contaminants on bioindicator species such as Apis melifera L. Moreover, histological methods include determination of factors causing a negative effect on bioindicator species. In the present study we aimed to assess the histological changes in the reproductive system in Apis melifera drones due to pesticide exposure. The observed alterations in the reproductive system of the test individuals could serve as responsive biomarkers for chemical pollution. Furthermore, the histological changes in the test bioindicator could be included in monitoring programs concerning the health status of Apis melifera L. from polluted areas. This study was supported by the National Research Fund of Bulgaria through the contract KP-06-H5112/2021 "Complex assessment of genetic and environmental factors related to the losses of honey bees (Apis mellifera L.) in Bulgaria".

**Keywords**: biomarkers, pollution, Apis melifera drones, histology

# ACUTE TOXICITY OF AZOXYSTROBIN ON PELOPHYLAX RIDIBUNDUS (PALLAS, 1771) TADPOLES

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## ABSTRACT

Azoxystrobin is one of the synthetic organic pesticide groups widely used worldwide and in Turkey to combat pathogenic fungi in agriculture. While this fungicide group is designed to control fungal pathogens, its general toxic effects are not limited to fungi. The commonly used Azoxystrobin fungicides in agriculture may pose potential toxicity to organisms other than the target organisms. The acute toxicity of Azoxystrobin, particularly during different life stages, can vary in aquatic organisms. In this study, the 96-hour acute toxic effect of Azoxystrobin on the tadpoles of *Pelophylax ridibundus*, a commonly found species in Turkey, was investigated using a static test system. The data obtained from tadpoles exposed to different concentrations of Azoxystrobin were evaluated using the probit analysis method. As a result, the 96-hour LC50 value for *P. ridibundus* tadpoles was determined to be 0.358 ppm.

**Keywords**: Marsh frog, Pelophylax ridibundus, Tadpole, Azoxystrobin, LC50 (Lethal Concentration 50)

# A REVIEW OF THE RELATIONSHIP BETWEEN CANCER CASES-ENVIRONMENTAL CARCINOGENS AND POLLUTING AGENTS IN TURKISH THRACE REGION

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## ABSTRACT

Cancer occurs as a result of the combination of various factors (environmental, genetic). Factors brought by personal or social life change the working system of cells over time. All factors that cause a person to have cancer are called carcinogens (cancer-causing). When environmental factors are examined in cancer cases, obesity, viruses and bacteria, UV rays, alcohol and chemicals, especially smoking, have been identified as the most important carcinogens. When genetic factors were examined in cancer cases, oncogenes, tumor suppressor genes, DNA repair genes and other carcinogenic gene concepts were determined. As a result of the statistical studies conducted by the WHO (World Health Organization), approximately 19.2 million new cancer cases were seen in the world in 2021. It has been determined that 9.9 million deaths occurred due to cancer. According to the Ministry of Health HSGM (General Directorate of Public Health) Cancer Department Turkey Cancer Control Program 2021 Report, it was determined that between the years 2009-202**1** an average of 200,000 to 240,000 people were diagnosed with cancer annually in Turkey. With the increase in the world population, this number is expected to increase gradually in the coming years. The significant increase in cancer cases we have seen in recent years, especially in Turkish Thrace Region, is one of the most important factors in our handling of this issue. In this review, the relationship between cancer cases-environmental carcinogens and polluting agents in Turkish Thrace Region is discussed by scanning the existing literature. The high rate of elderly population in Turkish Thrace Region, the uncontrolled dumping of industrial wastes into the Ergene River in this region, the effects in the region after the Chernobyl disaster and the excessive use of pesticides (pesticides) in agriculture in the Thrace Region, which is a grain warehouse, completely affect the serious increase in cancer cases. From this point of view, it is important to examine Turkish Thrace Region.

**Keywords**: environmental carcinogens, Turkish Thrace, oncogenes, carcinogens, cancer

# FUNGAL AMYLASE PRODUCTION METHOD

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## ABSTRACT

Due to their capacity to grow on cheap media during short period of time and synthesize a broad spectrum of exocellular enzymes that could be easy separate from culture filtrate, fungal strains are the most advantageous sources of amylases. Fungal amylases are involved in a number of industrial processes such as in food, textiles, paper industries, production of sake and soya sauce, bread making, as well as in scientific research, medicinal and analytical chemistry. Wide applications of amylases emphasize the importance of producers' biosynthetic potential enhancing. To improve the synthesis of amylases in fungal strain *Aspergillus niger* CNMN FD 06 the nanoparticles of Cu 60-80 nm were used as factor of influence. Studies were carried out under submerged cultivation in Erlenmeyer flasks on rotatory shaker, as well as in the BIOSTATR A plus Sartorius fermenter. The nanoparticles of copper were added to the culture medium in concentrations of 5-20 mg/L. The lab-scale fermenter experiments were performed at two cultivation regimes: I – nutrient medium volume 2 L, aeration 2.0 L/L medium / min, agitation 100 rpm; II - medium volume 2 L, aeration 2.0 L/L medium / min, stirring 180 rpm, duration of cultivation 5-6 days. As control served the data obtained at the cultivation in the media without nanoparticles. In flasks level experiments, addition of Cu nanoparticles, in a concentration of 10 mg/l, intensified the amylase synthesis process. Thus, on the 5th day of cultivation, the enzyme activity was 72.72 u/ml, exceeding by 16% the level of control from the same day and being only 12% lower compared to the maximum value of control sample determined in the 6th day of cultivation. At the fermenter level, the optimal cultivation regime that ensures the maximum synthesis of amylases was the follow: medium volume -2.0 L and aeration (air bubbling) - 2.0 L/L of medium/min, stirring speed -100 rpm. When cultivating in the presence of copper nanoparticles, the producer's activity varied between 53.04-77.77 u/mL - at the I regime, being practically at the level of control and between 61.33-81.25 u/mL - at the II regime, showing an increase of about 10% on the 6th day and an activity only by 17% lower than the maximum of control - on the 5th day. In the conclusion we can mentioned that the addition of nanoparticles of Cu into nutritive media of *Aspergillus niger* CNMN FD 06 ensures the increasing of amylases production and shortening of cultivation cycle of the producer both at the flasks and lab-fermenter level.

**Acknowledgments:** This study was supported by the research project 20.80009.5007.28 with funding from ANCD. The coordinating compounds were synthesized and offered for investigations, according to the project's objectives, by the partner team from the Institute of Chemistry of the State University of Moldova, coordinated by dr. hab. Bulhac Ion (project manager).

**Keywords**: fungi, amylases, nanoparticles of Cu, production scale

# EVALUATION OF THE IMPACT OF INDUSTRIAL POLLUTION ON THE LEVEL OF TOTAL PROTEINS OF PLANT SPECIES ACHILLEA MILLEFOLIUM, HYPERICUM PERFORATUM, AND PLANTAGO LANCEOLATA IN DRENAS AND MITROVICA

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## ABSTRACT

Environmental pollution is a global problem that Kosovo also contends with due to extensive mining activities. The purpose of the research was to evaluate environmental pollution in industrial areas (Drenas and Mitrovica) by employing three plant species, namely *Achillea millefolium, Hypericum perforatum, and Plantago lanceolata*, as bioindicators. Peja as an area far from industrial centers was used as a reference point. The amount of total proteins in the homogenate of the leaves of the plants included in the research was determined by Lowry's method. The findings of this study showed significant differences in the amount of total protein among the three plant species studied. Specifically, the level of total proteins in both Achillea millefolium and Hypericum perforatum had shown to be significantly higher ($p < 0.05$ and $p < 0.01$) in Drenas (10.72±3.96; 12.60±2.46mg/L) compared to plant samples collected in Mitrovica (7.80±2.59;10.69±2.80mg/L) and Peja (6.44±3.41; 9.53±1.89mg/L). Whereas no significant difference was observed in the total protein levels of *Achillea millefolium and Hypericum perforatum* between Mitrovica and Peja. In contrast, the amount of total proteins in the *Plantago lanceolata* species had a significant difference ($p < 0.05$) in the samples collected in Peja (4.41±1.97mg/L) compared to those in Mitrovica (2.90±1.09mg/L), but not with those collected in Drenas (4.24±1.74mg/L). Additionally, the study explored potential differences in total protein content among in the three plant species concerning their spatial positions in the west, north, east, and south directions. However, the results indicated no statistically significant variations in total protein content based on different spatial positions for any of the plant species. Therefore, based on the results obtained, it can be inferred that higher level of total proteins in Drenas and Mitrovica is likely a consequence of the higher pollution levels resulting from the pronounced mining activity in the region. These findings underscore the urgency of implementing effective pollution control measures and environmental management strategies in industrial areas to mitigate the impact on plant and ecosystem health and, ultimately, safeguard human well-being.

**Keywords**: Environmental pollution, total protein, Achillea millefolium, Hypericum Perforatum and Plantago lanceolata.

# DETERMINATION OF MICROFUNGUS BIODIVERSITY OF ACIGÖL LAKE, TURKEY

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## ABSTRACT

Fungi are one of the largest groups of organisms known for their high diversity complex metabolism and unknown diversity in extreme environments has enormous potential for new metabolites and other new molecules. In this study, it was aimed to contribute to the microfungi diversity in the hypersaline and alkaline surface waters in our country. For this purpose, Acıgöl Lake (Denizli/Turkey), known as a hypersaline and alkaline tectonic lake, was chosen as the sampling area and investigated in terms of microfungi diversity in this study. Microfungi isolation were made by membrane filtration method from a total of 8 water samples taken seasonally from two points determined in Acıgöl Lake. Some parameters such as pH, salinity and temperature of the samples were measured *in situ*. For selective isolation, DRBC medium containing 5%, 10% and 15% NaCl were used. Considering the samples taken from both sampling points for 4 seasons and the types of media used, average numbers of colony were recorded as 10-283 CFU/100 ml and 3-606 CFU/100 ml for sampling points. Totally 199 microfungi were isolated and identified using conventional methods and multi-locus gene sequencing methods such as ITS, Beta-Tubulin, Calmodulin. The distribution of the isolates at the genus level was recorded as follows; 31% *Penicillium* spp., 28% *Aspergillus* spp., 11% *Cladosporium* spp., 6% *Alternaria* spp. *Aspergillus flavus* (19 isolates, 9.5%), *P. chrysogenum* (15 isolates, 7.5%), *C. cladosporioides* (12 isolates, 6.0%), *A. tubingensis* (10 isolates, 5.0%), *P. allii* (10 isolates, 5.0%), *A. alternata* (8 isolates, 4.0%) species were found to be prominent. Furthermore, *Aspergillus venenatus*, *Cladosporium limoniforme* and *Neocamarosporium obiones* were determined as new records for Turkey. As a result, with this study, the microfungi biodiversity of the region was revealed as well as the fungal culture community that could serve different biotechnological initiatives.

**Keywords**: Polyextreme environment, Microfungus diversity, *Aspergillus*, *Penicillium*, *Alternaria*

# PREVALENCE AND ANTIMICROBIAL SUSCEPTIBILITY PATTERNS OF GRAM-NEGATIVE UROPATHOGENS ISOLATED IN PUBLIC HOSPITAL ESTABLISHMENT «SAAD GUERMECH SAOUDI AMAR HMAIDA» SKIKDA-ALGERIA

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## ABSTRACT

Urinary tract infections (UTIs) are a serious world-wide health problem whose treatment becomes highly difficult due to the emergence of antibiotic-resistant bacterial strains. Herein, a retrospective study was conducted with the aim to determine the prevalence, the identification of the bacteria responsible of UTIs, and the antimicrobial resistance profile. All Patient samples, including either external samples or samples taken from patients admitted to Public Hospital Establishment "Saad Guermech Saoudi Amar Hmaida" in Skikda-Algeria were used in this study for a period extending from January 2018 – March 2020. The identification of bacterial strains and the antibiotic susceptibility testing was carried out using Analytical Profile index galleries (API) system and disk diffusion method. Among the 1203 samples, 206 (17.12%) were positive, and 997 (82.88%) were negative for bacterial growth. Regarding the pathogenic strains, 26 (12.62%), and 180 (87.38%) were found respectively, Gram-positive and Gram-negative strains. Among the 180 Gram negative strains, 104 (57.83%) were reported in female patients, 68 (37.72%) were in male patients, and 8 (4.45%) whose gender was not mentioned. The most representative Gram-negative strains are Escherichia coli (E. coli) (43.33%), Klebsiella pneumoniae (K. pneumoniae) (13.33%), Proteus mirabilis (P. mirabilis) (7.77%), Enterobacter sp (E. sp) (6.66%), since the other strains were less frequent. Moreover, 6 bacterial strains belonging to 3 genera (Escherichia, Klebsiella, and Enterobacter) were ESBLs producers with an overall prevalence of 3.33% of pathogenic strains isolated from urine. ESBLs were produced in 4.00%, 5.88%, and 6.25% of E. coli, K. pneumoniae, and E. cloacae strains respectively. E. coli was found to be the most predominant strain, while most of the Gram-negative strains were highly resistant to Amoxicillin/clavulanic acid, Ampicillin, penicillin and tobramycin.

**Keywords**: Urinary tract infection ; Gram-negative ; antibiotic ; antimicrobial resistance

# POSSIBLE MOLECULAR TARGETS OF SARS-CoV svRNA-nsp3.2

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## ABSTRACT

The severe acute respiratory syndrome (SARS) coronavirus (SARS-CoV) is a virus that has caused pandemic-level illness. More than 8000 people were affected in 30 countries on five continents and the mortality rate was 10% in 2003. Recently, SARS-CoV-2 (Covid-19) has affected 6.9 × 108 people globally and the mortality rate was 6.8 × 106 by July 2023. Transmission from symptomatic SARS patients usually occurs on or after the fifth day of disease onset, in parallel with the increased viral load in nasopharyngeal secretions. SARS-CoV-2, which causes a worldwide pandemic in 2020, is genetically similar to SARS-CoV in 2003. The mean viral load in the SARS-CoV-2 family cluster reached 6.8 × 105 copies per upper respiratory tract swab during the first 5 days. In the first 2 days of SARS-CoV infection, svRNAs have been recorded to reach hundreds of numbers. mRNAs belonging to some genes that perform important functions in humans have probabilities to be silenced by virus-derived siRNAs (vsiRNAs). nsp3 is one of the non-structural proteins that has an important role in the viral life cycle, interaction with host proteins, and anchors the coronavirus replication/transcription complex (RTC) to modified membranous structures originating from the endoplasmic reticulum (ER). In our previous study, 11 possible target gene regions and sequences of the SARS-CoV svRNA-N were determined on Homo sapiens. The binding sites on possible target sequences consist of 15-18 nucleotides. It has been demonstrated in the literature that mRNAs expressed from the determined gene regions can cause various adverse events, especially apoptosis, in the case of silencing. The aim of this study is to determine the possible mRNA targets which could be silencing by SARS-CoV svRNA-nsp3.2 and to provide a new approach to help fight against other types of coronaviruses in future. In this study, possible target genes/sequences of SARS-CoV svRNA-nsp3.2 (5'-GAGGAAGAAGAAGAGGAAGACT-3') were examined and investigated by applying Homo sapiens (taxid:9606) and Genomic + transcript databases parameters on NCBI Blastn. Detailed information on virus isolates was obtained from NCBI Virus. As a result, it was determined that transcripts CWC22 spliceosome associated protein homolog (CWC22), euchromatic histone lysine methyltransferase 2 (EHMT2), WD repeat domain 70 (WDR70), radial spoke head component 4A (RSPH4A), cysteine and serine rich nuclear protein 3 (CSRNP3), SR-related CTD associated factor 1 (SCAF1), eukaryotic translation initiation factor 3 subunit D (EIF3D) and G-patch domain containing 8 (GPATCH8) mRNAs, which have various functions in human cells, may be possible molecular targets for SARS-CoV as much as SARS-CoV-2. The binding sites on possible target sequences consist of 20 nucleotides. Therefore, it is thought that each study on SARS-CoV will help in the fight against SARS-CoV-2 and on developments of coronavirus vaccines.

**Keywords**: SARS-CoV, svRNA-nsp3.2, BLASTn

# PHYSIOLOGICAL AND BIOCHEMICAL CHARACTERIZATION OF CHENOPODIUM QUINOA WILLD. SEEDS UNDER SALT STRESS

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## ABSTRACT

The United Nations General Assembly declared 2013 the "International Year of Quinoa" to promote *Chenopodium quinoa* Willd as a means of contributing to food security. Quinoa cultivation is capable of growing on a wide range of marginal agricultural soils. Given its tolerance to many abiotic stresses and high nutritional properties, quinoa is a promising crop for dealing with global climate change and rising food insecurity in developing countries. This work consists of studying the physiological and biochemical response of the seeds of two genotypes of *Chenopodium quinoa* Willd. at the germination and post-germination stage treated with NaCl. The study was carried out under controlled laboratory conditions at a temperature of 25°C. The seeds were put to germinate in Petri boxes containing 100, 200, and 400 mM of NaCl solutions. The results of the germination test showed that seed behaviour varied according to stress intensity and variety. The 100 mM NaCl concentration induced the highest final germination rate in the Q102 genotype. Salt stress at 200 mM NaCl stimulated radicle length growth in both genotypes and epicotyl growth in Q103 seeds. Epicotyls were more affected by the salt treatment than radicles. The accumulation of soluble sugars, polyphenols, flavonoids, saponins and malondialdehyde (MDA) is higher in (Q102) seeds, while proline synthesis is more dominant in (Q103) seeds.

**Keywords**: Chenopodium quinoa Willd, salt stress, physiology, biochemistry germination

# DESCRIPTION OF THE MAIN BIOLOGICALASPECTS OF THE SPECIES PARAPENEAUS LONGIROSTRIS AT THE GULF OF ANNABA:BIOMETRIC ANALYZES.

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## ABSTRACT

The shrimp *Parapenaeus longirostris* from the Gulf of Annaba (eastern Algeria) is of socio-economic interest, given its high commercial value in Algeria. The aim of this work is to provide as much morphometric information as possible on the Algerian white shrimp, and also to study its growth in order to contribute to the improvement and, above all, the development of this species. A total of 450 specimens (293 females and 157 males,), were sampled between November 2022 and May 2023 ($12 \leq LC(mm) \leq 45$; $77 \leq LT(mm) \leq 153$ and $3.9 \leq PT\ (g) \leq 15.6$). The results obtained show that the mean sizes of all the morphometric parameters measured are greater in the females than in the males of this population. The overall sex ratio is in favor of females (65%). On the other hand, the morphometric study showed strong minorizing allometries in both sexes and for two-thirds of the equations associating the different parameters measured. The height-weight relationship reveals a minorizing growth pattern for the population as a whole, with weight growing proportionally slower than the cube of length.

**Keywords**: Parapenaeus longirostris, morphometry, relative growth,height-weight relationship, sx ratio, Algerian coastline

# GERMINATION OF BELLEVALIA EDIRNENSIS ÖZHATAY & MATHEW SEEDS UNDER IN VIVO CONDITIONS

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## ABSTRACT

In this study, a germination experiment was conducted using seeds of the endangered plant species *Bellevalia edirnensis*, which is endemic to Turkey. Increasing in vitro and in vivo propagation studies on endemic or endangered species is of great importance in terms of reducing pressure on natural populations. In this germination experiment conducted with *B. edirnensis* seeds, seed coat abrasion was performed by sulfuric acid treatment on a total of 500 seeds divided into 5 trial groups. When the seedling development was examined, it was concluded that the experiment with the highest exit rate was the control group. Based on the results of the study conducted on 5-year-old *Bellevalia edirnensis* seeds, it is possible to reduce seed dormancy, highlighting the importance of preserving the material under appropriate conditions.

**Keywords**: Germination, Seed, In Vivo, Bellevalia

# BIO-ELECTROCHEMICAL TREATMENT OF WASTEWATER USING MICROBIAL ELECTROLYSIS CELL TO PRODUCE BIOENERGY

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## ABSTRACT

Wastewater can be defined as the final or by-products formed because of various natural and industrial processes, degraded, and contaminated by various pollutants. Wastewaters may contain materials such as inorganic and organic pollutants such as heavy metals, dyes, pesticides, xenobiotics etc. Therefore, wastewater has to be treated or contaminants removed before it can be discharged to waterways. The treatment methods include biological, chemical, electrochemical processes such as adsorption, membrane technologies, anaerobic digestion and activated sludge. Microbial electrolysis, which is one of the methods used in the treatment of wastewater, has emerged as a subject of interest by researchers in recent years. The microbial electrolysis method stands out with its ability to produce high value-added energy and industrial gases such as methane, carbon monoxide, carbon dioxide and hydrogen from wastewater, apart from its treatment capability. Moreover, being able to operate with high efficiency, keeping the process under control, being safe and stable are among the advantages of the microbial electrolysis method. In this study, it is aimed to contribute to the literature by examining the current studies that parameters of the treatment processes carried out on different wastewaters by microbial electrolysis and by examining the current studies about the production of energy sources from different waste waters by microbial electrolysis. Moreover, operation conditions such as reactor components and design, electrode materials, pH, applied voltage are discussed in detail.

**Keywords**: Biomass, Energy resource, Microbial electrolysis, Wastewater, Wastewater treatment

# SYSTEMS BIOLOGY PERSPECTIVE OF GENDER BIASES IN PAPILLARY THYROID CANCER DIAGNOSIS, PROGNOSIS AND THERAPY

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## ABSTRACT

Papillary thyroid cancer (PTC) represents the most prevalent form of thyroid malignancy, and its early detection holds paramount importance for effective treatment. Numerous factors, including age, gender, and exposure to radiation, can contribute to an increased risk of thyroid cancer. Although thyroid cancer can manifest at any age, women in their 40s or 50s face a higher risk compared to men, who typically present with the disease in their 60s or 70s. Additionally, thyroid cancer occurs approximately three times more frequently in women than in men. This study endeavors to elucidate the potential biomolecular signatures responsible for the gender disparity observed in PTC patients. To achieve this, four microarray datasets containing normal thyroid and PTC samples were utilized to identify gene expression signatures. Through a meta-analysis, common differentially expressed genes were discerned independently for both genders. Reporter molecules were then determined by mapping mRNA expression data across various biological levels, including transcriptional regulatory networks, protein-protein interactions, and metabolic pathways. Functional enrichment analysis was subsequently employed to identify relevant biological processes, molecular functions, signaling pathways, and metabolic routes. The study further explored the prognostic potential of the identified reporter molecules through survival analyses. Consequently, this investigation reports candidate biomolecules in each gender cohort that may serve as valuable prognostic biomarkers or potential therapeutic targets for personalized medical interventions in PTC patients.

**Keywords**: gender biases; papillary thyroid cancer; drug; systems biology; biomarker

# CRYSTALLIZATION KINETICS IN KAOLIN BASED-CERAMIC

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## ABSTRACT

In the present study, we studied the kinetics of Hydroxyapatite formation in different composites under non-isothermal conditions using DTA. Different composites based of mullite and hydroxyapatite were prepared by reaction sintering of Kaolin and natural phosphate. Several mixtures were used while varying the percentage of the Kaolin from 30 to 70 mass% with a step of 20. The XRD patterns revealed the presence of both kaolinite and hydroxyapatite phases in all of the mixtures and full disappearing of kaolinite phase in the heat-treated samples. According to the DTA curve results, both the peak temperature formation of hydroxyapatite and the relative fraction-transformed increased as the heating rate increased and the amount of phosphate in the mixture decreased. The activation energy of hydroxyapatite phenomenon was estimated using Kissinger method. The obtained values of the activation energy were in the range of 196.5 and 210.6 kJ/mol. The growth morphology parameters n and m were both foundto be near to half unity indicating that the surface nucleation with plate-like growth was dominant in hydroxyapatite formation controlled by diffusion.

**Keywords**: Kaolin, Natural Phosphate, Hydroxyapatite, Kinetics, DTA

# MECHANICAL PROPERTIES AND PROTEIN ADSORPTION BEHAVIOR OF POLYURETHANES INVESTIGATED VIA MOLECULAR DYNAMICS SIMULATIONS

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## ABSTRACT

Materials science has entered a significant transformation era in response to the evolving needs and expectations of societies driven by advancing technologies. This transformation involves the discovery of new materials, enhancement of the properties of existing materials, and the incorporation of cutting-edge technologies. Polymer surface coatings, a pivotal domain within materials science, find extensive applications in areas such as biomedical, industry, aviation, and marine sectors. These coatings play a critical role in protecting materials against various environmental factors, including moisture, biological degradation, radiation, mechanical stress, and chemical damage. They also have a significant effect on the physicochemical properties of the material surface, biomass interactions and adsorption. The interactions of proteins with surfaces can change the biological properties of these surfaces and, in some cases, lead to colonization by certain microorganisms. This possesses significant problems in biomedical, marine and industrial applications. For instance, in biomedical applications, issues such as biofouling, the spread of infectious diseases, implant rejection, and malfunctioning of biosensors present substantial health risks. In marine industry, biological pollution by marine organisms on ship surfaces, such as accumulated biomass can lead to increased fuel consumption, releasing more greenhouse gases to the atmosphere, and high maintenance costs. In order to prevent these and to increase the service life of the materials, it is necessary to develop smart polymer surface coatings with functional surface behavior. Nowadays, anti-fouling coatings as functional coatings are becoming an important field of study. The anti-fouling property of materials is closely related to the hydration layer on the surface. This hydration layer can serve as a physical barrier to proteins, effectively preventing their adhesion to the surface. Thanks to superhydrophilic materials, biological molecules such as bacteria and other marine organisms as well as proteins cannot displace tightly bound surface water molecules, and as a result, adhesion to the surface is prevented. Recently, integrating hydrophilic dangling chains into polymer matrices with hydrophobic network structure is proposed as an approach to develop anti-fouling smart polymer coatings. Hydrophilic polymers like polyethylene glycol (PEG) and amphiphilic chains are used to modify material surfaces to stimulate desired functionality at a particular polymer surface (Kizilkaya & Ghermezcheshme, 2023). Molecular dynamics (MD) simulations are very useful tools in terms of providing data that are difficult or costly to obtain through experiments and understanding interactions at the molecular level. In this work, two systems have been obtained through simulation methods: one with hydrophilic and another with hydrophilic-hydrophobic dangling chains integrated to a hydrophobic polyurethane (PU) system. In this talk, we present the findings of atomistic molecular dynamics simulations performed after relaxing the systems with coarse-grained molecular simulations. We will focus on the mechanical properties and protein-surface interactions of these systems.

**Keywords**: Functional Polymer Surfaces, Polyurethane, Molecular Modeling and Simulation, Mechanical Properties, Protein Adsorption

# DETERMINATION OF THE PROPERTIES OF A POLYMERIC GEL AS A DRUG CARRIER MATERIAL VIA MOLECULAR SIMULATIONS

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## ABSTRACT

From the past to the present, drug discovery, drug administration methods, drug delivery systems and drug dosing strategies have been the focus of attention to fulfill the aim of controlled and targeted delivery of drugs. In this context, a number of methods and systems have been developed to effectively deliver drugs to the desired site. However, during these efforts, there have been efforts to eliminate difficulties such as toxicity, biocompatibility and biodegradability. For applications ranging from simple drug delivery methods to gene therapy, various strategies and systems have been developed using structures of various origins that have been validated. Eventually, the success of these attempts depends on factors such as minimizing the risk of toxicity, being compatible with the body and being naturally degradable, as well as effectively delivering the drug to the target. Polymeric gels are known as structures formed by cross-linked polymer chains. These gels can switch between solid and liquid depending on temperature and time change. While liquid gels are usually formed at high temperature and in short periods of time, solid gels exhibit elastic behavior. Hydrogels, which are water-containing gels, are of great importance thanks to their resemblance to real tissues and their customizable structure. Especially temperature and pH sensitive hydrogels are preferred in drug delivery systems. Block copolymers are used in the creation of these hydrogels. Especially block copolymers called Pluronics® exhibit various interactions thanks to their hydrophilic and hydrophobic regions. Polymers such as Pluronic®-L64 are widely used as hydrogel structures. However, problems such as mechanical durability and dissolution rate can be experienced. Various methods such as mixed micelle structures, different polymer chains, nanoparticles or network structures have been used to overcome these problems. In this study, we aimed to investigate a Pluronic®-based polymeric gel by molecular modeling and simulations to develop a novel drug carrier. In our study, the equilibrated Pluronic® structure will be obtained by initially creating the polymer hydrogels, which is followed by adding the drug molecules. Initially, the mechanical properties of the polymeric gels will be obtained. By adding drug molecules into the gels, drug release and encapsulation efficiency at different temperatures will be investigated as a later step. The simulations in this thesis will be performed with the MARTINI force field, which is one of the widely used coarse-grained simulation methods. The findings of this study are expected to provide valuable information on the structures of polymeric gels and their drug transport capacity and gel properties as drug carriers.

**Keywords**: Polymeric gels, Smart drug delivery systems, Pluronic®, Molecular dynamic simulations, MARTINI force field

# THE COMMUNITY STRUCTURE OF THE MACROFAUNA IN A DEGRADED LACUSTRINE ENVIRONMENT (WETLAND OF RÉGHAIA-ALGERIA)

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## ABSTRACT

The Réghaïa wetland is an ecological site and is included in the Ramsar list of wetlands of international importance. However, this wetland is subject to pollution risks, which threaten its terrestrial and aquatic biota. Until now, there has been no study analysing the environment-macro fauna interaction. Therefore, in order to characterise the state of this area, which is heavily affected by intense physical and chemical pollution of anthropic origin, we studied the quality of its water and its biological communities in order to consider possible consequences and dangers. The results obtained correspond to excessive pollution of the environment as well as communities of macoinvertebrate individuals affected by the number and distribution mainly of insects (18 taxa). The Diptera constitute the richest faunal group in terms of taxa, with 10 families (45%); within the Diptera, which are qualified as tolerant taxa, the Chironomidae were the best represented family and resistant to changes in the state of the environment with 52% of the total abundance. The present study constitutes a first step for future research on the environmental and spatio-temporal impact of water quality on the aquatic fauna of the Réghaïa wetland, for which urgent management decisions are needed to preserve its biodiversity value.

**Keywords**: Réghaïa lake, water quality, pollution, macroinvertebrate

# DIVERSITY OF MEDICINAL PLANTS USED BY THE LOCAL COMMUNITIES IN PROVINCE OF AIN DEFLA (ALGIERS).

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## ABSTRACT

The study was conducted over a two-year period (2019-2021) in the Ain Defla province, located in the southwest of Algeria. The region of Ain Defla is known for its diverse range of medicinal plants used for therapeutic purposes. The research focused on examining the indigenous population's knowledge of medicinal plants and their use in treating various human ailments. Information was collected and recorded using a feedback form, including data on demographics of the informants, the plants utilized, treatment methods, specific plant parts employed, and the diseases addressed. Out of the 180 individuals interviewed, the majority were men, accounting for 60% of the total sample. The study identified 65 species of medicinal plants belonging to 33 distinct families, with the Lamiaceae family being the most commonly employed. Leaves were found to be the most frequently used plant part, followed by stems, fruits, flowers, and seeds. Infusion was the predominant method of preparation. The plants *Thymus munbyanus* subsp. *coloratus* and *Allium cepa* were the most commonly utilized, having the highest use values among the informants at 1.07 and 0.69, respectively. The findings of the study revealed the frequent utilization of medicinal plants by the local population for both therapeutic and cosmetic purposes. Notably, no previous ethnobotanical studies had been conducted in the Ain Defla province prior to this research.

**Keywords**: Algeria, Ain Defla, medicinal plants, ethnobotanical, therapeutic

# ANTISTAPHYLOCOCCAL STUDY OF THE ESSENTIAL OIL OF EUCALYPTUS GLOBULUS L. (EL-TAREF -ALGERIA)

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## ABSTRACT

Antimicrobial resistance is a huge threat against the public health sphere and is a major cause of global mortality and morbidity. Antibiotic misuse and overuse have led to the development of many resistant bacterial strains. One particular bacterium of concern is methicillin-resistant *Staphylococcus aureus* (MRSA), which is the most common resistant bacteria in humans. Antibiotic development has been unable to keep up with the rapid evolution of antibiotic-resistant organisms, and there is an urgent need to identify alternative agents to combat this problem. Antimicrobial properties of plant essential oils (EO) have been investigated through several observations and clinical studies which purpose them as potential tools to overcome the microbial drug resistance (MDR) problem. *Eucalyptus globulus* L. commonly called in eastern Algeria (Kalitous) is a medicinal plant belonging to the Myrtaceae family, widely used by the population, especially for respiratory disorders. The aim of this research was to study the antibacterial effect of a traditional plant EO, *Eucalyptus globulus* L., against clinical isolates of methicillin resistant *Staphylococcus aureus* (MRSA) through disk diffusion method. The EO showed very effective bactericidal activity towards the majority of the tested bacterial strains with inhibition zone diameters in the range of 13.57-18.63mm. These results suggest that the essential oil of *Eucalyptus globulus* L. may be a useful alternative to antibiotics for the control of the infections caused by *Staphylococcus aureus.*

**Keywords**: Eucalyptus globulus L., Essential oil, Antibacterial activity, Staphylococcus aureus MRSA

# MORPHOMETRY AND RELATIVE GROWTH OF THE COMMON CARP, CYPRINUS CARPIO (LINNAEUS, 1758) FROM OUBEIRA LAKE IN EL KALA NATIONAL PARK (EAST-ALGERIA)

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## ABSTRACT

The common carp *Cyprinus carpio* (Linnaeus, 1758) is an introduced species in Algeria, its first introduction dating back to 1860, since which date 86 restocking actions have been carried out in Algerian lakes and dams, including Lake Oubeira, which was introduced in 1986 and 1991 within the national framework for the introduction of exotic species (Kara, 2012). However, no information is available on the morphometric pattern of the species Cyprinus carpio (Linnaeus, 1758) from Lake Oubeira of the PNEK (East-Algeria), so this study is motivated by the scarcity of work on this species in this area and mainly, the biometric aspect. Thus during a three-month cycle (January to March 2023) and from a global sample of 174 individuals ($20 \leq Lt \leq 36$ cm; $112.1 \leq Pt \leq 610.8$ g; $100 \leq Pe \leq 588$g), we were interested in the biometric study based on the measurement of morphometric variables and relative growth (size-weight relationship) of this species. The morphometric study of the overall population shows that of the fifteen parameters studied, eight exhibit a major growth allometry: LPa/Lt, Hpc/Lt, Ec/Lt, Do/Lc, LPo/Lc, Lpo/Lc, Eio/Lc and Lmax /Lc, while the other seven Ls/Lt, Lf/Lt, Lc/Lt, LPd/Lt, LPp/Lt, Lpp/Lt and Hc/Lt show growth isometry. Relative growth shows growth isometry, with weight growing at the same rate as fish size, with a slope equal to 3.030 and an intercept equal to 1.930.

**Keywords**: Cyprinus carpio, Lake Oubeira, biometry, relative growth, PNEK, East Algerian

# IN VITRO PROPAGATION OF ENDANGERED SIDERITIS SCARDICA GRISEB.

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## ABSTRACT

Medicinal plant preparations are still the most popular life-saving remedies for a larger part of the world's population. The exhaustion of natural resources demands new approaches to the utilization and protection of plant species that are threatened with extinction. The development of plant biotechnological methods has been a significant advance, providing tools for the conservation of plant genetic resources as well as their management, characterization, and sustainable use. Plant tissue culture technologies discover new opportunities for the maintenance of germplasm and biodiversity protection of valuable and endangered medicinal plants as sources of a wide range of secondary metabolites. Using *in vitro* techniques, it is possible to obtain a large number of homogenous plants in a short period of time. *Sideritis scardica* Griseb. is a Balkan endemic species listed as critically endangered on the Red List of Bulgaria. Sideritis spp. are rich in secondary metabolites with unique bioactive qualities classified into terpenes, sterols, coumarins, flavonoids, phenols, iridoids and lignins. Metabolites of *S. scardica* possess antioxidant, anti-inflammatory, neuroprotective, antitumor and other activities. The aim of the current experiments was to introduce S. scardica into *in vitro* culture and to elaborate an efficient method for micropropagation that would allow the preservation of the species. The optimum sterilization procedure for stem tips isolated from *in vivo* germinated seedlings provided a 100% clean culture. Seven variants of nutrient media based on Murashige and Skoog supplemented with different growth regulators (Kinetin, BAP, TDZ, zeatin, NAA) were used for micropropagation. The best media combination for shoot proliferation was MS containing 1 mg/l zeatin and 0.1 mg/l IAA, where the mean number of shoots per explant was 6, with a mean height of 2.4 cm. Efficient *in vitro* rooting was induced on half-strength MS with the addition of 1.5 mg/l IAA. The elaborated *in vitro* propagation protocol of *S. scardica* could be of great value for the sustainable conservation of this threatened medicinal plant.

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**Keywords**: Mursala tea, multiplication, biodiversity

# ANNUAL MONITORING PROGRAMME OF EUROPEAN RED WOOD ANTS DISTRUBUTED IN YILDIZ (STRANJHA) MOUNTAINS

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## ABSTRACT

In this study, nests belonging to the *Formica pratensis* species in the Yıldız (Stranjha) Mountains of Kırklareli province were examined i in spring and autumn periods. Field studies were carried out in previously registered regions and in Çağlayan Village, which was registered for the first time. According to the field results, it was determined that 31 of the 43 known nests were destroyed, and the current number of nests was 31 with 19 newly detected nests. During the field studies of the nests in two separate periods, diameter and height data, nest shape and habitat characteristics were examined and recorded on the nest identification cards. The results demontsrated that all of the nests are monodom type nests built in the forest clearing and mostly in sun-drenched areas. Nest volumes were evaluated as an indicator for the determination of colony density, and the measurements in the two periods were compared with each other to determine the effect of seasonal changes, but it was seen that there was no significant difference. As a result of nest and habitat investigations, the factors causing the destruction of nests; nest destruction, habitat destruction and conversion of the land into different usage areas. Distribution maps were prepared with the coordinate data of the nests. Living areas (area of occupancy, AOO) were calculated with a 2x2 km grid added to the distribution maps, and extension of occurrence (EOO) was calculated with appropriate polygons. It was determined that with the destruction of 31 nests, AOO decreased by 45% and EOO by 40% over a period of 4 years. By adding newly found slots to the remaining slots with the current distribution map prepared, it was seen that AOO occupies a smaller area by 20% and EOO by 26%. The data obtained indicates the high extinction rate in a short time and the fact that the current distribution is lower than the old distribution despite the new nests showed the importance of conducting a conservation study. For this, various conservation proposals have been made considering the demands of the species and the types of destruction that can be detected, but it has been determined that different studies are needed to create an appropriate conservation plan.

**Keywords**: european red wood ants, formica pratensis, monitoring, biodiversity, conservation

# DIVERSITY OF RIPARIAN AVIFAUNA IN EL-KALA NATIONAL PARK (NORTHEASTERN ALGERIA)

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## ABSTRACT

The riparian forests are characteristic of El-Kala National Park. Its botanical composition is marked by the presence of deciduous tree species, and it is the only deciduous habitat on the plain where black alder, alder ash and poplar are found. This habitat, characterised by the diversity of resources it contains, provides particularly favourable environmental conditions for a varied and dense avifauna. 20 avifauna inventories, using the IPA method and mesological parameters, were carried out in the alluvial forests of Bou-Merchen and Demnet-Rihen located to the north of Lake Oubeira. The total richness of each site is 28 and 36 species respectively. The two sites combined have 41 species. The structural parameters of the riparian lowland communities reveal that the Bou-Merchen site is more homogeneous, with a high density of 65.62c/10ha. This density is 40.49c/10h at Demnet Errihen. The diversity index is near 4 bits on both sites, and the same applies to equitability, with an index of 0.88 on both habitats, showing stable populations.

**Keywords**: riparian forests - avifauna - population - structure - mesology - El-Kala

# ALGAL COENOSES OF SHALLOW ROCKY COASTS OF THE ADRIATIC SEA IN ALBANIA

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## ABSTRACT

Studies on algae of shallow rocky coasts in Albania are limited and so are the existing data. The aim of this study is to know species composition and algal cover in the rocky coasts of the Adriatic Sea in Albania, as well as their seasonal differences between the study areas. The study was carried out in the all rocky areas of the Albanian Adriatic coastline, namely Cape Rodoni, Kallm, Spille, and Triport in the spring, summer, and autumn seasons. The study presents the list of species composition of macroalgae for each studied area and the percentage of algal cover. Comparisons of these data were made between the four studied areas and between the three seasons. The dominant classes of algae were: Cyanophyceae; Florideophyceae with families: Rodomelaceae, Corallinaceae, Rhodymeniaceae, Callithamniaceae; Phaeophyceae with families: Sargassaceae, Dictyotaceae, Stypocaulaceae; Ulvophyceae with families: Ulvaceae, Caulerpaceae, Cladophoraceae. Kallmi and Triport areas had the highest algal cover in the spring and autumn seasons, while Kallmi and Spille had the highest algal cover in the summer season. In the Spille area it was recorded a large number of algal species, which were not found in the other three areas. In this paper are given also considerations on possible natural and anthropogenic factors that affect the algal coenoses of the studied areas.

**Keywords**: marine macroalgae, algal cover, species composition, natural and anthropogenic factors

# MOLLUSCS FROM HIMARA COAST, IONIAN SEA, ALBANIA.

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## ABSTRACT

Himara is part of the Ionian coast in southern Albania. Data on molluscs of the shallow Himara coast are limited, while there are more detailed data for the deeper waters of the infralittoral of this area. This study was carried out in four sites of this area: Guma (Jalë), Llaman, Porto Palermo, and Qeparo. Molluscs were collected on shallow rocky shores in supralittoral, mediolittoral and the upper part of the infralittoral in October 2022. This study provides data on species composition, the density, and abundance of the mollusc populations, as well as their relationship with the algal cover. The mollusc groups with the highest presence and abundance were gastropods of the families Patellidae, Trochidae, Cerithiidae, Littorinidae, Risoiidae, and bivalves of the Family Mytilidae. Among the species found in this study are threatened and alien species for the Mediterranean Sea. Data on the species composition and density of the mollusc's populations were analyzed in comparison between the four sites of the study. Considerations on possible factors affecting the mollusc populations in the studied area are presented. A possible important factor influencing the species composition and quantitative characteristics of mollusc populations in the studied area may be related to the algal cover.

**Keywords**: marine malacofauna, threatened species, alien species, algal cover.

# ANTISTAPHYLOCOCCAL ACTIVITY OF THE ESSENTIAL OIL OF MENTHA PULEGIUM L.

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## ABSTRACT

*Staphylococcus aureus*, an important pathogen in human, causes serious infections. This bacterium is known as one of the most resistible agent against typical antibiotics. It also causes plenty of problems in hospitals and society. Therefore finding of new and effective antimicrobial agents derived from new resources for such resistant bacteria is of an over riding importance. Essential oils (EOs) from medicinal and aromatic plants are of major interest due to their rich bioactive compounds and potent antimicrobial activity. *Mentha pulegium* L. is well known for is medicinal properties against respiratory diseases and headaches. It was largely used for culinary purposes. It is a wild aromatic plant with a wide range of biological properties such as antioxidant, anti-inflammatory and antimicrobial. The present study aims to evaluate the antistaphylococcal activity of the essential oil of *Mentha pulegium* L. from the production unit (Florest). In this study, the antibacterial effect of a traditional plant EO, *Mentha pulegium* L., against clinical isolates of methicillin resistant *Staphylococcus aureus* (MRSA) through disk diffusion method. The EO showed very effective bactericidal activity towards the majority of the tested bacterial strains with inhibition zone diameters in the range of 17.06-24.50 mm. These results suggest that the essential oil of *Mentha pulegium* L. may be a useful alternative to antibiotics and might be useful in controlling MRSA infections. Further research is required to evaluate the practical values of therapeutic applications.

**Keywords**: Mentha pulegium L., Essential oil, Antibacterial activity, Staphylococcus aureus MRSA

# DISTRIBUTION AND MORFOLOGICAL DIVERSITY OF TEUCRIUM POLIUM POPULATIONS IN ALBANIA

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## ABSTRACT

*Teucrium polium* aggr is a Mediterranean species with high medicinal values used to treat different health condition in traditional medicine. It has a wide geographical distribution in Albania. The distribution and natural habitat characteristics of the plant species are important for ecological restoration and their conservation approaches. The aim of this study was to investigate the *Teucrium polium* aggr. populations distribution, their natural habitats characteristics and the variation on the morphological traits that contribute in the population differentiation. In our approach 130 plant individuals belonging to thirteen populations distributed in the middle region (9), North (1) and South (3) were evaluated using 13 morphologic traits of the leaf, steam and flower. High variation was observed in plant, corolla and inflorescence height. We found significant differences on the size of populations correlated with the geographical distances and ecological conditions of the population site. The range of the populations of this species is in reduction due to habitat destruction. The study provides the first data of monitoring the natural habitats in order to persevere and assist restoration of this plant species.

**Keywords**: habitats, medicinal plant, species distribution, morphologic diversity

# DIURNAL BEHAVIOR OF NORTHERN SHOVELER SPATUALA CLYPATEA IN LAKE OUBEIRA (EL KALA NATIONAL PARK).

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## ABSTRACT

Clearly, the El Kala wetland complex is unique in that its natural conditions are eminently favorable to a biological richness that is uncommon in the Mediterranean. Lake Oubeïra, in turn, is part of a reservoir of biodiversity considered exceptional in the Mediterranean region and classified as a Ramsar site since 1982.the present work is a study of the diurnal tempe budget of the shoveler duck in Lake Oubeira during the wintering season (2022 /2023). Monitoring of the activity budget of the species studied at Lake Oubeïra began at the beginning of October 2022 and will continue until April 2023, at the rate of one outing per week, with all scans lasting every hour between 8: 00h 14: 00h. For the study of activity rhythms, we adopted the "instantaneous scan sampling" or SCAN method, which consists of observing a group and recording the instantaneous activities of each individual. The behavioral study is based on five activities: Feeding, Swimming, Resting, Toileting and Flying. Time budget analysis revealed that the species spends more than half its diurnal time resting and feeding, while the rest of its activities (swimming, grooming, flying, courtship behavior) occupy only a small proportion. Parading behavior is non-existent. Finally, these results highlight the importance of Lake Oubeira, which is considered a wintering site par excellence, as well as a nesting ground for several bird species.

**Keywords**: Lake Oubeira, wintering, Anatidae, activity rate, Northern shoveler

# CONTRIBUTIONS TO BLACINAE (HYMENOPTERA: BRACONIDAE) FAUNA OF CENTRAL ANATOLIA REGION IN TURKEY

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## ABSTRACT

This study provides information about Blacinae fauna in the Central Anatolia Region, in Turkey, during the years of 2004-2008. As a result of this study, six species were identified. Those were *Blacus (Blacus) nigricornis* Haselbarth, 1973 *Blacus* (*Ganychorus*) *conformis* Wesmael, 1835, *Blacus (G.) diversicornis* (Nees,1834), *B.* (*G.*) *maculipes* Wesmael, 1835, *B.* (*G.*) *ruficornis* (Nees, 1812), *B.* (*G.*) *tripudians* Haliday, 1812. Although all identified species were recorded before Turkey, they are new records for the research area. The distributions and detailed locality records of the identified species are given.

**Keywords**: Blacinae, Braconidae, Central Anatolia Region, Fauna, Turkey

# DISTRIBUTION OF THE PLANT SPECIMENS COLLECTED FROM TÜRKIYE IN HERBARIUMS OUTSIDE OF TÜRKIYE

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## ABSTRACT

Türkiye is a rich country in terms of plant biodiversity and endemism due to its different climate, soil, and geomorphological characteristics, being at the intersection of three different phytogeographic regions (Europe-Siberian, Mediterranean and Iran-Turanian) and geographical location. It is known that around 11 thousand plant taxa are distributed in Türkiye, and more than 3 thousand of these taxa are endemic to Türkiye. Türkiye's plant biodiversity has been the focus of the attention of many foreign and Turkish researchers. Also, numerous works have been published in this sense. Flora Orientalis and Flora of Turkey and the East Aegean Islands are at the forefront of these works. In this study, we prepared a detailed list of the distribution of the specimens collected from Turkey in herbariums outside of Türkiye. Thus, it is aimed that this list will help researchers in future flora and revision studies. The databases of GBIF, JSTOR, and herbariums with online catalogs were searched based on specimens collected from Turkey. The obtained data were first transferred to a local database. These data were pre-processed, and the names of the collectors, the country of collection, family, and genus names were arranged. Incorrect records or specimens with low accuracy in location were removed from the database. As a result of this study, records of 144,963 herbarium specimens belonging to 190 families and 1492 genera in herbariums from outside of Türkiye were compiled. These records belong to the 2,162 collectors and are in 174 different herbariums. 50,771 of these herbarium specimens are in the Royal Botanic Garden Edinburgh Herbarium (E). This is followed by the Herbarium of Muséum National d'Histoire Naturelle (P) with 10,291 specimens and the Naturhistorisches Museum Wien Herbarium (W) with 7,650 specimens. According to the results, most plant specimens from the families of Asteraceae, Fabaceae, Poaceae, and Brassicaceae are recorded. Also, most specimens were recorded in Astragalus L. and Centaurea L. The collector with the most specimens is P.H. Davis, the editor and one of the writers of the volumes of Flora of Turkey and the East Aegean Islands with 19,424 herbarium specimens. P.E.E. Sintenis with 9,555 and B. Balansa with 7,467 specimens follow P.H. Davis. The digitalization of herbarium specimens has accelerated, and most of them have been processed in online databases with new technologies. However, most herbariums in Türkiye still do not have open-access and online databases. Pre-processing and creating detailed lists of herbarium specimens in Türkiye will contribute greatly to the flora, revision, and check-list studies.

**Keywords**: Türkiye, Plant, Herbarium, Specimens, Database

# MORPHOLOGICAL CHARACTERISATION OF PRAMECIUM BURSARIA (EHRENBERG, 1831) (EUKARYA, CILIOPHORA) ISOLATED FORM AN ARTIFICIAL POND IN VAN, TÜRKIYE

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## ABSTRACT

The *Paramecium bursaria*, material of the present study, was isolated from an artificial pond in Van Yüzüncü Yıl University campus. Water samples taken from the pool in glass jars by siphoning method were brought to the laboratory and examined by direct or enriched cultures. The examinations were first performed on living cells, and then by applying various silver staining techniques. Measuring and counting of various morphological characters were made from cells both live and silver stained. The obtained numerical data were evaluated statistically and the results were summarized in table. During the morphological examinations, images of cells suitable for the purpose were taken. *P. bursaria* in live is 70-100 × 40-60 µm in size. When viewed from the dorsal and ventral side of the cell, the anterior end is in the form of a truncated footprint. The cell is flattened dorso-ventrally in a ratio of 2:1. Living cells have a green appearance due to the dense symbiotic chlorella they contain in their cytoplasm. Oral aparey is located on the equatorial plane on the ventral surface. It has a pair of contractile vacuoles in a channeled structure located in the anterior and posterior halves of the cell. Contractile vacuoles open outward with an excretory pore. The macronucleus is oval or kidney-shaped with an average size of 25 × 15 µm. It is usually located in the middle of the cell, rarely closer to the anterior half. The micronicleus is approximately 10 × 6 µm in size, elliptical or oval in shape, and is located very close to the macronucleus, usually within its an indentation. On the ventral surface, the kinetics anterior and posterior to the oral opening meet to form the peroral and postoral suture. Some somatic kineties directed to the right and left sides of the oral opening differentiate around the oral opening to form vestibular kineties. The oral ciliate consists of vestibular kineties surrounding the oral opening and four adoral kineties (quadrulus) extending into the oral opening. Each of the quadrulus consists of 4 rows of kinetosomes and reaches to the cytostome. *P. bursaria*, which is the subject of this study, is compatible with the literature data in terms of morphological characters. However, this is the first detailed morphological study on *P. bursaria* in Türkiye. Molecular phylogenetic studies based on the SSU rDNA gene sequence for *P. bursaria* are ongoing.

**Keywords**: Paramecium bursaria, Morfoloji, Van, Türkiye

# BIODIVERSITY OF NATURAL GRASSLANDS IN THE SÉTIF REGION

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## ABSTRACT

Grasslands are open and continuous, fairly flat areas of grass composed mainly of Poaceae and Fabaceae, generally located in wetlands. They are used to feed livestock, particularly cattle. In this study we will focus on two grasslands that are located in the north of Sétif. The first one is located in the commune of Amoucha and the second one in the commune of Ain Abassa. A floristic inventory and an attempt to establish a typology on this basis are the objectives of this work. the floristic inventory is carried out using the random method; the taxa identification is based on the Algerian floras (Quezel and Santa, 1962) and eflores (Telabotanica). Our study showed that both grasslands are dense, very homogeneous and 100% covered. Poaceae dominate with 28%, followed by Fabaceae with 21%. The typology study shows that the first grassland is Poaceae Grassland (*Festuca sp*., *Phleum sp*., *Bromus squarosus*) and the second one is grassland with great variety (*Onanthe fistulosa*, *Dactylorhiza elata*, *Trifolium repens*).

**Keywords**: Biodiversity, Natural grasslands, Setif, Poacaea, Fabaceae, Typology

# COMPREHENSIVE SURVEY ON THE GENETIC DIVERSITY OF GENUS CROCUS (IRIDACEAE) IN BULGARIA USING DNA BARCODING APPROACH

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## ABSTRACT

The genus *Crocus* L. (Iridaceae) includes over 230 species and is among the most taxonomically intriguing genera of monocots (Lilianae sensu Chase & Reveal). The reasons for this are different: the huge intra-population and intra-species variability; morphological differences between the taxa that are usually more difficult to notice at first glance; the lack of clear boundaries between taxa due to hybridization etc. The incorporation of molecular methods to classical morphometric parameters has recently led to the discovery and description of many new species in the genus. These new trends also apply to the flora of Bulgaria, where the number of established taxa has increased by more than 50% in the last decade. The present study is part of the first author's dissertation aimed at exploring the genetic diversity within the genus *Crocus* in Bulgaria using DNA barcoding method. The currently known 14 species from sections *Nudiscapus* (series *Biflori*, *Flavi*, *Reticulati*, *Speciosi*) and *Crocus* (series *Crocus* and *Verni*) from a total of 39 populations (190 specimens), collected in different floristic regions in Bulgaria, were studied. The plant material was collected during terrain work in the period 2019-2021. DNA barcoding analysis was performed based on chloroplast loci ribulose **1**5-biphosphate carboxylase (rbcL), psbA-trnH intergenic spacer (trnH-psbA), maturase K (matK) and the ITS2 region of ribosomal DNA. Our study showed that multi-marker DNA barcoding approach is highly recommended to comprehensively evaluate the genetic divergence within the genus *Crocus*. Here, DNA barcoding clusters correspond well with the known series of closely related species of the two sections of the genus *Crocus*. Meanwhile, population genetic differentiation at within-species level was also observed. This finding implies that the taxonomic richness of the genus in Bulgaria is much greater than believed, not sufficiently explored and taxa new to the country or to science will be soon reported.

**Keywords**: Nudiscapus, Crocus, rbcL, matK, trnH-psbA, ITS, taxonomic richness

# PLANT BIODIVERSITY OF THE SANDY ECOSYSTEMS IN THE SAHARA DESERT

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## ABSTRACT

This study aims to investigate the diversity of plant species in the sandy ecosystems in the Sahara Desert of Algeria. For this purpose, we selected four representative stations of different geomorphological forms (desert pavement, wadis, depressions, and rocky lands) using a sampling method, and in each station, we conducted 05 floristic surveys. The results allowed us to identify 17 plant species belonging to 13 families. The recorded species' frequency varies from station to station, with high occurrences of Retama raetam and Zilla macroptera. The most represented families are Asteraceae, Brassicaceae, Fabaceae, and Chenopodiaceae. The most common biological type is chamaephytes (58.82%), and the biogeographic elements with the highest values are the Saharo-Arabian element (35.29%) and the endemic element (29.35%). These findings indicate that the Algerian northern Sahara plant species are well adapted to the conditions of the Saharan environment. Furthermore, understanding the development conditions of psammophytes in arid environments can provide valuable basic data for combating sand encroachment.

**Keywords**: Biodiversity, Sandy ecosystems, Arid environment, Psammophytes, Sahara Desert, Algeria

# BIODIVERSITY, BIOINDICATION AND ECOLOGY OF EPIPHYTIC LICHENS ON CORK OAK IN THE FILFILA FOREST MASSIF (NORTHEASTERN ALGERIA)

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## ABSTRACT

Lichen communities were studied in deciduous oak forests across Filfila (Skikda region, northeastern of Algeria) to find out the lichen species richness, make an idea about their ecology, relative distribution and actual statute. All lichen species were collected of mainly all *Quercus suber* L. trunks from their base up to the highest canopy twigs. Identification of taxa is based on stereo-microscopic examinations and usual chemical tests (K, C, P, I and KC). Results reveal important lichen diversity with 64 species belonging to 17 lichenological families. The most represented groups is the crustose and foliose growth form (about 85%) where as fruticose and gelatinous were represented by 9 and 7 species, respectively. Within each group, various taxa known for their high sensitivity to certain toxic air compounds (essentially SO2 and some NOx) have been inventoried (mainly fruticose and foliose). Such taxa qualified as bioindicators reflect a buffer capacity of these forest ecosystems to physical changes of the environment and some stability of their functioning without concealing artificialisation and simplification of the forest environment in response to various activities carried out by rural people and their livestock.

**Keywords**: Cork oak forests - lichens - Bioindication – Filfila - Algeria

# INTESTINAL PARASITE SURVEY OF DIPTURUS FROM ALGERIAN BASIN

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## ABSTRACT

The present study is part of the ichyological and parasitical inventory of Elasmobranchs and their Cestoda from the Algerian basin which is a large part of the south west Mediterranean Sea. We here describe two species of intestinal parasites of the Order of Rhinebothriidea Healy, Caira, Jensen, Webster & Littlewood, 2009 *and* belong to the family of Echeneibothriidae de Beauchamps, 1905 from *Dipturus oxyrinchus* (Linnaeus, 1758): *Echeneibothrium dubium* Van Beneden, 1858 and *Echeneibothrium* demeusiae Euzet, 1959. For the first time, this survey allowed us to find out *Echeneibothrium demeusiae* a species non collected after its original description in the Mediterranean basin. Among the morphological characters of this cestoda, it has eighteen loculus in each bothridium, an H shape ovary and a typical undulate long vagina. By this collect and identification we validate this species.

**Keywords**: Cestoda, Echeneibothrium, Echeneibothrium deumeusiae, Dipturus oxirynchus, Intestine, Algeria, Mediterranean sea

# DIVERSITY OF BENTHIC MACROMOLLUSCAN COMMUNITIES ON THE ROCKY SHORES OF EASTERN KARABURUNI PENINSULA, VLORE, ALBANIA

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## ABSTRACT

Variations in species richness within ecosystems are influenced by natural processes and can be further affected by both natural and human activities. Our research focuses on the Karaburuni Peninsula, situated in the southern part of the Albanian coast. This peninsula features a diverse rocky coastline interspersed with small pebble beaches and gulfs, such as the gulf of Raguzë, Shën Vasil, and Shën Jan. The outer region of the peninsula is encompassed within the Karaburun Sazani Marine Protected Area. For our study, we specifically investigate the eastern part of the Karaburuni peninsula, which was divided into three study stations: Raguzë, Shën Vasil, and Shën Jan. These stations comprise rocky coasts that serve as our primary areas of interest for the research. The main objective of this research was to investigate these variations. The study focused on rocky intertidal mollusks and aimed to achieve three specific goals: 1) to determine the species richness of these mollusks; 2) to track their geographical distribution at the State level; and 3) to understand how species richness changes in response to annual rainfall cycles. To accomplish these objectives, data were collected at different time points throughout two seasons: May, July and October of 2020. The sampling area comprised three transects for each site, and within each transect, three samples were taken. The sampling area was delimited using a PVC rectangle frame measuring 50 x 50 cm per side. During the sampling process, all mollusks present within these designated units were meticulously collected, identified, and counted. The analysis of species distribution in the study was based on different sites seasonal species richness and biodiversity composition. Overall, the research identified 45 mollusk species between 1396 individuals. Their richness was found to be associated with factors such as substrate stability, wave intensity at each site, and trophic level. Among the mollusk classes, Gastropods exhibited the highest species richness. When examining the sites distribution, the researchers ob served a consistent pattern of species richness in areas with marine vegetation. The dominance of gastropods in species composition and density could be attributed to their broad food range, which includes carnivorous, necrophagous, phytophagous, and detriphagous species. Notably, certain species like *Phorcus sp* and *Patella rustica* contributed to the high ecological value and thus, the dominance of these species across all stations. Surprisingly, the overall species richness in the rocky intertidal zone was significantly increased by aquaculture activities in the Ragusa area. However, upon closer analysis, the malacofauna exhibited changes in species richness influenced by the constant expansion of marine barens and the retreat of marine forests of Cystoseira sensu lato. These changes in habitat appear to have a direct impact on the diversity of mollusk species in the region.

**Keywords**: Karaburun peninsula, makrozoobenthos, gastropod, malacofauna, Bivalvia, Vlora Bay

# BIODIVERSITY AND TROPHIC STRUCTURE OF INVERTEBRATE ASSEMBLAGES ASSOCIATED WITH RED ALGAE TITANODERMA TROCHANTER AND ELLISOLANDIA ELONGATA BEDS

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## ABSTRACT

The modern biodiversity crisis, referred to as the "seventh extinction," sets itself apart from previous mass extinctions due to its primary cause - human activities. Human actions, such as deforestation, pollution, overexploitation, and climate change, are central factors driving this crisis, with marine ecosystems bearing the brunt of the consequences. Despite the importance of marine species and ecosystems, the conservation efforts of organizations like the IUCN Red List often tend to prioritize terrestrial species, possibly due to the dominance of terrestrial-focused groups within these organizations. Addressing the neglect of marine species' conservation needs is crucial. Ensuring comprehensive protection for both terrestrial and marine ecosystems is vital, as both play essential roles in maintaining global biodiversity and ecological balance. Bridging the gap between terrestrial and marine conservation efforts requires increased awareness, international cooperation, and more inclusive policies to effectively combat the ongoing biodiversity crisis. This research aims to evaluate the importance of biodiversity, shelter, and reproduction habitats of two significant species of bioconstructors in the marine intertidal area. The study focuses on two red algae species, Titanoderma trochanter and Ellisolandia elongata, which are included in Annex II ('endangered and threatened species') of the Barcelona Convention's Mediterranean Action Plan by the United Nations. These calcareous rhodophytes' structures enhance substrate complexity, support diverse assemblages, and play a crucial role in CO2 sequestration. Additionally, they host many endemic species of the Mediterranean Sea, making their evident structures rare in the Basin. The research examines the associated fauna of these two calcareous rhodophytes through sampling in 20 x 20 cm squares in four areas of the Karaburuni peninsula, within the Karaburun Sazani Marine Protected Area. The sampling was conducted during March, April, September, and October of 2021 and 2022. In the spring season, a total of 67 invertebrate species were identified among 126 sampled invertebrates in Ellisolandia elongata. On the other hand, Titanoderma trochanter revealed 59 identified species out of 136 sampled invertebrates. During the autumn season, a total of 75 invertebrate species were identified in Ellisolandia elongata, while Titanoderma trochanter hosted 72 species. Both species showed a dominance of the phylum Polychaeta, especially in Ellisolandia elongata, which had the highest number of families present. The researchers conducted spatiotemporal and comparative analyses to determine the diversity of the associated fauna of these two calcareous rhodophytes.

**Keywords**: Ellisolandia elongata, Titanoderma trochanter, macrozoobenthos, marine invertebrates, polychaeta, Karaburuni peninsula

# ALIEN PLANT SPECIES THREATENING THE MEDITERRANEAN ECOSYSTEMS: RISK AND INVASIVE POTENTIAL IN ÇANAKKALE PROVINCE

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## ABSTRACT

Alien species (AS) are the species that has been transported or grown outside of its biogeography/native area. Ornamental horticulture is an important pathway for alien plant introductions to a new area that can be invaded by AS. Regions with Mediterranean type climates are prone to plant invasions despite their high biodiversity. The Çanakkale Province and vicinity where is in northwest of Türkiye, have fragile and sensitive ecosystems between Mediterranean and Europe thorough Balkans as a passage. Cities are under threat of alien species invasions with socioeconomic damages while they are threatening natural habitats with being host of alien ornamental species. *Robinia pseudoacacia* ve *Ailanthus altissima* which have long history in Türkiye that were introduced for railway and greenbelt afforestation have become invasive cities itself, historical places and natural habitats. Our surveys in city of Çanakkale showed that *R. pseudoacacia* has wider distribution from *A. altissima* because it has extensively (especially, recently *R. pseudoacacia* 'Umbraculifera') used as ornamental tree public and private areas in landscape of town. *R.pseudoacacia* was recorded vastly along streets and creeks, and gardens while *A. altissima* from waste areas, bridges, and many other places such as walls. In addition, trees such as *Melia azedarach*, *Catalpa bignonoides*, *Gleditsia triacanthos* and herbs such as *Drosanthemum floribundum*, *Carpobrotus edulis*, *Agave americana* that are considered as invasive in Mediterranean region have been planted in the city as well. Municipalities and citizens should be trained and made aware on invasive alien plants (IAP) to avoid hazard of IAP.

**Keywords**: Afforastation, Ornamental plants, R.pseudoacacia, A. altissima, C. edulis

# CONTRIBUTION TO THE STUDY OF STRPTOMYCES IN THE ALGERIAN MARINE ENVIRONEMENT: TAXONOMY AND ANTIBACTERIAL ACTIVITY AGAINTS STAPHYLOCOCCUS AUREUS

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## ABSTRACT

A total of 47 isolates of the genus *Streptomyces* were collected. The taxonomic study of isolated *Streptomyces* was carried out based on macro and micro-morphological characters. The results made it possible to link the isolates to 5 groups of *Streptomyces*, the majority of which belong to the *Spira* type (23 isolates) and *Rectus Flexibilis* (16 isolates). The screening of the antibacterial activity of the 47 strains was carried out against 8 strains of *Staphylococcus aureus*, 33 isolates were found to be active with inhibition diameters between 15 and 65 mm. Furthermore, 7 strains possess antagonistic activity against all the strains of *S. aureus* tested. An isolate presenting very strong activity, designated MBS5, was selected for a more in-depth taxonomic study based on the sequencing of the gene coding for 16S rRNA which showed that the MBS5 strain is a new species of *Streptomyces*

**Keywords**: Streptomyces, Algerian coast, Taxonomy, antibacterial activity, Staphylococcus aureus

# IN VITRO, MOLECULAR DOCKING AND TOXICITY PREDICTION OF PINE RESIN EXTRACT

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## ABSTRACT

The aim of this study was to evaluate the *in vitro* and *in silico* antibacterial activity of an oleoresin of Pine used in the Algerian traditional phytotherapy. The antibacterial effect of the oleoresin was evaluated by the agar diffusion test against three bacterial strains; *E. coli* (ATCC 25922), *S. aureus* (ATCC 25923) and *P. aeuroginosa* (ATCC 27853). The *in silico* antibacterial study was performed against the bacterial enzyme TyrRS via AutoDock Tools 1.5.7 software using the main compounds of the resin extract and the toxicity was evaluated via Molinspiration Cheminformatics and SwissADME online tools. Both of the resins acted on *E. coli* and *S. aureus* with inhibition diameters of 17 mm at 200mg/ml. However, *P. aeuroginosa* was completely resistant. All the molecules integrate at the active site of the enzyme but with different scoring. The Dehydroabietic acid has the best binding energy (-10.06 kcal/mol) which is much higher than that of gentamicin (-5.59 kcal/mol). The vanillin is the most weakly integrated with -4.48 kcal/mol. The prediction of toxicity indicated that vanillin, limonene and 4-allylanisole can be individually toxic with mutagenic, tumorigenic and irritant effects. It is concluded that the compounds of the resin act on different targets and not only on the TyrRS and probably synergistically not individually.

**Keywords**: Pine resin, TyrRS , molecular docking, ADMET prediction

# IMMUNOEXPRESSION OF THYROID HORMONE RECEPTORS IN LINYAN JIRD'S (MERIONES LIBYCUS) TESTIS DURING GROWING

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## ABSTRACT

It is now evident that thyroid hormone (TH) plays an important role in the growth and metabolism of individuals. Numerous data show that thyroid hormones affect steroidogenesis and spermatogenesis. Sertoli cells are the units of functional seminiferous tubules that control germ cell development, maturation, and division. The role of triiodothyronine (T3) in supporting the control of cell proliferation and functional maturation is well recognized, as is its role in postnatal Leydig cell differentiation and steroidogenesis. The aim of our work was to detect thyroid receptors (TRs) alpha-1 by immunohistochemistry in male desert rodent the Libyan jird (Meriones libycus) testis during growth. The results show an intense staining of the cytoplasm and Sertoli cells nuclei around the seminiferous tubules during the first three months of animal's life according to the stage of cell proliferation. However, this coloration is less important and is absent even in prepubertal and adults; this suggests that thyroid hormones play a role in sexual maturation in male Libyan jird.

**Keywords**: Thyroid hormones (THs) receptors- Sertoli cells- growth- Desert rodents

# CHEMICAL COMPOSITION AND INSECTICIDAL POTENTIAL OF ESSENTIAL OILS FROM TWO MENTHA SPECIES AGAINST THE MAJOR STORED PRODUCT PEST, SITOPHILUS ORYZAE (COLEOPTERA: CURCULIONIDAE)

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## ABSTRACT

The genus Mentha comprises plants that are widely distributed across the globe and have been historically recognized for their aromatic and medicinal properties in traditional medicine. This study aims to investigate the chemical composition of essential oils from two Mentha species, namely Mentha longifolia and Mentha x piperita, obtained from the southern region of Morocco. Additionally, the insecticidal activity of these essential oils, as well as the main compound, pulegone, was evaluated using fumigant and topical application bioassays against adults of Sitophilus oryzae. The GC-MS analysis revealed that pulegone and Linalool were the dominant compounds, constituting 56.39% and 56.57%, respectively, in M. longifolia and M. x piperita. M. longifolia demonstrated the highest toxicity in both fumigant and contact bioassays, achieving 100% mortality at a concentration of 60 µL/L of air and 0.01 µl/insect, respectively, after 72 hours. M. x piperita also exhibited toxicity after 72 hours of fumigant exposure, with a mortality rate of 90% at 60 µL/L of air. However, in the contact toxicity bioassay, the highest mortality rate recorded for was 58% at a concentration of 0.012 µl/insect after 72h. Furthermore, pulegone demonstrated significant toxicity, particularly through fumigation, with a mortality rate of 100% at the lowest concentration tested (30 µL/L of air) after 48 hours. An impressive 90% mortality rate was observed at a concentration of 0.08 µL/insect after 72 hours. The LC50 values were calculated for all substances tested in both Fumigant and Topical application assays. In the fumigant toxicity test, the initial LC50 values after 24h were 50.9 µL/L of air for M. longifolia, 86.7 µL/L of air for M. x piperita, and 19.5 µL/L of air for pulegone. These values showed a significant decrease over time, reaching 17.02, 28.5, and 7.6 µL/L of air after 72h . For the Topical application toxicity test, the initial LC50 values after 24 hours were 0.071 µL/insect for M. longifolia, 0.137 µL/insect for M. x piperita, and 0.074 µL/insect for pulegone. Similar to the fumigant results, these values decreased significantly after 72 hours to 0.046, 0.112, and 0.038 µL/insect respectively. In summary, this study provides valuable insights into the chemical composition and insecticidal properties of x Mentha longifolia and Mentha piperita eo, highlighting their potential as natural alternatives for insect pest control, with pulegone being a prominent contributor to the observed insecticidal activity.

**Keywords**: Mentha, Sitophilus oryzae, Pulegone, Topical application, Fumigation

# CHEMICAL AND ANTIMICROBIAL PROFILS OF THE ESSENTIAL OIL OF FOENICULUM VULGARE MILL.

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## ABSTRACT

The surface area and the geographical position of Algeria, made that this country contains a remarkable and important natural heritage at the same time, rich in flora and fauna also. The diversity of the Algerian flora in aromatic and medicinal plants constitutes a significant base of bioactive molecules known by their traditional therapeutic effects. With the aim of developing and exploiting this resource, we have chosen the fennel "*Foeniculum vulgare* Mill", an aromatic, medicinal and culinary plant of the Apiaceae family. The aim of this work is to evaluate the essential oil obtained from fennel seeds, through its physicochemical characterisation and a study of its antimicrobial power. The results obtained showed that the hydrodistillation of the seeds by the Cleavenger method provided a yield of 2.45% in essential oil. Furthermore, the chemical analysis of this essential oil by C.G/M.S. revealed the presence of trans-anethole as the major compound. The antimicrobial activity of this essential oil was evaluated "in vitro" using the direct diffusion technique on agar, against the following microbial strains *Pseudomonas aerogenosae, Escherichia coli, Staphylococcus aureus, Bacillus subtilis, Candida albicans* and *Saccaromyces cerevisiae*. Similarly, Gram+ bacteria and yeast were more sensitive than Gram- bacteria. In the light of the results obtained, we concluded that the essential oil of fennel seeds has an important antimicrobial power, due to the presence of trans-anethole. Indeed, it can constitute an important source of natural antimicrobial agents.

**Keywords**: Foeniculum vulgare Mill., Essential oil, Antimicrobial activity, CG/MS, Trans-anethole

# IMPACT OF ORGANIC EXTRACTS OF THE LEAVS OF THYMUS VULGARIS L. ON THE LARVAL DEVLEPMENT OF TUTA ABSOLUTA MEYRICK

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## ABSTRACT

In Algeria, the tomato occupies a privileged place in the market gardening sector, in spite of that it is subject to various attacks of bio aggressors, of which the tomato leafminer Tuta absoluta (Lepidoptera), a harmful insect of an invasive character, the consequence of which is the annihilation of the whole productions of tomato, as well under greenhouse as in open field. The aim of this study is to reduce the arbitrary use of chemical insecticides, as well as the development of a biological control strategy against this key pest. The present work aims at evaluating the larvicidal potential of ethyl acetate extract and petroleum ether extract obtained using Soxhlet from the leaves of Thymus vulgaris on the mortality of T. absoluta larvae tested in vitro over a period of 24, 48 and 72 h at increasing doses ranging from 2.5 - 5 and 10 mg/mL. The estimation of the impact of ethyl acetate and petroleum ether extracts on T. absoluta larvae, allowed us to record a very good mortality ranging from 83 to 100% at doses 2.5 - 5 and 10 mg/mL, and this after 24 and 48 h of exposure only for the four larval stages, with low LD50 and TL50. However, these bioassays are still more effective than the two chemical insecticides (Coragen® and Voliam Targo®) tested. After exposing T. absoluta larvae at different developmental stages to organic extracts at increasing doses, we found that the dose of the tested extract, the nature of the extraction solvent as well as the exposure time are directly related to the mortality rate. The higher the dose, the more effective the extract; thus, the longer the exposure time, the more effective the treatment.

**Keywords**: Thymus vulgaris L., Tuta absoluta Meyrick, Larval Developpment, Organic Extracts, DL50, TL50

# COMPREHENSIVE BIOINFORMATICS ANALYSIS OF POLYGALACTURONASE-INHIBITING PROTEIN1(PGIP1) IN VARIOUS BRASSICALES SPECIES

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## ABSTRACT

Polygalacturonase inhibiting protein1 (PGIP1) is an important plant defense protein with a unique protein structure that allows it to specifically inhibit polygalacturonase enzymes produced by pathogens. Its role in plant defense makes it a promising target for the development of new strategies for crop protection against pathogens. PGIP1 is a small, globular protein with a three-dimensional structure that is composed of a central β-sheet flanked by α-helices. The protein contains ten β-strands that are stabilized by hydrogen bonding and hydrophobic interactions, as well as disulfide bonds that help to stabilize the structure. The active site of PGIP**1** where it binds to polygalacturonase enzymes and inhibits their activity, consists of a conserved patch of amino acids that interacts with the enzyme's substrate-binding site. In current study, the PGIP1 protein reference sequences (RefSeq) of some plant species of Brassicales order (including *Arabidopsis thaliana, Brassica oleracea, Chorispora bungeana* and *Raphanus sativus*) were downloaded from the National Center for Biotechnology Information (NCBI). The tertiary structure prediction and visualization of PGIP1 in *Arabidopsis thaliana* as a sample of plants was performed with the Protein Homology/analogy Recognition Engine V2.0 (PHYRE2) server. The 3D model of PGIP protein was created using the "d1ogga" model (PDB Accession Code: 1ogg) which shared 100% confidence, 93% coverage and 46% identify. The presence and location of signal peptide cleavage sites in PGIP1 sequences were predicted by the SignalP 5.0 server. TMHMM (http://www.cbs.dtu.dk/services/TMHMM-2.0/) was used to identify transmembrane helices. The obtained data of the bioinformatics analysis indicated that PGIP1 is a secretory protein, and the positions of the secretory proteins of each sample from representative plants were predicted by SignalP analysis. In this research, proteomics analyses of Brassicales PGIP1 showed similarities between this protein in different plant species of this order and the obtained data provide a background for bioinformatics studies on the function of this protein in other plants and organisms.

**Keywords**: Brassicales, Polygalacturonase-inhibiting protein1(PGIP1), Structural Analysis Tertiary structure

# ISOLATION AND IDENTIFICATION OF POTENTIAL PROBIOTIC LACTIC ACID BACTERIA FROM GOAT MILK

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## ABSTRACT

The selection of lactic acid bacteria strains for their industrial applications or potential probiotic properties has gained momentum in many countries. Our study focused on lactic acid bacteria isolated from goat milk. During this work, 20 strains of lactic acid bacteria were isolated from goat milk (10 strains on MRS agar and 10 strains on M17 agar), purified, and pre-identified using classical microbiology techniques (macroscopic and microscopic examination, physiological and biochemical tests). The results revealed that the 10 strains cultured on MRS agar belong to the *Pediococcus* genus, while those on M17 agar belong to *Streptococcus thermophilus*. The 20 strains were subjected to tests evaluating their probiotic potential (tolerance to acidity and bile salts, antibiotic resistance), antimicrobial activity, and bacteriocin production using the diffusion method. The study of the probiotic profile showed the strains' ability to withstand the biological barriers of the digestive tract, and most of the *Pediococcus* and *Streptococcus thermophilus* strains were sensitive to the range of antibiotics tested, except for *Streptococcus thermophilus*, which showed resistance to Amikacin. The results of antimicrobial activity revealed that 10 strains of Pediococcus and 9 strains of Streptococcus thermophilus produced inhibitory substances in the culture medium, capable of inhibiting the growth of Staphylococcus aureus, Bacillus spizizenii, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Klebsiella pneumoiae*, with varying inhibition zones. The search for bacteriocins yielded negative results for all the strains studied. Goat milk is rich in lactic acid bacteria that show good probiotic potential.

**Keywords**: lactic acid bacteria, probiotics, classical microbiology, antimicrobial activity, bacteriocins, bile salts

# PHYTOCHEMICAL SCREENING AND EVALUATION OF ANTIMICROBIAL ACTIVITY OF POLYPHENOLS EXTRACTED FROM CALENDULA OFFICINALIS LEAVES.

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## ABSTRACT

The traditional medicine remains very wide-spread in developing countries and its use is increasing in developed countries. In order to valorize a medicinal plant cultivated in the eastern region of Algiers, we were interested in the identification of phenolic compounds as well as in the evaluation of antimicrobial activities characteristic of *Calendula officinalis* leaves. Phytochemical tests carried out on different extracts as well as on the plant powder revealed the richness of the leaves in secondary metabolites at different levels, represented mainly by saponins and flavonoids. The polyphenol yield of the methanolic extract of *C. officinalis* is relatively average with a rate of around 21%. The antimicrobial activity of this extract was evaluated by the disc method on several microbial strains. The microorganisms chosen are Gram+ bacteria such as: *Bacilus subtilis* and *Staphylococcus aureus*, and Gram- bacteria, namely: *Echerichia coli* and *Pseudomonas aeruginosa*; as well as on a yeast (*Candida albicans*). The results of the antimicrobial activity of C. officinalis demonstrate moderate effectiveness against Gram+ bacteria, they are sensitive and have remarkable zones of inhibition. Gram- bacteria show low sensitivity to the extract tested. As for the yeast tested, the extract of the polyphenols recorded minimal antimicrobial activity.

**Keywords**: Calendula officinalis, Phytochemical screening, microbial strains, antimicrobial activity

# FUNGAL INVERTASE FROM PENICILLIUM LILACINUM

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## ABSTRACT

Now a days a large number of researchers are working on living systems, which could be used in harsh industrial conditions. The present work shows improved production, partial purification and some characterization of Beta-D-fructofuranosidase (Invertase) from *Penicillium lilacinum*. Various agricultural-based wastes were investigated to be used as energy source. The maximum enzyme (invertase activity; 13.05 Unit mL-1) was observed when date syrup and yeast extract were added to the growth medium as carbon and nitrogen source respectively. The growth medium was incubated for 96 h at 40º C and pH 8.0. The crude enzyme was also purified (7 folds than crude) and characterized. Molecular mass (65 kDa) was determined by 10 % SDS-PAGE. Kinetic Parameters (Vmax 178.6 U/mL/min and Km 2.76 mM) were also calculated. Maximum activity of partial purified enzyme was noted (Temperature, 55 ºC and pH of 5.5).

**Keywords**: Commercial enzyme, Industrial enzyme, Invertase, Penicillium lilacinum, Submerged fermentation

# PRODUCING NEXT-GENERATION PESTICIDES AGAINST PINE PROCESSIONARY MOTH

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## ABSTRACT

Insects represent the most crowded animal groups on Earth. Although mammals have approximately 5000 species, insects have more than 1.4 million species. Accordingly, they have very vital roles in ecology and agriculture. Despite this, they can also be act as pests. Tremendous benefits have been derived from using pesticides in forestry, public health, and agriculture. However, they have profound health implications for man and the environment. Insect neuropeptides have been suggested as ideal candidates, which do not affect humans, but their disadvantage is their low bioavailability and high cost of using them as a pesticide. So, designing an agonist for their receptors, which are G-protein-coupled-receptors (GPCRs), is an alternative to using the peptide. Allatostatin neuropeptides are inhibitors of juvenile hormone in insects that regulates metamorphosis, food intake, and many other essential physiological functions. AstRs are GPCRs, found in the cell membrane and activated after binding their ligands, resulting in the expression of related genes and finally responding to this stimulus. The targeted insect species is the pine processionary moth (Thaumetapoea pityocampa), which feeds from the leaves of pine trees and damages pine forests mainly in south Europe/South Africa/Mediterranean Countries. It is allergic to mammals due to its urticating hairs. Using whole-genomesequencing we identified the sequence of the receptor and the ligand. To determine the orthosteric pockets of the receptor we performed ligand docking/molecular dynamic/simulation studies by screening small libraries (ChemDiv). We identified 4 molecules that bind to the receptor. Further verification was done by site-directed mutagenesis. We performed in vitro assays by TGFα shedding assay (EC50 EC50 4.6μM, 2.12 μM, 6.7 μM, 34 μM). In vivo studies were done by feeding the insects with pine tree leaves, which are applied with different concentrations of the designed agonist (LC 50 443.646 mg/L). The current study discovered novel AlstR-C targeted specific hit agonists with no harmful effects on other insects. Our study is an important initial advance toward an insect GPCR-targeted next-generation pesticide design. In addition, our approach may apply to other invertebrate GPCRs involved in vital metabolic pathways.

**Keywords**: Molecular Biology and Genetics, Ab-initio Molecular Dynamics, Bioinformatics, Biopesticide, Juvenile hormone

# ASSISTED EXTRACTION OPTIMIZATION OF BIOACTIVE COMPOUNDS FROM CUCURBITA MAXIMA BY-PRODUCTS USING RSM DESIGN

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## ABSTRACT

*Pumpkin* is ranked among the most consumed foods in the world. Actually, the world consumption of pumpkins and squash represents 602 kilos per second, with a world production of 26 million tons per year. Usually, only the flesh of this fruit is consumed, which induces a massive amount of unused biomass. The valorisation of its by-products would be interesting in the circular economy in food industries. In this context, this work aimed to optimize the extraction conditions of bioactive compounds obtained from three squash (*Cucurbita maxima* Duch. of 'Batati' genotype) by-products (peel, endocarp, and seeds) using the response surface methodology (RSM). The selected independent variables were ethanol concentration, extraction time, and extraction temperature. Squash by-products' bioactive molecules were extracted according to the matrix proposed by the experimental plan. Significant variability in total phenolic compound content (TPC) and antioxidant activity, depending on the extraction time, the solvent concentration, and the extraction temperature, was recorded for the tested by-products. The experimental results adequately fitted with second-order polynomial models and showed significant linear, quadratic, and interaction effects of the independent variables. Data analysis suggested that the optimal extraction conditions were 12.2% ethanol for 11.2 min at 55°C for peels; 28.5% ethanol for 10.5 min at 37 C for endocarp; and 20% ethanol for 10.5 min at 60°C for seeds. The results obtained showed that the experimental and predicted values of TPC and antioxidant activities as an indicator of a successful extraction fit with each other, thus indicating the optimal extraction conditions. Under these conditions, the obtained extracts exhibited high, although variable, TPC with epicatechin and epigallocatechin as major compounds, as well significant antimicrobial potency, which reached 100% and 80% inhibition of the tested bacteria and fungi.

**Funding:** European project PRIMA, Acronym: PulpIng

**Keywords:** *Cucurbita maxima*; by-products; response surface methodology; antioxidant activity; antimicrobial capacity, flavonoids

# AROMA VOLATILE COMPOUNDS PROFILE OF THE TUNISIAN PITTOSPORUM TOBIRA(THUNB.) AIT.

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## ABSTRACT

*Pittosporum tobira* (Thunb.) Aiton is an aromatic medicinal plant widely cultivated in the world as an ornamental species. It has also been extensively investigated for potential use in fighting disease because the richness of its organs on bioactive compounds. The aim of this work is to identify the volatile organic compounds of roots, young and old leaves and stems, and flowers using headspace method (HS-SPME) and gas chromatography coupled with mass spectrometry (GC/MS) techniques, in order to valorize its volatile aroma in Tunisian industry. A total of 58 extracted volatile compounds emanating from *P. tobira* organs, representing 92.8–99.8% of the total composition, were identified. They belonged to nine chemical groups that included 7 monoterpene hydrocarbons, 19 sesquiterpene hydrocarbons, 4 oxygenated monoterpenes, 1oxygenated sesquiterpene, 17 alkanes, 5 aldehydes, 3 alcohols, 1 ester, and 1organonitrogene compounds. Their composition differed according to the organ type in the relative abundance of the volatiles compounds. Ten major volatiles compounds dominated the head space powerds; n-undecane, α-cubebene, n-nonane, myrcène, α-pinene, α-copaene, β-cubebene, β-maaliene, α-gurjunene, β-gurjunene and α-himachalene. N-undecane appears to be the major compound in the old stems (32.6%), the young stems (35.6%), the old leaves (71.4%) and the young leaves (40.9%), and it is the second main compound in the roots (13.4%) and in the flowers (25.6%). However, the main compounds in the two latest organs are α-gurjunene (14.2%) and n-nonane (27.1%), respectively.

**Keywords**: Pittosporum tobira; Aroma compounds; N-undecane; N-nonane; α-cubebene

# PHYSICOCHEMICAL EVOLUTION OF BLUEBERRIES DURING EXTENDED FROZEN STORAGE AT -20°C: IMPLICATIONS FOR SHELF LIFE AND QUALITY PRESERVATION

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## ABSTRACT

Blueberry (*Vaccinium* spp.*),* is well-known for its high antioxidant capacity and exceptional richness in vitamins, fibers, and polyphenols. It possesses various health benefits such as anti-diabetic, anti-cardiovascular, and anti-carcinogenic properties due to its bioactive compounds including flavonoids, tannins, and phenolic acids. However, their slight production period, and short shelf-life, generate a huge quantity of post-harvest losses. In this context, a set of post-harvest treatments are necessary, including storage, freezing, lyophilization, and irradiation methods, with the aim of extending the shelf life of blueberries and promoting their consumption throughout the year. In this regard, this work aims to evaluate the evolution of the physicochemical quality of blueberries stored at -20°C for three months of storage. The results showed that frozen storage for 1 month significantly preserved the biochemical quality of blueberries. However, during the second month of storage, fruit quality improved, with stable levels of anthocyanins and further decreases in pH, Brix, and maturity index. In this context, it is recommended to store blueberries at -20°C for a maximum of two months for consumption in a fresh state. On the other hand, blueberries stored for more than three months must be intended for processed blueberry-based products for their acidic taste and their low weight.

**Keywords**: Vaccinium spp., Storage, -20oC, Physicochemical quality, Shelf-life extension, quality preservation.

# CRISPR/CAS9-BASED GENOME EDITING STRATEGIES IN HONEY BEES

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## ABSTRACT

Honey bees (*Apis mellifera*) are scientifically important model organisms in terms of haplodiploid sex system, social order in the hive, learning and memory studies, as well as pollinating a large part of flowering plants to ensure the continuity of both industrial agriculture and wild flora. Continuously developing molecular genetic methods and technologies are applied in the examination of honey bee behavior, determination of breeds and subspecies and disease and pest control giving successful results. Recently, studies based on the CRISPR/Cas9 (clustered regularly interspaced short palindromic repeats/CRISPR associated nuclease 9) system have been carried out for genome editing in honey bees. As a genome editing technique, CRISPR technology is a highly effective and relatively economical method for the analysis of gene functions. From this point of view, CRISPR/Cas9-based gene editing strategies and current studies in honey bees were compiled in this study.

**Keywords**: Biotechnology, CRISPR/Cas9, Genome editing, Honey bee

# ANTIOXIDANT POTENTIAL OF IN VITRO CULTURED MARRUBIUM VULGARE PLANT

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## ABSTRACT

*Marrubium vulgare* (white horehound or common horehound) belongs to the Lamiaceae family. It is a valuable medicinal plant from the Bulgarian flora with high pharmacological potential and a multispectral medicinal effect. *M. vulgare* is known for its antihypertensive, antidiabetic, gastroprotective, anti-inflammatory, antimicrobial, anticancer, antioxidant and antihepatotoxic properties. Over fifty secondary metabolites from *M. vulgare* were isolated and identified. These biologically active substances include diterpenes, sesquiterpenes, flavonoids and phenylpropanoids located in the aerial parts of the plants. Plant biotechnology, in particular micropropagation, is an effective tool for the large-scale production of disease-free plant material of high quality and high secondary metabolite content. The aim of the study was to develop an efficient and reliable protocol for micropropagation of *M. vulgare and to compare the antioxidant potential of in vitro obtained and wild growing plants. Kinetin (2 mg/l) was found to be effective for multiple shoot induction among the cytokinins tested. The best nutrient medium for in vitro rooting was half strength MS medium containing 2 mg/l IBA and 0.2 mg/l IAA.* The content of total phenols of *in vitro* propagated and wild plants are 1396.4±73.6 and 1411±77.1 and flavonoids are 41.1±3.4 and 102.5±3.4, respectively. The antioxidant activity by ORAC method showed that *in vitro* plants have secondary metabolite production comparable to that of wild growing plants, 405.6±21.6 and 411.2±19.6, respectively. The developed protocol allows obtainment of numerous well-developed and rooted plants with high antioxidant potential.

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**Keywords**: white horehound, micropropagation, antioxidant

# ANTIBACTERIAL ACTIVITIES OF ENDOPHYTIC FUNGI ISOLATED FROM SOME MEDICINAL PLANTS OF WESTERN SAUDI ARABIA

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## ABSTRACT

**Background:** Endophytes are microbes that colonize inside plant tissues without damaging the host parts. Recently, there has been interest of endophytes because of the fact these microbes have the ability to produced several novel and interesting bioactive metabolites with multiple applications. Therefore, the aims of this study were to identify and to test the antimicrobial activity of endophytic metabolites of fungi that colonize *Commiphora gileade*, and *Carissa edulis*, medicinal plants growing in the western rejoin of Saudi Arabia.
**Method:** Four fungal isolates obtained and were identified morphologically and under molecular level based on internal transcribed spacer primer (ITS**1**ITS4) as : *Curvularia caricae-papayae, Canariomyces notabilis, Aspergillus terreus, Alternaria sp*. The isolates were cultured by solid-state fermentation on 100g rice medium and the metabolites were extracted using ethyl acetate and distilled water. The antimicrobial activity was evaluated using well agar diffusion method.
**Result:** Aqueous and organic extracts showed positive effects with different concentration against human pathogenic bacteria which include gram-positive bacteria as (*Staphylococcus aureus, Staphylococcus aureus* (*MRSA*)), gram-negative bacteria as (*Escherichia coli, Pseudomonas aeruginosa, Salmonella typhimurium*). Most of the isolate's metabolites (90%) showed positive effects against human pathogenic bacteria for both Aqueous and organic extracts.
**Conclusion:**These endophytes fungi can provide a wide variety of secondary metabolites that might be a potential source of novel antimicrobial compounds.

**Keywords**: endophytic fungi, fermentation

# IN VITRO PROPAGATION AND ANTIOXIDANT ACTIVITY OF MEDICINAL PLANT CLINOPODIUM VULGARE L.

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## ABSTRACT

Plants of Lamiaceae family are highly recommended as a source for new pharmaceuticals due to their wide range of biological activities. *Clinopodium vulgare* L. (wild basil) is an medicinal, herbaceous, and aromatic plant belonging to those family. This valuable herb is popular remedy for treatment of skin irritation and swelling, and relieving the symptoms associated with mastitis, prostatitis and gastric ulcers. The main biologically active compounds responsible for its pharmacological action are flavonoids, phenolcarboxylic acids, monoterpenoids, diterpenoid quinines, triterpenoid glycosides (Bardarov et al., 2016). Biotechnological approaches provide the opportunity to obtain high quality clones and overcome the genetic and phenotypic variability of wild grown plants, the existence of toxic components and contaminants. The aim of the present work was to develop efficient protocols for clonal propagation of *C. vulgare* and to compare the antioxidant activities of the obtained cultures with wild species. Seeds from wild plants were harvested from their natural environment in the Vitosha Mountain, near the village of Bistritsa, Bulgaria and used as initial *in vitro* plant material. The achieved *in vitro* seed germination frequency was 95% on 21st day. For shoot proliferation explants (shoot tips and nodal segments) were cultured on full-strength MS medium supplemented with one of the following cytokinins: 6-benzylaminopurine, kinetin, zeatin or N6[2-isopentenyl]-adenine at concentration 1 mg/l alone or in combination with the auxin indole-3-butyric acid at concentration 0.1 mg/l. The best results were obtained on MS medium enriched with 1 mg/l BAP and 0.1 mg/l IBA, where 100% of nodal segments developed shoots and the multiplication rate reached 6.9 shoots per explant. In vitro shoots were successfully rooted (100%) on half strength MS medium free of auxins. The substrate mixture consisting of peat, perlite: sand and soil in proportion 2:1:1:1 was appoptriate for *ex vitro* adaptation with 100% survival rate. No phenotypic variations were observed between the *ex vitro* adapted plants. In this study, a difference in the total polyphenols and flavonoids content, as well as antioxidant activity of different organs—leaves, flowers, and stems of wild and also of cultivated C. vulgare plants was found. The amount of polyphenols, varied between 16713.6 mg GAE/100g DW and 30510.9 mg GAE/100g DW. Flowers extracts from *in vitro* plants showed higher total polyphenol content (29927.6 ± 592.1 mg/100 g vs 27292.8 ± 85.3 mg/100 g) and ORAC antioxidant activity (7281.3 ± 82.9 µmol TE/g vs 7246.3 ± 62.4 µmol TE/g) compared to flowers from wild plants. Data obtained from the ORAC and HORAC assay was in correlation with the results obtained from total polyphenols and total flavonoids assay (Petrova et al., 2023).

**Funding**: This research was funded by NATIONAL SCIENCE FUND - BULGARIA, Grant number KP-06-N56/16.

**Keywords**: wild basil, microprogation, biodiversity

# BETA-GALACTOSIDASE ACTIVITIES OF 3 LIGILACTOBACILLUS SALIVARIUS STRAINS IN SIMULATING GASTRIC AND INTESTINAL DIGESTION

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## ABSTRACT

β-Galactosidase (β-D-galactoside galactohydrolases, EC 3.2.1.23) is an enzyme that catalyzes the cleavage of terminal galactosyl groups from the non-reducing ends of different galactosides. In this research, 3 strains (isolated from fecal samples of free-range chicken) that belong to *Ligilactobacillus salivarius* species were used. *In vitro* conditions for simulating gastric and intestinal digestion were designed. β-galactosidase enzyme activities of 3 strains were evaluated by using o-nitrophenyl- β-D-galactopyranoside (o-NPG) as a substrate. We observed that in the simulated gastric phase the highest specific enzyme activity occurred at a pH level of 4 (3.400 U/mg) at KC27L while the lowest specific enzyme activity at KC21L occurred at pH level of 2 (0.780 U/mg). On the other hand, in the simulated intestinal phase, the highest specific enzyme activity was found to take place at a pH 8 (1.452 U/mg) at KC27L. In the study, it has been determined that, the bacteria show high β-galactosidase enzyme activity by protecting their aliveness in the gastro-intestinal environment.

**Keywords**: Ligilactobacillus salivarius, β-galactosidase, gastro-intestinal environment

# EFFECT OF BASAL MEDIA ON GROWTH AND EXOPOLYSACCHARIDES PRODUCTION BY ARONIA MELANOCARPA (MICHX.) ELLIOTT CELL SUSPENSION CULTURE

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## ABSTRACT

*Aronia melanocarpa* (Michx.) Elliott (black chokeberry) is well known plant among the consumers and its berries are widely used for production of jam, wines, juices and food colorants. Nowadays, with the stunning advance in cellular agriculture, different in vitro systems from many edible plants are considered as perspective renewable sources of valuable phytochemicals. In this study, the effect of basal medium composition on biomass accumulation and exopolysaccharides production by *Aronia melanocarpa* cell suspension culture was investigated. The results showed that maximal amount of accumulated biomass (ADB=10.37±0.52 g/L; GI=2.13±0.05) and exopolysaccharide content (3.44±0.20 g/L) were achieved when the culture was cultivated on Gamborg B5 medium, whereas, when grown on Murashige and Skoog medium the biomass was significantly lower (ADB=0.21±0.11 g/L; GI=0.06±0.03). It worth noting, that there was no significant difference in total phenolic content between the cells grown on B5, WP and MS media. The reported results are the base for further development of black chokeberry cell suspension culture as alternative platform for sustainable production of valuable food additives.

**Keywords**: Cellular agriculture, Sustainable production, Black chokeberry, Exopolysaccharides, Nutrient media.

# CHEMICAL AND FATTY ACID COMPOSITION OF TRADITIONAL PRIZREN SUDJUK

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## ABSTRACT

The paper presents the chemical and fatty acid composition of the traditional Prizren sudjuk, which has been produced according to the standard recipe for more than 30 years using the same recipe and in a mini-slaughterhouse with a sausage production plant. Prizren sujuk belongs to the group of semi-baked sausages made from beef, salt, onions and spices. Prizren sujuk is produced from beef. The technological process for the production of Prizren sujuk begins with the meat being cooked in a wolf-machine. The minced meat is transferred to a mixer where salt, chromidot and spices are added. After achieving adequate homogenization, the charge was transferred to the filler. Sausages are stuffed in small beef intestines. Filled hoses are lined up on a frame-cart, strained and brought into the chamber for smoking and heat treatment. Thermal processing and dimensioning is carried out at a temperature of 67 to 75 oS for a time of 4.15 to 4.30 hours. Immediately after filling the crevata, the chemical and fatty acid composition of the freshly produced sausages - sudžuk was tested. The pH value of the battery immediately after charging is 6.10. The water content of fresh sausages is 53.30%, protein 15.32%, fat 22.50%, salt 2.77% and sugar 1.66%. The content of saturated fatty acids immediately after filling is 11.12%. After heat treatment, the chemical composition changes, i.e. the water content decreases and amounts to 42.97%, the other components are increased and thus the protein content is 21.05%, fats 30.50%, salt 3.33%, and sugars 2.36 %. After heat treatment, the content of saturated fatty acids increases and amounts to 14.95%.

**Keywords**: Key words: sausages - sujuk, chemical composition, fatty acids

# ANTIMICROBIAL ACTIVITY OF A NEW DEVELOPED CREAM FORMULATION WITH NATURAL ADDITIVES: Citrus medica L. var. sarcodactylis FRUIT ETHANOL EXTRACT AND PROBIOTIC

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## ABSTRACT

*Citrus medica* L. var. *sarcodactylis* is a morphologically remarkable fruit that grows in subtropical regions. It is accepted as food and nutrient rich in bioactive components, with high antioxidant activity and can be consumed safely. The chemicals used in cosmetic products cause skin irritation and allergic reactions. For this reason, herbal compounds offer natural options that support and protect skin health with their antimicrobial properties and skin care effects. In this study, it was aimed to create a new cream formulation by combining plant extract and probiotic as natural ingredients and to determine its antimicrobial activity. For this purpose, the cream formulation was developed using *C. medica* L. var. *sarcodactylis* ethanol extract and *Limosilactobacillus fermentum* MA-7, a probiotic candidate strain derived from human milk and commercial cream. The antibacterial and antifungal activities of the developed cream formulations against test microorganisms were determined using the well diffusion method. In the commercial cream (control, C) group, the inhibition zone diameter was not determined against *Candida glabrata* RSKK 04019, *Staphylococcus aureus* ATCC 25923, *Escherichia coli* O157:H7 and *Listeria monocytogenes* ATCC 7644. The developed groups of cream and *L. fermentum* MA-7 (CL), cream and the extract (CE) and cream containing extract and *L. fermentum* MA-7 (CEL) showed the highest inhibition zone diameters against *S. epidermis* ATCC 12228 (6.52 mm), *S. aureus* ATCC 25923 (6.06 mm) and *E. coli* O157:H7 (15.75 mm), respectively. The CEL group against all tested microorganisms exhibited higher antimicrobial activity compared to other developed cream groups (CE and CL). The results showed that the developed cream formulation with natural content can be used as an antimicrobial agent in the cosmetic and pharmaceutical industries to develop alternative products alternative to chemical substances.

**Keywords**: skin, cosmetic, antibacterial, probiotic

# COMPARATIVE ANALYSIS OF BIOFILM MORPHOTYPES OF TYPE 1 FIMBRIAE N-TERMINAL DOMAIN DISRUPTED MUTANT AND WILD-TYPE STRAIN IN SALMONELLA TYPHIMURIUM

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## ABSTRACT

Type 1 fimbriae can be found in most *Salmonella* strains and many other members of Type 1 fimbriae are found in most *Salmonella* strains and many other members of the family *Enterobacteriaceae*. Type 1 fimbriae are one of the structures that allow *Salmonella* to attach itself effective onto abiotic surfaces and different host cells. In this study, the aim was to determine the effects of N-terminal domain on biofilm in *S.* Typhimurium ATCC 14028 strain, which was cloned only N-terminal domain of the *fim* gene. In the *S.* Typhimurium *fimF* mutant, the biofilm formation was found to be statistically significantly reduced compared to the wild-type strain ($p<0.05$), and the biofilm forming capacity of the *fimF* gene N-terminal domain cloned construct increased compared to the *fimF* mutant ($p<0.05$). When the morphotypes of biofilms formed by wild-type and other strains are examined; The wild-type strain displayed the ‘rdar’ morphotype, while the *fimF* mutant strain and its N-terminal domain cloned construct be detected changed to the ‘bdar’ morphotype.

**Keywords**: Salmonella Typhimurium, Type 1 fimbriae, N-Terminal Domain, Biofilm formation, Biofilm morphotypes, Cellulose production

# ISOLATION, CHARACTERIZATION, AND IDENTIFICATION OF YEASTS SPECIES FROM DAIRY PRODUCTS, AND CHARACTERIZATION OF THEIR INDUSTRIAL ENZYME PROFILES

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## ABSTRACT

The specific search for microorganisms from natural resources and elucidation of their biotechnological application potentials are still one of the significant, and fundamental concepts of microbial biotechnology. The aim of this study is the isolation and taxonomic identification of the novel yeast species producing different enzymes of biotechnological interest. The raw milk samples that belong to cow and water buffalo, and local cheese samples were used for the yeast isolation. A total of 137 yeast strains, 87 from the raw milk samples and 50 from the cheese samples, were isolated. In the first step, yeast isolates were characterized based on their microscopic and macroscopic morphology, ability to grow on different carbon sources, and proteolytic, lipolytic and amylolytic activities. Among them, yeast isolates showing different profiles were selected and subjected to the API-ZYM test for further identification. The species identities of the selected yeast isolates were determined according to their ITS1-5.8S rDNA-ITS2 regions' sequence homologies and API-20C test results. Our results showed that these yeast isolates belong to 6 different genera. The species names of these isolates and the yeast genera they belong to are; *Kluyveromyces marxianus* (2 isolates), *Cutaneotrichosporon curvatum* (1 isolate), *Hanseniaspora* spp., (1 isolate), *Pichia membranifaciens* (1 isolate), *Trichosporon inkin* (5 isolates), *Wickerhamiella pararugosa* (2 isolates). It was determined that the above-mentioned yeast species isolated in this study showed different levels of enzymatic activity for 19 enzymes based on the API-ZYM test system. Moreover, of these species, *Trichospon* spp., displayed high levels of extracellular proteolytic activity on skim milk agar. We think that novel yeast strains isolated from dairy products in this study have an important potential in the production of new enzymes with novel biochemical characteristics. In addition, we also think that these new yeast strains have a large potential to be used for different purposes in industrial microbiology with their distinct biochemical and physiological properties.

**Keywords**: yeasts, dairy products, microbial enzymes, biotechnology, identification.

# INVESTIGATION OF CORNELIAN CHERRY FRUIT AS A NATURAL ADDITIVE IN THE INDUSTRY

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## ABSTRACT

Birçok endüstride, patojenik mikroorganizmalara karşı katkı maddesi olarak antimikrobiyal ajanlar kullanılmaktadır. Günümüzde ticari olarak kullanılan bu maddeler yerini bitkilerden elde edilen doğal antimikrobiyal maddelere bırakmaktadır. Antimikrobiyal ajan olma potansiyeline sahip olan kızılcık (*Cornus mas L.), antioksidan ve antosiyanin içeriği yüksek, Türkiye'de yetiştirilen bir meyvedir.* Bu çalışmada, su ve kloroform solventleri ile hazırlanan kızılcık ekstraktlarının *Salmonella pullorum*, *Vibrio angillarum* A4, *Aeromonas hydrophila* ATCC 19570, *Candida albicans* ATCC 10231, *Escherichia coli üzerindeki antibakteriyel ve antifungal aktiviteleri araştırıldı.*O157:H7 patojenleri araştırıldı. Ekstraktların antimikrobiyal aktivitesi disk difüzyon, minimum inhibitör konsantrasyon (MIC) ve minimum bakterisidal veya fungisidal konsantrasyon (MBC veya MFC) yöntemleriyle belirlendi. Kızılcıkta en yüksek zon çapı kloroform ekstraktı için *S. pullorum* (18.06 mm), su ekstraktı için *A. hydrophila ATCC 19570 (16.06 mm) üzerinde belirlenmiştir.* Ekstraktların MİK değerleri 5 µg/µl ila 40 µg/µl arasında değişmiştir. *En düşük sidal değer S. pullorum'a* karşı kloroform ekstraktı için 10 µg/µl (MBC) olarak elde edilmiştir.. Sonuçlar, kızılcık meyve özlerinin gıda, yem ve ilaç gibi çeşitli endüstrilerde sentetik ajanlara karşı alternatif doğal antimikrobiyal katkı maddeleri olma potansiyeline sahip olduğunu belirlemiştir.

**Keywords**: Antimicrobial activity, Cornus mas L., Extract, Natural additive

# ANTIOXIDANT CAPACITY, TOTAL PHENOL CONTENT AND SENSORY PROPERTIES OF FIG WINES PRODUCED FROM FRESH AND DRIED FIGS (FICUS CARICA L.)

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## ABSTRACT

In this study, total antioxidant capacity, total phenol content and sensory properties of fig wines produced from Sarilop (yellow colored) and Bursa Siyahi (dark purple colored) fig varieties grown in Aydın, Türkiye were determined. Fig wines were produced from both fresh and dried figs using commercial yeast fermentation technique with two replications. For this purposes, fig musts were prepared from both dried and fresh Sarilop figs and from fresh Bursa Siyahi figs at two different brix values (17 and 24 Bx). The young wines were stored at 13°C for 1 month before further analysis. Total phenolic content, total antioxidant activities (TAA) and total monomeric anthocyanin contents of fig wines were determined by spectrophotometric analysis. Total phenolic content of fig wines ranged between 15.53 and 18.23 mg GA/100 mL wine. The total antioxidant capacity of the samples was measured using two spectrophotometric assays, including ABTS and DPPH methods. Total antioxidant capacity values of the fig wines were found as 3.68-4.49 µmol Trolox/100 mL wine and 35.09-69.30 µmol trolox/100 mL wine for ABTS and DPPH radical scavenging activity assays, respectively. Fig wines produced from Bursa Siyahi figs had the highest values in terms of phytochemical properties. Flavor Profile Analysis was used for the sensory evaluation of fig wines and 18 descriptive terms were developed for the evaluation of wine samples. Based on sensory evaluations, the wines produced from the musts having a brix value of 24 had higher scores than the wines produced from the musts having a brix value of 17 ($p<0.05$).

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**Keywords**: Fig wine, antioxidant capacity, total phenol, sensory properties, Sarilop, Bursa Siyahi

# PHYSICOCHEMICAL STUDY, PHYTOCHEMICAL SCREENING AND DOSAGE OF PHENOLIC COMPOUNDS OF THE SOLANUM ELAEAGNIFOLIUM PLANT

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## ABSTRACT

Solanum elaeagnifolium (yellow nightshade) is a herbaceous plant that belongs to the Solanaceae family, which are herbaceous plants, trees, shrubs or lianas widely distributed in tropical regions. The objective of this work is to highlight the existence of secondary metabolites that characterize Solanum elaeagnifolium. To achieve these objectives, a qualitative study based on phytochemical screening was carried out on the different parts (leaves, fruits, stems and roots) to highlight the existence of secondary metabolites. The results of this study showed that the leaves are rich in flavonoids, tannins, coumarins, reducing sugars and irridoids, the fruits are rich in Flavonoids, Tannins, coumarins and reducing Sugars, the Stems are rich in coumarins, reducing sugars and the roots are rich in flavonoids, reducing and irridoid sugars. The dosage allowed us to deduce that the phenolic composition varies according to the part studied. Indeed the fruits showed the highest contents of total polyphenols (5.129 ± 0.40 mg/g dry matter) Concerning the total flavonoids, the highest contents were determined in the leaves (0.618 ± 0.01 mg/g dry matter) followed by the fruits (0.460±0.01 mg/g dry matter). Similarly, the fruits (1.380±0.97 mg/g dry matter) were the richest in tannins followed by the stems (0.506±0.73 mg/g dry matter); leaves (0.431±1.57 mg/g dry matter); and roots (0.251±1.37 mg/g dry matter). Gas Chromatography (GC-MS) analysis of the extracts reveals the presence of alkanes, alcohols, acids. In general, these results demonstrate that Solanum elaeagnifolium has potent properties, indicating its potential use for therapeutic purposes.

**Keywords**: Solanum elaeagnifolium, physicochemical; screening; dosage; Gas Chromatography; Morocco

# EFFECTS OF DIFFERENT DOSES PLANT GROWTH REGULATORS FOR IN VITRO PROPAGATION ON CALENDULA SSP.

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## ABSTRACT

Calendula officinalis and Calendula arvensis species belonging to the Calendula genus is a medicinal herb that can be used for pain relief, defense against viruses, bacteria and fungi. The aim of this study is to develop a fast and easy micropropagation protocol for medically valuable Calendula species. It is important for plants with medicinal value to obtain more and faster plants using less space. Therefore, it is important to develop micropropagation protocols for rapid production and to obtain a large number of plants. This study the seeds were kept at +4 C0 for 24 hours before surface sterilization was performed. Afterwards, surface sterilizations were carried out with 75% ethanol and 10% bleach, respectively. Plants germinated in a sterile medium were used for the propagation step and then their be reproduced capacity was controlled. The germination percentage of the seeds germinated in MS medium for two weeks was 40% and the length of the plantlets grew between 4-6 cm on average. All plants were taken into three subcultures containing 1 BAP, 2 BAP, 3 BAP and 4 BAP and 0.3 GA and 0.1 NAA for propagation, and the number of siblings of plants in different media in each subculture was determined. Afterwards, the plants were taken to media containing different concentrations of IBA for rooting. 0.3 GA and 0.1 NAA were also added to the media along with IBA. The experiment was created according to a random trial design and the effects of environmental conditions on plants were tested by analysis of variance (ANOVA). Plants rooted in approximately 21 days were acclimated in controlled greenhouses.

**Keywords**: Plant growth regulators, in vitro propagation, Calendula ssp., plant production

# TOMATO RESISTANCE GENES MI AGAINST TO THE ROOT KNOT NEMATODE (MELOIDOGYNE SPP.) AND MOLECULAR APPROACHES.

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## ABSTRACT

*Meloidoyne spp.* is a pest threatening the tomato production both in open fields and green houses worldwide. It was first detected in England but now it is a worldwide problem for tomato and other *Solanaceae* crop production. If appropriate control measures are not taken 15- 85 % yield losses can take place. Just as control measures including chemical spraying and use of biological agents are important, plants own tolerance is of great importance for prevention of damage. As expected, infestation severity is largely dependent on the plant defence response mechanisms. Tolerant tomato relatives are already known with reduced feeding and penetration of *Meloidogyne spp.* Understanding and engineering these gene mechanisms is of great importance for development of tolerant varieties against *Meloidogyne spp.*. Plant resistance (R) proteins recognize pathogen avirulence (Avr) determinants and trigger plant defence mechanism. Then carefully organized dynamic defence includes the control of expansive number of genes that regularly come out in as a Hypersensitive Response (HR), and programmed cell death. The programmed cell death prevents to the attack of the pathogen at the point of infiltration or stop the feeding of the pest and decrease the damage caused by the *Meloidogyne spp.* Going before the HR, series of metabolic changes is following the accumulation of reactive oxygen. As a result of these changes, new studies identified new components of Mi-1-mediated resistance to the nematodes. Intramolecular interaction of Mi-1 protein is important for regulation of HR signaling. In addition, Mi-1 binds and hydrolyzes ATP in cell. ATP hydrolysis assists in generating a conformational change in Mi-**1** which triggers defense responses of tomato. In this study we review the molecular mechanisms of tolerance against *Meloidogyne spp*. in tomato.

**Keywords**: Meloidogyne spp., defence mechanisms, Solanum lycopersicum

# HETEROLOGOUS EXPRESSION OF HUMAN GSK3B GENE IN SCHIZOSACCHAROMYCES POMBE

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## ABSTRACT

Glycogen synthase kinase 3β (GSK3β) is a highly conserved serine/threonine kinase that plays a role in many cellular processes including glucose metabolism, intracellular signal transduction, DNA repair, and cell division. It is known to phosphorylate more than 40 different substrates involved in glucose regulation, cellular proliferation, regulation of migration, neuronal functions, oncogenesis, embryonic development, apoptosis and immune response pathways. Yeasts, eukaryotic single-celled organisms, can be used to study conserved cellular processes from yeast to humans, such as organelle biogenesis, cytoskeletal organization, or eukaryotic transcription, translation and DNA replication, which are significantly different from bacteria. *Schizosaccharomyces pombe* (*S. pombe*) is widely used for heterologous expression of proteins associated with human diseases. In this study, after codon optimization, the synthetic human *GSK3β* gene was amplified by PCR and the PCR product and pREP42 plasmid were cut with restriction endonucleases to generate suitable ends. Then, ligation of the human *GSK3β* gene to the pREP42 plasmid was performed. This recombinant plasmid was transferred into *S. pombe* including a deletion in the *gsk3* gene, which is the ortholog of the human GSK3β gene. These transformant cells were grown under different conditions and the alterations in the expression of the human GSK3β gene were analysed by qPCR.

**Keywords**: GSK3β gene, glycogen synthase kinase 3, Schizosaccharomyces pombe, heterologous gene expression

# THE DEVELOPMENT OF THE FIRST LEEK (Allium ampeloprasum L.) SPECIFIC EST-SSR MARKER USING RNA SEQUENCE DATA

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## ABSTRACT

Turkey is among the highest leek producer that ranks at the top of the world along with Indonesia. The number of molecular markers for leek is very limited, and generally cross-transferred markers from other *Allium* species are used on this economically significant species. EST-SSR markers, SSR-based nature and simply developed from transcriptomic data, expeditiously lowered the molecular marker deficiency in many plant species. Considering the above-given marker deficiencies and the simpleness of EST-SSR development, this study aims to develop new leek-specific EST-SSR markers from RNA sequence data. For this purpose, the available RNA sequence raw reads were downloaded from the NCBI database and used for the EST-SSR development. The de-novo assembly was made using the TRINITY program due to the lack of a reference genome of leek. BUSCO software was executed for quality assessments and completeness of that draft de-novo assembly, and the results showed that almost 90% of assembled data were completed and single-copied by BUSCO. In the next step, SSR motifs were predicted from these transcribed RNAs using GMATA software. In total, approximately 29.3 million long sequence data were analyzed with GMATA and 1637 SSR regions were predicted at the end of analysis. The primer pairs were designed for 78% (1279) of these predicted 1637 SSR regions. The 893 of 1237 markers were determined as unique markers. In the next step, selected ones of these predicted markers will be validated on leek population and will be tested on some other allium species for their cross-transferability.

**Keywords**: Leek, SRR, EST-SSR, Genetic Diversity, RNA-Seq, Molecular markers

# CYTOTOXICITY OF ORANGE PEEL (Citrus sinensis) ESSENTIAL OIL NANOEMULSIONS ON THE RAINBOW TROUT GONADAL CELLS

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## ABSTRACT

The citrus industry holds a significant position in the agricultural industry. However, it also generates substantial amounts of orange peel (*Citrus sinensis*) wastes. Essential oil production is one of the widely used bio-economical methods for the evaluation of these wastes. Essential oils are evaluated below their potential for different sectors due to their volatile nature and low stability against environmental stress conditions, which the nanoemulsion can overcome. Therefore, this study aimed to form and characterize the nanoemulsion of orange peel essential oil (OPEON) and investigate its cytotoxicity on the rainbow trout gonadal (RTG-2) cells. The OPEON (0.1:0.3:0.6:99 w/w, EO: Tween 80:Ethanol: water) was successfully created using an ultrasonic homogenizer. The OPEON was characterized using TEM (~100 nm), zeta sizer (the ζ-potential value of -12.6 mV, and the polydispersity index of 0.657, conductivity of 0.00547 mS/cm), and FT-IR analysis. Treatments of 125, 250, 500, 1000 ppm of the OPEON have a statistically significant toxic effects on RTG-2 cells after 24 hours of exposure. Based on the study results and considering the toxic effect on cells, there is a potential for effective use of nanoemulsion forms of essential oils, especially in the pesticide industry.

**Keywords**: Orange peel essential oil, Nanoemulsion, Zeta sizer, Cytotoxicity, Rainbow trout gonadal cells

# INVESTIGATION OF THE EFFECTS OF MEDIUM STRENGTH AND ZINC NANOPARTICLES ON BIOMASS PRODUCTION AND TOTAL PHENOL-ANTIOXIDANT CONTENTS IN ADVENTITIOUS ROOT CULTURES OF RADISH PLANT (RAPHANUS SATIVUS L.)

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## ABSTRACT

Radish (*Raphanus sativus* L.), one of the important vegetables of the *Cruciferae* family, has attracted attention due to its nutritional content and health-improving properties. The adventitious root culture technique not only supports the propagation of medicinally valuable plants but also offers an alternative method to harvest valuable bioactive components from plants. In the current study, hypocotyls obtained after germination of red and black radish seeds were used as explant material, the effect of MS basic medium at different strengths (1/4, 1/2, 3/4 and, 1) and the effect of zinc nanoparticle on adventitious root formation were evaluated in terms of biomass formation, total phenol and total antioxidant values. Within the framework of the results obtained, it is thought that adventitious root cultures of radish can be used as a complementary method in large-scale production of valuable bio-compounds to be used in pharmaceutical industry.

**Keywords**: Biocompounds, in vitro, root culture, medium strength

# AN INVESTIGATION ABOUT VOLTMETRIC BIOSENSING PERFORMANCE OF PENCIL GRAPHITE ELECTRODE (PGE) FOR SIMULTANEOUS DETECTION OF XANTHINE, HYPOXANTHINE AND URIC ACID

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## ABSTRACT

Xanthine is simply identified as a metabolite which is generated from guanine and hypoxanthine (both generated from ATP degradation) by guanine deaminase and xanthine oxidase enzymes, respectively, which is subsequently converted to uric acid by xanthine oxidase and excreted through urine. Determination of xanthine level in serum/urine is very important in the diagnosis and medical management of hyperuricemia, gout, xanthinuria and renal failure, while it also has attracted much attention in evaluating the meat freshness, especially in fish. Freshness of the fish meat is essential in food and pharmaceutical industries for manufacturing of high quality products. Actually, there exist a lot of nitrogen containig compounds as a potential freshness indicator such as ammonia, amines, volatile basic nitrogen (TVB-N), trimethyl amine (TMA) and indole, etc. in addition to the other substances (hydrogen sulphure, mercaptane) but these are claimed to be deceptive sometimes. Fortunately, final degradation products of ATP (hypoxanthine, xanthine and uric acid) are more robust alternatives to be considered as freshness indicator while their concentration increases as the muscle turns to meat. To determine it, literature shows that biosensing seems to be a promising tenchnique due to being fast, practical and easier (well educated personnel and chemicals/equipments are not required) for such a control process. That's why, biosensor studies have been accelerated recently. Biosensor is simply defined as an analytical device which specifically and sensitively reacts with a particular substance (analyte) and produces signals (electrochemical, optical, etc.) proportional to the concentration of that target substance. But manufacturing a biosensor has many options depending on the aim, materials to be used and further goals (stability, portability, etc.). This research aims to investigate the suitability of pencil graphite electrode (PGE) to be used for manufacturing a freshness sensor in electrochemical detection of ATP degradation products hypoxanthine, xanthine and uric acid simultaneously. Because PGE is abundant and also an economical material which may be easily adaptable for point-of-care (POC) analysis with a portable design. By the way, this material is intended to be used for electrochemical (voltmetric) measurements to increase sensitivity and selectivity in addition to be faster. In this context, hypoxanthine, xanthine and uric acid solutions at five concentrations (10, 20, 50, 100 and 200 µM) are prepared in phosphate buffer solution (PBS; pH=7,0) and electrochemical characterisation of three metabolites are determined by differential pulse voltammetry (DPV) based measurements which were carried out with AUTOLAB-PGSTAT-FRA12 instrument (a three electrode electrochemical cell system) and NOVA 10.1 software. Peak potentials of hypoxanthine, xanthine and uric acid have been found as 0,9 V; 0,6 V and 0,2 V, respectively. Selectivity of PGE electrode was also tested with a non-specific measurements by usage of dopamine and aspartic acid, which occur in meat matrix and have an interference potential but it was shown that these chemicals' peaks did not overlap wth that of freshness indicators' and they both gave peaks at the same potentials as 0,1 V and 0,8 V. These trials show that PGE is a suitable electrode for simultaneous detection of hypoxanthine, xanthine and uric acid and also may be adaptable to more practical and advanced

usage with surface modifications and/or portable designs.This study was supported by the Manisa Celal Bayar University Scientific Research Projects Coordination Unit. Project Number: 2022-070.

**Keywords**: Biosensor, xanthine, hypoxanthine, uric acid, pencil graphyte electrode (PGE)

# INVESTIGATION OF THE EFFECTS OF SOME ELICITORS ON (−)- A-BISABOLOL PRODUCTION IN MATRICARIA CHAMOMILLA L. CALLUS CULTURES

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## ABSTRACT

*Matricaria chamomilla L*. also called medicinal chamomile, is a plant species from the Asteraceae family. Due to the bioactive constituents of medicinal chamomile essential oil, which is known for its traditional use, is now widely used in various sectors such as cosmetics, food and pharmacology. The production of chamomile essential oil on an industrial scale requires a lot of labor, time and agricultural space, so it is important to find new methods to increase the quantity and quality of this valuable oil during the production phase. Although there are studies using callus culture or different elicitor to increase chamomile essential oil, they are known to be not sufficient. In this study, we used 22(S),23(S)-Homobrassinolide and putrescine as elicitor substances in *in vitro* callus culture and examined the effects on the synthesis of α-(−)-bisabolol, which is one of the important bioactive components of chamomile essential oil, by quantifying α-(−)-bisabolol content with GC-MS analysis. In order to determine the effects on biomass, measurements were made at 15-day intervals, and the highest value was found at 75mg/mL putrescine. Data obtained from this study is thought to contribute for the future studies that focus the production of important secondary metabolites by using biotechnological methods.

**Keywords**: Matricaria chamomilla L., Callus culture, Putrescine, 22(S)-23(S)-Homobrassinolide, Essential oil

# RED DRAGON FRUIT: ALTERNATIVE USE OF FRUIT EXTRACTS IN VARIOUS INDUSTRIES

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## ABSTRACT

Plants known to have antimicrobial properties are very rich in secondary metabolites. Dragon fruit is one of the tropical fruits whose popularity has increased in recent years, especially in our country. Dragon fruit is known as a phytochemical store with bioactive components such as phenolic compounds, betacyanin, terpenoids and polysaccharides. In the present study, it was aimed to investigate the potential of using methanol extracts of red dragon fruit obtained from Turkey as a natural additive in various industries. The antimicrobial activity and photoprotective activity of the fruit and peel methanol extracts obtained by the hot water bath method were investigated in vitro. Firstly, the antimicrobial activity of the extracts was determined using disc diffusion and microdilution methods. Afterwards, the photoprotective activity was determined spectrophotometrically. The results determined that the highest inhibition zone diameter of the fruit extract was 11.84 mm against *Pseudomonas aeruginosa* ATCC 27853 and *Aeromonas hydrophila* ATCC 19570. The highest inhibition zone diameter of the peel extract against the test microorganisms was determined as 11.38 mm in *Candida glabrata* RSKK 04019. The minimum inhibition concentration (MIC) value was 10-40 µg/µl for fruit extract, it was determined in the range of 10-80 µg/µl for peel extract. The minimum bactericidal concentration (MBC) was determined in the range of 20->80 µg/µl for the fruit extract and in the range of 20-80 µg/µl for the peel extract. The sun protection factors of fruit and peel methanol extracts were determined as 10.64 and 14.34. These results revealed that methanol extracts obtained from dragon fruit have the potential to be used as natural additives in the pharmaceutical, food, feed, and cosmetic industries. At the same time, the data obtained from the study has the potential to lead to further studies for various industries.

**Keywords**: Hylocereus polyrhizus, Antimicrobial Activity, Sun Protection Factor, Natural Additive

# ANTIMICROBIAL ACTIVITY OF NEW CREAM FORMULATIONS: HYLOCEREUS POLYRHIZUS AQUEOUS EXTRACTS AND LIMOSILACTOBACILLUS FERMENTUM MA-7

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## ABSTRACT

Knowing the harmful side effects of chemical additives in commercial creams has increased the demand for herbal creams today. Our skin is constantly exposed to physical and chemical threats. *Hylocereus polyrhizus* is known as a tropical fruit with rich bioactive compounds that benefit in many areas. The topical application of probiotics can help protect the skin from a variety of infections. In our study, it was aimed to develop new cream formulations containing *H. polyrhizus* aqueous peel or fruit extracts and probiotic strain *Limosilactobacillus fermentum* MA-7 for topical applications and then to determine the biological activity of these cream formulations. For this purpose, *H. polyrhizus* peel and fruit obtained from Turkey were extracted by sonication method using aqueous solvent. The biological activity of the developed new cream formulations was determined against the test microorganisms by the well diffusion method. The results showed that the cream (control) group did not have a zone of inhibition against all the tested microorganisms. It was determined that the addition of *H. polyrhizus* aqueous extract and *L. fermentum* MA-7 to the cream group increased the antimicrobial activity. The highest inhibition zone diameter of the Cream-Extract-*L. fermentum* MA-7 (CEL) group containing peel extract was determined as 18.68 mm against *S. enteritidis* RSKK 171. The highest inhibition zone diameter of the CEL group containing fruit extract was determined as 17.01 mm against *E. coli* ATCC O157:H7. The results show that the cream formulation containing *H. polyrhizus* aqueous extracts and *L. fermentum* MA-7 can be used as a protective and therapeutic natural agent against some pathogens that cause contamination in our body.

**Keywords**: Red pitahaya, Cream formulation, Yeast, Bacteria, Pathogens

# SYNTHESIS OF SILVER AND GOLD NANOPARTICLES FROM ONION PEEL BIOWASTES

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## ABSTRACT

In this study, the production of silver and gold nanoparticles was performed using onion peel extract, a vegetable waste, in an environmentally friendly approach. The colour change of the reaction mixture during synthesis confirmed the formation of nanoparticles. The nanoparticles were characterized using UV-vis and STEM. According to STEM results, silver nanoparticles had a spherical shape while gold nanoparticles had various shapes such as spherical, hexagonal, triangular, and slightly rod-like structures. The gold and silver nanoparticles exhibited different morphologies, although the same extract and synthesis procedure were utilized. The formation of nanoparticles was also confirmed by UV-vis spectroscopy. In sum, biowaste onion peel was shown to be suitable reducing agent for the production of gold and silver nanoparticles. The potential use of these nanoparticles, obtained by recycling bio-waste, in various sectors such as the food, biomedical and cosmetic industries, not only offers economic benefits but also avoids the use of harmful chemical synthesis processes and the generation of by-products.

**Keywords**: Onion peel extract, biowaste, silver nanoparticles, gold nanoparticles, green synthesis, STEM

# INVESTIGATION OF IMMOBILIZATION OF LACTOBACILLUS RHAMNOSUS IN CALCIUM ALGINATE GEL BEADS

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## ABSTRACT

The importance and use of probiotic bacteria in food biotechnology have been on the rise. In this study, it was aimed to immobilize *Lactobacillus rhamnosus*, a probiotic bacterium, to calcium alginate gel beads and to reveal some parameters affecting the immobilization efficiency. In order to perform bacterial immobilization under optimum conditions, the effects of alginate and $CaCl_2$ amounts and the number of microorganisms loaded on the gel were investigated. Different bead blasting methods were examined for the purpose of accurate determination of the number of viable microorganisms in the immobilized beads. For this purpose, vortex, stomacher, homogenizer and shaking incubator were used. The findings showed that the best performing concentration of alginate was 2%, CaCl2 was 3%, and the optimum bacterial load was 25%. Blasting with ultrasonic homogenizer was found to be the most effective method for removing *Lactobacillus rhamnosus* from alginate beads. By this way, immobilization of *Lactobacillus rhamnosus* to alginate with high efficiency was achieved.

**Keywords**: Lactobacillus rhamnonus, probiotic, immobilization, optimization

# STUDIES ON THE ANTIFUNGAL EFFICACY OF ARMORACIA RUSTICANA (HORSERADISH)

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## ABSTRACT

Studies on the antimicrobial activity of natural compounds continue to increase all over the world. For this purpose, various plant extracts are most commonly screened for their antimicrobial effects. In our study, it was aimed to determine the antifungal activity of *Armoracia rusticana* (horseradish) collected from the Thrace Region against various field and storage microfungi. For this purpose, antifungal effects on *Aspergillus flavus, Aspergillus niger, Dipodascus geotrichum, Fusarium concolor, Fusarium culmorum, Fusarium fujikuroi, Fusarium sp., Mucor racemosus, Penicillium digitatum* and *Penicillium italicum* fungi were investigated, both by direct use of the powders obtained from the roots of the plant and the use of volatile compounds. In the in vitro study, mycelial growth inhibition, determination of minimum fungicidal concentrations (MFK), effects on conidia germination and effects on hyphal morphology by Scanning Electron Microscopy were investigated. Inhibition rates of 100% were observed in mycelial growth inhibition experiments performed with direct (2% and higher concentrations) or volatile compounds (0.2 g and above treatment) of plant root powders. The MFK values for the test microfungi of the essential oils were determined as 125-500 µg/mL. It was determined that in 5 of 10 microgungus species, plant powder essential oils prevented conidia germination at a concentration of 15.62 µg/mL by more than 50% (54.33%-100%).

**Keywords**: Armoracia rusticana, root extracts, microfungi, antifungal activity

# DETERMINATION OF ANTIMICROBIAL ACTIVITY OF TOPICAL CREAM DEVELOPED WITH PLANT EXTRACT AND PROBIOTIC

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## ABSTRACT

Plants have been used for therapeutic purposes in many diseases from past to present. China rose is known to be used in skin diseases with its antibacterial and antifungal effects. The aim of this study is to evaluate the biological activity of water extract from China rose (*Hibiscus rosa-sinensis*) flowers on some pathogens. Disc diffusion and micro-dilution methods were used to evaluate the biological activity of China rose extract. In addition, an antimicrobial cream was formulated with China rose extract and the probiotic candidate strain *Limosilactobacillus fermentum* MA-7 originated from breast milk. The antibacterial and antigungal activities of the developed topical cream against the test microorganisms were determined by the well diffusion method. In conclusion, the China rose extract showed good biological activity on the test microorganisms. The highest activity was determined against *Staphylococcus aureus* ATCC 25923 with an inhibition zone diameter of 9.36 mm. The MIC and MBC or MFC values of the extract was determined as 12.5-50 µg/µL and 25-50 µg/µL. The developed cream formulations showed variable antimicrobial activity against the test microorganisms. The cream group prepared with Cream-Extract-Probiotic showed the highest inhibition zone (10.46 mm) against *Escherichia coli* O157:H7. The results of the current research show that China rose flower is a suitable candidate for the medical and pharmacological industries. The developed cream formulation containing China rose water extract and probiotic strain may be an alternative in the prevention and treatment of some infections.

**Keywords**: Cream formulation, Hibiscus rosa-sinensis, Limosilactobacillus fermentum, Natural additive, Skin

# WHITE OLEANDER: INVESTIGATION OF POTENTIAL USAGE IN AQUACULTURE AND COSMETICS INDUSTRIES

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## ABSTRACT

Plants have been used since ancient times to treat many diseases and are the source of therapeutic agents. In this study, biological activity of acetone and ethanol extracts from white oleander flowers and leaves was determined against fish pathogens. The disc diffusion and microdilution assays were used to determine the biological activity of the extracts on fish pathogens. The highest zone diameter of inhibition was determined as 12.67 mm in flower acetone extract against *Vibrio anguillarum* A4. The lowest inhibition zone against *Lactococcus garvieae* for leaf ethanol extract was determined as 7.09 mm. The MIC value was between 5-40 mg/mL for white oleander extracts against the fish pathogens. The lowest value of MBC was determined as 5 mg/mL in leaf ethanol extract against *Aeromonas hydrophila* ATCC 19570. In addition, sun protection factor (SPF) values of white oleander extracts were evaluated. The SPF values of the extracts were obtained as 25.72-26.52. The extracts from white oleander which is used as an ornamental plant can be used as natural additives in the aquaculture and cosmetics industries.

**Keywords**: Antimicrobial activity, Cosmetic, Fish pathogens, Nerium oleander, SPF

# MOLECULAR MARKER DETERMINATION FOR SEEDLING EMERGENCE IN WATERMELON

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## ABSTRACT

One of the most cultivated vegetable species in the world is watermelon. One of the important factors that can cause production disruptions in watermelon is seedling emergence losses and heterogeneity. DNA markers associated with phenotype can be determined by establishing a connection between phenotype and genotype with the relationship mapping technique that emerged with the development of molecular techniques. In this study, DNA markers related to seedling emergence rate in watermelon were determined by using relationship mapping technique using 96 watermelon genotypes. According to the Q-Q plot graph, the best agreement between the expected and observed values was determined by the GLM (Q) method. In the GLM (Q) analyzes, 11 markers were found to be correlated at the $p<0.01$ level. The model formed as a result of the back regression analysis included 3 markers (iPBS-2392.460, iPBS-2243.420 and iPBS-2081.500). The rate of explaining the seedling emergence of the model depending on these markers is 70.9%. Obtained marker information can be used in marker assisted selection studies.

**Keywords**: Watermelon, Citrullus lanatus, associating mapping, seedling emergence

# MICROENCAPSULATED AND NONCAPSULATED OF ARONIA EFFECT ON PARAOXONASE ENZYME ACTIVITY IN SD RATS FED WITH HIGH-FAT DIET

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## ABSTRACT

This study's objective was to assess the impact of microencapsulated Aronia (Aronia melanocarpa L) and its extract on paraoxonase enzyme (PON1) measured in Sprague-Dawley rats. PON1 enzyme investigation by ELISA. The control standard diet, control high-fat diet ,aronia extract (200 mg/kg and 400 mg/kg BW/day), aronia microencapsuled (200 mg/kg and 400 mg/kg BW/day) groups were weighted for 36-week-old rats. The corresponding weight in these grouping was 433.57±25.24 gr, 443.2±30.42 gr, 386.5±44.70 gr, 405.25±51.59 gr, 417.85±44.69 gr, and 406.85±45.80 gr respectively. Rats were gavaged with encapsulated and non-encapsulated versions of aronia extract; following using standarts; each of colours were a=0.0**1** b=**-**0.39, L=0.03 and each of antioxidants were chlorogenic acid=254455.6 ng/ml, rutin=29902.36 ng/ml, hesperidin=11067.99 ng/ml, protocatechuic acid=10455.69 ng/ml, quercetin=6912.89 ng/ml. The PON1 enzyme production averages of rats fed 200 mg of Aronia extract (0.0680±0.034 mmol/L), 200 mg of encapsulated aronia (0.026±0.019 mmol/L), and 400 mg of encapsulated aronia (0.0427±0.010 mmol/L) showed a significant correlation in the differences ($p<0.05$), according to tissue samples taken from the rat groups. Additionally, 400 and 200 mg/kg BW/day of aronia in the form of extract were found to have higher enzyme activity ($p<0.05$) when compared to the high-fat control group and the standard diet control group, respectively, according to PON1 enzyme measurements in their blood.

**Keywords**: paraxonase enzyme, PON**1** ELISA, Sprague Dawley, high fat diet, enzyme activity

# CONTRIBUTION TO THE STUDY OF STREPTOMYCES IN THE ALGERIAN MARINE ENVIRONMENT: TAXONOMY AND ANTIBACTERIAL ACTIVITY AGAINST STAPHYLOCCOCUS AUREUS

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## ABSTRACT

A collection of 47 isolates of Streptomyces from the Algerian marine environment were the subject of a taxonomic study based on macro and micro-morphological characters. The results made it possible to group these isolates into 5 morphological groups. The majority of strains belong to the Spira (23 isolates) and Rectus Flexibilis (16 isolates) type. The evaluation of the antibacterial activity of the 47 strains was carried out against several strains of Staphylococcus aureus, 33 isolates were active with inhibition diameters between 15 and 65 mm. Furthermore, 7 strains possess antagonistic activity against all the strains of S. aureus tested. An isolate with very strong activity, designated MBS5, was retained for further taxonomic study based on the sequencing of the gene coding for 16S rRNA. The phylogenetic study revealed that the MBS5 strain is a new species of the genus Streptomyces.A collection of 47 isolates of Streptomyces from the Algerian marine environment were the subject of a taxonomic study based on macro and micro-morphological characters. The results made it possible to group these isolates into 5 morphological groups. The majority of strains belong to the Spira (23 isolates) and Rectus Flexibilis (16 isolates) type. The evaluation of the antibacterial activity of the 47 strains was carried out against several strains of Staphylococcus aureus, 33 isolates were active with inhibition diameters between 15 and 65 mm. Furthermore, 7 strains possess antagonistic activity against all the strains of S. aureus tested. An isolate with very strong activity, designated MBS5, was retained for further taxonomic study based on the sequencing of the gene coding for 16S rRNA. The phylogenetic study revealed that the MBS5 strain is a new species of the genus Streptomyces.

**Keywords**: Streptomyces, littoral algérien, taxonomie, activité antibactérienne, Staphylococcus aureus

# CONTRIBUTION TO THE STUDY OF STREPTOMYCES IN THE ALGERIAN MARINE ENVIRONMENT: TAXONOMY AND ANTIBACTERIAL ACTIVITY AGAINST STAPHYLOCCOCUS AUREUS

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## ABSTRACT

A collection of 47 isolates of Streptomyces from the Algerian marine environment were the subject of a taxonomic study based on macro and micro-morphological characters. The results made it possible to group these isolates into 5 morphological groups. The majority of strains belong to the Spira (23 isolates) and Rectus Flexibilis (16 isolates) type. The evaluation of the antibacterial activity of the 47 strains was carried out against several strains of Staphylococcus aureus, 33 isolates were active with inhibition diameters between 15 and 65 mm. Furthermore, 7 strains possess antagonistic activity against all the strains of S. aureus tested. An isolate with very strong activity, designated MBS5, was retained for further taxonomic study based on the sequencing of the gene coding for 16S rRNA. The phylogenetic study revealed that the MBS5 strain is a new species of the genus Streptomyces

**Keywords**: Streptomyces, Algerian coast, taxonomy, antibacterial activity, Staphylococcus aureus

# GENETIC CHARACTERIZATION OF SOUR ORANGE (CITRUS AURANTIUM L.) GENOTYPES BY ISSR MARKERS

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## ABSTRACT

Citrus fruits are one of the most important crops in the world. Sour orange *(Citrus aurantium* L.) is one of the most widely used *Citrus* rootstock due to its many advantages for citrus species. Twenty accessions of Sour Orange (*Citrus aurantium* L.) were used as plant material to study genetic relationships and diversity. The CTAB method was used for DNA extraction and used in PCR reactions. The quality of the samples was confirmed by the Nanodrop spectrophotometer. Fourteen ISSR markers were used for the molecular characterization of sour orange accessions. Nine ISSR primers producing scorable polymorphic bands were used to amplify all of the accessions. Nine ISSR primers produced 39 clear and reproducible DNA band profiles, 30 of which were polymorphic. Therefore, the average polymorphic was 78.22%. ISSR data were recorded as 1 for the presence of a band and 0 for its absence to generate a binary matrix. Only reproducible bands were scored for all the accessions tested. All data were analyzed by Principle Coordinate (PCoA) and Cluster analyses using PAST program. First, a similarity matrix was generated using Jaccard coefficients. This matrix was then used for PCO. For cluster analyses, the UPGMA (Unweighted Pair Group Method using Arithmetic Average) method was used to construct the dendrogram. The results of all analyses were discussed together with the genotypes. Our study indicated that ISSR markers were useful in determining the genetic diversity of Sour Orange genotypes. Furthermore, these results revealed that among the different genotypes sampled, there is significant genetic variability that can be useful for future Citrus research and breeding programs. Key words: Citrus fruit, Genetic characterization, ISSR markers, Molecular breeding, Sour orange

**Keywords**: Citrus fruit, Genetic characterization, ISSR markers, Molecular breeding, Sour orange

# EVALUATION OF WINE PRODUCTION AND QUALITY INDICATORS OF SOME TECHNICAL GRAPE VARIETIES GROWED IN AZERBAIJAN

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## ABSTRACT

As the object of the study, Khindogni, Rkasiteli, Madrasah, Moldova, Hamashara, Shirvanshahi grape varieties, their juices, wine materials, national wines, technological development processes and regimes, physico-chemical and organoleptic quality indicators, active cultured dry yeasts were taken. In the study, a mathematical-statistical analysis of the dependence of the quality of white and red wines on separate indicators of physical-chemical composition was carried out. During the research studies, firstly, the sugar and acid amounts in grape juice were determined according to the varieties by using modern analysis methods. Accordingly, the mass share of sugar is 22.0 g/100 cm3 in Bayanshira grape variety, 23.5 g/100 cm3 in Merlo variety, 23.0 g/100 cm3 in juice of Rkasiteli grape variety and 22.7 g/100 cm3 in Rkasiteli grape variety. type. In Madrasa grown under Absheron conditions, this ratio is 23.0 gr/100 cm3 in Hindoghni, 23.2 gr/100 cm3 in Shirvanshahi, 21.7 gr/100 cm3 in Moldova, 21.3 gr/100 cm3 in Madrasa grown under Shamakhi conditions. gr/100 cm3, while it was 22.2 gr/100 cm3 in Madrasa grown in Shamakhi conditions. 100 cm3 in Hamashara. .Acidity indicators are 8.2 g/dm3 in Bayanshira grape variety, 5.6 g/dm3 in Merlo variety, 5.3 g/dm3 in juice of Rkasiteli grape variety, 5.3 g/dm3 and 5.2 g' in Madrasah grown under Absheron conditions. is. /dm3, dm3 in Khindogni, 6.1 g/dm3 in Shirvanshahi, 6.4 g/dm3 in Moldova, 6.2 g/dm3 in Madrasa grown under Shamakhi conditions and 6.3 g/dm3 in Hamashara was. The pH indicator fluctuated within the norm of 3.1-3.4 for varieties. Fruit juice yield was at a satisfactory level as 73.2-74.8% for the varieties, Moldova variety gave the highest result and Khindogny variety gave the lowest result. According to the results of the analysis, the amount of ethyl alcohol in the wine made from the Rkasiteli grape variety was 13.0%; Madrasa wine grown in Absheron conditions; 13.6 in Khindogni; 13.8 in Shirvanshahi; 12.7 in Moldova; 13.0 in the Madrasa, which grew up under the conditions of Shamakhi; In Hameshara, it was determined as 13.3%. According to the results of the analysis, the highest total acidity was 7.13 g/dm3 in the wine obtained from Bayanshira grape variety, and the lowest in Khindogni wine with 4.65 g/dm3. The amount of volatile acid in wines made from Rkasiteli grape variety is 0.35; It is defined as 0.24 g/dm3 in Moldova. According to the results of the analysis made in different wines, it was determined that the amount of sulfur 4-oxide varied between 3.0 and 3.4 mg/l. The mass ratio of sugar is 21,1-23.5 g/100 cm3, titratable acidity is 5.2-8.2 g/dm3, pH is 3.1 It was determined that the fruit juice yield was 73.2-74, 8% under laboratory conditions and the maturity index was fluctuating. Between 28.4 and 47.5 shows that these grape varieties are a valuable source of raw materials for the preparation of high-quality table wines. As a result of the analysis of the quality of the table wines prepared in general with modern methods, ethyl alcohol 12.7-14.0%, residual sugar 0.14-0.31 g/l, total acidity 4.65-7.13 g/l and total acidity in various wines. It was determined that the pH value was between 3.08-3.40 and the taste values were between 87-95 points. Examination of the characteristic ecological-geographical zoning characteristics of grape varieties grown in different soil-climatic conditions is very important in terms of producing competitive national brands with different geographies, known for their geographical indicators, and increasing export potential. Normative and technical documents were developed based on the technology of making quality wine from the proposed grape varieties and submitted to the relevant institutions.

**Keywords**: fruit juices, national wines, physico-chemical and organoleptic quality, mathematical-statistical analysis

# ENDOPHYTIC MICROORGANISMS FOR PLANT GROWTH PROMOTION AND BIOTECHNOLOGICAL APPLICATIONS

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## ABSTRACT

In the last year, more and more attention has been directed to organic farming, which has become a priority in agriculture. The great importance of enriching the root layer of the soil with beneficial microorganisms to improve the conditions of root nutrition is sufficient for the need for the application of endophytic microorganisms. This review elucidates the role and practical use of microbial endophytes. Endophytes are bacteria and fungi that live in the plant tissues of apparently healthy hosts without causing any harm to the plant. Most of our knowledge about the plant growth-promoting characteristics of endophytes comes from the study of bacterial endophytes, and comparisons can be useful for studying endophytic yeasts and fungi. They have a number of useful properties, namely: they synthesize physiologically active substances and supply the plant with them; increase the productivity of photosynthesis; enhance enzymatic processes in plants and improve the water regime; activate the activity of other microorganisms in the soil; act as antagonists of phytopathogenic microorganisms and increase the protective functions of plants. Their beneficial properties also include the ability to produce or alter the concentration of plant hormones such as indole acetic acid (IAA), gibberellic acid, cytokinins and ethylene; fixation of atmospheric nitrogen; suppression of the growth of harmful microorganisms through the production of siderophores, β-1,3-glucanase activity, chitinase activity, synthesis of antibiotics and cyanide; and increase the solubility of phosphates and other properties. A number of free-living bacteria have the ability to fix nitrogen and increase its availability to the plant. Till now, no endophytic plant-growth-promoting microorganism has been registered yet as a biological agent. They have the advantage of biocontrol which is well protected from threats from the outside environment, but there is a risk of the presence of an endophytic microbe or its metabolite in edible plant parts. This necessitates more in-depth research on the duration of their action in plant tissues also ecological adaptation to the targeted environment.

**Keywords**: Biological control, endophytic microorganisms, plant growth-promotion, plant-microbe interaction, plant hormones, siderophores

# PROSPECTS AND POTENTIAL OF MORINGA OLEIFERA SPP OF PAKISTAN AS A NATURAL PRESERVATIVE FOR GROUND BEEF

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## ABSTRACT

The aim of this work was to demonstrate the preservative potential of leaves of *Moringa oleifera* specie of Pakistan due to their antioxidant and antimicrobial potential, under optimal conditions. Subsequently, the extracts rich in Quercetin and Myricetin incorporated as natural ingredients in ground beef, with two objectives: to preserve meat, introducing bioactive properties as natural ingredients with preservation capacity. To determine antioxidant activity plant powder were analyzed against 2,2-diphenyl-1- picrylhydrazyl (DPPH) and phosphomolybdate and for the analysis of antimicrobial activity, the inhibitory effects of the extracts against *Escherichia coli*, *Staphylococcus aureus*, and *Klebsiella pneumoniae* were evaluated by using agar well diffusion. Four groups: control (without addition of any additive), meat incorporated with artificial preservative (BHT), meat incorporated with *Moringa oleifera* leaves powder of different concentrations (0.50%, 1% and 1.5%) and for each group were 4 different times were analyzed: 1**,** 4 ,7 and 10 days. The ground beef incorporated with the natural extracts, especially 1.5% concentration, presented a lower lipid oxidation and microbial activity than the meat incorporated with BHT. Overall, the obtained results demonstrate that these extracts could be used in the preservation of meat and meat products replacing the synthetic preservatives, without interfering with nutritional characteristics.

**Keywords**: Moringa oleifera; ground beef; antioxidant; lipid oxidation.

# ANATOMICAL FEATURES OF UROSPERMUM DALECHAMPII L. (ASTERACEAE) VEGETATIVE ORGANS

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## ABSTRACT

*Urospermum dalechampii* L. is a herbaceous species of the Asteraceae family widespread in North Africa. It is widely used in popular medicine for its hypoglycemic and anti-inflammatory properties, and its significant nutraceutical value. Moreover, *U. dalechampii* is a rich source of bioactive compounds that has beneficial effects on human health. The aim of the present research work is to provide detailed informations about the anatomical features of this species. They contribute to its botanical identification and have potential taxonomic significance. Free-hand transverse sections were made at different vegetative organs (leaves, stems and roots) and colored using the Mirande technique. Anatomical examination showed a dorsi-ventral and homogeneous mesophyll. In the midrib, the main vein is composed of collateral bundles arranged in a sole ring. Secondary veins are also observed. The leaf epidermis surface varied in terms of cover hairs. The non-glandular ones appeared on both abaxial and adaxial surfaces of the leaf. The stem and the root showed a secondary anatomical structure. The periderm is present only in the root transverse section. The stem cross-sections have polygonal shape and are characterized by the presence of medullary collateral vascular bundles arranged in a circle. Few of them are observed outside of the circle, toward to cortex region. The intra-fascicular cambium is functional and has given rise to the wood and liber in discontinuous pachyte. The root consists of vascular tissues and the pith region is composed of completely lignified cells. Laticifers are observed in the roots and leaves parenchymas. This anatomical description add valuable information and could contribute to the identification of this potential species.

**Keywords**: Anatomy; Asteraceae; Leaf; Root; Stem; Urospermum dalechampii

# EVALUATION OF THE CYTO-GENOTOXICITY OF PHARMACEUTICAL INDUSTRIAL EFFLUENT IN KANO METROPOLIS, KANO STATE, NIGERIA, USING ALLIUM CEPA ASSAY

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## ABSTRACT

The root cells of Allium cepa were used to assess the cytotoxic and genotoxic effects on Pharmaceutical industrial effluent in Kano Metropolis. The physicochemical characteristics and heavy metal composition of the effluent were assessed and the values obtained were found to be higher than acceptable limits, indicating that it had not been treated before disposal. A set of 45 onion bulbs were grown for 96 hours in the pharmaceutical effluent at different concentrations (2.5, 5.0, 7.5, and 10.0% v/v) to determine the EC50, root growth inhibition, mitotic index, mitotic inhibition and other chromosomal aberrations using the acetocarmine squash technique. Exposure to increased concentrations of the effluents inhibited root growth with an EC50 value of 6.3%. An analysis of variance (ANOVA) revealed a significant difference ($P< 0.05$) in the average root growth of Allium cepa exposed to the various concentrations of the pharmaceutical effluent. Mitotic Index (MI) decreased with increase in effluent concentrations whereas Mitotic inhibition (Mih) increased with increase in effluent concentrations compared to controls. The pharmaceutical effluent induced chromosomal aberrations in Allium cepa root tip cells, particularly sticky chromosomes, Binucleated cells, and Bridge chromosomes being most commonly seen at lower doses of 2.5%. The study has indicated that the effluent has both cytotoxic and genetoxic effects on the root meristem cells of Allium cepa and could have a similar if not the same effect on humans and other animals. This calls for concerted efforts towards ensuring that operators of industries adopt environmentally friendly techniques in handling their effluents before discharging them.

**Keywords**: Allium cepa, chromosomal aberration, cytotoxicity, pharmaceutical effluent, genotoxicity, mitotic index

# BOTANICAL CHARACTERISTICS OF HONEY FROM THE CONTINENTAL REGION OF BOSNIA AND HERZEGOVINA

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## ABSTRACT

Bosnia and Herzegovina (B&H) is represented by three biogeographical regions: continental, alpine and Mediterranean. Each biogeographic area, through a different combination of distinguished ecological factors, determines the horology, seasonal dynamics and chemical composition of the nectar of honey plants. During two growing seasons, 72 honey samples were collected from the continental region for investigation purposes. The preparations were analyzed using the melissopalynological method following the Rulebook on methods for the control of honey and other bee products of Bosnia and Herzegovina. The identification of honey plants in the honey samples is done based on the micromorphological characteristics of the pollen grains. The exact number of pollen grains was determined for each species. In the melissopalinological analysis of 72 honey samples, a total number of 21.600 pollen grains was counted. Based on micropalynological characteristics, 44 honey plant species were identified. During the research period, the species *Robinia pseudoacacia* L. (4248), *Tilia* sp. (3460) and *Castanea sativa* Mill. (3317) showed the greatest potential for honey production. Based on the percentage representation of pollen grains of honey plants in the melissopalynological spectrum, 42 monofloral and 30 polyfloral honey samples were identified. Among the monofloral ones, the most represented honey samples are acacia (15), linden (7) and chestnut (7). In the group of polyfloral samples, the meadow type of honey had the highest frequency (22). The average number of honey plants per sample in the continental region of BiH is 6.43. The distribution of habitats where honey grazing is performed directly affects the melissopalynological composition of the samples, as well as the unique botanical characteristics of honey as a specific reflection of the biogeographical region.

**Keywords**: honey plants, continental region, pollen, melissopalynology

# ETHNOBOTANICAL SURVEY OF MEDICINAL PLANT SPECIES USED IN LIBRAZHD DISTRICT

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## ABSTRACT

Ethnobotanical studies are a relevant source of information on medicinal plant species with significant value in folk medicine. The knowledge of traditional herbal remedies utilized by local communities is an important component of the plant conservation approach. This study aimed at the exploration of traditional utilization of aromatic and medicinal plants in Librazhd district, to improve the ethnobotanical knowledge on this plant species. The survey was carried out based on semi structured questionnaires on the use of 19 plant species belonging to nine families. Lamiaceae was the most represented family with 42% of studied species. The data showed that most of the plants species were used only for medicinal purposes (68.4%) and some of them (31.6 %) were used also in culinary as spices. 67% of responders reported that the main form they use the plants was as herbal tea, and a few of them as paste and use essential oils of these plants. The study revealed that these plants were used to treat a wide range of illness and symptoms such as analgesic, sedative, for skin diseases treatment, diabetes, epilepsy and viral infections. The study identified that approximately 31% of the plant species were the most used in this region. Pharmacological studies on these plant species with high percentage use would assist in the validation of their uses, the potential isolation of plant compounds with therapeutic applications and conservation of most used species.

**Keywords**: ethnobotanic, medicinal plant, folk medicine, Albania

# ANTIOXIDANT ACTIVITY OF THAPSIA GARGANICA

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## ABSTRACT

*Thapsia garganica* is a medicinal plant belonging to the Apiaceae Family, commonly known in Algeria as Derias. this plant contains several bioactive compounds, some of whic may have antioxidant proprties. The antioxidant activity of essential oils of *Thapsia garganica* using the powder of aerial parts can be evaluated using the DPPH (2,2-diphenyl-1-picrylhydrazyl) test, it is a free radical that has a dark purple color in solution. When it reacts with antioxidants, it loses an electron, and its purple color disappears, indicating its antioxidant power. The findings from antioxidant activity analysis revealed that the plant beinng studied demonstrated a high activity, showing an Inhibition percentage I of 78.3 % when compared to Ascorbic Acid as control, which exhibited 82.17% Inhibition at the highest concentration.

**Keywords**: Thapsia garganica, antioxidant activity, DPPH, Inhibition

# PHYTOCHEMICAL SCREENING OF THE MEDECINAL PLANT ANASTATICA HEIROCHUNTICA

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## ABSTRACT

*Anastatica hierochuntica* (Family: Brassicaceae) locally called (Kaff-e-Maryam), is a well known desert zone medicinal plant. All parts of *A. hierochuntica* are famous and used in Traditional medicine to provide cure against various disease such as uterine haemorrage, menstrual cramps, and depression, and this is due to the presence of the active substances and their various medicinal properties that can play a role in the treatment of these diseases. This work aims to detect the qualitative presence of some secondary metabolites in a Brassicaceae family plant. The areal parts of *Anastatica hierochuntica* were washed with distilled water, shade dried and ground. The finely ground plant powder was used in preliminary phytochemical tests to indicate the presence or absence of certain compounds belonging to the chemical families of secondary metabolites. The phytochemical screening revealed the presence of saponins, glycosides, flavonoids, and tannins. As a result, *Anastatica hierochuntica* is a plant rich in bioactive molecules, which gives it significant therapeutic and pharmacological activity.

**Keywords**: Anastatica hierochuntica, medecinal plant, secondary metabolites, phytochemical screening

# TRADITIONAL USAGE OF OLIVE (OLEA EUROPAEA L.) IN THE AEGEAN REGION OF TÜRKIYE

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## ABSTRACT

Ethnobotany, as a scientific discipline, investigates the historical and contemporary uses of plants by human societies. Its primary objective is to illuminate the plants employed by local communities, encompassing their vernacular names, purposes, and utilization methods. Furthermore, ethnobotany aims to document these traditional knowledge systems, ensuring their preservation and transmission to future generations through written records. In Türkiye, ethnobotanical usage of plants is widespread, and this study focuses on exploring the ethnobotanical utilization of the olive tree (*Olea europaea* L.) in the Aegean region. For this investigation, we compiled a comprehensive dataset by referencing previous scientific studies conducted in the Aegean region, covering diverse time periods, thus enabling a thorough exploration of the subject matter. The analysis revealed that the olive tree has been a focal point of ethnobotanical research in numerous provinces across the Aegean region. According to the dataset, various morphological parts of the olive tree have been ethnobotanically utilized, including leaves, fruits, seeds (kernels), shoots, and stems. Among these parts, fruits are the most extensively employed, while stems are the least utilized. The most common uses of the olive tree pertain to medicinal applications and crafts. Notably, the fruit and leaf components are predominantly used. The studies indicate that olive fruits and leaves are widely employed for the treatment of diabetes, hypertension, hypercholesterolemia, and wound healing. In conclusion, this study provides valuable insights into the ethnobotanical practices related to the olive tree in the Aegean region of Türkiye. The findings contribute to the preservation of traditional knowledge associated with the olive tree's uses and may serve as a resource for further research and conservation efforts.

**Keywords**: Ethnobotanical practices, Local communities, Medicinal uses, Cultural knowledge, Conservation

# THE FLORISTIC VALUES OF 'NARTË - PISHË PORO' PROPOSED NATURA 2000 SITE IN ALBANIA

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## ABSTRACT

The Nartë-PishëPoro is proposed as a Natura 2000site in Albania with a surface of 235.4 km2, situated along the Adriatic Sea shore, on both sides of Vjosa River and its delta. Two existing national protected areas are included in the site, namely the 'Vjosë-Nartë Protected Landscape" and the "Pishë Poro Managed Nature Reserve" (Category V and IV according to IUCN criteria). In this study we aim to describe its floristic richness, important species distribution, and the existing pressures and threats with mapping display of their normalized values. Thus values will testify of the site's uniqueness which fulfills the scientific requirement for sites of interest of European Community. As result, were identified 770 species of which 757 species phanerogams, 6 species ferns and 6 species algae.120 species of this floristic richness have a conservation status according Albanian Red List and/or IUCN. Specifically, 41 species are part of Albanian Red List, 99 species of IUCN, and 20 species have a conservation status according to Albanian Red List and IUCN. There are reported 4 species of annex II, IV and V of Habitats Directive and two species of annex I of Berne Convention. *Galatella albanica, Achillea baldaccii* and *Silene cephallenia* are three subendemic species found in the area; *Halopeplis amplexicaulis, Isoetes histrix, Arthrocnemum perenne, Chamaemelum fuscatum, Euphorbia pinea, Glycyrrhiza glabra, Sphenopus divaricatus, Ononis variegate* and *Thymelaea hirsuta* occur only in this site in the whole country. The estimated floristic richness of conservation interest species are given numerical values to carry out statistical processing which are reflected in maps of normalized species values, according to the request and instructions of Article 17 of the Habitats Directive. Also, it was estimated 4 main pressures and threats for floristic values of the study area, which are: intensive maintenance public parks/cleaning of beaches, forestry clearance, actively burning down existing vegetation and invasive non-native species. The maps of normalized threats values were designed as well.

**Keywords**: Nartë-Pishë Poro, Natura 2000, floristic values, species of conservation interest, normalized maps

# EUNIS HABITATS OF HIGH ANTHROPOGENIC IMPACT IN THE WATERSHED OF THE MIDDLE SECTION OF THE DEVOLL RIVER

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## ABSTRACT

The study aims to describe and map the habitat types of watershed of the middle section of the Devoll River where the human activity is very high and transformative, using EUNIS classification. Results show that 26.5% of the study area is covered by habitats of high human activity. Among them, semi natural habitats created as result of high and persistent human activity occupy 11% and are represented by E5.3(*Pteridium aquilinum fields*), G4 (*Mixed deciduous and coniferous woodland*), G1.7C2 (*Carpinus orientalis woods*) and artificial habitats such are agricultural area and villages occuly 14% and are prepresented by J1 (*Buildings of cities, towns and villages)* and X25 (*Domestic gardens of villages and urban peripheries*). The habitat type C1.33 (*Rooted submerged vegetation of eutrophic waterbodies*) represents the aquatic habitats with rooted macrophytes of artificial ponds and lakes. Hydropower dams constructed in Moglicë village and Banjë turned a huge area of Devoll River flow into permanent lakes with high fluctuation of water level and with few pioneer and ephemeral vegetation in the lake shore. A notable area of Devoll River is transformed in permanent lakes due to the Moglicë and Benja Hydropower constructions. Therefore, due to high water fluctuation, in the lakeshore few pioneer and ephemeral vegetation, are present. Habitats C1.2 (*Permanent mesotrophic lakes, ponds and pools*) and C3.5 (*Periodically inundated shores with pioneer and ephemeral vegetation*) are present in these man made permement lakes. Although human activity is high, the habitat G4 is very rich in plant species, among them many species are with conservation interest such as *Anacamptis pyramidalis, Juniperus oxycedrus, Hypericum perforatum, Orchis sp., Ophrys sp.,* etc.

**Keywords**: EUNIS habitats, human activity, watershed of Devoll River, plant species of conservation interest

# REDISCOVERY OF A TAXON LOST FOR NEARLY SIXTY YEARS IN TURKEY: AEGILOPS COMOSA SM. SUBSP. HELDREICHII (HOLZM. EX BOISS.) EIG

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## ABSTRACT

The genus *Aegilops* L. consists of 24 species in the world. It constitutes the primary and secondary gene pool for cultivated wheat. Species in the genus are distributed in Southwest and Central Asia and throughout the Mediterranean basin. A primary center of diversity of *Aegilops* is considered to be the Fertile Crescent because a more significant number of *Aegilops* species are found there than in other areas. Türkiye is one of the key countries for diversity of the genus in the world, harboring 17 *Aegilops* species. A novel record of *Ae. comosa* Sm. subsp. *heldreichii* (Holzm. ex Boiss.) Eig, a taxon not seen for sixty years and presumed to be extinct in Turkey, was recently found in Istanbul again. With this new rediscovery, the presence of this taxon in Turkey is confirmed. In this study, the current conservation status of *Ae. comosa* Sm. subsp. *heldreichii* is reassessed nationally by using IUCN Red List categories and criteria. We also provide detailed information on its ecology and phenology in Turkey.

**Keywords**: Botanical, Taxonomy, Aegilops, Heldreichii, Rediscovery, Türkiye, IUCN

# EVALUATION OF TOTAL PHENOLIC SUBSTANCE AND FLAVONOID CONTENTS OF AQUEOUS AND METHANOLIC EXTRACTS OF HELICHRYSUM ARENARIUM PLANT

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## ABSTRACT

*Helichrysum arenarium* is a perennial herbaceous plant belonging to the Asteraceae family and is widely found in Europe, Central Asia, and China. Helichrysum, popularly known as immortelle and golden grass, has been used in folk medicine for thousands of years due to its many medicinal properties. The flowers are rich in phenolic compounds, including flavonoids, chalcones, phenolic acids, coumarins and pyrones. Besides polyphenols, other compounds such as sterols, lignans and glycosides of aromatic compounds have also been isolated from H. arenarium. Their use in various therapeutic applications such as anti-inflammatory, antibacterial, antiviral, antifungal, antiallergic, hepatoprotective, choleretic, spasmolytic and wound healing has been proven by scientific experimental results. In Turkey, it is used in many areas as a cold, spasmolytic, diuretic, wound healing, liver ailments, gallbladder disorders, diabetes treatment and as an antibacterial agent. Studies have shown that the most important group of compounds responsible for biological activities are flavonoids. This group of compounds has been shown to have antibacterial, antiviral, anti-inflammatory, antiallergic and vasodilator activities because of biochemical and pharmacological applications. In addition, flavonoids have effects on lipid peroxidation, platelet aggregation, capillary permeability, as well as inhibitory effects on cyclooxygenase and lipoxygenase enzyme systems. In this study, it was aimed to determine and mutually evaluate the contents of phenolic substances and flavonoids, which are the compounds responsible for the biological activities of the H.arenarium plant, in the aqueous and methanolic extracts of the plant. The total amount of phenolic substance; The absorbance of the samples prepared by the Folin Ciocalteu method was measured at 750 nm in the spectrophotometer and the results were calculated as gallic acid equivalent (mg GAE/g) was calculated. The total amount of flavonoid substance was calculated as the quercetin equivalent (mgQE/g) using the aluminum chloride colorimetric method with an absorbance of 415 nm. In our study, the flavonoid ratio of the methanolic extract prepared from the aerial part of the H.arenarium plant was 152.43±1.82 mgQE/g; It was determined that the flavonoid content of the aqueous extract was 26.84 ±0.84 mgQE/g, the phenol content of the methanolic content was 65.66 ±5.57 mgGAE/g, and the aqueous extract had a phenol content of 40.68±4.93 mgGAE/g.

**Keywords**: Helichrysum arenarium, flavonoid, phenolic

# DETERMINATION OF MORPHOLOGICAL AND MOLECULAR PHYLOGENETIC PROPERTIES OF SOME VICIA L. (FABACEAE) TAXA GROWING IN EUROPEAN TURKEY USING DNA SEQUENCING

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## ABSTRACT

In this study, the relationships of 13 taxa in the genus *Vicia* of the Fabaceae (Leguminosae) such as *V. articulata*, *V. cracca* subsp. *cracca*, *V. cracca* subsp. *gerardii*, *V. cracca* subsp. *stenophylla*, *V. crocea*, *V. hirsuta*, *V. meyeri*, *V. parviflora*, *V. sibthorpii*, *V. tetrasperma* and *V. villosa* subsp. *dasycarpa*, *V. villosa* subsp. *eriocarpa* and *V. villosa* subsp. *villosa* collected in different localities in European Turkey (Turkey) and have been addressed based on systematic and phylogenetic properties in ITS sequence. Phylogenetic relationships were constructed using bioinformatic tools based on molecular data of ITS sequence. Genomic DNAs were isolated from basal leaf cells of fresh plant samples collected from the field and the ITS regions were amplified by previously prepared primers. The data obtained in the abi format by sequencing of the amplified DNA regions were evaluated by applying bioinfomations and phylogenetics programs. CLUSTALW2 program were used to determine the leveling of the species in question within the other *Vicia* species. The phylogenetic trees were built by using the Neighbour Joining, UPGMA ve Maximum likelihood methods of MEGA 4,0 (STABLE) and PAUP 4.0 programs. The data obtained from the distance matrix table and phylogenetic trees were compared with the classical taxonomical data.

**Keywords**: Fabaceae, Vicia L., ITS, Filogeny, European Turkey

# CHARACTERIZATION AND PHYLOGENY OF OPHRYS L. (ORCHIDACEAE) SPECIES WITH MOLECULAR MARKERS GROWING IN EUROPEAN TURKEY

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## ABSTRACT

In this study, molecular phylogenetic analysis were carried out on total 21 wild genotypes consist of 12 taxa belonging to *Ophrys* L. genus naturally growing in European Turkey. For this purpose, phylogenetic analyzes were carried out using markers with high polymorphism ratios, in order to reveal the genetic characterization efficiently. In the first step, genomic DNA were isolated of the samples. Then, the purity and concentrations of the DNAs determined by spectrophotometric measurements were selected and diluted for optimisations. Later, polymerase chain reactions (PCR) were polymerase chain reactions (PCR) were performed with selective molecular markers and the amplification of the primers with optimized temperature ratios in the determined samples was carried out. According to the results obtained from 3 different marker systems used in the study, a total of 28 primers were used. A total of 582 loci were evaluated in the fragment analysis. An average of 21 band fragments per primer were analyzed. The highest number of loci evaluated was 35 (IRAP-5) and the lowest number of loci was 7 (IRAP-8). While the number of polymorphic band fragments was 516 loci in total, this number was found to be 19 loci per primer. Polymorphism rate was calculated as 87% when all markers were evaluated together. The highest polymorphism was calculated as 100% (IRAP-**1** IRAP-9, IRAP-11 and REMAP-6) and the lowest polymorphism rate was 72% and 73% (REMAP-2, REMAP-4, REMAP-9 and ISSR-2). . Maximum bp between 5000 (REMAP-1) and 1000 (ISSR-3); the minimum bp varied between 850 (IRAP-9) and 270 (REMAP-10). Polymorphism information content (PIC) ranged from 0.500 (IRAP-4, IRAP-6, REMAP-6) to 0.363 (REMAP-9) on average, while the average PIC coefficient was calculated as 0.475. Molecular polymorphism measurements were made by using present (1) or absent (0) of the band profiles obtained as a result of agarose gel electrophoresis, and Jaccard similarity matrices were formed for determine the genetic diversity rates. UPGMA dendrograms will be produced with Jaccard similarity coefficient, and also maximum likelihood and neighbour joining cladograms generated. Principle Component Analysis (PCA) and AMOVA (analysis of molecular varience) graphs evaluated. Phenotypic variance matrices formed by using Pearson coefficients determined of the data obtained from the morphological measurement results. Our results reporting that retrotransposon-based markers have been used successfully in phylogenetic analysis of taxonomic groups in orchids. Our retrotransposon-based phylogenetic results; It is a source for biodiversity research with the detection of variations in close species and subspecies categories, classification for biochemical and medicinal aromatic contents.

**Keywords**: Orchidaceae, Ophrys, Retrotransposons, Genetic Diversity, Molecular Polymorphism.

# SOME ENDANGERED ENDEMIC PLANTS IN THRACE REGION: A REMOTE SENSING APPROACH WITH UAV IMAGERY

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## ABSTRACT

Endemic plants need protection due to their rarity. This protection should be more serious if these rare species are in endangered status due to various reasons. Some of the endemic plants in Thrace Region also have big potential for pharmaceutical and medical science. This is another important reason to protect them besides protecting the regions flora due to extinction threat. Therefore, a remote sensing with uav imagery can be a solution firstly for identifying fastly then taking precautions effectivly against the danger. Until now, endemic plants in Turkiye's Thrace Region were only detected by eye during field trips. Since these plants have small size, its nearly impossible to identify them from satellite imagery. A high resolution UAV imagery can be a solution for detecting these plants. This imagery also can be used for mapping and this map can involve statistical data such as the coordinates of the endemic plants and the number of them in a certain area. In this way, important inferences such as the endemic plant density in the region and the change in the number of plants according to time can be collected. These collected statistical data can show the state of endangered endemic plants in Thrace Region.

**Keywords**: Remote Sensing, Endemic Plants in Thrace Region, UAV Imagery, Mapping

# DESIGN OF A TWO-WHEELED SELF-BALANCING ROBOT CONTROLLED BY VOICE

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## ABSTRACT

This study encompasses the design, construction, balancing, and voice command-based control of a two-wheeled self-balancing robot. The robot, statically unstable but dynamically stable, is based on the inverse pendulum system. The PID control method was used to maintain the robot's balance and control its movements. The PID controller corrects the error between the actual tilt angle and the desired set point by regulating the speed of the DC motor, thus maintaining the robot's balance. Additionally, an Inertial Measurement Unit (IMU), which combines accelerometer and gyroscope measurements to determine and measure the robot's tilt angle, was used. The IMU measures angular acceleration and angular velocity via accelerometers and gyroscopes, and the necessary calculations are made by applying a Kalman filter to these values. Four commands were used in the control of the robot. These commands were defined to the EasyVR voice recognition card through a throat microphone. EasyVR Commander, the graphical interface program of the EasyVR voice recognition card, was used to define these commands. After the voice commands are converted into digital signals by the voice module, they are transmitted to the robot via the Bluetooth module.

**Keywords**: Balance Control, Inverted Pendulum, PID Controller, Kalman Filter, Voice Recognition.

# DESIGN OF A SELF BALANCING SINGLE WHEEL ROBOT

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## ABSTRACT

Self-balancing single-wheeled robots have been an important research topic in the fields of robotics, dynamic balance, control theory, and mechatronic systems. Single-wheeled mobile robots are inherently unstable and non-linear, which makes balancing difficult. In this study, a PID controller is used to control the balance of the single-wheeled robot. In addition, the balancing mechanism is designed separately, assuming that both roll and pitch dynamics are separated in the study. The self-balancing single-wheeled robot consists of a reaction wheel and a wheel for balancing and forward/backward movement, and also pitch and roll angles are measured by the IMU sensor and used for balancing by applying a complementary filter algorithm to these measured data. The reaction wheel pendulum method is used to balance the roll axis, while the inverted pendulum method is used to balance the pitch axis. As for balancing control, the motor control on the reaction wheel and wheel is based on the feedback of the measured pitching and rolling angles from the IMU sensors. The prototype of the single-wheeled robot is designed, produced, and controlled.

**Keywords**: Self-Balance, Single-Wheeled Robot, Complementary Filter, PID Control, Arduino.

# INVESTIGATION OF THE VIBRATION DAMPING PROPERTIES OF ALUMINUM COMPOSITE FOAM

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## ABSTRACT

In recent years, aluminum metal foam materials have come to the forefront with their light structures, high energy absorption capabilities, very good sound absorption capacities and higher compression strength compared to other cellular metals due to their porous structure. In this study, the vibration damping ability of aluminum composite foam materials produced using EN AW 5754 alloy and SiCp (500 mesh) as reinforcement was investigated. Aluminum alloy and rubber materials were also used in the experiments in order to compare their vibration damping capabilities. The prepared samples were subjected to sinusoidal frequency scanning test with constant acceleration amplitude in the determined frequency ranges, and then dynamic elastic modulus curves were obtained. When the dynamic elastic modulus curves of the samples were compared, it was seen that the dynamic elastic modulus of the aluminum composite metal foam material was higher than the dynamic elastic modulus of the rubber material, which is frequently used as a damping element in the industry, but lower than the dynamic elastic modulus of the aluminum alloy material. When the data obtained as a result of this study are evaluated, it has been observed that the vibration damping ability of aluminum metal foam materials is better than aluminum alloy, but lower when compared to rubber material. In short, it has been concluded that the use of aluminum foam materials as a vibration damping element will not yield effective results, since it is not possible to return to the equilibrium state in a short time when exposed to repetitive forces, but this material can be used for vibration isolation.

**Keywords**: Metal Foam, Vibration Analysis, Damping, Sound Absorption

# MODAL ANALYSIS OF CARBON FIBER COMPOSITE SANDWICH PLATES

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## ABSTRACT

Various experimental methods are used to prove the accuracy of the theories used in determining the static and dynamic behavior of structures. Natural frequencies, mode shapes and damping ratios, which are called dynamic characteristics, are the elements that determine the free vibration characteristics of the structure. This characteristic depends only on the physical properties of the system and helps in determining the response of the structure under coercive forces. In this project, sandwiches, the usage areas of which are increasing day by day, it is aimed to make dynamic analysis of beams and plates. For this purpose, vibration and modal analysis of sandwich beams and plates formed from different materials by bonding method were carried out under different supporting conditions. The vibration behavior of sandwich beams and plates is calculated theoretically and the results are presented.

**Keywords**: modal analysis, carbon fiber, composite sandwich plates, vibrations

# AN EXPERIMENTAL STUDY ON THE COMPARATIVE ANALYSIS OF PV AND PV/T SYSTEMS IN EDIRNE-TURKEY CLIMATIC CONDITIONS

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## ABSTRACT

The ideal operating temperature of photovoltaic panels is calculated as 25ºC. Each 1ºC temperature increase in the photovoltaic panel reduces electricity production by 0.45%. In this case, PV/T systems gain importance to benefit from this heat obtained in the photovoltaic panel and to cool the photovoltaic panel. In this study, the annual performance of the PV and PV/T systems that can be used integrated to the buildings were experimentally investigated for Edirne-Turkey climate conditions. An off-grid PV and PV/T system with solar air heating collector were installed in Trakya University Engineering Faculty. Annual energy production of the systems has been comparatively examined. The results showed that electricity production of the PV/T system in 2021 was 12% more than the regular PV system, however it is not cost effective if there is no need for heating. The solar air heater produced 783 kWh of thermal energy during the heating season.

**Keywords**: Solar energy, PV, PV/T, Off-grid

# NUMERICAL COMPARASION OF METHANE COMBUSTION IN A TUBE BURNER FOR DIFFERENT COMBUSTION MODELS

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## ABSTRACT

In this paper, methane fuel combustion in a tube burner was predicted with the use of Fluent code. Two different combustion models, namely the eddy dissipation model and the non-premixed model with chemical equilibrium, were used for the calculations. The results were compared with the experimental data in terms of temperature values in the center of the tube burner. The comparison between the predictions and the experimental data proves that the eddy dissipation model is able to give more satisfactory results than the other model. The eddy dissipation model predicts the maximum flame temperature higher than the experimental data since it does not take into account the intermediate species, while it is still able to predict the flame position more accurately than the other model. It is determined that the assumption of the chemical equilibrium of the non-premixed combustion model leads to false predictions, especially for the premixing zone of fuel and air in the entry of the burner.

**Keywords**: Natural Gas, Combustion, CFD

# MEDICAL PLANTS USED IN BIODYNAMIC AGRICULTURE AND PHYTOSANITARY

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## ABSTRACT

With the existence of humanity, nutrition has taken the first place among the basic needs. The existence of agriculture cannot be ignored from the researches carried out in different geographies of the world and in our country, where the first determinations were made that people lived together, to the ruins of Göbekli Tepe in our country, until today's modern age. Increasing popularity and global warming with the industrial revolution in the 18th century caused people to realize the ecological deterioration on the earth, and accordingly, saving ecology and the world has become one of the main topics of current issues. Production of plant and animal products, increasing their quality and efficiency, keeping these products in appropriate conditions, processing, evaluating and marketing are the basic issues of today's agriculture. It is a well-known fact that the development of industry in Europe has progressed from the green revolution to the present day, with the aim and methods of agriculture in different schools. The proof of the negative effects of pesticides used in the past years on human health, the damage to the environment, the most important input cost in production has led to the development and dissemination of production models such as ITU, Organic Agriculture, EKUY (Integrated and Controlled Product Management). The biodynamic farming system was built in 1924 on an anthropological theory based on Rudolf Steiner (philosopher) and E. Pfeiffer (agronomist) and the concept of man-nature-universe. Biodynamic farming is familiar with organic farming. Basically both are due to the opposing viewpoint on the use of chemical inputs (fertilizer, pesticide, herbicide, hormone, etc.). The basic ecological principle of biodynamic agriculture is that it thinks of the farm as an organism and a self-contained entity. Organic farming, home-made products, safe and traceable foods, and ancient time teachings (old knowledge) have come to the fore in societies that have returned to themselves with the effect of the Covid 19 pandemic. prepared to compile the teachings.

**Keywords**: Biodynamic agriculture, pesticide, Yarrow , Chamomile , Nettle , Oak Bark , Dandelion Flower , Valerian

# ECONOMIC ANALYSIS OF THE USE OF MONOCRYSTALLINE AND BIFACIAL PV PANELS IN THE SOLAR ENERGY SYSTEM TO BE ESTABLISHED FOR IRRIGATION IN AN AGRICULTURAL LAND

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## ABSTRACT

Recently, aridity has been increasing in agricultural areas in many countries of the world due to global warming and climate change. With the decrease in precipitation, crop growth and food safety are negatively affected. Due to the increase in energy costs, the use of renewable energies in agricultural irrigation is of great importance. Electricity generation from solar energy is becoming widespread in many regions of our country. Investment costs and amortization periods for solar energy systems to be installed in agricultural irrigation vary depending on the photovoltaic panel type. In this study, an economic analysis of a 9.2 kWh solar energy installation for agricultural irrigation was made by selecting a field in Yolüstü village of Edirne as the location. In case of choosing monocrystalline and bifacial photovoltaic panels, the energy values and investment costs to be obtained from the solar energy system were examined. Based on the simulation study, it has been seen that choosing a monocrystalline photovoltaic panel for solar energy installation in this location is more suitable in terms of investment cost and depreciation time.

**Keywords**: Solar Energy, Photovoltaic Panel, Agricultural Irrigation, Economic analysis

# PHOTOVOLTAIC PANEL ENERGY FORECAST ON WEEKLY PERIOD USING SUPPORT VECTOR REGRESSION(SVR) METHOD

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## ABSTRACT

In today's conditions, interest in solar energy systems, which is a sustainable clean energy technology, is increasing due to global climate change, negative effects caused by fossil fuels and economic problems. Among the research topics related to solar energy technologies, especially the photovoltaic energy production estimation, the creation of circuit components, system efficiency and control remain up-to-date. Forecasting its generation in solar energy applications plays a large role in planning and managing future electrical power generation. These predictions are used to ensure that solar power plants operate at optimum efficiency, energy demands, and stabilize energy prices. For this reason, it is aimed to estimate the weekly electrical energy production estimates of photovoltaic (PV) panels with the Support Vector Regression (SVR) Algorithm, one of the traditional machine learning algorithms. Linear, Radial, Polynomial and Sigmoid kernel functions were used to perform the predictions. Depending on these functions, the performance metrics Mean Square Error (MSE), Root Mean Square Error (RMSE), Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE) and R-Square ($R^2$) were calculated. In this study, it was determined that the kernel function with the best performance metrics of the Support Vector Regression (SVR) algorithm is the radial kernel function. Therefore, it is recommended to use the SVR algorithm with the radial kernel function for electrical energy production forecasting in the weekly period.

**Keywords**: Solar energy, machine learning, support vector regression, photovoltaic panel

# LC-MS/MS METABOLOMICS-BASED PROFILING OF ALBIZIA ANTHELMINTICA LEAVES EXTRACT AND EVALUATION OF ITS. ANTIOXIDANT, AND ANTIMICROBIAL

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## ABSTRACT

The Albizia genus, belonging to the Fabaceae family, is a taxonomically complex group of species commonly used in traditional medicine. These plants are recognized for their abundance of bioactive secondary metabolites, including flavonoids, tannins, saponins, terpenes, and alkaloids. Traditional uses of Albizia species encompass the treatment of various ailments such as diarrhea, cough, anxiety, depression, insomnia, rheumatism, and wounds, as well as inflammatory and ROS-related disorders. Additionally, the flowers and leaves of different Albizia species have been employed in the management of liver and digestive disorders. One such species is *Albizia anthelmintica* (A. Rich.) Brongn., a deciduous tree found predominantly in tropical and subtropical regions of Africa. In folk medicine, *Albizia anthelmintica* has been specifically used for gastrointestinal conditions, including Taeniasis, an infection caused by adult tapeworms of the Taenia genus, as well as stomach worms, stomach pain, and diarrhea. This study focused on the LC-MS/MS analysis of *Albizia anthelmintica* leaf extract originating from Tanzania, resulting in the identification of approximately 50 compounds. Notably, major constituents included kaempferol glucoside arabinoside, kaempferol glucoside, Kaempferol rhamnosyl *p*-coumarylrhamnosyl-glucoside, and Kaempferol rhamnoside-ferulyglucosyl-rhamnoside, along with phenolic acids and other flavonoids. Furthermore, the leaf extract exhibited robust antioxidant properties as demonstrated by three widely used assays: 1, 1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging activity assay, [2,2'-azinobis (3-ethylbenzothiazoline-6-sulphonic acid)] (ABTS) free radical scavenging activity assay, and Ferric ion Reducing Antioxidant Power (FRAP) assay.

**Keywords**: Albizia anthelmintica, chemicals composition, LC-MS/MS, anti-antioxidant activities.

# MODELING THE ANTIVIRAL POTENTIAL OF GINKGO BILOBA POLYPHENOLS FOR VARIOLA TREATMENT: IN SILICO INSIGHTS AND CANDIDATE SELECTION.

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## ABSTRACT

The study aims to model and estimate the antiviral activity of natural molecules from *Ginkgo biloba* for treating variola, a zoonotic disease posing a global threat. Due to its recent spread in non-endemic countries and potential bioterrorism use, finding new antiviral therapies with reduced side effects is crucial. Molecular docking was employed to investigate the interactions between polyphenolic compounds from *Ginkgo biloba*, known for their antiviral properties, and two variola treatment enzymes (*Var*TMPK and *Hss*TMPK). Docking scores indicated several ligands with high inhibitory potential among the 152 selected polyphenolic compounds. Liquiritin and Olivil emerged as the top candidates for *Var*TMPK inhibition, exhibiting superior scores and no Lipinski's rule violations compared to reference ligands. Ginkgolic acids demonstrated favorable affinities with *Hss*TMPK and acceptable physicochemical properties for oral drug administration. Multiple molecules showed promising results for both enzymes, suggesting the potential for multi-targeting and highlighting the antiviral properties of *Ginkgo biloba* and selected polyphenols. These findings underscore the need for further exploration of these compounds as antiviral agents. Validation and scaling up of these results require additional in-vitro and in-vivo experimental studies.

**Keywords**: Variola treatment, Ginkgo biloba, polyphenolic compounds, antiviral activity, molecular docking

# ANTIOXIDANT PROPERTIES AND PHENOLIC PROFILE OF SELECTED ALGERIAN HONEYS: A COMPARATIVE STUDY

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## ABSTRACT

This study aimed to investigate the antioxidant properties of 14 selected Algerian honeys produced by *Apis mellifera*. The specific objectives were to determine the total phenolic and flavonoid content and evaluate the correlation between these compounds and the honey's antioxidant activity. The total phenolic content was determined using the Folin-Ciocalteu reagent, and the total flavonoid content was measured using aluminum chloride. The antioxidant activity of the honey samples was evaluated using two methods: the 2,2-diphenyl-1-picrylhydrazyl free radical scavenging assay and the ferric reducing power assay. The total phenolic content in the honeys ranged from 8.95 to 156.6 mg EGA/100g of honey, while the total flavonoid content varied from 1.71 to 10.10 mg EQ/100g of honey. Eucalyptus honey exhibited significant antioxidant activity, whereas thistle honey, wild carrot honey, and jujube honey showed comparatively lower antioxidant activity when compared to eucalyptus honey. A significant correlation was found between the two antioxidant evaluation methods. The presence of phenolic compounds and flavonoids in honey contributes to its biological and functional activity. Honeys rich in these compounds exhibited higher antioxidant activity. This study highlights the considerable antioxidant potential of eucalyptus honey and provides insights into the antioxidant properties of different honey types. Understanding these properties can have implications for their utilization in various applications in the food and health industries. Further research in this field can help explore the specific mechanisms underlying the antioxidant activity of honey and its potential health benefits.

**Keywords**: Algerian honeys, phenolic compounds, flavonoids, antioxidant properties, health benefits

# SYZYGIUM CUMINI: LC-MS/MS PROFILING AND INVESTIGATION OF ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF ITS LEAVES EXTRACT

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## ABSTRACT

*Syzygium cumini*, commonly known as Java plum or Jamun, is an evergreen shrub with various medicinal applications. It has traditionally been used to treat dysentery, menorrhagia, cough, and cold. Antimicrobial resistance is a global health concern that threatens our ability to treat various infectious diseases effectively. Plant extracts offer a unique and useful source of bioremedies for controlling antimicrobial resistance and reducing the likelihood of resistance development when applied as a synergist with other antibiotics. This study aimed to investigate the antimicrobial activity of eight Bangladeshi plants against a panel of severe human pathogenic microorganisms, including *Bacillus subtilis*, MRSA NCTC, *Staphylococcus auricularis*, *Enterococcus faecalis*, *Streptococcus pyogenes*, *Escherichia coli* ATCC, *Klebsiella pneumoniae*, and *Candida albicans*. This study also evaluated its antioxidant potential using established assays, such as 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulphonic acid) (ABTS) radical scavenging assays. Furthermore, the phytoconstituents in the most bioactive extract were characterized using liquid chromatography-tandem mass spectrometry (LC-MS/MS). Among the tested plants, *Syzygium cumini* exhibited the highest antimicrobial activity against all tested microorganisms with MIC ranging between 16µg/Ml and 4096µg/mL, The extract furnished promising antioxidant activities in both assays. The analysis revealed the presence of 90 compounds, with a predominant abundance of hydrolyzable tannins, condensed tannins, as well as other phenolic acids and flavonoids. These findings highlight the potential of *Syzygium cumini* as a valuable source of antimicrobial and antioxidant agents.

**Keywords**: Syzygium cumini, antimicrobial activity, antioxidant potential , LC-MS/MS Profiling

# SYNTHESIS AND CHARACTERIZATION OF AMPHIPHILIC FLUORESCENT POLY(B-AMINO ESTER) FOR COMBINED THERAPY IN CANCER TREATMENT

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## ABSTRACT

Cancer is one of the most challenging diseases of modern medicine and is the cause of about one in six deaths worldwide1. Imaging and targeting the cancerous region in individuals and increasing the drug level in the cancerous region with selective systems are very important for the treatment of the disease. Fluorescent dyes offer significant advantages in applications such as in vivo imaging, photodynamic therapy (PDT), and drug release monitoring. Compared with conventional fluorescent dyes, boron complexes of dipyrromethene (BODIPY) and azadipyrromethene (aza-BODIPY) have strong absorption in the visible region, narrow emission band with high quantum yield, good physiological and photochemical stability2-3. It is known that the absorption and emission maxima of aza-BODIPY derivatives approach approximately 100 nm further infrared when compared to BODIPY2. It seems that aza-BODIPYs are more advantageous for studies in biological environments, since light in the near infrared region can penetrate biological environments to a certain depth. Fluorescent polymers are defined as polymers containing fluorophore groups in their structure. Fluorescent materials are needed for chemical identification and follow-up processes in the health field as well as in many fields and thanks to their fluorescent properties, such polymers are frequently used in chemical identification and tracking processes. There is increasing interest in the design and synthesis of biodegradable and well-dispersed/soluble fluorescent polymers in biomedical fields such as drug delivery, imaging, diagnostics, and tissue engineering. Poly(β-amino esters) have recently attracted great attention due to their biocompatibility and biodegradability. In this study, amphiphilic, biocompatible, biodegradable and pH-sensitive poly(β-amino esters) with containing the aza-BODIPY molecule that can ability to absorbs/radiates near-infrared (NIR) light in their structure have been synthesized. Synthesis of fluorescent amphiphilic PBAEs was carried out by Michael addition reaction by one-pot method. In the amphiphilic polymers, the hydrophobic segment consists of 4-4'-trimethylenedipiperidine, aza-BODIPY and 1,4-butanedioldiacrylate, while the hydrophilic segment consists of poly(ethylene glycol) diacrylate (PEGDA, Mn 700 Da) and 5-amino-1-pentanol. Moreover, the end groups in polymers are functionalized with amino folate, a ligand molecule that can target cancer cells. Characterization of amphiphilic fluorescent polymers was performed by NMR, FT-IR, UV-Vis and fluorescence spectroscopy.

**Acknowledgement:** This study was supported by the financial project support of the Scientific and Technological Research Council of Turkey (TÜBİTAK) with the project code '120Z966'.

**Keywords**: Fluorescent polymer, poly(β-amino esters), aza-BODIPY, combined therapy, micelle.

# COMPARISON OF DIFFERENT EXTRACTION METHODS AND HPLC-DAD METHOD DEVELOPMENT FOR SIMULTANEOUS DETERMINATION OF ANTHRAQUINONES IN MADIMAK (POLYGONUM COGNATUM MEISSN.) PLANTS

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## ABSTRACT

*Polygonum cognatum* Meissn, known as 'Madımak, Kuşekmeği, Madımalak, Kayışkıran' in Turkey, is a perennial plant that belonging to the *Polygonaceae* family. The plant grows spontaneously in both agricultural and non-agricultural areas in our country. *Polygonum cognatum* is cooked by local people and consumed in soups and meals, in addition by making salad from raw leaves. The plant is effectively used for treatment of various diseases as diuretic, analgesic, gynecological and skin diseases in the central parts of Turkey. Several biological activities such as antioxidant, antimicrobial and anticancer have been reported in the previously studies. Anthraquinones are important members of the quinone family found in plants, insects, bacteria, fungi and lichens and are the group of natural compounds found in abundance in nature. These secondary metabolites, which constitute the largest natural pigment group, are used in many different aims, especially in paint. It has been reported that emodin, crysophanol and physcion compounds, which are anthraquinone derivatives, have anticancer, anti-inflammatory, antiviral and antitumor activities. Various analytical methods are used for the separation and determination of anthraquinones. Among them, HPLC is a widely preferred technique because of providing effective separation, high detection sensitivity and fast analyzes. In the study, a new HPLC-DAD method was developed and validated for the simultaneous qualitative and quantitative determination of emodin, crysophanol and physcion compounds in *Polygonum cognatum Meissn*. that collected from Sivas region. Optimum method conditions (column, mobile phase A composition, flow rate, column temperature) were investigated aim to detect the most effective method for separation of the anthraquinone derivatives. All chromatographic analyses were performed at 25°C and 1.0 mL/min flow rate on a SUPELCOSIL LC-18 (25cm x 4.6mm, 5µm) column by gradient program at 254 nm. The deionized water containing 0.1% orthophosphoric acid was determined as mobile phase A and methanol was determined as mobile phase B. Linearity, limits of detection (LOD) and limits of quantification (LOQ), and recovery in plant extracts were studied as validation parameters. The standard curve was linear in the range of 2-40 µg/ mL for emodin, 2-40 µg/ mL for chrysophanol, 10-100 µg/ mL for physcion. Correlation coefficient (r2) values that found in range of 0.9996-0.9997 demonstrate good linearity. LOD and LOQ values were detected which ranging 1.083-3.514 µg/mL and 3.609-11.714 µg/mL. Three extraction techniques (soxhlet, ultrasound-assisted and maceration) were compared for their efficiency to analyze by HPLC-DAD method of anthraquinones in plant extracts. The effects of extraction parameters (solvent, solvent ratio and time) were investigated and the results showed that in soxhlet method, nine hours extraction with methanol is the best for extraction of anthraquinones. The recoveries in

plant extracts of the emodin, chrysophanol, physcion were 95.84 ± 0.56, 64.25 ± 0.06, 99.80 ± 2.30%, respectively.

**Keywords:** HPLC-DAD, Anthraquinone, *Polygonum cognatum* Meissn, Extraction.

**Funding:** This study was funded by Scientific Research Projects Coordination Unit of Istanbul University. Project number: FLO-2018-32565.

# PHYTOCHEMICAL PROFILING AND ANTIOXIDANT ACTIVITIES STUDIES OF RUMEX ACETOSELLA L. AND RUMEX CRISPUS L.

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## ABSTRACT

Turkey has a rich diversity in terms of vegetation that grows spontaneously and many medicinal and aromatic plants. Rumex species (*Rumex acetosella* L. and *Rumex crispus* L.) are used by the public for various purposes (food, treatment, dye, etc.). These plants are rich in anthraquinone content and the specification and determination of these contents is very important. In this study, a HPLC-DAD method with high separation efficiency, high detection sensitivity and selectivity was developed, validated and the antioxidant activities of the extract were determined for the simultaneous qualitative and quantitative determination of anthraquinones (aloe-emodin, rhein, emodin, chrysophanol and physcion) in *Rumex acetosella* L. and *Rumex crispus* L. plants collected in different regions and time. In the developed HPLC-DAD method, chromatographic separation was performed on a Supelcosil LC-18 column (250×4.6mm, 5µm) and a gradient program. Optimum method conditions were determined by studying different mobile phase compositions, mobile phase flow rates, column temperatures injection volume and wavelength of the compounds. Deionized water containing 0.5% orthophosphoric acid and methanol was used as the mobile phases A and B. The procedure was carried out at 20 °C with the flow rate of 1.0 mL/min and the injection volume of 20 µL utilizing an HPLC method with DAD detector at 225 nm. Validation studies were carried out to prove the validity of the developed method. The correlation coefficient (r2) for all compounds was found to be in the range of 0.9991-0.9997 and the calibration curve was linear in the concentration range of 0.1-1 µg/mL. LOD and LOQ values were calculated in the range of 0.014–0.017 µg/mL and 0.017–0.057 µg/mL, respectively. Acceptable intraday (99.18%-100.81%) and interday (99.38%-100.92%) recoveries were acquired for anthraquinones with RSDs less than 1%. In the accuracy study, the % recovery values of the compounds were found between 99.22% and 100.92%. In the stability parameter, it was shown that the compounds remained stable for 48 hours at room temperature without decomposition, and the method was reliable and robust in the robustness test. Major emodin, chrysophanol and physcion, and small amounts of aleo-emodin and rhein were determined in *Rumex acetosella* L. and *Rumex crispus* L. plants. The developed and validated method showed that it is effective and suitable for the qualitative and quantitative determination of aloe-emodin, rhein, emodin, chrysophanol and physcion in extracts of *Rumex acetosella* L. and *Rumex crispus* L. plants. In addition, it was determined that plant extracts have antioxidant properties by using Copper Ion Reducing Antioxidant Capacity (CUPRAC) and 2,2-Diphenyl-1-picrylhydrazil radical (DPPH) methods.

**Keywords**: Anthraquinone, Antioxidants, HPLC-DAD, Method validation, Rumex species

# DETERMINATION OF THE CHEMOTYPE OF SOME ALGERIAN ESSENTIAL OILS

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## ABSTRACT

Algeria boasts a great diversity of flora, combined with a centuries-old tradition of using aromatic plants. This potential for medicinal and aromatic plants is a focus for scientific research, particularly in the field of essential oils. The aim of this study is to determine the chemotype of some essential oils produced in Algeria (Eucalyptus globulus; Mentha spicata; Myrtus communis; Rosmarinus officinalis). Chemical identification by GC-MS revealed the presence of nine compounds for Rosmarinus officinalis, with eucalyptol in the majority (51.27%), nine compounds for Myrtus communis, with eucalyptol also in the majority (69.14%), six compounds for Mentha spicata, with D- carvone in the majority (61.06%) and two compounds for Eucalyptus globulus, with eucalyptol in the majority (84.89%). Our results are in line with those published in the literature, where we found almost all the majority compounds at different levels.

**Keywords**: Essential oil, Eucalyptus globulus, Mentha spicata, Myrtus communis , Rosmarinus officinalis,GC-MS.

# PREPARATION AND COMPARISON OF WATER-SOLUBLE MAGNETIC NANOPARTICLES MODIFIED WITH DIFFERENT FLUORESCENT DYES

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## ABSTRACT

Nanotechnology is currently a hot topic in the scientific world. The products and approaches that emerged as a result of the studies in this field bring daily life more efficiently. In particular, the need for sustainable energy, the diagnosis, and treatment of new diseases, the increasing need for food as a result of the increasing population, etc. are important motivations for the development of nanoscience. Nanostructures are the basic building blocks for the scientific approach to turning into a product. Nano-sized materials are highly functional in studies in the biomedical field with their unique properties. Magnetic nanoparticles have properties especially suitable for use in both imaging and treatment methods. The fact that they have high contrast in the MR imaging system and are suitable for magnetic targeting processes gives these particles an important role in the diagnosis of cancer disease. In addition, the heat release of magnetic particles under an alternating magnetic field makes them a very effective tool for the application of hyperthermia therapy used in cancer treatment. So much so that while the currently used hyperthermia treatments are only effective in cancer cells near the surface, in the magnetic hyperthermia approach, cancer cells in deep regions also undergo apoptosis thanks to magnetic nanoparticles agglomerated by targeting within the tumor. They can be prepared with a functional surface of different shapes and sizes, so this feature makes them preferred in biomedical applications. However, the absence of optical properties of magnetic nanoparticles is an important feature. This makes it difficult to monitor the instantaneous state of magnetic particles in both experimental and applications. This problem can be handled by modifying magnetic particles with optical properties of dyes (fluorescent or chromophore dye etc.) and nanostructures (quantum dots or plasmonic nanoparticles etc.). The resulting nanostructures have both magnetic and optical properties. Especially in intracellular studies, magnetic particles with optical properties are becoming a unique tool in determining particle or drug concentration. In this study, cobalt ferrite magnetic nanoparticles will be modified with chitosan to make their surfaces suitable for functionalization, then the attachment of different dye molecules (eosin y, fluorescein, and rhodamine B) to the particle surface by bonding reactions will be examined with spectrophotometric methods.

**Keywords**: Magnetic Nanoparticles, Biomedical Applications, Fluorescent Dyes

# FERTILIZER POTENTIAL OF A NATURAL ZEOLITE FROM TÜRKİYE

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## ABSTRACT

Türkiye is one of the richest countries that has extensive mineral deposits of zeolite, especially clinoptilolite type, which are beneficial for plant and soil health. Scientists have long researched the agricultural application of clinoptilolite to use this mineral efficiently. In this study, natural zeolite, obtained from Türkiye, and ammonium nitrate, which is one of the most beneficial fertilizers for plant nutrition, were used to obtain zeolite-based nitrogen fertilizers. Before the preparation of zeolite-based nitrogen fertilizers with solid state preparation method, natural zeolite was characterized using TGA/DTA, FTIR, BET, XRD, SEM-EDS, and ICP-OES techniques. After characterization of the zeolite mineral, ammonium nitrate adsorption was conducted on the zeolite mineral. Optimization studies were implemented to obtain the maximum nitrogen content of the zeolite-based nitrogen fertilizer. Optimization parameters were conducted as zeolite size, different zeolite:ammonium nitrate ratio, preparation temperature, reaction time, and number of washings after fertilizer preparation. Optimum preparation parameters for zeolite-based nitrogen fertilizer were obtained, and the fertilizer obtained under optimum conditions was characterized using the same techniques as the natural zeolite. All analysis results show that the ammonium nitrate adsorption process has been performed successfully under optimum conditions, and a natural zeolite-based nitrogen fertilizer has been prepared successfully within the scope of this study.

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**Keywords**: Adsorption, Ammonium nitrate, Characterization, Clinoptilolite, Zeolite.

# THE EFFECT OF SOLID:LIQUID PREPARATION METHOD ON ZEOLITE-BASED FERTILIZER PREPARATION

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## ABSTRACT

Nitrogen is one of the most useful nutrients in plant nutrition. Nitrogen provides longitudinal growth in the plant and ensures the development of green parts. However, excess nitrogen fertilization causes nitrate pollution in soil and groundwater. To prevent the negative effects of nitrate pollution on living organisms and the environment, new-generation natural-based fertilizers have attracted a lot of attention. In this study, a new generation of natural zeolite-based fertilizers was synthesized using the solid: liquid synthesis method. In addition, we investigated the effect of the solid-liquid preparation method on the preparation of zeolite-based fertilizer. Natural zeolite samples were reacted with different concentrations of ammonium nitrate solutions. The fertilizer samples obtained were analyzed with an elemental analysis device for nitrogen content. According to the results of the elemental nitrogen analysis, nitrogen adsorption to zeolite was successfully carried out using the solid:liquid synthesis method. However, considering the commercialization potential of zeolite-based fertilizers, the fertilizers obtained by this method were not found to be very economical as a result of the high amount of ammonium nitrate used to increase the nitrogen content. In conclusion, although the zeolite-based fertilizers obtained are potential natural fertilizers in terms of containing a nitrogen element useful for the plant, their commercialization potential was found to be very low.

**Acknowledgments:** This study was prepared within the scope of TUBITAK 2244 Industry Doctorate Program (Project no: 118C156). This study was also supported by the program's industry establishment, Toros Agri Industry and Trade Co. Inc. R&D Centre. This study was supported by the Research Fund of Mersin University, Mersin, Türkiye (Project no: 2022-1-TP3-4576). The authors also thank Gördes Zeolite Inc. for providing the natural zeolite used in the study.

**Keywords**: Zeolite, Adsorption, Fertilizer, Ammonium nitrate.

# FABRICATION OF PH-SENSITIVE AMPHIPHILIC HYPERBRANCHED COPOLYMERS VIA PHOTOINITIATED POLYMERIZATION

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## ABSTRACT

pH-responsive amphiphilic DOX-conjugated hyperbranched copolymer based on amphiphilic Litocholic acid segment and glucose moieties as hydrophilic segment which can actively target to cancer cell was synthesized. Initially, 2-hydroxyethyl methacrylate (HEMA) modified Lithocholic acid (LTC-HEMA) as inimer, 2-(methacrylamido)glucopyranose (MAG) a glucose-functional monomer, N-acryloxysuccinimide (NAS) were used to obtain hyperbranched poly(lithocholic-2-hydroxyethyl methacrylate-*co*-2-(methacrylamido)glucopyranose-*co*- N-acryloxysuccinimide) [HP(LTC-HEMA-*co*-MAG-*co*-NAS)] via Type II photoinitiated polymerization, in the presence of camphorquinone (CQ) under UV-vis light at 430 nm for 150 minutes. The active ester group (NAS) of the hyperbranched polymer was treated with anhydrous hydrazine to transform hydrazide [1] and conjugated with doxorubicin (DOX) which was chosen a model drug, through pH sensitive hydrazone bond [2] [HP(LTC-HEMA-*co*-MAG-*co*-Hyd)/DOX]. To perform characterization of polymers, the following techniques were utilized: 1H NMR, gel permeation chromatography (GPC), and Fourier transform infrared (FT-IR) spectroscopy.

**Keywords**: hyperbranched polymer, pH sensitive, amphiphilic, photopolymerization

# SYNTHESIS OF P-TERT-BUTHYLCALIX[4]ARENE DERIVATIVE CONTAINING CONJUGATED TRIAZOLE USING CLICK METHOD

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## ABSTRACT

The phenolic hydroxyl groups on the calixarene enable the binding of various functional groups on the molecule and allow the formation of the desired size molecule. Therefore, the synthesis of these compounds and their derivatives gains importance because of the ability to obtain compounds suitable for the objective. Another important compound is 1,2,3-triazole, which is among the heterocyclic compounds. The synthesis of 1,2,3-Triazole, which can be easily formed with terminal alkyne and azide by the click chemistry method developed by Kolb and Sharpless, has become attractive due to its various biological activities. In this study, *p-tert*-butylcalix arene compound was obtained by reacting *p-tert*-butylphenol and formaldehyde in basic medium. Then, calixarene derivative containing bromine was synthesized by binding 1,4-dibromobutane on the phenolic groups of calixarene. On the calixarene, azide groups were formed by reacting sodium azide with bromine groups. Finally, to obtain the final product, the azide groups on the calixarene and phenylacetylene were reacted by using the click method and the desired calixarene molecule containing 1,2,3-triazole derivative was synthesized. The final product was characterized by 1H NMR and 13C NMR.

**Keywords**: calixarene, click reaction, 1,2,3-triazole

# PREPARATION AND CHARACTERIZATION OF BIO-BASED RIGID POLYURETHANE FOAM FROM LIQUIFIED AUTUMN LEAVES-BASED POLYOL

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## ABSTRACT

Autumn leaves which possess many beneficial organic and inorganic compounds are fall's most abundant crop. However, many of them are abandoned or burned directly in the field where they fall, polluting both air and environmental. Therefore, the conversion of them into value-added chemical feedstocks have been attracted a great deal of attention lately especially in the polymer industry. In this study, autumn leaves-based polyol was obtained via acid-catalyzed solvothermal liquefaction method. Afterwards, bio-based rigid polyurethane foam (bio-RPUF) was synthesized according to one-shot and molding technique. The obtained autumn leaves-based polyol was used at a fixed ratio of 50 php in the synthesis of bio-RPUF. The effect of biopolyol on the morphological, physicomechanical, and thermal properties of bio-RPUF were evaluated. The biopolyol has a 477.2 mg KOH/g hydroxyl number and 1663 cP viscosity at 25 ºC. SEM picture of the obtained bio-RPUF revealed that the cellular structure was in polyhedral form and the cell size distributions were uniformly homogeneous. While the thermal conductivity value was determined as 31.27 mW/m.K, the closed cell content was 88.4%. The compressive strength value of bio-RPUF with moderate density was detected as high as the commercial analogs. Thermogravimetric analysis demonstrated that the synthesized bio-RPUF was thermally stable at temperatures up to 273 ºC. This study proves that the use of autumn leaves in the polyurethane foam synthesis is a useful, promising and sustainable strategy.

**Acknowledgement:** This study was supported by Eskisehir Technical University Scientific Research Projects Commission under the grant no: 23ADP090.

**Keywords:** Autumn leaves, biopolyol, physico-mechanical properties, bio-based polyurethane foam

# ENHANCING WASTEWATER TREATMENT EFFICIENCY THROUGH EXPERIMENTAL PHYSICO-CHEMICAL COAGULATION/FLOCCULATION: PARAMETER INVESTIGATION AND OPTIMIZATION

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## ABSTRACT

the objective of this study was to explore the application of an experimental physico-chemical treatment method, specifically coagulation/flocculation, in treating wastewater originating from diverse chemical analyses laboratory. The primary emphasis was placed on investigating and evaluating the crucial parameters associated with this treatment process, encompassing the duration and intensity of agitation, settling time, coagulant dosage (lime CaO), pH's impact, and flocculant dosage (Cactus). In order to assess the effectiveness of the physico-chemical treatment, comprehensive analyses were conducted, focusing on the aforementioned parameters and their interplay within the system. Various experiments were performed, systematically altering the values of these parameters and carefully measuring the resulting outcomes. The results obtained from this investigation demonstrated the remarkable efficacy of the coagulation/flocculation technique in removing heavy metals from wastewater. Through careful manipulation of the parameters, it was observed that specific combinations yielded superior results in terms of wastewater treatment efficiency. The impact of agitation time and speed, settling time, coagulant dose, pH adjustment, and flocculant dosage were analyzed, providing valuable insights into their individual and collective influence on the overall treatment process.

**Keywords**: Wastewater treatment, coagulation/flocculation, lime CaO, Cactus, pH

# SYNTHESIS OF CLAY AND ACTIVATED CARBON HYBRID COMPOSITE SUPPORTED Co NANOPARTICLES TO BE USED IN HYDROLYSIS OF NABH4 FOR H2 GENERATION: CCD-BASED RSM OPTIMIZATION

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## ABSTRACT

Hydrogen production from hydrolysis of sodium borohydride (NaBH4) in the presence of metal-loaded catalysts is a constantly used and promising method for hydrogen storage. Metal nanoparticle supported catalysts are known to have better recyclability and dispersion than unsupported catalysts. For this purpose, a support material named HNT-AC was obtained by a hydrothermal method using waste hazelnut shells and halloysite nanotubes (HNT) as support materials. Then, cobalt (Co) nanoparticles doped catalyst (Co/HNT-AC) have been obtained by chemical reduction method. The obtained catalyst has been characterized using Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM-EDX), elemental mapping, N2 adsorption-desorption, X-ray diffraction (XRD), inductively coupled plasma mass spectrometry (ICP-MS) and transmission electron microscopy (TEM) methods. To examined the effect of the parameters on hydrogen generation rate (HGR), the response surface methodology (RSM) was applied. The maximum HGR was 367.82 mL/min.gcat for Co/HNT-AC when the NaBH4 amount was 183.6 mM, NaOH amount 7.8 wt%, and catalyst amount 26.86 mg. The improving of this type of catalysts could ensure a promising choice for catalyzing NaBH4 for hydrogen generation.

**Acknowledgement:** This study was supported by the Scientific Research Projects Department of Van Yuzuncu Yil University. Project Number: FYD-2022-10365.

**Keywords**: Hydrogen generation, hazelnut shell, halloysite nanotube, response surface methodology

# EFFICIENT VALORIZATION OF LIME SLUDGE FROM WATER TREATMENT: LEACHING FOR SUSTAINABLE HEAVY METALS RECOVERY AND UTILIZATION

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## ABSTRACT

Within the water treatment industry, the generation of lime sludge poses a significant challenge due to the presence of various metallic element. This by product is typically considered waste and disposed of, resulting in not only environmental concerns but also a loss of valuable resources. The negative impact on the environment can not be ignored, as the disposal of this sludge contributes to landfills and can result in soil and water contamination. On the other hand, the metallic elements present in the lime sludge are considered valuable resources that can be reused for other industrial purposes. Within the water treatment industry, the generation of lime sludge poses a significant challenge due to the presence of various metallic element. This by product is typically considered waste and disposed of, resulting in not only environmental concerns but also a loss of valuable resources. The negative impact on the environment can not be ignored, as the disposal of this sludge contributes to landfills and can result in soil and water contamination. On the other hand, the metallic elements present in the lime sludge are considered valuable resources that can be reused for other industrial purposes. In this study, we have explored the valorisation of lime sludge by recovering the metals present in it using leaching process. . We experimented with different acid solutions, including hydrochloric acid, sulfuric acid and perchloric acid, and with different concentration. Inductively Coupled Plasma spectrometer analytic ICP (PerkinElmer optima 8000) was used to measure the metal ion concentration.

**Keywords**: lime sludge, metals characterization, leaching, electro-precipitation, Water treatment processes.

# CHRONIC TOXICITY OF MICROPLASTICS HAS LETHAL EFFECTS ON COMMON CARP (CYPRINUS CARPIO LINNAEUS, 1785)

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## ABSTRACT

The 21st century has seen the realization that people have overused plastic. Unfortunately, plastic pollution is a widespread environmental problem in many of the world's rivers and seas. Plastic litter is well distributed in shallow as well as in deep-waters, and therefore it is inevitably present in the world's ocean which is in turn the final sink of plastic debris of all sizes, alongside other various anthropogenic toxicants (for example, heavy metals and persistent organic pollutants). The negative effects of microplastics (MPs) which are produced by the breakdown of larger plastic debris on aquatic organisms, including both freshwater and marine fish have been already well documented. However, there is a gap in the knowledge from studies conducted in the field or under laboratory conditions in Bulgaria. Therefore, in order to clarify the long-term effects of MPs, we assessed the accumulation in tissues and a battery of biomarkers in common carp, such as histopathological and histochemical lesions (PAS and SUDAN III reaction) as well as biochemical changes (activity of metabolic enzymes, i.e. LDH, AChE, ASAT and ALAT and antioxidant enzymes, i.e. CAT, GR and GPx) in gills and liver were followed under laboratory conditions. Here we present the first results from the experiment on the lethality rate of common carp after 30 days' exposure to MPs. Acknowledgements: This study has been supported by the Department of Scientific Research, Plovdiv University - project SP23BF001 -Assessment of microplastic effects on various pollution responsive biomarkers in an economically important fish species (common carp, Cyprinus carpio Linnaeus, 1785)".

**Keywords**: microplastics, pollution, negative effects, fish, Bulgaria

# BACTERIA AND FUNGI FROM ACTIVATED SLUDGE

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## ABSTRACT

This study based on the microbiological characterization of activated sludge through the isolation and identification of *Pseudomonas* spp. fluorescents and some fungal isolates. The monitoring of the physicochemical parameters of raw and treated wastewater and the physical analysis of activated sludge were also carried out to check the effectiveness of the treatment. Physico-chemical analyzes of two samples of raw and treated wastewater and suspended matter of activated sludge have shown values meet the standards of rejection at the exit of the Chenoua WWTP. Sixty-three bacteria were isolated from two activated sludge samples, of which 25 isolates from the first sample and 38 from the second sample. After the identification, 41 strains represent the typical characteristics of *Pseudomonas* spp. fluorescent. These strains are divided into two distinct physiological groups and are affiliated to *Pseudomonas fluorescens*, *Pseudomonas chlororaphis*, *Pseudomonas aurefaciens*, *Pseudomonas putida* as well as the group of intermediate strains between *Pseudomonas putida* and *Pseudomonas fluorescens*. 14 fungal isolates from two activated sludge samples, 9 isolates are from the first sample and 5 isolates from the second sample. Macroscopic and microscopic observation have shown that fungal strains belong to three different genera: *Aspergillus, Penicillium, Trichoderma*, grouped into two classes of *Ascomycete* and *Deuteromycete*, and other strains that are not sporulated are referred to as sterile mycelium. *In vitro* antagonism assay showed that the bacterial strains of *Pseudomonas* spp. fluorescents have considerable potential for antagonism against *Aspergillus* sp, *Trichoderma* sp, and *Penicillium* sp fungi on King B and PDA medium. From these results, it can be concluded that the biological treatment by activated sludge is very effective, which means that the station functions properly.

**Keywords**: Wastewater treatment plant, activated sludge, fungi, Pseudomonas spp. fluorescents

# THE ANTIOXIDANT ACTION OF TURMERIC (CURCUMA LONGA) AGAINST CADMIUM-INDUCED STRESS IN RATS

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## ABSTRACT

Cadmium (Cd) is a toxic heavy metal that can induce serious health problems in humans and is possibly implicated in several human diseases related to oxidative stress. This study was designed to evaluate the antioxidant action of turmeric (*Curcuma longa*) against cadmium-induced oxidative stress in the rat. Forty male *Albino wistar* rats were divided into four groups. They underwent oral treatment for 30 days with cadmium chloride (CdCl2) and/or a diet containing 2% turmeric. Group (T) served as a control and received a normal diet; group (0-C) received an experimental diet with 2% turmeric; the group (Cd-0) received an oral dose of cadmium (5 mg/kg) with a normal diet; the (Cd-C) group received an oral dose of cadmium (5 mg/kg) with an experimental diet containing 5% turmeric. Cadmium has a pro-oxidant effect expressed by a significant decrease ($p \leq 0.001$) in the level of tissue GSH, the enzymatic activity of GPx and CAT in both hepatic and renal tissues. This pro-oxidant action was also shown by a significant increase ($p \leq 0.001$) in the level of MDA and in the enzymatic activity of GST in these two organs. The addition of turmeric in the food of the rats revealed a reduction in the toxic effect of cadmium by improving all the oxidative stress markers studied compared to controls. These results suggest that turmeric has a powerful antioxidant activity which can attenuate the intensity of oxidative stress induced by cadmium.

**Keywords**: Toxicity, Oxidative stress, Cadmium chloride, Curcuma longa, Oxidative stress markers

# NOVEL APPLICATION OF POMEGRANATE PEELS-CHITOSAN AS A PRETREATMENT FLOCCULANT FOR ENHANCED SAND FILTRATION AND EFFICIENT REMOVAL OF HEAVY METALS FROM WASTEWATE

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## ABSTRACT

This study explores the potential of harnessing the force of nature by utilizing pomegranate peels and chitosan as a novel flocculant for pretreatment to enhance sand-filter and efficiently remove heavy metals from wastewater. Pomegranate peels, a byproduct of the pomegranate processing industry, and chitosan, a biopolymer derived from chitin, are natural and sustainable materials known for their adsorption and coagulation properties. The research involves the extraction and purification of active compounds as tannin from pomegranate peels. After that chitosan and tannin are modified and formulated into a flocculant capable of effectively removing heavy metals such as lead (Pb), cadmium (Cd), chromium (Cr), copper (Cu), and zinc (Zn) from from wastewater. The synthesized novel flocculant is characterized using various analytical techniques to assess its structural and physicochemical properties. The performance of the flocculant is evaluated through laboratory-scale experiments, focusing on its effectiveness in pretreating wastewater to enhance sand filtration and achieve efficient heavy metal removal. The parameters investigated include flocculant dosage, contact time, pH, and heavy metal concentration. To ensure the effective execution of this research, a series of flocculation jar tests were performed under varying conditions. The natural compounds exhibit synergistic effects, combining the adsorption capabilities of extract product of pomegranate peels - tannin and the coagulation properties of chitosan. The findings of this study contribute to the development of sustainable and cost-effective solutions for heavy metal removal from water. The utilization of natural compounds offers an eco-friendly approach, reducing the reliance on synthetic flocculants and minimizing the environmental impact associated with heavy metal contamination. The results of this research provide a safe, easy, eco-friendly and cheap method of wastewater treatment.

**Keywords**: Pomegranate Peels; Chitosan; Flocculant; Water pollution; Heavy metals

# EVALUATION OF PROTECTIVE EFFECT OF (OLEA EUROPEA) ON SOME PHYSIOLOGIC MARKERS, OXIDATIVE STRESS AND FERTILITY IN WISTAR RATS EXPOSED TO CADMIUM

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## ABSTRACT

The objective of this research is to test the effectiveness of adding olive leaves Olea europa to attenuate cadmium toxicity in male wistar rats. The study was carried out on 80 male rats, divided into 8 groups. The control group received a standard diet, the 3 groups positive controls (FO1, FO2 and FO3) were treated with olive leaves extract at three different doses (0.25g/Kg bw, 0.5g/Kg bw and 1g/Kg bw), the cadmium chloride CdCl2 group (40mg/Kg bw) and three other groups were received a combination of Cd and FO (Cd+FO1, Cd+FO2, Cd+FO3). The administration of cadmium and olive leaves extracts was by gavage for 30 days. The extraction and determination of phenolic compounds from olive leaves' extracts, in addition to biochemical, reproductive and oxidative stress markers were evaluated. Results demonstrated the presence of various classes of phenolic compounds (total soluble phenols, flavonoids, and condensed tannins) in the aqueous extract of olive leaves. A significant rise in the activities of alanine aminotransferase, aspartate aminotransferase, and alkaline phosphatase and in the concentration of total bilirubin, total cholesterol, triglycerides, urea and creatinine was observed in the Cd-exposed rats compared to all controls, but the level of albumin and total proteins manifested significant decrease. Concerning fertility, a significant decline in the concentration, mobility of spz, level of testosterone and LH was seen. Results indicated a significant raise in the MDA level of the Cd group compared with the 4 control groups, but a significant decrease was noted in the groups of Cd+OL1, Cd+OL2 and Cd+OL3 compared to the Cd group. For the GSH, the Cd group showed a significant decrease compared to all control groups. In conclusion, the supplementation of olive leaves extracts revealed attenuation in Cd toxicity with different degrees.

**Keywords**: Cd, olive leaves, oxidative stress, reproduction, rats, toxicity

# ASSESSMENT OF GENOTOXIC IMPACT OF A FUNGICIDE ON POPULATION OF MOSQUITOFISH GAMBUSIA AFFINIS USING MICRONUCLEUS TEST

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## ABSTRACT

Micronucleus assays with fish have been shown to be useful in vivo techniques for genotoxicity testing and show potential for in situ monitoring of impact of pesticides on freshwater fishes and water quality. Over the last 30 years, there have been mass declines in freshwater fish populations. We undertook work to examine the possible effects of an agent of stress; a systemic fungicide widely used to combat cereals parasites on the freshwater fishes *Gambusia affinis*. We centered our study on the study of certain physical parameters in artificial medium creates in laboratory (pH and T°) and biometric (Weight measurement, linear evolution and coefficient of condition).In this study genotoxic potential of this fungicide, was evaluated using a test of genotoxicity the MNT (micronucleus test). The fishes were exposed to different concentrations (50, 75, 100,150µl/L) of the fungicide and (methyl methane sulfonate) was used as a positive control at a concentration of 1,56mg/L Our results highlight a reduction at the same time weight and size of *Gambusia affinis* exposed to a range of concentrations of fungicide, as well as the index of condition which reveals a delay of growth which can affect the sexual maturation of the treated animals . The results of toxic conditions showed high mitotic indices in erythrocytes and few cells with nuclear morphological aberrations, like binucleated cells. About micronucleus frequencies, there were significant differences between the positive control (MMS) and the groups treated with fungicide concentrations, whatever the time of exposure. Results suggested the suitability of the test used as tools in environmental monitoring programs of risk assessment. Our results revealed genotoxic effects of the fungicide on *Gambusia affinis* only at the highest concentrations and the longest time exposure (12days).

**Keywords**: Genotoxic, micronucleus test, growth parameters, mosquitofish, Gambusia affinis

# OXYDATIVE STRESS AND AND AMPHIBIAN DECLINE : POLLUTION CAUSED BY A FUNGICIDE RECENTLY INTRODUCED IN ALGERIA FUNGICIDE

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## ABSTRACT

The problem of phytosanitary products, through their persistence in the natural environment and their potential impact, is one of today's major environmental preoccupations. All over the world, amphibian populations are disappearing due to the effects of these agrochemicals. Water in particular is a major vector for all these contaminants. In this study, the toxicity of a systemic fungicide (Propiconazole), recently introduced in Algeria to combat cereal pests, was assessed in terms of metabolites (proteins, lipids, carbohydrates) and glutathione (GSH) content, as well as acetylcholinesterase (AchE) and glutathione S-transferase (GSTs) activity. We demonstrated that the metabolism of the tadpoles was affected by disturbances in protein, lipid and carbohydrate content, as well as glutathione (GSH) levels in the whole body of the tadpoles. The results showed that the fungicide used increased GSTs activity in tadpoles treated with the selected concentration range (25, 50, 75 and 100µL) as compared with controls. At the same time, there was a progressive decrease in AchE activity, indicating a neurotoxic effect on treated tadpoles. Acetylcholinesterase and Glutathione S-transferase activities can be considered as biomarkers of fungicide toxicity in *R. Saharica tadpoles.*

**Keywords**: Biomarkers, oxydative stres, GSTs, AchE, GHS, Fungicide, amphibian, Rana saharica.

# BEHAVIOR OF POLYVINYL CHLORIDE CONTAINING NEW BIOADDITIVES

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## ABSTRACT

The objective of our work is the preservation of the environment and human health, new formulations based on PVC are studied. They aim to replace two additives widely used until now. These are phthalate plasticizers, increasingly criticized because of their potential toxic effects, and lead-based stabilizers. The substitute products considered are a plasticizer from the family of adipates or di iso nonyl adipate (DINA) and epoxidized sunflower oil (ESO) as heat stabilizer. A natural ageing test of the PVC samples was investigated. The samples were characterized by Fourier transform infrared (FTIR). The morphological changes were followed by scanning electron microscopy (SEM). The evolution of the bacterial growth, identification using biochemical tests, variation of pH and variation of mass were investigated. The results showed that the nature of the plasticizer and heat stabilizer affects the properties of PVC and the phenomenon of the biodegradation.

**Keywords**: PVC, Plasticizer, natural aging, bacterial growth, biochemical tests

# PROTECTIF EFFECT OF OLIVE LEAVES (OLEA EUROPEA L.) ON HISTOPATHOLOGY OF SOME ORGANS AND BIOCHIMICAL MARKERS AGAINST CADMIUM TOXICITY IN WISTAR RATS

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## ABSTRACT

This study focuses on the search for a natural treatment to reduce lead toxicity in male Wistar rat by using the aquous extract of olive leaves (Olea europea L). The study was carried out on 80 male rats, divided into 8 groups. The control group received a standard diet, the 3 groups positive controls (FO1, FO2 and FO3) were treated with olive leaves extract at three different doses (0.25g/Kg bw, 0.5g/Kg bw and 1g/Kg bw), the cadmium chloride CdCl2 group (40mg/Kg bw) and three other groups were received a combination of Cd and FO (Cd+FO1, Cd+FO2, Cd+FO3). A significant decrease in RBC count, the level of HCT, HGB, MCV, MCH, MCHC and PLT was observed in cadmium group compared to the control and the positive controls. However, significant increase in, WBC and LYMP counts was recorded in the Cd group compared to the control, the positive controls and the combined doses. Biochemical parameters showed a decrease at the level of thyroid gland secretion in the Cd group compared to the (control and Cd + FO groups). The serum urea, creatinine, total cholesterol levels, the rate of TGP and TGO were significantly increased in rats treated with (Cd) alone compared to (the control and Cd + positif groups). These results are confirmed by the study of histological sections. A morphological change represented by volume shrinkage of the vesicles. A return to the normal structure of follicles was observed in Cd + FO groups (positif groups). Histology study of the kidney and testis showed no change in (Cd +FO groups) compared to the control. Containement in the group exposed to (Cd) the parenchyma of the kidney shows dilated distal and proximal tubules causing renal tubular damage. The testis marked destruction and degeneration of germ cells and the light of some seminiferous tubules are empty.

**Keywords**: Cadmium, biochimical parameters, hematological parameters, histopathological organs, olive leaves, rats

# TOXICITY OF A NOVEL PHOSPHORAMIDATE ON GROWTH INHIBITION AND OXIDATIVE STRESS STATUS IN THE FRESHWATER CILIATE: PARAMECIUM AURELIA

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## ABSTRACT

The toxicological impacts of the increasing number of organophosphorus insecticides present in the aquatic environment are assessed predominantly in laboratory studies where test organisms are exposed to a range of compounds. In recent years, the development of methods for testing environmental samples (particularly rapid tests) has been increasing. This work aims to investigate the inhibitory effect of a synthetic phosphoramidate derivative at different concentrations (2, 4 and 8 µM) on pure culture of *Paramecium aurelia* during 72 hours affecting its growth (proliferation) in concentration-dependent manner. The lower levels of glutathione and increased of catalase and glutathione S-transferase activity recorded in the presence of various synthetic phosphoramidate concentrations involved the activation of detoxification system.

**Keywords**: phosphoramidate PA-B, Paramecium aurelia, oxidative stress, detoxification.

# LEVELS OF POTENTIALLY TOXIC ELEMENTS AND ECOTOXICOLOGICAL WATER QUALITY ASSESSMENT OF RIVERINE ECOSYSTEMS IN BIGA PENINSULA, TÜRKIYE

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## ABSTRACT

Contamination of freshwater ecosystems is a significant environmental problem today for the whole world and the levels of potentially toxic elements (PTEs) in especially riverine habitats rises day by day. The Biga Peninsula that is located in the northwest part of the Anatolia has a great agricultural, industrial and touristic potential. In this research, concentrations of 8 PTEs including arsenic (As), barium (Ba), boron (B), cadmium (Cd), mercury (Hg), nickel (Ni), selenium (Se) and strontium (Sb) were investigated in the water of Umurbey, Çanakkale, Kepez, Hamamlık and Küçük Menderes Streams located in the Biga Peninsula of Türkiye. Heavy Metal Pollution Index (HPI) and Heavy Metal Evaluation Index (HEI) were used to evaluate the water qualities in terms of PTEs contamination. According to detected data, the average order of levels of investigated PTEs in water of 5 fluvial ecosystems were as follows: Cd < Hg < Sb < Se < Ni < As < Ba < B. As a result of applied heavy toxic metal risk assessment indices, although significant spatial differences were detected, water of all the investigated lotic habitats were unpolluted by toxic metals (<100 for HPI; <10 for HEI).

**Keywords**: Biga Peninsula, Fluvial habitats, Potentially toxic elements, Ecotoxicological evaluation

# ECOTOXICOLOGICAL RISK ASSESSMENT OF POTENTIALLY TOXIC ELEMENTS IN WATER OF FLUVIAL HABITATS LOCATED IN GELIBOLU PENINSULA (TÜRKIYE)

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## ABSTRACT

Water management, which is a significant global problem, is essential to protect human health and the environment. Potentially toxic elements (PTEs) are among the most hazardous chemical contaminants and amounts of these significant pollutants rises day by day in especially fluvial habitats. The Gelibolu Peninsula that is located in the northwest part of the Anatolia has a great agricultural, industrial and touristic potential. In this research, concentrations of 8 PTEs including arsenic (As), barium (Ba), boron (B), cadmium (Cd), mercury (Hg), nickel (Ni), selenium (Se) and strontium (Sb) were investigated in the water of Munipbey, Bağlar and Kayaaltı Creeks located in the Gelibolu Peninsula of Türkiye. Heavy Metal Pollution Index (HPI) and Heavy Metal Evaluation Index (HEI) were used to evaluate the water qualities in terms of PTEs contamination. According to detected data, the average order of levels of investigated PTEs in water of 3 fluvial ecosystems were as follows: Hg < Sb < Se < Cd < Ni < As < Ba < B. Also, the ecological risk assessment indices showed that all the investigated fluvial ecosystems were unpolluted by toxic metals (<100 for HPI; <10 for HEI).

**Keywords**: Gelibolu Peninsula, Creeks, Toxic elements, Ecotoxicological risk assessment

# STUDY OF THE MALATHION COMPOUND DEGRADATION BY PHOTOLYSIS OF HYDROGEN PEROXIDE IN AQUEOUS MEDIA

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## ABSTRACT

This work was designed to study the effectiveness of hydrogen peroxide photolysis on the degradation of Malathion pesticide in an aqueous medium. Experiments were performed in a static reactor with a low- pressure mercury vapor lamp at initial organophosphorus concentrations of 10—3. The first result obtained showed that the system H2O2/UV can completely oxidize the organophosphorus compound. The oxidation yields obtained using the static reactor depended on the reaction time, the initial concentration of H2O2, and the initial pH solution. However, the oxidation efficiency may be reduced by the presence of radical traps in the reaction medium. Moreover, a model of the hydrogen peroxide photocatalysis is also presented in this paper. The use of experimental design and in particular the response surface methodology (RSM) in addition to the full factorial design allowed the determination of the influence of the simultaneous effects and interaction of the operating parameters on the performance of the photo degradation. Indeed, the operating parameters studied in this research work were the initial concentration of Malathion, H2O2 catalyst volume and the pH of the solution. The results found showed that the application of the RSM allowed describing correctly the effect of these three operating parameters on the treatment efficacy. The optimal parameter values giving a maximum yield (100%) were determined.

**Keywords**: Malathion, organophosphorus, H2O2, optimization ,hydrogen peroxide

# MACRO-WASTE CLUTTERING THE BEACHES COASTLINE OF EL KALA (NORTH-EAST ALGERIA)

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## ABSTRACT

The presence of macro-waste on beaches is a real problem. Not only does it degrade the beauty of the landscape, it also affects the environment and exposes people to nuisances and dangers, some of which can be very serious. To this end, we have carried out a study to identify and quantify the solid waste of urban origin cluttering the 9 main beaches along the El Kala coastline (La Messida, Laouinette, la Montagnie, la Grande plage, El Mordjen, Cap Rosa, Sable d'or, la Vieille Calle and El Hnaya), It was carried out between September 2022 and May 2023 over 3 seasons (autumn, winter and spring), in accordance with the "Guidance on Monitoring of Marine Litter in European Seas" published by the Marine Litter Technical Subgroup of the European Marine Strategy Framework Directive. Our results show that the El Kala coastline is exposed to a significant amount of marine litter from land-based sources, the most important of which are plastics at 25%, followed by pieces of wood at 23%, then glass waste at 16%, then metal waste at 15% and finally textiles and paper at 13% and 8% respectively. Macro-waste is more prevalent on beaches in the city center, such as El Mordjane and Grande plage, due to their proximity to residential areas and urban waste, as well as their heavy use, especially during the vacation season. The further you move away from urban areas, the less waste you come across, as is the case for El Hnaya, Vielle Calle, La Messida, Cap Rosa and La Montagnie beaches, with the exception of Laouinette. The aim of this work is to raise public awareness of the issues at stake, which are beach cleanliness, public health and environmental protection.

**Keywords**: Pollution, urban solid waste, plastic, environment, El Kala coastline

# METAL CONTAMINATION ASSESSMENT IN SEA CUCUMBERS, HOLOTHURIA TUBULOSA (GMELIN, 1788) FROM THE ORAN COAST, ALGERIA.

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## ABSTRACT

Metallic pollution of coastal waters can result in more or less stable bioaccumulation in the tissues of marine organisms, which can inform us about the contamination of the environment in which they evolve. The study of monitoring the metal concentrations of four pollutants namely (Cu, Zn, Cd and Fe) allowed us to evaluate the contamination of *Holothuria tubulosa* sampled at three different sites (La Madrague, Ain Franin, and Cap Carbon) during a period from February 2014 to January 2015. The four metals studied were found to be selectively distributed in the different body compartments of sea cucumber (Calcareous Ring, Body wall, Intestine, Female Gonad and Male Gonad). For Cap Carbon site the Fe concentrations were found to be the highest value at the level of the calcareous ring (29.33 ± 16.80 ppm P.F), and the female gonad 35.12 ± 23.39 ppm P.F. However, the Cu concentrations revealed the highest value of 11.86 ± 6.89 ppm P.F in the intestines. For the Zn, the Cap Carbon samples showed the highest value with 13.2 ± 2.94 ppm P.F at the level of the calcareous ring. In the La Madrague site, the highest concentrations of Zn are at the level of the male gonads (18.07 ± 2.12 ppm P.F).

**Keywords**: Holothuria tubulosa, metal concentration, La Madrague, Ain Franin, Cap Carbon.

# INVESTIGATION OF THE EFFECT OF PHAGE APPLICATION ON ANTIBIOTIC RESISTANCE LEVELS OF MULTIDRUG RESISTANT ESCHERICHIA COLI ISOLATES

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## ABSTRACT

Bacteriophages are defined as viruses that infect bacteria. Phages have started to gain importance again because of the increase in antibiotic-resistant bacteria due to the widespread and misuse of antibiotics. These natural killers of bacteria are used in many areas and the use of phages in combination with antibiotics is an application that has come to the fore in recent years to achieve synergy. In this study, it was aimed to investigate the effect of phage application on antibiotic resistance levels of multidrug resistant *Escherichia coli* isolates. Five antibiotics (ampicillin, fosfomycin, nitrofurantoin, tobramycin and chloramphenicol) belonging to different antibiotic groups, three lytic phages (M8A, M11A and M12A) isolated from previous studies and multi-antibiotic resistant *E. coli* and *E. coli* O157 strains isolated from cattle and chicken were used. Three experimental groups were formed; the *control group*, which was not treated with phage cocktail, the *phage group* in which the phage cocktail and bacteria were treated simultaneously, and the *phage mutant group*, which consisted of survivors after treatment with phage cocktail. Minimal inhibition concentration (MIC) values of the isolates after treatments were determined using the broth microdilution method. According to the results, all *E. coli* O157 isolates sensitized in the fosfomycin phage group, and also in the chloramphenicol phage and phage mutant group. All of the strains resistant to nitrofurantoin in the phage group became sensitized in generic *E. coli* isolates. However, MIC values were significantly increased in the phage group in all ampicillin resistant strains. For tobramycin, an increase in MIC values was observed in all isolates in the phage group, while sensitization was detected in the phage mutant group. As a result, it was determined that the combinations of phages and antibiotics caused sensitization in phenotypic antibiotic resistance in multidrug resistant *E. coli*, but the synergistic effect of phage and antibiotics showed great variability according to the strain and antibiotic. Further molecular studies are needed to more clearly elucidate the mechanisms of phage-antibiotic synergism.

**Keywords**: Bacteriophage, antibiotic resistance, minimal inhibition concentration

# BATCH ADSORPTION OF DICLOFENAC ON AN ALKALINE-ACTIVATED CARBON PREPARED FROM OAK BARK

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## ABSTRACT

The aim of this work is to study the Alkaline-activated carbon adsorption capacity prepared from oak bark for the removal of Diclofenac (DIC) from an aqueous solution in a Batch system, the results show that the adsorption capacity of this adsorbent is 71 mg/g. Second adsorption kinetic data were fitted with a pseudo-second-order model. Diclofenac Adsorption onto Alkaline-activated carbon is consistent with the Freundlich model, the thermodynamic parameters (ΔG°, ΔH°, and ΔS°) suggest the spontaneous, endothermic, and physical nature of interactions.

**Keywords**: Alkaline-activated carbon, Batch adsorption, mechanism, Diclofenac

# EVALUATION OF THE GENOTOXIC POTENTIAL OF THE PESTICIDE AMITRAZ APPLIED IN BEEKEEPING

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## ABSTRACT

The study of pesticide toxicity as a risk factor for living organisms requires a comprehensive study of their mutagenic effects. Using the Allium test, we analyzed the genotoxic potential of the pesticide amitraz used in beekeeping in three different concentrations. The obtained results show that the tested insecticide has a pronounced genotoxic effect on the root meristem of Allium cepa. Demonstration of this is the statistically significant higher frequency of chromosomal aberrations of clastogenic and aneugenic type in the experimental variants compared to the control sample. Amitraz induces a wide range of abnormalities related to chromosome and spindle integrity, including: chromosome bridges and fragments, "vargant" chromosomes, C-mitoses, and micronuclei. Our data confirm the need to test pesticides for their genotoxicity to verify their safe use. Additional investigations using other in situ methods will contribute to establish the mechanism of action of the studied pesticide. Acknowledgements: This study was supported by the National Research Fund of Bulgaria by the contract KP-06-H5112/2021 "Complex assessment of genetic and environmental factors related to the losses of honey bees (Apis mellifera L.) in Bulgaria".

**Keywords**: Genotoxicity, chromosome aberrations, Amitraz, Allium test system

# ZOOPLANKTON AND PHYTOPLANKTON VARIABILITY IN RELATION TO THE ENVIRONMENTAL PARAMETERS IN RAMSAR SITE OF THE SW MEDITERRANEAN (TONGA LAKE )

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## ABSTRACT

Phytoplankton and zooplankton, as well as several physicochemical variables (water temperature, pH, dissolved oxygen, total suspended particulate, and nutrients), were analyzed monthly at two stations during 2019–2020. The results showed that the physicochemical variables were within the tolerable ranges, except for phosphate, which slightly exceeded the reference threshold. No phytoplankton blooms were encountered; cyanobacteria were the most abundant during the study period and reached their maximum in winter (137888 cells/l), while dinoflagellates and diatoms reached their maxima in autumn and spring, respectively (23809 and 102083 cells/l). while the maximum of all the identified zooplankton groups was recorded in the spring. Dinoflagellates were strongly affected by pH and total suspended particulate. On the other hand, high significant correlations were reported between protozoa and dissolved oxygen, as well as between rotifers and water temperature. Nonetheless, no-significant correlations were detected between the remaining groups (diatoms, cyanobacteria, cladocerans, and copepods) and the investigated environmental variables.

**Keywords**: Tonga Lake, PNEK, zooplankton, phytoplankton, physicochemical parameters

# QUANTITATIVE STRUCTURE ACTIVITY RELATIONSHIP MODELING OF TOXICITY OF SURFACTANTS ON DAPHNIA MAGNA

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## ABSTRACT

The use of surfactant in pesticide application is crucial as it provides important benefits such as defoamer, foaming and stabilization. However, it is important to consider that surfactants can be toxic to plants and amphibians. The EC50 parameter, ascertained via a chemical toxicity test, serves as a quantifiable indicator of toxicity. This paper aims to predict the EC50 of surfactants by studying a quantitative structure-activity relationship (QSAR) tool. The DA-SVR tool was used for modeling the EC50 of anionic and nonionic surfactants on Daphnia magna using 3 molecular descriptors representing as input. We optimized the model and assessed its performance through internal and external validation using various statistical parameters. The results indicate high accuracy with a mean squared error (MSE) of 0.208, a root-mean-square error (RMSE) of 0.408, a coefficient of correlation ($R^2$) of 0.956, robustness ($Q^2$) of 0.954, an average and a delta of (*rm2*) are 0.938 and 0.004 respectively. The general outcomes have demonstrated significant predictive ability and robustness.

**Keywords**: Quantitative Structure Activity Relationship, surfactants, support vector regression, effective concentration 50

# APPRAISING THE ABUNDANCE OF MICROPLASTICS IN FOOD SAMPLES IN RIYADH, SAUDI ARABIA AND THEIR REMOVAL FROM CONTAMINATED WATER USING BIOCHAR

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## ABSTRACT

More than 60% of the produced plastics are being introduced into the environment, which on degradation generates nano– and microplastics (MPs), subsequently polluting the environment. Despite the giant threat of MPs pollution, the occurrence, varieties, quantities, and toxicity of MPs in food and drink items are not fully explored. Therefore, the presence of MPs in food samples collected from Riyadh, Saudi Arabia were appraised in this study, and efficiency of biochar in removing MPs from contaminated water was evaluated in this study. The samples of the commercial food products were purchased from local markets in Riyadh, and MPs were separated and examined using microscopic techniques. The results showed the presence of MPs in all the collected samples. The highest number of MPs were found in teabags (378–489 particles per cup), followed by disposable plastics containers (211–351 particles per containers), and drinking bottled water (31–127 particles per liter) samples. The majority of the MPs found were irregular shaped, followed by fiber-type, and rod-shaped. Thereafter, jujube (*Ziziphus jujube* L.) waste was pyrolyzed at 300°C and 700°C, and the resultant biochars were used to remove nylon or polyethylene MPs from contaminated water in fixed-bed column trials. pH 7 was found as optimum for the highest removal of both MPs through biochars. Both of the biochars reached to 99% of the MPs removal capacity after 12 pore volumes; however, sand based filter could reach up to 78% removal of MPs even after 15 pore volumes. Overall, biochar produced at 300°C showed up to 20-fold higher retention, while biochar produced at 700°C showed up to 33-folds higher retention for MPs, as compared to only sand filters, indicating that the biochar produced at higher pyrolysis temperature was more efficient for nylon and polyethylene retention. Entrapment into the pore, entanglement with flaky structures of the biochars, and electrostatics interactions were the major mechanism for MPs retention onto biochars. Therefore, jujube waste-derived biochars could be used as efficient adsorbents to remove nylon and polyethylene from contaminated water.

**Keywords**: Microplastics; Drinking water; Food contamination; Biochar; Column trials

# IMPROVEMENT OF PRODUCTIVITY WITH PHOTOGRAMMETRIC METHODS IN AGRICULTURAL ACTIVITIES

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## ABSTRACT

One of the most important elements of agricultural activities can be considered as providing maximum benefit with minimum requirements. This situation leads to the result of increasing the yield per unit area as much as possible. Current irrigation conditions and the presence of harmful plants in agricultural fields stand out as factors that can hinder these goals. A production dysfunction can also be observed, in which the yield may be affected completely, not partially, for a particular region, especially if it is considered within the scope of harmful plants. In this study, our goal is to determine the harmful plant species in the fields by photogrammetric methods, where cultivation and production for agricultural purposes. With the autonomous flight plans to be prepared for the areas determined for this purpose, and using the Unmanned Aerial Vehicle (UAV), overlayed photographs will be taken by aerial photogrammetry from previously determined flight heights. These photos will be collected by visible (RGB) and infrared cameras on the existing UAV, and a large amount of data will be obtained with different flight altitudes. With the images to be obtained, a 3D digital terrain model (SAM) of the field will be created; optimum heights will be calculated where both harmful plants can be detected in the best possible way. Also, our aim is to obtain the location data required for spraying or direct intervention in the affected region with high accuracy, as well as to improve yield estimations.

**Keywords**: Photogrammetry, UAV, Yield Forecast

# EVALUATION OF SURFACE WATER AND SEDIMENT MICROPLASTICS OF SULTANSUYU DAM LAKE (MALATYA) IN TURKEY

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## ABSTRACT

Synthetic components made from organic polymers are called plastics, and those smaller than five millimeters are classified in the Microplastics (MPs) group. The amount of microplastics in the aquatic ecosystem has increased significantly in recent years. In this study, the concentration, type, size and color of MPs in surface water and sediment in Sultansuyu Dam Lake were investigated. Fibers, in surface water and sediment were the dominant MP type. MP concentrations in surface waters are 153.33 at St.1 and 160 par.m-3 at St.2. MP concentrations in the sediments are 960 and 1320 par.m-2 in St.1. at St. 2. The most common MP sizes in surface waters and sediment were 1-2 mm. The dominant color of the detected MPs was transparent in surface waters and gray in sediment. Polypropylene was the main polymer types of selected particles. Of the two stations, St. 2 showed a higher MP concentration level.

**Keywords**: Microplastic, Freshwater, Pollution, Sultansuyu Dam Lake

# ASSESSMENT OF AGRICULTURAL USE OF SLUDGE IN THE CONTEXT OF CIRCULAR ECONOMY (CE) APPROACH

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## ABSTRACT

Treatment of wastewater produces sludge that must be disposed off properly. Reuse and recycling of sludge in agricultural land or soil is one of the disposal alternatives as it contains nitrogen (N), phosphorus (P), potassium (K), and organic materials, thereby it can be used as potential substitutes for conventional fertilizers in agricultural production. Therefore, wastewater treatment sludge is being considered as a resource, rather than a waste for along time. This fact is strongly encouraged in line with circular economy (CE) approach and reuse of sludge in agriculture has been elaborated from CE perspective. Land application of sludge has been widely studied as a viable alternative for the recycling of municipal sewage sludge, but limited information is available concerning the industrial wastewater treatment plant sludge. The aim of this paper is to investigate the land use potential of the sludge generated from an agro-industry. In this framework, sludge samples from wastewater treatment plants of vegetable processing and olive-oil industries were used. Characterization study was carried out and parameters limiting reuse potential were determined. The pH, salinity, solids content, moisture content, organic matter, organic carbon, nitrogen, phosphorus, potassium, iron, magnesium, sodium, calcium as well as heavy metals (Cu, Zn, Cd, Cr, Pb, Ni) were analyzed in order to find out the physical and chemical properties of the sludge samples. In addition, to investigate the metal accumulation on plant leaves and roots, the sludge was amended with soil mixture and applied at various rates to promote the growth of lettuce and cucumber plants. Vegetable processing industry sludge was used for growth of lettuce and cucumber plants. The sludge application caused no significant increase in heavy metal concentrations in the plant leaves, though zinc and iron were found at elevated concentrations. However, despite the zinc and iron accumulation, no toxicity symptoms were observed in the plants. Similar to vegetable processing industry sludge, lower metal uptakes were also measured for olive oil industry sludge. Only the cadmium and lead concentrations in the lettuce plants exceed the maximum permissible metal concentrations. Cadmium generally tends to accumulate in leaves, and therefore is more risky especially for leafy vegetables. Since, increase in the dietary uptake of cadmium is a potential risk to human health, a careful assessment of plant species to be grown, is required prior to land application of sewage sludge. As conclusion; since sludge contains certain elements that are useful for the agricultural production, it may deserve particular interest for agro industries. Trace element can accumulate in the plant tissue, e.g. leaves, and therefore it should be considered by appropriate low sludge application rates.

**Keywords**: Sludge, Circular economy, Reuse, Recycle, Land application

# ASSESSMENT OF WATER QUALITY AT ZERDAZAS EL HARROUCHE DAM (SKIKDA, ALGERIA)

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## ABSTRACT

Our study area is located in the Skikda region (NE of Algeria) which contains four (4) large dams and three (3) wadis. The Zerdazas dam located in the commune of El Harrouche, which is an agricultural region, was the subject of our present study. To ensure that the treatment works properly and that the treated water meets standards, it must undergo a chain of physico-chemical and bacteriological analyses before, after and during treatment. It is within this framework and with the aim of verifying the effectiveness of the drinking water treatment (necessary for quality control) used by the Zerdazas dam drinking water treatment plant. For the physico-chemical analyses, either the samples from the dam or the treated water are within standards. The difference between untreated and treated water in terms of physico-chemical parameters is not significant. While the microbiological control of the dam samples after treatment did not reveal any bacterial pollution, and the treated water is of good quality and all the physico-chemical parameters studied are within the standards, so the operation of the plant seems rigorous and efficient.

**Keywords**: parameters, Skikda, Dam, Water quality, treatment

# INVESTIGATION OF TEMPORAL VARIATION OF PM 2.5, PM5 AND PM10 POLLUTION IN ÇORUM PROVINCE

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## ABSTRACT

There are many pollutants that pollute the environment. In particular, the rapid pace of industrialization increases the amount of pollutants emitted into the atmosphere. It is thought that climatic changes, which have recently become a common problem of the whole world, are directly proportional to polluting gases and particles. It has been shown in scientific studies that gases and particles polluting the atmosphere also pose serious dangers to human health. Among the pollutants that have polluted the environment and atmosphere in recent years, dust particles originating from the combustion process are among the most striking ones. These are generally referred to as PM2.5, PM5 and PM10 in the literature. These dust particles are classified according to their size. These dust particles are classified according to their size. Particulate matter, known as PM2.5, PM5 and PM10, is a term that describes extremely small solid particles and liquid droplets suspended in the air. Particulate matter can be composed of different components including nitrates, sulfates, heavy metals, organic chemicals, soil and dust particles. Particulate pollution mainly consists of diesel vehicles, coal, fuel-oil and wood-burning heaters and industrial sources without flue gas treatment. PM2.5 and PM10 pollution are observed in residential areas where coal and fuel-oil are burned, especially in winter. Floor plans have a great influence on pollution intensity. PM10, PM5 and PM2.5 pollution are observed in regions where old diesel vehicles and public transportation vehicles are concentrated. In calm and dry weather, as PM2.5, PM5 and PM10 pollution increases in cities, particles have a greater potential to retain viruses and can act as carriers for infectious agents. This situation has emerged as a very important problem in the spread of viruses during the pandemic period that the whole world has experienced in the past, and it stands before us as an important issue for a similar situation that may occur in the future. In this study, the temporal variation and causes of PM 2.5, PM5 and PM10 pollution in Çorum province were investigated. In the study, the data obtained from the three polluting stations established in the city were examined temporally and a regional pollution map was drawn. As a result of the study, it was investigated that which type of pollutant was concentrated in which region in which time period.

**Keywords**: PM 2.5, PM5, PM10, Gaseous pollutants

# UV LIGHT-DRIVEN PHOTOCATALYTIC DEGRADATION OF METHYLENE BLUE USING TIO2, ZNO, AND SNO2 AS CATALYSTS: A COMPARATIVE STUDY

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## ABSTRACT

The improper disposal of wastewater from the textile industry is a crucial global challenge that addresses various adverse effects on the aquatic environment. Methylene blue (MB) is a thiazine dye most widely used as a textile dye. Since MB is entirely stable, the degradation of this dyestuff in nature is considerably hard. Hence, different physical, chemical, and biological treatment technologies including adsorption electrocoagulation, and electrochemical have been utilized to remove MB from contaminated water. Among them, heterogeneous photocatalysis is a cost-effective and sustainable method for the efficient degradation of organic compounds to smaller and safer components without contributing to secondary contamination. For the application of photocatalysis, TiO2, ZnO, and SnO2 are well-known semiconductors that play a vital role to mineralize dyes into H2O and CO2 through the generation of reactive oxygen species. In this study, the structural and morphological differences of TiO2, ZnO, and SnO2 nanoparticles were performed by FT-IR, XRD, SEM, and Raman spectroscopy. The photocatalysts were investigated comparatively for the degradation of MB dye under UV light irradiation. The kinetic data revealed that the degradation of MB dye followed pseudo first-order kinetics. The percentage degradation of MB in the presence of TiO2 and ZnO was found to be 73% and 97 % respectively, within 60 min irradiation. For SnO2 nanoparticles, this value was lower compared to TiO2 and ZnO photocatalysts.

**Keywords**: Decolorization, heterogeneous photocatalysis, methylene blue, SnO2, TiO2, ZnO.

# RECENT TRENDS AND FUTURE PROSPECTS ON THE POLYMERIC-BASED CATALYSTS FOR PHOTOCATALYTIC DEGRADATION

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## ABSTRACT

Photocatalytic technology is viewed as an efficient wastewater treatment that is proficient to remove pollutants completely using UV/visible or solar energy. With this technology, the development of semiconductor materials based on polymers has been more and more attention due to the modification of the structure resulting in higher photocatalytic activity. The main advantages of the utilization of polymers as catalysts in photocatalytic systems are having good photostability and moderate band gap and being low-cost and easy accessibility. Hence, the combination of various semiconductors with conducting polymers mostly preferred polyaniline, polythiophene, and polypyrrole has improved the photocatalytic performance. Recently, the synthesis of green polymeric catalysts composed of safe monomers makes them popular in photocatalysis. Biopolymers such as chitosan have been used as a support material for metallic oxides to avoid environmental toxicity from the employment of chemical compounds. The current perspectives and prospects for advancement in green technology can be helpful in the potentiality of large-scale applications of polymeric-based catalysts that are utilized for photocatalysis.

**Keywords**: Biopolymers, catalyst, conducting polymers, green technology, photocatalysis.

# TREND ANALYSIS OF PRECIPITATION PARAMETERS IN EDIRNE PROVINCE USING MANN-KENDALL AND SEN'S SLOPE ESTIMATOR TESTS (1982-2021)

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## ABSTRACT

Climate change is currently one of the most prominent and increasingly significant environmental issues on a global scale. This importance has been accentuated by strong support from scientific data, escalating extreme weather events, international policy actions, and heightened societal awareness. In this context, precipitation data is crucial for assessing climate change, as precipitation plays a critical role in influencing the climate system and ecosystems. The quantity, distribution, and characteristics of precipitation are vital for monitoring and understanding climate change processes, such as water cycles, droughts, floods, soil fertility, agriculture, water resources, water management, sea level rise, and ocean currents. This study employed the Mann-Kendall test to determine the temporal trend of precipitation parameters in Edirne, and the Sen's slope estimator test to evaluate the magnitude and significance of the trend in temperature data. The results revealed a statistically significant increasing trend ($p<0.05$) in precipitation parameters in Edirne, indicating an annual increase of 6.233 mm. This increase provides essential insights into potential climate change impacts and plays a significant role in updating regional climate models and developing strategies to mitigate climate change. Furthermore, this study opens the possibility for future similar analyses on other climate parameters.

**Keywords**: Climate Change, Edirne, Mann-Kendall, Precipitation, Trend, Sen's Slope

# INVESTIGATION OF HUMAN ACTIVITIES IN THE COASTAL AREA AND ITS IMPACT ON BEACH LITTER IN THE SOUTHEAST BLACK SEA

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## ABSTRACT

The main objective of the present paper is to investigate the impact of human activities on beach marine litter pollution along the Southeast Black Sea coast of Turkey. Two sandy beaches, Balıklı and Yeniay beaches (designated as T1 and T2 stations), known for attracting local visitors for recreational purposes, were selected as representative pilot study locations to assess the level of beach litter pollution in the region. During the summer of 2022, beach marine litter, specifically macro litter (human-made litter larger than 2.5 cm), was collected and cleaned from these sites. The collected litter was counted to gauge the extent of beach marine litter pollution and determine the Coastal Clean Index (CCI). As a result, a total of 287 items were gathered and removed from the beaches, with plastic emerging as the predominant material, followed by paper and various other types of litter. Commonly found items at the stations included single-use items such as cigarette butts, beverage containers, and plastic fragments. The results pointed to a high level of pollution along the Southeast Black Sea coast, with Balıklı and Yeniay beaches exhibiting litter densities of 1.42 and 1.45 items per square meter, respectively. According to the Coastal Clean Index (CCI), both beaches fell under the category of "extremely dirty," surpassing an index value of 20. The outcomes of this study emphasize that human activities on the beaches play a significant role in the accumulation of marine litter, revealing a lack of awareness among beachgoers regarding the environmental impact of beach marine litter.

**Keywords**: Beach Litter, Marine Litter, Pollution, Antropogenic, Black Sea

# PROPYLPARABEN IMPEDES SURVIVAL AND GROWTH OF DAPHNIA MAGNA AND SACCHAROMYCES CEREVISIAE

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## ABSTRACT

Parabens are commonly used as preservatives in various products including food, cosmetics and pharmaceuticals. Propylparaben (PP) is one such paraben used in water-based cosmetics, such as creams, lotions, shampoos and bath products, as well as a food additive to increase the shelf life of consumer products by inhibiting microbial growth. The high production and wide use of parabens results in their leaching out and accumulation in the environment. The present study aimed at analyzing the impacts of PP on both *Daphnia magna* and *Saccharomyces cerevisiae*. *Daphnia magna* juveniles (< 24 hours) were first exposed to different concentrations of PP (ranging from 0.01 µM to 500 µM) for 48 hours. Based on this, the survival rates and LC50 values were determined. At 24 hours, 50 µM PP and above concentrations were found to be toxic to *Daphnia magna*, while, at 48 hours, the effective concentration of PP decreased to 10 µM. The LC50 values were determined as 58 µM and 49.3 µM for 24 and 48 hour exposures, respectively. Various concentrations of PP (10, 50, 100, 400, 800 and 1000 µM PP) were also used to analyze its impacts on *Saccharomceys cerevisiae*. The growth kinetics and inhibition levels on cells were considered as the endpoints. The results showed that PP did not affect the growth kinetics at any concentration up to 100 µM PP, while above concentrations resulted in a significant decrease in the growth kinetics. However, cell inhibition was observed at all exposure concentrations in a dose-dependent manner. Comparative analysis of the results demonstrated that PP causes a higher toxicity in *Daphnia magna* compared to *Saccharomyces cerevisiae*. Taken together, the present study provided critical data on the negative impacts of PP and suggests further analyses at the gene and protein levels to better understand the possible paraben-related toxicity.

**Keywords**: Propylparaben, Daphnia magna, Saccharomyces cerevisiae, survival, growth kinetics

# BIOLOGICAL AND PHYSICOCHEMICAL INVESTIGATION OF CERTAIN STATIONS OF TUNCA RIVER

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## ABSTRACT

This study was carried out in order to determine some water analysis, substrate and environmental data of 3 stations determined in Tunca River in Edirne province in 2012. The first station on the river was determined as Suakacak Village, which is close to the border where the river enters Turkey, the second station as Değirmenyeni Village, and the third station as Trakya University Tunca Barracks garden. Field studies carried out between June and October 2012 were carried out as monthly periods. During the study, water samples were taken from each station and brought to the biology department laboratory for some analysis (temperature, pH, dissolved oxygen, total hardness, conductivity, suspended solids). In addition, notes were taken by observing the water in the river and the surrounding environments, and as a result, the stations were compared from various perspectives. Months and stations were evaluated physicochemically according to the Bray-Curtis similarity index. The months of September and October and September and August show the most similarity; In terms of stations, the 3rd and 2nd stations were found to be similar at most. In addition, the results of other studies conducted on the river were compared.

**Keywords**: Tunca River, Physicochemical analysis, Ecology

# THE IMPACT OF CLIMATIC CHANGES ON TURKISH SEAS

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## ABSTRACT

In the biosphere, one of the most significant factors that influences the entire living structure, life forms, and habitats is the climate factor. However, climate change poses a serious threat to seas and marine organisms, just like it does to all living beings. The Mediterranean and Black Sea basins, in which our country is located, are among the regions most affected by global climate change. In parallel with climate change, both the Mediterranean and Black Seas experience surface water temperature changes above the global average, along with rising sea levels. Climate change not only affects the surface of the seas but also deeply impacts the ocean. These changes are observable in their effects on marine ecosystems as well. The effects of invasive species and ocean acidification are observed in both the Mediterranean and the Black Sea. Due to their distinct ecological and climatic characteristics, this increase in Turkey's seas has transformed them into more tropical-like environments, leading to the migration of invasive species from tropical seas to our waters According to the sea meteorology data from the General Directorate of Meteorology between 1970 and 2021, there has been an increase of approximately 0.4 - 1.4°C in sea water temperatures over the last twenty years in the Black Sea, Marmara Sea, Aegean Sea, and the Mediterranean. In During the same period, it has been observed that the maximum increase in sea water temperatures ranges from approximately 2.3°C to 3.5°C, with the highest increase being recorded in the Black Sea. It is also predicted that there will be an increase of 2°C to 5°C in sea water temperatures by the year 2100. Identifying species with invasive potential will make it easier to eradicate them in new habitats with less economic loss in a shorter period. In the fight against climate change, widespread ecological energy production methods and reducing carbon emissions are of great importance. Our seas, shaped by their geological histories and biotas, each exhibit unique identities and are facing the threat of biological homogenization. They should be closely monitored to address this issue.

**Keywords**: Climatic Change, Sea Surface Water Temperature, Invasive Species, Mediterranean, Black Sea, Eagean Sea (TURKEY)

# ASSESSMENT OF METHANE EMISSIONS FROM BALAKHANI LANDFILL USING LANDGEM MODEL

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## ABSTRACT

Landfill sites are considered to be significant anthropocentric sources of pollutants, encompassing various forms such as litter, dust, odor, and emissions of landfill gas (LFG). In the year 2018, the global population produced a total of 2.01 billion metric tonnes of municipal solid waste. On a global scale, the average amount of waste produced per individual per day is approximately 0.74 kilograms. However, it is important to note that this figure exhibits significant variation, with values ranging from 0.11 to 4.54 kilograms. According to projections, the global volume of waste is anticipated to increase to 3.40 billion tons by the year 2050. This research focuses on evaluating the methane emissions originating from the Balakhani municipal solid waste sanitary landfill located in Baku, Azerbaijan. The estimation of methane emissions was conducted using the Landfill Gas Emissions Model (LandGEM). There are several factors that contribute to the overall quantity of landfill gas (LFG) generated, including the type of waste, environmental conditions, and the efficiency of collection. The quantity and rate of landfill gas (LFG) are subject to variation based on the organic composition of the waste material that is deposited within the landfill site. The study's framework encompassed an evaluation of several key factors, including the quantity of waste deposited in landfills, the characteristics of these landfills, the composition of the waste materials, and the current climate in the area. According to the LandGEM methodology, the Balakhani municipal solid waste sanitary landfill has released a total of 145,780,000 metric tons (Mg) of methane gas from the years 2009 to 2024.

**Keywords**: municipal solid waste, methane, sanitary landfill

# ENVIRONMENTAL EFFECTS OF OFFSHORE AND ONSHORE WIND POWER PLANTS AND CAPACITY OF WIND ENERGY IN TURKEY

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## ABSTRACT

This study extensively examines wind energy systems among various renewable energy systems. Wind energy is one of the renewable energy sources that has the least impact on the environment, since its source is a type of energy that comes from nature. Turkey has a rich wind energy potential due to its geographical location. In order to benefit from this potential at the maximum level and to display an environmentally friendly approach in energy production, OWPP (Offshore Wind Power Plant) projects should be given importance. OWPP projects will reduce dependency on fossil fuels and minimize environmental impacts. These projects will reduce carbon emissions by promoting clean energy production and contribute to the fight against climate change. In addition, since OWPPs are installed in the marine environment, negative effects such as noise pollution, visual pollution, bird deaths (it may not be followed because it is a marine environment) will also disappear. Although the cost of OWPP is higher than WPP (Onshore Wind Power Plant), OWPP has the capacity to produce more energy than WPP. If comprehensive studies are carried out for OWPP projects in Turkey, it will become clearer that Turkey is a suitable country for OWPP and that there will be serious increases in energy production. Necessary incentives and policies should be implemented for these projects. Selection of appropriate technology is of great importance for the successful implementation of OWPP projects. Sea-resistant wind turbines should be used and infrastructures compatible with the seabed should be built. In addition, wave movements, currents and other environmental factors need to be considered. By analyzing Turkey's wind energy potential and current situation, the feasibility of offshore wind energy turbines in Turkey is assessed. Environmental impacts of offshore wind energy systems are also considered in this evaluation. The spread of OWPP projects in Turkey will also provide economic benefits. New job opportunities will be created, domestic industry and technology development will be supported. In addition, OWPP will be an important step in reducing Turkey's dependence on foreign energy and achieving sustainable development goals.

**Keywords**: Renewable Energy, Offshore wind energy, onshore wind enegy

# THE DETECTION OF BOATS ENGAGED IN NIGHT FISHING IN THE EASTERN MEDITERRANEAN BY SATELLITE IMAGES

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## ABSTRACT

This study was conducted to detect the locations of fishing boats using light at night during the 2022-2023 fishing season in the Eastern Mediterranean (Mersin - Iskenderun Gulf) using VIIRS (The Visible Infrared Imaging Radiometer) Suomi-NPP (The Suomi National Polar-orbiting Partnership) satellite images with a Day/Night Band (DNB) radiometer. The monthly night location coordinates of trawlers actively fishing in the region were obtained from the Automatic Identification System (AIS). The monthly composite night images of the Suomi-NPP VIIRS-DNB satellite, published by the NOAA (National Oceanic and Atmospheric Administration) agency, between September 1, 2022, and March 31, 2023, were used to obtain the satellite images. The location information of 10 trawl boats actively fishing in the region was overlaid on the downloaded night images, and a preliminary study was conducted to assess the availability of monthly satellite products. All DNB and location data were processed using ENVI 5.3 and ArcGIS 10.0. Overlap was observed between the areas where trawling boats were fishing and the monthly satellite images. As a result of the preliminary study, it was observed that the detection of light sources in the marine environment could be achieved using satellite images.

**Keywords**: Eastern Mediterranean, Suomi-NPP, satellite images, VIIRS-DNB

# RATIONAL USE OF PASTURES USING REMOTE SENSING ON THE LANDS OF NORTHERN KAZAKHSTAN

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## ABSTRACT

Intensive grazing leads to degradation of pastures and, accordingly, to a shortage of pasture feed for animals. With the haphazard use of forage lands, they are trampled and the coefficient of their use decreases, the botanical composition of phytocenoses is depleted and valuable crops fall out of its composition. To maintain pasture productivity, it is necessary to develop a pasture resource management system to control pasture capacity and grazing duration. The article shows the results of studies of corral grazing of beef cattle, using remote sensing of the land in Northern Kazakhstan.

**Keywords**: pastures, paddock grazing, pasture capacity, pasture turnover

# UTILIZATION OF SOME GAS PHASED COMPOUNDS THAT ARE RELEASED DURING BREAD PRODUCTION IN BREAD STORAGE

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## ABSTRACT

In order to replace the nutritional needs of the world population, food production is also increased due to the increasing population, and this situation turns into an extraordinary ecosystem where food waste arise. In this context, bread has risen to an interesting position as it is one of the most consumed and most wasted food. Many studies have been carried out on the recycling of solid waste of bread to integrate into the economy. However, these studies were only limited to the solid waste of bread. This study aims to investigate the valuable gases released during bread production and valorize these gases. The most important gaseous compounds released during and after bread production were selected according to the literature information about their concentrations, health effects, toxicology and global usage conditions. Ethyl alcohol, 2-methyl-1-propanol (2MP) and 3-methyl-1-butanol (3MB) were determined as the most important compounds in this context. The 2MP and 3MB in with ethyl alcohol (70% v/v) at a final concentration of 0.3% (v/v) were sprayed to the bread slices (having no additive) prior to packaging in zipped plastic pouches (polyethylene terephthalate/polyethylene). Samples that were sprayed with only ethyl alcohol (70%) or packaged without spraying were used as the controls. Then, the changes in the quality properties (microbial count, texture profile, moisture content, color, pH, and sensory properties) of the bread samples during storage were observed. The samples that were applied with ethyl alcohol, 2MP, and 3MB by spraying method have been found to be statistically different by means of textural, sensorial and microbiological properties compared to the control samples which were not treated with any of the compounds or ethyl alcohol. Utilization of these gases are of great importance and this circular economy without waste and the valorization of ethyl alcohol and other released gases has a fundamental role in the construction of a sustainable society.

**Keywords**: Bread, Gas Waste, Ethanol, Preservation by Spraying Method

# CONSUMPTION OF FUNCTIONAL FOODS: WHAT DO YOUNG CONSUMERS, IN THE GREAT METROPOLITAN AREA OF TUNIS, SAY ABOUT LOW-CONTENT CLAIMS?

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## ABSTRACT

Cardiovascular diseases (CVDs) are the leading cause of death all over the world with a number of death reaching around 17.9 million lives each year. Unhealthy diets, lack of physical activity, tobacco and excessive use of alcohol are leading reasons for the spread of these diseases as well as overweight and obesity. Improving food products quality by the development of functional foods, like low-content foods (low-fat, reduced sodium, cholesterol-free, low sugar), is among strategies to overcome CVDs issue. Meanwhile, the success of such strategy depends on consumers' knowledge about these products. The objective of this research was to assess young consumers' knowledge about low-content claims and their consumption habits of such products. A sample of 250 Tunisian consumers aged between 20-30 years old was surveyed online, in March 2021. Respondents were asked about their: demographic characteristics, thoughts about current diet, knowledge about low-content claims, consumption habits of low-content products. Results revealed that 71.1% of respondents believe they have a healthy and equilibrate diet. Around 68% of respondents declared they know and understand claims. However, when asked to define them some confusion was discovered. Only 42.2% of participants reported they consume low-content products with a diversity of low calories and low sugar products like dairy products, juices & soda and cereal products. These results highlight the proactive behavior of young consumers in the great metropolitan area of Tunis to tackle health issues problems related to obesity and CVDs. Meanwhile, there still have a need for communication to explain nutritional and health claims to encourage more consumers to adapt the use of such products.

**Keywords**: Knowledge, low-content products, cardiovascular diseases, survey, young consumers.

# EFFECTS OF MATERNAL NUTRITION ON WEIGHT GAIN DURING PREGNANCY

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## ABSTRACT

Objectives. – To assess maternal intakes of energy and nutrients in each trimester of pregnancy and their effect on gestational weight gain. Materials and methods. – A prospective and longitudinal study of a cohort of 300 women was carried out during the entire period of pregnancy at antenatal consultation and monitoring centers in Constantine (Algeria) from December 2013 to July 2016. The estimation of energy and nutrient intakes was made bya three-day dietary record and repeated each trimester of pregnancy. Height and starting weight and weight at the end of pregnancy were measured. Statistics were performed using StatviewTM and SPSS software. Results. – The majority of women (75.0%) had inadequate weight gain in late pregnancy. Intakes of energy, vitamines and minerals of women with low weight gain were lower than that of women with normal and excessive gain in the three trimesters of pregnancy ($P < 0.0001$). For all weight categories, average energy and nutrient intakes were lower in the first trimester then increase in the second trimester and stabilized in the third trimester. Between the first and third trimesters, 86 to 100% of women had vitamin and mineral intakes that were significantly lower than recommended dietary allowance. Conclusion. – Our study demonstrated the impact of maternal nutrition on gestational weight gain in relation to energy intake and specific nutrients, but the role of macronutrients was inconsistent. Pregnancy should be used as a ‘window of opportunity’ for changes in diet.

**Keywords**: Gestational weight gain, effects of dietary, caloric intake, vitamin intake, minerals intake.

# PHYTOCHEMICAL CHARACTERIZATION OF LIPOPHILIC AND HYDROMETHANOLIC FRACTIONS OF ALLIUM TRIQUETRUM L. FROM GOURAYA IN NORTHERN ALGERIA

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## ABSTRACT

This work focuses on the phytochemical study of a spontaneous plant, *Allium triquetrum* L. from the Gouraya region, wilaya Tipaza. The analysis by GC-MS of the apolar fraction of leaves and bulbs obtained by Soxhlet revealed the presence of 11 compounds from different fatty, saturated, monounsaturated and polyunsaturated acids. The spectrophotometry assay of methanolic extract showed the richness of this plant in total polyphenols (18.72+-1.84 mg/g d'extrait) and flavonoids (4.49-+0.04mg/g d'extrait). The DPPH method showed that this extract produces an interesting anti-radical potential with an IC50 of 0.69ug/l, which is 18 times lower than that Of the referred product butylated hydroxytoluene (BHT) Thanks to its properties shown in this work, *Allium triquetrum L*. de Gouraya deserves to be valued as a medicinal plant and as a condiment or green vegetable.

**Keywords**: Allium triquetrum L., polar and apolar fractions, GCMS profile, polyphenol, flavonoids, DPPH, IC50.

# QUALITY OF DRY PEPPERMINT (MENTHA PIPERITA L.) LEAVES AS AFFECTED BY IN-PACKAGE DIELECTRIC BARRIER DISCHARGE COLD PLASMA

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## ABSTRACT

Cold plasma is an emerging technology that can replace conventional food treatment technologies in the future. This study investigates the effects of in-package dielectric barrier discharge cold plasma (DBD-CP) treatment on dry peppermint's (*Mentha piperita* L.) microbial load, color, total phenolic content (TPC), and antioxidant properties. Unpacked peppermint leaves were bought from a local spice shop and were packed under normal atmospheric air (AP) or modified atmosphere (MAP) composed of 50% N2 and 50% CO2. After packaging the samples were placed between two parallel stainless steel electrodes with a radius of 66mm and a thickness of 3mm. The top electrode was coupled to a 2 mm dielectric glass barrier, and there was a 16 mm gap between the electrodes. Then the samples were treated by DBD-CP at 40kV for 0, 15, or 30 minutes. All treatments were replicated three times. The changes in the total plate count, color (L*, a*, b*) values, total phenolic content (TPC), and antioxidant activity of the peppermint samples due to the in package DBD-CP treatment were evaluated. In package DBD-CP application did not affect the total plate count of peppermint in AP ($p>0.05$), while it caused a slight increase in MAP ($p<0.05$). The b* value and hue angle of the AP samples changed upon 30 min-DBD-CP treatment ($p<0.05$). In addition, the total color difference values of samples were similar and ranged between 1 – 2 that the difference was noticeable only by experienced observers. The TPC of the samples increased after the in package DBD-CP treatment ($p<0.05$), while the 30 min-treated MAP samples had a similar TPC to that of the control ($p>0.05$). The antioxidant activity of the samples were not affected by the in package DBD-CP treatment ($p>0.05$). In conclusion, the in package DBD-CP treatment of dry peppermint increased the TPC, but it did not decrease the total bacterial count. The treatment under MAP performed slightly better in protecting the color compared to AP.

**Keywords**: In-package dielectric barrier discharge cold plasma, peppermint, Mentha piperita L., total bacterial count, color, total phenolic content, antioxidant activity.

# DATA ANALYSIS OF OLIVE OIL CHARACTERIZED IN EAST AND SOUTH-EAST OF ALGERIA

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## ABSTRACT

In Algeria, the growing of olive trees is the most widespread fruit crop. The Agricultural Area Used (UAA) is spread over several wilayas of the country, such as Batna, Tebessa, Biskra, Grarm Gouga, Khenchela, Sétif, El-Oued and Bejaïa. These areas produce large quantities of olives, the majority of which are destined for oil mills for olive oil extraction. These oils have been the subject of several characterization studies over the years. The latter have revealed a great deal of information. Olive oils are classified according to the parameters and standards developed by the International Olive Council. Olive oil is oil obtained from the fruit of the olive tree by mechanical or physical processes under conditions, in particular thermal, which makes it possible to maintain the composition and the organoleptic characteristics of the oil as they are found in the fruit. The chemical and physical data on olive oils extracted from olives from several regions in the East and Southeast of Algeria are collected from a work carried out over several years and processed by Principal Component Analysis (PCA) in order to classify and separate these oils according to the regions. The study purports to examine whether there are any links between the variables and between the samples. The purpose is to describe the chemical data contained in a table with n rows (individuals) and p columns (variables). The analysis of the data has made it possible to separate the region of El Oued on two Principal Components.

**Keywords**: Olive oil, chemical and physical data , Principal Component Analysis, regions

# SO-CALLED MILK SUBSTITUTES: CAN PLANT-BASED MILKS BE AN ALTERNATIVE TO CONVENTIONAL MILK?

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## ABSTRACT

Recently, consumer preferences in daily diets have been changing and the proportion of people adopting a vegetarian diet has been increasing, and this group strongly supports their thesis, claiming that plant-based milk substitutes are the best option for human health and nutrition compared to natural milk. For this reason, the production and consumption of plant-based milk-like beverages has shown an increasing momentum, especially in western societies, attracting the attention of the traditional dairy industry market. The mainstay of the advocates of herbal milk substitutes is the presence of some functional components that come from the plant and promote health in their structure. On the other hand, milk is considered a healthy whole food, providing balanced proportions of macro (fat, proteins, and carbohydrates) and micronutrients. In addition, many scientific reports in the literature show that natural milk contains more beneficial nutritional factors such as organic acids, milk vitamins and minerals (calcium, selenium, riboflavin, vitamin B12 and pantothenic acid, vitamin B5) and immunoglobulins, peptides, oligosaccharides, enzymes, compared to artificially produced counterparts. It has been reported that it contains many bioactive components such as lactoferrin and nucleotides in its structure, and therefore these two liquids cannot be substituted for each other. In addition, in order for these so-called alternatives to gain milk-like taste, aroma, appearance, stability and rheology, they must be artificially produced by supplementing with other chemical additives, and therefore they are not natural. In order to obtain a quality end product, quality raw material is a requirement in the first step, and disintegration method, extraction, particle size and homogeneity, rheological stability and storage conditions are important. Considering the increasing market share of these so-called plant-based milk alternatives in today's dairy market, it is considered important to compare these two beverages from a scientific point of view.

**Keywords**: dairy industry, economic impact, non-dairy milk plant-based milk

# EFFECT OF THE ADDITION OF EGG YOLK ON THE PHYSICOCHEMICAL AND SENSORIAL CHARACTERISTICS OF ALGERIAN TRADITIONAL ADGHESS CHEESE

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## ABSTRACT

Algerian *Adghess* cheese is a fresh cheese very popular with the people of the region of Oum El Bouaghi; it is a product that is not or is poorly known outside its original geographical area. This study consists of comparing a cheese prepared with eggs and one without eggs in order to record the effect of the latter on the physicochemical (pH, titratable acidity, fat, ash) and sensory qualities (triangular and hedonic test), with the study of the cheese-making process. The manufacture of *Adghess* is ensured following a traditional manufacturing diagram. Five preparations made for each type of cheese were characterized. The results show that the pH values of two *Adghess* cheeses are very close (4.33 and 4.44 respectively) (P> 0, 05). The average dry extract content of Egg *Adghess* is 54g/100g while that of *Adghess* without eggs is 56.33 g/100g (P>0.05). The fat content of *Adghess* cheese with eggs is 25 g/100g; this content is higher than that of *Adghess* cheese without eggs which is 15.25 g/100g (P<0.05). With at the percentage of fat in the total dry extract (FTDE) of 60.4% and a defeated cheese moisture (DCM) of 45.7%, *Adghess* egg cheese is classified as a very fat semi-hard cheese, while *Adghess* cheese without eggs is classified as a semi-fat hard cheese, with a FTDE of 53.51% and a DCM of 27.9%. The triangular test shows that the two cheeses are significantly different at α<0.05. This difference is mainly due to color, taste and texture. Among the 15 tasters who judged the two samples of the cheese (with and without eggs), only five chose *Adghess* with eggs, against 10 who preferred *Adghess* without eggs. This work constitutes the starting point to launch a research on this product, in order to preserve the know-how on the one hand and to achieve the objective of manufacturing it on artisanal then industrial scales

**Keywords**: Adghess, characteristic, cheese, physicochemical, sensoriel, traditional

# ELABORATION OF A DIETARY BREAD ENRICHED WITH RYE BRAN

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## ABSTRACT

The aim of this work is to increase the value of the dietary fiber contained under covers of grains, called commonly« Bran » presenting a growing interest in therapy and in a prevention of several diseases. This investigation played a part to determine the physicochemical, microbiologic and toxicological characteristics of rye bran. The introduction of the bran on productions tests of special products like rye bread with a percentage of 30%. The physicochemical analysis of rye bran showed that bran contains considerable quantities of cellulose and starch. There is a total absence of any germs and any toxin and our rye bran has a good hygienic and toxicological quality. The finished product shows a good acceptability by the sensory panel.

**Keywords**: Rye -Dietary fiber - Incorporation- Bran – Bread.

# SCREENING AND CHARACTERIZATION OF NEW LACTIC STRAINS WITH TECHNOLOGICAL FUNCTIONS

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## ABSTRACT

Raw milk is a medium rich in strains of lactic acid bacteria with new properties. The screening and characterization of this microflora is very interesting for isolating new strains with technological functions potentially applicable on an industrial scale (improving the quality of food products, bioconservation, production of industrial enzymes, probiotics, etc.). In this respect, eight strains of autochthonous Lactobacilli isolated from raw goat and cow milk from local Algerian populations were identified by phenotypic and molecular approaches by amplification and sequencing of 16S rDNA as being *Lactobacillus casei* (C4, C5, V2 and V5), *Lb. paracasei* (C6) and *Lactobacillus plantarum* (C7, C8, C10). Virtually all strains studied from a technological point of view gave more than or equal to 0.89 g 100 ml-1 of lactic acid. Most of the strains exhibited high proteolytic capacity and actively produced proteases in the stationary phase between 24 and 30 hours. The strains in this study can be used for biotechnological purposes.

**Keywords**: milk, screening, Lactobacilli, identification, acidification, proteolysis

# MATERNAL NUTRITION AND BIRTH WEIGHT: ROLE OF VITAMINS AND TRACE ELEMENTS

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## ABSTRACT

Introduction: Pregnancy is a period of increased metabolic needs. Vitamins, minerals and trace elements are major determinants of the health of the pregnant woman and the fetus. Objective: To evaluate maternal intakes of vitamins and trace elements in the first, second and third trimesters of pregnancy and assess their effect on birth weight. Materials and methods: A prospective and longitudinal study have been conducted among 226 pregnant women throughout the whole period of pregnancy in the centers of prenatal consultations and follow up in Constantine (Algeria) from December 2013 to June 2016. We analyzed maternal intakes of iron, minerals and vitamins by comparing them to the normally recommended dietary allowances (ANC) and then by multivariate analysis, we studied the correlation between these intakes and birth weight. Statistics were performed using the Statview TM and SPSS software. Results: This study noted the positive effect of some maternal factors on birth weight, such as maternal age, parity, pre-pregnancy BMI and pregnancy term. The average daily intake of minerals (iron, calcium, zinc and magnesium) and vitamins (B9, B1 and E) were below the recommended intakes (ANC). In contrast, average intakes of vitamin C in the 2nd and 3rd trimesters of pregnancy corresponded to the ANC. Only magnesium intakes in the first trimester ($p=0.02$) and vitamin B9 in third one ($p=0.004$) were significantly correlated with birth weight. Conclusion: Intakes of trace elements and vitamins in our study population are reduced compared to the ANC. The correction of the pregnant women diet is urgently needed. Thus, promoting quality over quantity to avoid deficiencies in trace elements and vitamins which are harmful to the development and fetal growth.

**Keywords**: Pregnancy; Birth weight; Trace elements, vitamins

# OLIVE OIL TRACEABILITY and AUTHENTICITY

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## ABSTRACT

Olive oil traceability is of increasing interest to producers as it can optimize supply chains, improve producer competitiveness, and prevent mislabeling of oils from different geographical origins. This ensures that consumers receive accurate information. In addition, the EC Regulation on Olive Oil Marketing Standards allows producers to market virgin and extra virgin olive oils based on their geographical origin. Since the chemical composition of olive oil is known to be influenced by genotype as well as various agronomic, environmental, and technological factors, olive oil traceability requires the characterization of the resulting oil. Establishing the authenticity of extra virgin olive oil is important for geographical identification such as Protected Designation of Origin (PDO) and Protected Geographical Indications (PGI) established by official European regulations. These designations ensure that the quality of extra virgin olive oil is associated with its original geographical origin. Advances in equipment have led to great successes in traceability development. Developing an accurate analytical fingerprinting method to authenticate olive oil and prove its geographic origin is a hot topic and a major challenge. Some varieties of olives are produced in well-defined geographical areas and are therefore considered high-quality oils. These oils trade at better prices and are protected by law.

**Keywords**: olive oil, geographic origin, PDO

# OLIVE OIL AS FUNCTIONAL FOOD

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## ABSTRACT

Extra virgin olive oil can be called a functional food because it is rich in bioactive compounds, has health benefits and meets nutritional requirements. Prevention of cardiovascular disease and certain types of cancer is associated with its balanced fatty acid composition/profile, oleic acid as being major fatty acid and the presence of phenols, tocopherols, and sterols. These properties make olive oil a valuable functional food and a product of great economic and social importance in the Mediterranean region. Consuming olive oil as part of the Mediterranean diet may lead to longer life expectancy and lower cardiovascular disease and mortality rates in Mediterranean countries compared to other European regions and the United States. The antioxidant capacity of polyphenols in olive oil is related to their polarity and bioavailability and may vary with the unique individual characteristics of the gut microbiota, which may alter bioavailability and antioxidant activity. The bioavailability of hydroxytyrosol, tyrosol, and oleuropein has been extensively studied. The European Food Safety Authority and the US Food and Drug Administration have recognized the beneficial effects of olive oil phenolic compounds on human health and have announced the possibility of introducing these labels. Health benefits are attributed to a Mediterranean diet pattern that includes regular consumption of olive oil. Olive oil effectively reduces oxidative damage, inflammation, telomere attrition, aging, and apoptosis and enhances antioxidant resistance, mitochondrial function, autophagy, nutrient recognition, brain, bone, and skin protection.

**Keywords**: olive oil

# FACTORS ASSOCIATED WITH THE MOTOR DEVELOPMENT OF HEALTHY INFANTS (0- 18 MONTHS) AT SKIKDA

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## ABSTRACT

**Objectives:** Motor acquisitions are dependent on cerebral maturation, perceptual and cognitive abilities and also on experience. Research on the cognitive development of children has multiplied in recent years. They emphasize the interactions between genetically determined characteristics specific to each individual and the role of the environment (Chaix, 2008). The growth rate is very high after birth. Genetic and nutritional factors play an important role (Edouard and Tauber, 2012). Our study aims to describe the motor development of healthy infants (0-18 months) and to study the associated factors.
**Methodology:** A prospective descriptive study of the observational type was conducted in the Maternal and Child Protection Department of the Public Health Establishment of Proximity of Skikda in 2014. The data were collected by questioning the mothers using a questionnaire adapted from the WHO (2004) according to the visits of the Algerian vaccination schedule.
**Results:** At 5 months, infants with a normal birth weight were able to complete four stages of motor development compared to only two in infants with an increased birth weight. At 9 months, infants with normal birth weight were able to complete six milestones of motor development compared to only four in infants with hypertrophied birth weight.
Motor development in normal birth weight infants is early at 9 months of age for crawling and standing alone according to the practice of predominant breastfeeding (p=0.008) and continued up to 5 months of age ( p=0.020).
**Conclusion:** To ensure good growth in infants, as well as adequate motor development in infants, it is important to know the associated factors in order to correct, adjust or maintain them. Diet and breastfeeding in particular have a very strong effect on cognitive and motor development.

**Keywords**: Infants, breastfeeding, growth, motor development, Skikda

# INVESTIGATING ANTIOXIDANT AND PHARMACEUTICAL ACTIVITY OF PONCIRUS TRIFOLIATA PEEL AND PULP FROM THE MEDITERRANEAN COAST

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## ABSTRACT

*Poncirus trifoliata,* more famously known as trifoliate orange, belongs to the *Rutaceae* family. This citrus relative is a thorny, well-branched, deciduous shrub or small tree native to China and Korea, but currently present worldwide. Even though the fruit of trifoliate orange is edible (lemony flavor), it is very acidic, seedy, and not so popular or commercially used. Still, because of the anti-inflammatory, antibacterial, and anti-anaphylactic effects, and the antitumor activity of *P. trifoliata,* it has significant pharmaceutical potential. In traditional medicine, it is used to treat gastrointestinal disorders, including digestive ulcers, gastritis, dysentery, and inflammation. Interestingly, different studies also found a correlation between consuming this fruit and treating type 2 diabetes. The main classes of phytochemicals identified in *P. trifoliata* fruits include phenolic acids, flavonoids, coumarins, alkaloids, triterpenoids, and sterols. This research used the peel and pulp of *P. trifoliata* fruit, harvested from Bar, Montenegro to examine the vast potential of the plant. After the separation of its pulp and peel, plant material was lyophilized for 24 hours and milled for the homogenization of samples. Extraction was performed using an acetone: ethanol (36:64) mixture as a solvent for 30 minutes on ultrasound. After the centrifuge, the supernatant was separated and used for further analyses. Using spectrophotometry, three antioxidant assays were performed (DPPH●, ABTS●+, and reducing power), and bioactive compounds including phenolics, flavonoids, and carotenoids were investigated, as well as anti-inflammatory and antihyperglycemic activity. According to the results, there is a significantly higher amount of phenolic and flavonoid content in *P. trifoliata* peel (1528.44 and 967.75 mg/100g), compared to the pulp (610.08 and 22.68 mg/100g), respectively. On the other hand, more carotenoids are found in its pulp, 4.46 mg β-car/100g, than in peel, 1.21 mg β-car/100g. For the antioxidant assays, the strongest activity of peel and pulp samples was presented against ABTS●+ radicals, with 104.72 and 41.99 mm TE/g. As for its scavenging activity against DPPH● radical, it ranged from 8.50 to 21.26 mm TE/g. The lowest activity was presented in the reducing power assay with only 9.84 mm TE/g for the peel and no activity for the pulp. Antihyperglycemic test showcased the great potential of both the peel and pulp of trifoliate orange, where IC50 was 102.03 and 7.42 mg/ml, respectively. To sum up, an edible part of the plant, pulp, has good antioxidant and pharmaceutical activity and is full of health-promoting bioactive compounds. Furthermore, the peel of *P. trifoliata*, as a waste material after fruit consumption, showing even greater activity, has a huge, unexploited potential for application in various food and pharmaceutical applications.

**Keywords**: Poncirus trifoliata; peel; pulp; antioxidant activity; pharmaceutical activity

# FORMULATION AND ASSESSMENT OF NUTRIENT-RICH, PIGMENTED FOOD EMULSIONS CONTAINING RED BEETROOT EXTRACT

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## ABSTRACT

Red beetroot (*Beta vulgaris*) is a root vegetable belonging to the *Amaranthaceae* family. It is grown all around the world, regularly consumed as part of the normal diet, and commonly manufactured as a food coloring agent (E162). Also, it is one of the most potent vegetables regarding antioxidant activity, mainly because of its abundance of betalains and phenolic compounds. Besides its antioxidant activity, several parts of this plant are known for their antidepressant, antimicrobial, antifungal, anti-inflammatory, diuretic, expectorant, and carminative activities. Recently, red beetroot has attracted much attention as a health-promoting functional food. The perspective solution to incorporate beetroot extract, as a functional additive for pharmaceutical and food industries, is the production of food-grade emulsions. Emulsions are described as capsules that protect bioactive compounds in the inner phase and can be used to deliver active ingredients which improve product stability, solubility, flavor, and taste. Therefore, in this study optimization of the formulation of red beetroot-based emulsions was investigated. The emulsions were comprised of the following components: red beetroot extract, Tween 80, oil (coconut oil, sunflower oil, or hemp oil), and water. In the experiment the mass ratio of the emulsifier and type of oil was varied. The mass ratio of red beetroot extract (0.16 g), oil (3 ml), and water (1 ml) was constant. In samples 1, 2, and 3 were used coconut oil where the concentration of emulsifiers was 200, 100, and 50 µl. Samples 4 and 6 used hemp oil in a concentration of 100 and 50 µl of emulsifier, respectively, while samples 5 and 7 used sunflower oil following the same pattern. In obtained emulsions, the content of polyphenolics and betalains was determined, as well as its antioxidant (DPPH, ABTS+, and reducing power), antihyperglycemic and anti-inflammatory activity. The content of polyphenolics ranged from 117.90 to 176.15 mg GA/100g. Analyses of betalains showed that samples contained the following concentrations of batanins and vulgaxantins: 2596.90–7414.32 mg betanin/g and 1167.53–4295.17 mg vulgaxantin/g. The antioxidant activity for DPPH was between 54.87 and 89.38 mM TE/100g; ABTS+ was between 16.90 and 280.58 mM TE/100g; and reducing power was between 27.76 and 101.02 mM TE/100g. Antihyperglycemic and anti-inflammatory activity were analyzed in a concentration of 100 mg/ml. Antihyperglycemic activity was from 24.70 to 65.16%, while anti-inflammatory activity was from 7.93 to 100%. Results revealed that sample 4 has the highest values for polyphenolics and ABTS+, while sample 6 has the highest concentration of vulgaxantin. Both samples contain hemp oil. Sample 1 expressed the strongest DPPH activity as well as anti-inflammatory activity, while sample 7 possesses

significant antihyperglycemic activity and reducing power. It can be concluded that all samples are rich in phytochemical compounds and have strong activities, but their values differs according to the choice of oil, but similarity could be observed in the use of a same concentration of emulsifier (100 µl).

**Keywords**: red beetroot extract; emulsions; phytochemical content; antioxidant activity

# MRL INDICATORS IN/ON FOOD IN BOSNIA AND HERZEGOVINA FOR 2022

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## ABSTRACT

In accordance with the Ordinance on maximum levels of pesticide residues in and on food and feed of plant and animal origin ("Official Gazette of BiH", number 48/21), the Food Safety Agency of BiH implemented the Program of Control Pesticide Residues (MRL) for 2022. A total of 184 food samples were sampled and analyzed, of which 90 or 48.9% were domestic products, 92 or 50.0% were imported products and 2 samples or 1.1% the origin is unknown. Out of a total of 184 analyzed samples, 99 samples (53.8%) did not contain pesticide residues at the quantification level, while 85 samples (46.2%) contained pesticide residues at/above the quantification level. Of these, 80 samples (43.5%) contained pesticide residues in/above the quantification level. In three detected samples (1.6%), pesticide residues above the prescribed MRL were found within the limits of measurement uncertainty, and the samples are considered appropriate (spinach, apple and tomato), while two samples (1.1%) were inadequate (pear and strawberry). The Food Safety Agency of Bosnia and Herzegovina conducted an assessment of the acute (short-term) and chronic (long-term) exposure of consumers to pesticide residues in food. Acute risk assessment was performed for all combinations of pesticides and food products included in the Control Program, using the conservative deterministic EFSA model, PRIMo revision 3.1. The deterministic approach used for this calculation is based on conservative model assumptions. The results of the short-term (acute) risk assessment showed that it is unlikely that there is a risk, in terms of health consequences, of short-term dietary exposure of consumers (adults) in Bosnia and Herzegovina through the pesticide/food combination sampled as part of monitoring. The result of long-term (chronic) dietary exposure took into account all unprocessed food products in which pesticide residues were determined as part of the Control Program in 2020, 2021 and 2022, and shows that dietary exposure is significantly below the established ADI value in all scenarios. In accordance with the above, it can be concluded that it is unlikely that long-term food exposure to pesticides, in established concentrations, represents a risk for the health of consumers in Bosnia and Herzegovina.

**Keywords**: MRL, pesticides, food, risk assessment

# DEVELOPMENT A VEGAN SNACK BAR

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## ABSTRACT

The functional foods sector is thriving by the consumers' recognition of the relationship between diet and health. In addition to functional characteristic of these foods, it is also important that these foods should meet the needs of people with vegan, food intolerance, etc., both in terms of nutrition and taste. Herein, development of a vegan snack bar containing of chia seeds, oats, dates and tahini was main purpose of the study. Moisture content, color parameters (L*, a*, b*) and sensory properties (9-points Hedonic scale) of the snack bar samples were investigated. Besides, storage time was evaluated based on these properties by 24 hour-intervals for 72 hours at 4°C. In meantime of production, vegan snack bars containing tahini at a rate of 5, 10 and 20% (standard) were also produced and evaluated in terms of consumer taste. To the results, all of the snack bars were found tasteful but, 5% tahini vegan snack bar was the most favorable one. L*, a*, b* values were changed between 25.14-36.04, 4.02-4.96 and 14.79-20.55, respectively. Then, the values were slightly decreased with storage time. Also, the moisture content decreased from 10.69% to 6.57% between 24 and 72 hours storage. Therefore, suitable packaging material and process should be studied for further studies. To sum up, the vegan snack bar fulfils the needs of consumers with chia seeds, oats, dates and tahini contents. Furthermore, the vegan snack bar would be gain a place in the market in the future.

**Keywords**: Chia, oat, tahini, dates, vegan, snack bar

# DEVELOPMENT A SUGAR FREE VEGAN CHOCOLATE

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## ABSTRACT

Recently, the augmenting request for natural ingredients that improve health has led to the expansion of the functional food market. Also, it is substantial that functional foods meet the needs of consumers in terms of taste as well as in terms of nutrition. Furthermore, it is known that chocolate is a kind of food to consume for attractive taste and personal gratification. Even it is one of the most preferred food, there is rising demand for a low-calorie, sugar free and a vegan product formulation chocolate with increasing awareness of functional foods. In line with this information, development of a vegan and sugar free chocolate was main purpose of the study. Any animal origin product was not used on the production process of the chocolate and date extracts was utilized instead of sugar. Besides, acai (granulated) and strawberry (dried) were chosen for flavor regarding antioxidant characteristic of them. Moisture content, color parameters (L*, a*, b*) and sensory properties (9-points Hedonic scale) of the chocolate samples were performed in the study. Also, storage time was evaluated in terms of sensory properties by 24 hour-intervals for 72 hours at 4°C. According to the results, moisture content was found at 2.35%. Then, L*, a*, b* values were changed between 27.65-9.21, 14.07-2.71 and 15.32-1.21, respectively for front and back side. Besides, the chocolate was generally accepted as like very much by panelists even the aftertaste was evaluated as like slightly. Additionally, there was not observed any significant changes during storage periods ($p > 0.05$). To conclusion, the developed chocolate is a great alternative for who ask for healthy, functional and delicious snack as well as functional food market.

**Keywords**: Functional chocolate, sugar free, vegan

# IMPROVEMENT OF ESCHERICHIA COLI O157: H7 AND SALMONELLA SPP. DETECTION IN FOOD SAMPLES

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## ABSTRACT

Foodborne pathogens such as *Escherichia coli* O157:H7 and *Salmonella* spp. are a significant concern for human health, public safety, and economic property worldwide. The outbreaks caused by foodborne pathogens are related to the consumption of contaminated foods. Therefore, early detection of foodborne pathogens is critical to prevent the spread of illnesses and to ensuring public health. This study investigates the effectiveness of the treating the food samples with HCl dilutions prepared with NaCl solutions, as an alternative to the pre-enrichment and enrichment steps that are typically used in standard ISO methods. To achieve this goal, standard ISO and modified detection methods were used to detection of *E. coli* O157:H7 and *Salmonella* spp. in various food samples. A total of 103 food samples (89 meat samples, 3 instant soup powders, 2 Turkish-style fermented sausages, 2 whipped creams, 1 yogurt, 1 lettuce, 1 mayonnaise, 1 fruit juice, 1 ketchup, 1 nut and 1 raw milk.) were randomly purchased from markets in Edirne, Türkiye. The ISO 16654:2001/Amd 1:2017 method was used for detection of *E. coli* O157:H7. The ISO 6579-1:2017 method was used for detection of *Salmonella* spp. HCl treatment steps (for 30 sec and 1 min) were performed instead of enrichment step or after enrichment step. Five different HCl concentrations (1/2N, 1/4N, 1/6N, 1/8N and 1/10N) were used. For *E. coli* O157:H7 detection, 2 positive results were obtained from 1 beef meat and 1 Turkish-style fermented sausage by classical ISO method and also 2 modified methods. It was determined that different HCl concentrations (1/2 and 1/10 N HCl for beef meat and 1/10N HCl for Turkish-style fermented sausage sample) were effective for each food sample. For *Salmonella* spp. detection, 2 positive results were obtained from 1 instant soup power and 1 whipped cream by classical ISO method and also 2 modified methods. while two different HCl concentrations (1/6 N and 1/10 N) were effective for the whipped cream sample and 3 different HCl concentrations (1/6, 1/8 and 1/10 N HCl) for the instant powder soup sample, 1/6 and 1/10 N HCl treatments were found to be effective for both samples. Our results showed that, the use of HCl solution to treat the food samples could eliminate the need for pre-enrichment and enrichment steps and shorten the time required for detecting these pathogens and also it also reduces costs.

**Acknowledgments:** This study was supported by the Trakya University Scientific Research Fund by the research project (2018/133) given to Dr. Ece Şen.

**Keywords**: Escherichia coli O157:H7, Salmonella spp., hydrochloric acid, foodborne pathogen, detection

# DEVELOPMENT AND VALIDATION OF HPLC-DAD METHOD FOR SIMULTANEOUS DETERMINATION OF PHENOLIC COMPOUNDS IN DIETARY SUPPLEMENTS AND EVALUATION OF THEIR ANTİOXIDANT ACTIVITIES

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## ABSTRACT

Dietary supplements are products used to support normal nutrition and may contain nutrients such as vitamins, minerals, carbohydrates, fatty acids, amino acids, and phenolic compounds. These products can be found in liquid or powder form and can be packaged in various forms like tablets, capsules, lozenges, liquid dropper bottles, etc. According to a study conducted in our country, the rate of use of dietary supplements was reported as 13%. The interest in dietary supplements is increasing day by day during the pandemic period that we are all affected by worldwide. Dietary supplements are recommended for many health issues such as cancer treatment, heart diseases, AIDS, Alzheimer's and allergic reactions. Due to these reasons, there is a need for more data regarding the contents and accuracy of dietary supplements. In this study, the antioxidant activity of five different dietary supplements ($DS_1$, $DS_2$, $DS_3$, $DS_4$, $DS_5$) has been determined. Also, a new HPLC-DAD method has been developed and validated for the dual qualitative and quantitative determination of phenolic compounds (rutin, resveratrol, quercetin) in these dietary supplements. The antioxidant activity of dietary supplements was analyzed by DPPH and CUPRAC methods The $IC_{50}$ values of the dietary supplement extracts, determined using the DPPH method, were found to range from 0.084 to 0.757 mg/mL. Furthermore, the TAC (Total Antioxidant Capacity) values of $DS_1$, $DS_2$, $DS_3$, $DS_4$ and $DS_5$, measured using the CUPRAC method, were found to be 0.093, 0.032, 0.095, 0.103, and 0.396 mmol trolox per gram of dietary supplement, respectively. A new HPLC-DAD method has been developed for the simultaneous determination of phenolic compounds. Chromatographic analyses were performed on a SUPELCOSIL LC-18 (25cm x 4.6mm, 5µm) column using a gradient program. The mobile phase, flow rate, and column temperature were optimized. The suitability of the developed method was investigated during the validation, and it was found to be in accordance with the recommended values. The LOD and LOQ values of rutin, quercetin, and resveratrol were found in the range of 0.005-0.007 mg/L and 0.016-0.022 mg/L, respectively. The intra-day analysis recoveries of the compounds were found to be in the range of 99.52% to 100.19%, with %RSD values ranging from 0.12 to 0.69. For inter-day analysis, the recoveries were determined to be in the range of 99.78% to 100.34%, with %RSD values ranging from 0.33 to 0.72. The developed and validated HPLC-DAD method was used for the determination of phenolic compounds in the content of five different dietary supplements.

**Keywords:** HPLC-DAD, Method validation, Phenolic compounds, Dietary supplements, Antioxidant activity

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# THE EFFECT OF DIFFERENT DRYING METHODS ON SOME CHEMICAL AND BIOACTIVE COMPONENTS OF ORANGE AND BLACK CARROT POWDERS

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## ABSTRACT

In this study, two different varieties of carrots (orange and black carrots) were dried with three different drying methods (hot air, microwave and freeze-drying) and ground to obtain carrot powders. Color values, ash, protein, fat, antioxidant activity, total phenolic content (TPC), β-carotene, total anthocyanin (TA) and mineral matter of the carrot powders were determined. Orange carrot powders showed higher lightness, redness and yellowness values than black carrot powders. The freeze-drying method provided higher lightness value in both carrot powder varieties. Different drying methods did not cause a significant ($p>0.05$) change on the ash, protein and fat content of carrot powders. The antioxidant activities and TPC of orange and black carrot powders varied between 75.16-76.60% and 87.52-95.75%, 263.50-470.90 mgGAE/100g and 596.10-1353.40 mgGAE/100g, respectively. β-carotene content of orange carrot powders dried with different methods ranged between 39.34 mg/100g and 48.72 mg/100g, and β-carotene content of freeze-dried samples was found to be higher than other drying methods. The TA amount of black carrot powders varied between 259.08 mgCGE/100g and 424.66 mgCGE/100g. The freeze-drying method resulted in the highest TA content, while the hot air drying method revealed the lowest TA content. Black carrot powders for all drying methods had higher Fe, K, Mg and P contents than orange carrot powders. Different drying methods did not change the mineral amounts in both carrot powders.

**Keywords**: Drying, orange carrot, black carrot, powder, bioactive component

# COLORIZING PROPERTIES OF MICROALGAE

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## ABSTRACT

Microalgae are photosynthetic organisms of microscopic scale found in various waters. They can live in freshwater lakes, rivers, seas, oceans, and even in various moist areas. They are used as a source of protein, food source, sweetener, colorant in the food industry with their various protection. They have different colors with the colored pigments they contain and gain coloring properties. These properties emerge through various pigments called chlorophyll. Chlorophyll is the green pigment involved in the photosynthesis of microalgae. Different microalgae species can produce different chlorophyll variants, making them appear in different colors. In addition to chlorophyll, the coloring properties of microalgae emerge through other pigments. For example, microalgae also contain carotenoids with a red, orange, or yellow color and phycobilins with a blue, green, or red color. These various pigment contents and their coloring properties allow microalgae to be used in industrial, agricultural, and biotechnological applications. For example, the color pigments of microalgae can be utilized as natural colorants in the food, cosmetic, and textile industries. In addition, the colored cells of microalgae can be used as fluorescent labels in biotechnological research and microscopic examinations. The coloring properties of microalgae can also be evaluated in agricultural and environmental applications. For example, red or blue microalgae can adjust the light spectrum to optimize plant growth in greenhouses. It can also be used for monitoring water pollution and assessing water quality. We can list the usage areas of the color pigments of microalgae as natural colorants, fluorescent labels, agricultural lighting, and environmental monitoring. While these features increase the biotechnological potential of microalgae, they also constitute an essential resource for providing sustainable and environmentally friendly solutions. Further research and application to the coloring properties of microalgae will help us further explore the potential of these organisms and develop future innovative projects.

**Keywords**: microalgae, color properties, chlorophyll, pigments

# UTILIZATION OF INDUSTRIAL KITCHEN BY-PRODUCTS IN VEGAN CHOCOLATE PRODUCTION: A SUSTAINABLE PROCEDURE FOR ENHANCING THE NUTRITIONAL VALUE AND SUPPORTING ZERO WASTE APPROACH

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## ABSTRACT

The employment of industrial kitchen by-products carries considerable importance in promoting sustainability and enhancing resource efficiency. Many of these secondary products exhibit a high content of phenolic compounds and antioxidants, thereby presenting potential additives to improve the nutritional value. The integration of these components into chocolate may offer a fitting application. Moreover, the presence of protein-phenolic interactions in dairy products can negatively impact the bioavailability of polyphenols. This study assessed the possibility of adopting various industrial kitchen by-products (including strawberry, raspberry, and blackberry residues) to manufacture vegan chocolate. For this purpose, the by-products were integrated into the vegan chocolate manufacturing process at concentrations of 5%, 10%, and 15%. According to sensorial analysis, the sample containing 10% industrial kitchen by-products received the highest ratings for overall acceptability. Physical and chemical studies such as texture, moisture, ash, dietary fiber, total sugar, total phenolic content, and antioxidant activity were conducted. According to these findings, the fortified vegan chocolate samples had higher antioxidant activity levels and dietary fiber content than the control group. However, it was determined that incorporating the by-products decreased the hardness values. In conclusion, it can be suggested that the industrial kitchen by-products mentioned might be feasibly utilized in vegan chocolate manufacturing. Furthermore, it is anticipated that the findings of this study will contribute to sustainable food production techniques.

**Keywords**: Vegan chocolate, Sustainability, Zero waste

# INFLUENCE OF POWDERS OBTAINED FROM DIFFERENT PARTS OF STINGING NETTLE (URTICA DIOICA L.) ON TECHNOLOGIC PROPERTIES AND BIOACTIVE COMPONENTS OF NOODLES

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## ABSTRACT

In this study, different parts of the stinging nettle (leaf and stem) were dried and ground to obtain stinging nettle leaf powder (SNLP) and stinging nettle steam powder (SNSP). Those powders were used in noodle production as replaced with wheat flour at 0, 2, 4, 6 and 8% ratios. Color (raw and cooked), cooking properties (water uptake, volume increase and cooking loss), firmness, antioxidant activity (DPPH, FRAP and CUPRAC) and phenolic contents (free, bound and total) of noodles were determined. L*, a* and b* values of raw control noodle was found as 72.69, -0.52 and 31.72, respectively. Those color values were 35.63, -7.67 and 8.67 for raw noodles containing 8% SNLP and 52.75, -4.41 and 22.23 for raw noodles containing 8% SNSP, respectively. SNLP and SNSP addition significantly ($p<0.05$) affected all color parameters in raw and cooked noodle samples. Compared to the raw noodle samples, the yellowness value of SNLP and SNSP added noodles decreased with cooking. High SNLP and SNSP addition ratios reduced the water uptake and volume increase values of the noodles. The total phenolic content and antioxidant activity (measured by different methods) of noodles increased with increasing use of SNLP and SNSP.

**Keywords**: Stinging nettle, leaf powder, stem powder, noodle

# NUTRITIONAL VALUE AND UTILIZATION POSSIBILITIES OF BULGUR INDUSTRY BY-PRODUCTS IN CEREAL PRODUCTS

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## ABSTRACT

Bulgur is a semi-ready-to-eat cereal product with high nutritional and functional properties. Bulgur is commonly produced from *Tr. durum*. Bulgur production process basically consists of cooking, drying, milling and classification stages. Intermediate steps of the bulgur production process some by-products which rich in functional and nutritional components are emerged. Some of these products are used as animal feed. However, bulgur by-products such as bulgur bran, bulgur flour, düğürcük are rich in protein, dietary fiber, bioactive component and mineral contents. In addition, phytic acid in bulgur bran and bulgur flour is quite low compared to untreated ones due to the applying presure cooking during bulgur production. Bulgur by-products can be used in different ratios in the production of various cereal products such as bread, pasta, noodles, biscuits, crackers and tarhana, and contribute to the nutritional and functional properties of these products. In this study, the use of bulgur process by-products in various cereal products and their effects on nutritional, functional and technological properties of these products were compiled.

**Keywords**: Bulgur, bulgur bran, bulgur flour, düğürcük.

# UTILIZATION OF DILL, PARSLEY AND GREEN ONION POWDERS IN THE CRACKER FORMULATION

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## ABSTRACT

In this study, dill, parsley and green onion powders were used in functional cracker production. After dill, parsley and green onions were dried and ground, they were sieved through a 500 µm sieve and used in the cracker formulation at four different ratios (0, 1, 3, 5%). The effect of dill, parsley and green onions powders on color, physical, textural and sensory properties of crackers was determined. Some quality characteristics of cracker samples containing dill, parsley and green onion powder were compared with control crackers prepared with refined wheat flour. L*, a*, b*, SI and Hue values of the cracker samples changed between 55.81-72.95, -6.37-2.22, 37.79-41.51, -87.47-86.63 and 37.86-41.58, respectively. All utilization levels of dill, parsley and green onion powder decreased the lightness of the cracker samples. As the proportion of dill, parsley and green onion powder increased in the cracker formulation, the thickness value of the cracker samples decreased and the spread values increased. While the use of dill, parsley and green onion powder in cracker formulation did not have a significant effect on the hardness value of the samples, the breakability values of the samples containing green onions were found to be higher.

**Keywords**: Cracker, ill powder, Parsley powder, Green onion powder.

# SOME TECHNOLOGICAL PROPERTIES AND BIOACTIVE COMPONENTS OF LEAVENED AND UNLEAVENED FLAT BREADS SUBSTUTITED WITH GERMINATED MILLET FLOUR

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## ABSTRACT

Germination is an effective and relatively inexpensive bioprocessing technology for improving bioactive components of cereal. Biochemical reactions along with germination result in the biosynthesis and accumulation of a wide range of secondary metabolites such as flavonoids, vitamin C, tocotrienols, γ-aminobutyric acid, tocopherols, and phenolic substances, while reducing anti-nutritional factors such as phytic acid. In this study, millet (*Panicum miliaceum L.*) was germinated for four days to improve bioactive components. Flour obtained from germinated millet was used at different ratios (0-20%) in the production of leavened and unleavened flat bread with replacing wheat flour. Control leavened and unleavened flat breads were produced from wheat flour. Color, diameter, thickness, spread ratio, antioxidant activity (DPPH, FRAP and CUPRAC) and phenolic (free, bound and total) contents of all breads were determined. The use of high ratios of germinated millet flour increased the diameter value and surface redness of both leavened and unleavened flat breads. Free, bound and total phenolic content of millet flour used as raw material of bread was found to be approximately 1.1, 2.3 and 1.9 times higher than wheat flour. Antioxidant activity values determined by DPPH, FRAP and CUPRAC methods were significantly ($p<0.05$) higher in germinated millet flours than wheat flour. The rich phenolic content and antioxidant activity of germinated millet flour was also reflected in leavened and unleavened flat breads. The highest phenolic content and antioxidant activity values were achieved especially at the 20% germinated millet flour addition ratio.

**Keywords**: Germination, millet, leavened bread, unleavened bread, flat bread

# EFFECT OF CAULIFLOWER POWDER ON THE CHEMICAL AND FUNCTIONAL PROPERTIES OF GLUTEN-FREE SNACK PRODUCTS

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## ABSTRACT

Cauliflower (*Brassica oleracea*) is one of the most important winter vegetables grown throughout the world and is widely used in food formulations due to its high nutritional quality. In this study, cauliflower powder was used in gluten-free cracker formulations to improve the nutritional and functional properties of snacks. For this purpose, cauliflower powder (0, 5, 10, 15 and 20 %) was used as replaced with rice starch: corn flour (50:50) in gluten-free formulations. Moisture, ash, protein, fat, antioxidant activity (DPPH, FRAP and CUPRAC), phenolic (free, bound and total) and mineral contents of the cracker samples were determined. The use of cauliflower powder in the cracker formulation increased the ash, fat and protein content compared to the control crackers. The phytic acid content of cracker samples decreased with increasing cauliflower powder ratio compared to control samples. The use of increasing cauliflower powder increased the antioxidant activity value of cracker samples, DPPH, FRAP and CUPRAC antioxidant activity values of control crackers were found as 79.87 mg TE/kg, 1.47 mmol TE/kg and 251.62 mmol TE/kg, respectively. Those antioxidant activity values were 477.21 mg/kg, 7.38 mmol TE/kg and 478.48 mmol TE/kg for crackers containing 20% cauliflower powder. The total phenolic content of the control was determined as 2889.58 mg GAE/kg. In comparison, the value was 5175.15 mg GAE/kg in containing 20% cauliflower powder cracker samples. The use of cauliflower powder made the crackers superior in terms of Ca, Fe and Mg content.

**Keywords**: Cracker, vegetable powder, cauliflower, antioxidant activity, bioactive component.

# CONSUMPTION OF FOOD SUPPLEMENTS DURING THE COVID-19 PANDEMIC IN ALGERIA

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## ABSTRACT

From the onset of the COVID-19 pandemic in December 2019, the Algerian food supplement market experienced a significant increase in sales. Because of its high efficiency and impact on this infection. The objective of this study was to evaluate the prevalence of the use of food supplements for the prevention of COVID-19. This was a retrospective, descriptive survey carried out during 2 months (March to April 2023). The data collected concerned women and men residing in the city of Tebessa (Algeria). A questionnaire was drawn up and completed by interview. It included questions about the disease, the consumption of food supplements and their use in the treatment and prevention of COVID-19. In the present study, 200 subjects are included. The sex ratio was 1. Half of our population was under 34 years old with an average age of 39 ± 15 years. The number of people who have been infected with COVID-19 has reached 35.5%. 86.5% of subjects consumed food supplements and 77.2% used food supplements for the prevention of COVID-19. The most used food supplements for COVID-19 prevention were vitamin, zinc and magnesium. This consumption was prescribed by the doctor for 90.4% of the population. Regarding the evolution of food supplements consumption during COVID-19, 17% of the population consumed more food supplements after the onset of the disease. In conclusion, it seemed that the consumption of food supplements was increased during the COVID-19 pandemic. This consumption could be beneficial for their health. Therefore, information-based on scientific evidence is important to prevent inappropriate use of food supplements by consumers.

**Keywords**: Food supplement, COVID-19, Retrospective survey, Prevalence

# SPORT CATEGORY AND CONSUMPTION OF DIETARY SUPPLEMENT BY ALGERIANS ATHLETES

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## ABSTRACT

Athletes represent a major part of dietary supplement users. Dietary supplement may be beneficial for athletes in certain situations, whereas incorrect or excessive use may impair performance, pose a risk to the athlete's health.
**Objective:** The objective of this study was to evaluate the consumption of dietary supplements among Algerian athletes with different sport categories.
**Material and methods:** This was a descriptive cross-sectional survey carried out over 2 months (from March to April 2023) in the east of Algeria.The collected data concerned women and men residing in the City of Tebessa who practiced a sporting activity in sports clubs. A questionnaire was drawn up and completed by interview. It included questions on the sporting activity practiced, the use of dietary supplements, the reasons for using and frequency of consumption as well as the types of dietary supplements used. We also assessed the nutritional status of athletes using body mass index (BMI).
**Results:** In the present study, 200 athletes are included. The sex ratio is 1.59. Half of our population was under 24 years old with a mean age of 25 ± 6.35 years.
The most practiced sport categories were bodybuilding, (41.5%), endurance sport (25%) and collective sport (22%). Concerning the using of dietary supplements, 49% of our population used it. There was a significant difference between the two sexes (54.5% for men and 40.2% for women). The most frequent reasons for consumption were to recover energy after exercise, to supplement a diet and for weight gain. The most used dietary supplements were vitamins (92.8%), mineral salts (89.8%) and unsaturated fatty acids (80.6%) including *omega 3* (78.5%). This consumption was significantly related to the sport category ($p<0.02$).
In conclusion, half of the athletes inverstigated used dietary supplements for different reasons. It is important to provide sports consumers of dietary supplements with information based on scientific evidence for proper use.

**Keywords**: Dietary supplements, Algerian altlethe, sport category.

# INVESTIGATING PARTICIPATORY LEARNING AS A TOOL TO ENGAGE STUDENTS AND TO RAISE THEIR AWARENESS ABOUT FOOD WASTE ISSUE

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## ABSTRACT

To face today's issues adapting the path of Responsible Research and Innovation (RRI) becomes a must rather than an option. Food waste is an issue gaining concerns worldwide in recent years because of its multidimensional impacts (economical, social, and environmental). Many strategies were suggested to tackle food waste problem such as awareness campaigns, as a way of affecting consumers' behavior. Engaging young consumers in such awareness campaign would be significant as they are the future leaders. This research aimed to using participatory learning as a tool to raise student's awareness toward food waste issue. Collaborative work was initiated through a brainstorming among restricted student groups(n=3) from different departments in the National Institute of Agronomy of Tunisia (University of Carthage, Tunisia). From this brainstorming, students suggested to organize an education and awareness campaign at the university scale. Posters addressing food waste issues were placed in prominent locations around the Campus. In addition, in order to engage their colleagues, students conducted a face-to-face survey (103 respondents) from September 15th to October 1st, 2021. The first part of the survey assessed students' knowledge and attitudes toward food waste. The second part was about solutions they suggest to reduce food waste at university scale and their opinion about the awareness campaign (did they hear about the event, what do they think about, what do they think about posters, would they attend the event…).Survey results showed that 97.8% of student respondents were aware about food waste issue and its impact on environment. About half (49.5%) of respondents declared to throw food moderately. Regarding the education and awareness campaign, 59.8% noticed the posters mainly at thecampuscafeteria (62.1%) and 81.2% heard about it, through social media. The posters 'content was appealing for 70.5% of respondents. Students also reported that information clarity, content and graphics were satisfactory. Moreover, 79.6% of students reported that the event and communicated information encouraged them to improve their behavior toward food waste. These results showed that using a participatory learning has engaged students who tried even to engage their colleagues, they felt more responsible as they suggested and implemented a solution. Moreover,our findings have highlighted the importance to take into consideration the specificities of Generation Z and accordingly, to use nontraditional tools (social media, graphical design).

**Keywords**: Food waste reduction, participatory learning, Responsible Research and Innovation (RRI), Generation Z, awareness campaign

# THE IMPACT OF SOCIAL MEDIA ON HEALTHY FOOD CONSUMPTION BEHAVIOR OF YOUNG ADULTS IN SRI LANKA

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## ABSTRACT

Topics related to food and wellness are now often discussed on social media by users, health organizations, and food bloggers. Young adults are bombarded with social media advertising for food and healthy food posts, demonstrating how social media has an effect on how people behave. According to our knowledge, no other recently published comprehensive econometric studies are available that analyze the impact of social media on the healthy food consumption behavior of Sri Lankans. Therefore, this study attempts to bridge this research gap. Social media users in Sri Lanka represented the population of this research. The sample size for the research was calculated for a large and known population ratio using Yamane's (1973) formula. A total of 473 social media users were surveyed with an online questionnaire. The dependent variable (consumer response) was measured using the AIDA model used in communication. Multinominal logistic regression was used as the econometric model. Our research shows that the majority of social media users simply scan posts about healthy foods and weight loss techniques without showing any interest, desire, or willingness to take any action. According to the results of the Multinominal logistic regression model, married people, women, people who suffer from NCDs, and people who are vulnerable to the risk factors contributing to NCDs change their food consumption behavior after watching healthy food posts. Social media users who viewed healthy food posts more frequently are more likely to change their dietary patterns. However, the majority of consumers increase their awareness on healthy food by exposing to social media posts while only a limited number of consumers become interested or convert the message to action. More research should be conducted to study the impact of social media to improve the healthy food consumption behavior of young adults as social media have an unswerving influence on day-to-day life.

**Keywords**: Social media, Healthy food, Food consumption behavior

# IMPROVING THE BIOACTIVE COMPOSITION OF BUCKWHEAT (FAGOPYRUM ESCULENTUM MOENCH) SPROUTS AND MICROGREENS USING TELLURIUM DOPED ZINC OXIDE NANOPARTICLES

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## ABSTRACT

Buckwheat is a pseudocereal crop with tremendous health benefits. It is commonly consumed as flour obtained from ground seeds, in alcoholic drinks, tea, salad and as sprouts and microgreens. Various studies suggest that sprouts and microgreens of buckwheat possess a higher amount of bioactive components when compared to their mature counterparts. However, the alteration in the content of phytochemical compounds of these sprouts and microgreens is highly dependent on the different germination conditions during their production. Therefore, in order to increase the content of bioactive components in buckwheat sprouts and microgreens, several biotechnological techniques, such as elicitation, might be used. In particular, elicitation stands out as a significant, effective and promising strategy for achieving this objective. Hence, in the present study, tellurium doped zinc oxide nanoparticles were utilized as elicitors to enhance the content of bioactive substances in buckwheat microgreens and sprouts. The foliar application of various concentrations (10, 50, 100, 150 and 200 mg/l) of tellurium doped zinc oxide nanoparticles was performed on microgreens and sprouts. The findings showed that the application of nanoparticles enhanced the levels of the majority of bioactive substances, including phenolics, flavonoids, flavonols, tannins, sugar and protein. An increase in the FRAP (Ferric Reducing Antioxidant Power), NSA (Nitrite Scavenging Activity) and DPPH (2,2-Diphenyl-1-picryl-hydrazyl) activity was also observed. The increase in the content of therapeutic metabolites like rutin, ferulic acid, quercetin and vanillic acid was also observed which was determined by Ultra Performance Liquid Chromatography (UPLC). The study reveals that using zinc oxide nanoparticles doped with tellurium may be a beneficial approach for boosting the levels of bioactive compounds in buckwheat microgreens and sprouts.

**Keywords**: Elicitors; bioactive compounds; antioxidants; nanoparticles; Fagopyrum esculentum Moench

# IMPROVING THE BIOACTIVE COMPOSITION OF BUCKWHEAT (FAGOPYRUM ESCULENTUM MOENCH) SPROUTS AND MICROGREENS USING TELLURIUM DOPED ZINC OXIDE NANOPARTICLES

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## ABSTRACT

Buckwheat is a pseudocereal crop with tremendous health benefits. It is commonly consumed as flour obtained from ground seeds, in alcoholic drinks, tea, salad and as sprouts and microgreens. Various studies suggest that sprouts and microgreens of buckwheat possess a higher amount of bioactive components when compared to their mature counterparts. However, the alteration in the content of phytochemical compounds of these sprouts and microgreens is highly dependent on the different germination conditions during their production. Therefore, in order to increase the content of bioactive components in buckwheat sprouts and microgreens, several biotechnological techniques, such as elicitation, might be used. In particular, elicitation stands out as a significant, effective and promising strategy for achieving this objective. Hence, in the present study, tellurium doped zinc oxide nanoparticles were utilized as elicitors to enhance the content of bioactive substances in buckwheat microgreens and sprouts. The foliar application of various concentrations (10, 50, 100, 150 and 200 mg/l) of tellurium doped zinc oxide nanoparticles was performed on microgreens and sprouts. The findings showed that the application of nanoparticles enhanced the levels of the majority of bioactive substances, including phenolics, flavonoids, flavonols, tannins, sugar and protein. An increase in the FRAP (Ferric Reducing Antioxidant Power), NSA (Nitrite Scavenging Activity) and DPPH (2,2-Diphenyl-1-picryl-hydrazyl) activity was also observed. The increase in the content of therapeutic metabolites like rutin, ferulic acid, quercetin and vanillic acid was also observed which was determined by Ultra Performance Liquid Chromatography (UPLC). The study reveals that using zinc oxide nanoparticles doped with tellurium may be a beneficial approach for boosting the levels of bioactive compounds in buckwheat microgreens and sprouts.

**Keywords**: Elicitors, bioactive compounds, antioxidants, nanoparticles, Fagopyrum esculentum Moench

# ENHANCING THE NUTRITIONAL VALUE OF BUCKWHEAT (FAGOPYRUM ESCULENTUM MOENCH) THROUGH IRON AND IODINE BIOFORTIFICATION: IMPACT ON BIOACTIVE COMPONENTS AND ANTIOXIDANT CAPACITY

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## ABSTRACT

Buckwheat is consumed globally as it possesses therapeutic properties like antihypertensive, cardiovascular, antidiabetic and anticancer. In the present study, hydroponically cultivated buckwheat was fortified with different concentrations of iodine and iron using potassium iodate and sodium iron ethylenediaminetetraacetate respectively. Inductively Coupled Plasma Mass Spectrometry (ICP-MS) was employed to quantify the levels of iron and iodine in buckwheat leaves and seeds at the time of harvest. In addition, the content of phenolics, tannins, flavonoids, sugar, protein and antioxidant activity in terms of FRAP (Ferric Reducing Antioxidant Power), Nitrite scavenging, and DPPH (2,2-Diphenyl-1-picryl-hydrazyl) radical scavenging activity was estimated. Furthermore, the variation in the content of beneficial metabolites like rutin, gallic acid, ferulic acid, quercetin and vanillic acid was also evaluated using Ultra Performance Liquid Chromatography (UPLC). The findings revealed that hydroponically grown buckwheat subjected to biofortification with iodine and iron exhibited a significant rise in the levels of these bioactive compounds, along with the increased antioxidant activity. The results of this investigation emphasize the promising role of biofortification as an efficient and cost-effective strategy for mitigating malnutrition and enhancing the nutritional value of staple food crops like buckwheat. To address micronutrient deficiencies and improve public health, more study and implementation efforts may be directed towards examining the feasibility of extensive biofortification initiatives.

**Keywords**: Fagopyrum esculentum Moench, functional food, antioxidant capacity, bioactive compounds, biofortification, nutrient enrichment

# EFFECTS OF AQUAFABA AS ALTERNATIVE PLANT ADDITIVE ON PHYSICAL, TEXTURAL AND SENSORY CHARACTERISTICS OF EGGLESS TURKISH PASTA (ERIŞTE)

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## ABSTRACT

Consumers experience health problems with egg consumption and also preference of vegan and vegetarian nutrition leads to the search for alternative egg substitutes in new product development. This research determined the quality and acceptability of Turkish noodle (Erişte) substituted with 25%, 50%, 75% and 100% chickpea aquafaba instead of egg. Erişte were analyzed for physical, textural, and sensory properties compared with sample containing egg. An increase in substitution led to a rise of 23.81% in water uptake, 23.74% in volume increase and 40.19% in the cooking loss. The addition of up to 75% aquafaba increased the firmness of erişte significantly compared to the control sample. Erişte sample containing 100% aquafaba showed significantly $p < 0.05$ higher values in L* (75.11) and hue angle (94.85), while lower values in a* (-2.13), b* (24.30) and saturation index (24.39). The odor (7.00), taste (7.00), appearance (7.00), chewiness (7.00) and overall acceptability (6.88) of samples containing aquafaba were found more acceptable than control sample (4.00, 5.50, 5.90, 5.95 and 5.47, respectively). Based on our results, possible to produce erişte with acceptable sensory properties, and good physical quality product by adding up to 50% aquafaba.

**Keywords**: Aquafaba, egg-less noodle, physical properties, textural properties

# APPLICATION OF LIPOSOMAL ENCAPSULATED ANTIMICROBIAL BIOACTIVE COMPONENTS IN FOOD PRODUCTS AS NATURAL PRESERVATION

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## ABSTRACT

Encapsulation technology is needed to make more durable and effective of alternative natural preservatives and nutritional components. In recent years, liposomal structures have attracted attention and liposomes ensure the preservation of the encapsulated material until the appropriate place and time thanks to controlled or delayed release capability. Liposomal structures prevent the conversion into harmful components during storage and increase the bioavailability. The liposomal encapsulation process provides to be more stable and more durable bioactive compounds in the food and the digestive system. The slowly release of antimicrobial components during storage against microbiological contaminations can be realized without allowing mold contamination and mycelium formation in food products. In addition, which will be carried out on non-chemical "hurdle" technologies in order to control the development of food-borne microorganisms and increase antioxidant activity in order to respond to consumer expectations, aims to produce product formulations suitable for the concept of 'Clean Label'. In addition, in order to respond to consumer expectations, it is possible to control the development of food-borne microorganisms and to produce product formulations in accordance with the concept of 'Clean Label' with liposomal systems suitable for "hurdle" technologies without chemical content.

**Keywords**: Liposom, natural preservation, bioactive compounds, Clean Label

# THE EFFECT OF PEELING, FILLING MEDIUM AND STORAGE TIME ON HMF AND SUGAR PROFILES OF CANNED SARILOP AND BURSA SIYAHI FIGS

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## ABSTRACT

Fig fruit which has a short seasonal availability due to its perishable nature was subjected to canning process and effects of canning process and storage time on sugar profiles (glucose, fructose and sucrose) and 5-hydroxymethylfurfural (HMF) contents of figs were evaluated. For this purpose, the most popular fig varieties grown in Turkey, namely Sarilop (yellow colored and Bursa Siyahi (dark purple colored) were selected and canned in different filling mediums such as syrup, water and fig juice as peeled or not peeled. The changes in sugar profile and HMF contents of figs before and after canning process were determined by HPLC (Shimadzu LC20A, Japan) consisting of a photo diode array (PDA) detector (Shimadzu, model SPD-M20A, Japan). Canned figs were also stored at room temperature for 12 months and changes in sugar profiles and 5-hydroxymethylfurfural (HMF) contents during storage for 0, 3, 6, 9 and 12 months were determined. In order to observe the effects of filling medium, storage time and peeling, the sugar profiles and HMF of results of canned figs were statistically analyzed using factorial variance analysis. Morever, all analysis of canned figs were evaluated using Principal Component Analysis. After canning figs with sugar syrup, it was seen that the amount of sucrose decreased significantly with the effect of heat treatment. Although the amount of HMF of Sarılop and Bursa Siyahi figs canned with fig juice increased during storage, it was observed that the amounts of glucose and fructose decreased during storage.

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**Keywords**: Ficus Carica, Canning, Sarilop, Bursa Siyahi, HMF, Sugar profile

# EFFECTS OF DEPURATION PERIOD ON ASH CONTENTS IN AN EDIBLE WEDGE CLAM (DONAX TRUNCULUS)

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## ABSTRACT

The present study was conducted to investigate, under laboratory conditions, the effect of the depuration phase on the ash content of an edible and bioindicator species of pollution, *Donax trunculus* (Mollusca, Bivalvia). Individuals of *Donax trunculus* were collected from Sidi Salem, a site near pollution sources, and seawater was collected from a less polluted site (El Henaya). Our results showed that the depuration phase led to a decrease in total ash content in depurated species compared to non-depurated species. The determined responses varied depending on the depuration phase and time. This suggests that *Donax trunculus* has a significant purification potential by eliminating inorganic matter through its filtration system. The obtained data reflect the effectiveness of the purification phase in removing contaminants from shellfish flesh.

**Keywords**: Depuration, Nutritional value, Ash content, Bivalve Mollusc, Donax trunculus

# EVALUATION OF SACCHAROMYCES AND NON-SACCHAROMYCES YEASTS ISOLATED FROM ALBANIANS AUTOCHTHONOUS GRAPE VARIETIES FOR CRAFT BEER PRODUCTION

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## ABSTRACT

In recent years, researchers have been working to create and expand the pool of yeasts for the brewery sector including the use of new strains isolated from non-brewing environments. In this context, the non-*Saccharomyces* and *Saccharomyces* yeasts use has attracted great interest from both researchers and commercial brewers for the production of novel beer styles. Recent research has shown that enzymatic activities of these non-conventional yeasts contributes during the fermentation process to the production of esters and higher alcohols that define the sensory characteristics of beer. Therefore, the selection and use of new yeast strains with peculiar metabolic properties could represent the key point in differentiating products in the brewery sector, especially for local producers of craft beer. Our study aims to evaluate some preliminaries fermentative characteristics of *Saccharomyces* and non-*Saccharomyces* strains isolated from the Albanian autochthonous grape varieties in the craft beer production. Specifically, the tested yeasts were isolated from the autochthonous grape varieties Kallmet and Shesh i Zi, collected from the Valias and Shkodra regions in Albania. Isolation was performed using WL as culture medium, followed by laboratory screening to assess the fermentation characteristics of the isolated yeasts. Our results showed that *Saccharomyces cerevisiae* SHZV3 strain has excellent aptitudes to be used as a new starter in craft beer production as it shows low levels of hydrogen sulfide (H2S) production and also negative results in production of biogenic amines, conversely with other strains, which exhibited undesirable production of hydrogen sulfide (H2S) and biogenic amines, rendering them unsuitable for beer production.

**Keywords**: Saccharomyces cerevisiae, craft beer, fermentation characteristics, hydrogen sulfide, boigenic amines

# BERRY INFUSIONS WITH HIGH POLYPHENOL CONTENT

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## ABSTRACT

Goji berry, also known as wolfberry, is a plant that grows in the Asian region. It is a red-orange elliptical fruit with a sweet, sour taste due to the presence of phenolic compounds. Recently, goji berry is becoming more and more popular because of the health benefits of bioactive ingredients. The present study is aimed to determine infusion parameters for producing functional beverages rich in bioactive components and suitable for consumption with maximum benefit to human health. In this context, the response surface methodology (RSM) was used for experimental design. Three independent variables were determined, which are temperature (75–95 °C), time (5–15 min), and mass (2–5 g), to optimize the desired quality characteristics in goji berry teas and to evaluate the interactions of the independent variables. The three variable experimental design was implemented 6 replications in the center point with 20 total trial patterns. The total phenolic content, total flavonoid content, antioxidant activity, anthocyanin content, and condensed tannin content of the samples were determined. For optimization, it is aimed that goji berry infusions have the values of maximum total phenolic content, total flavonoid content, antioxidant activity, anthocyanin content, and condensed tannin content. As a result of the variance analysis (ANOVA), a meaningful model for total anthocyanin content, total flavonoid content, condensed tannin content, and phenolic content values could not be established ($p<0.05$), but statistically significant model was obtained for DPPH ($p<0.05$). Temperature and mass were found to be statistically significant ($p<0.05$) on DPPH. Depending on the levels of the selected quality characteristics, the parameters that will provide an optimum formulation of goji berry infusions were suggested as 81.16°C, 5 min., and 5 g. Thus, the parameters of antioxidant capacity, total phenolic content, total anthocyanin, total flavonoid, and total condensed tannin content were determined in order to maximize bioactive substances and to obtain most beneficial effects for consumer health.

**Keywords**: Antioxidant, goji berry, infusion, optimization, phenolic content

# PRELIMINARY CHARACTERIZATION OF METSCHNIKOWIA PULCHERRIMA STRAINS FOR FUTURE APPLICATIONS IN WINE BIOTECHNOLOGY

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## ABSTRACT

In recent years, in the oenological sector there has been a re-evaluation of non-*Saccharomyces* oenological yeasts, considered in the past as unwanted or deteriorating yeasts, for a positive contribution they can make in improving the analytical composition and aromatic profile of the wine. Therefore, the selection and use of non-*Saccharomyces* yeasts with peculiar technological and enzymatic characteristics could represent a key point for the production of wines with good and distinctive chemical and organoleptic characteristics. The main objective of this work was to evaluate a possible use of *Metschnikowia pulcherrima* as starters in the production of wines obtained from native grape varieties of Albania. Therefore, three *M. pulcherrima* strains (ASB3R, AS3C1, 14AS), isolated from grape must, have been tested for their antimicrobial and enzymatic activities, biogenic amine production and some fermentative properties. The results showed an antimicrobial activity of these yeasts that suggests their possible use as biocontrol agents in winemaking. In addition, their β-glucosidase activity was detected, which could contribute to the release of varietal aromas from aromatic precursors present in grapes. Furthermore, these strains were safe for health because they did not produce biogenic amines. These results, although preliminary, open the way to further investigations aimed at a possible use of these yeasts as a starter in the alcoholic fermentation of grape juice and the contribution they can give in the definition of the physical-chemical and organoleptic characteristics of regional wines.

**Keywords**: Winemaking, non-Saccharomyces, Metschnikowia Pulcherrima, Biocontrol, beta-glucosidase activity

# QUALITY CHARACTERISTICS OF GLUTEN FREE COOKIES PREPARED FROM PEARL MILLET AND SORGHUM FLOURS

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## ABSTRACT

Pearl millet (Pennisetum glaucum) and sorghum (Sorghum bicolor) are the most important cereal crops in the tropics and developing countries in Africa and Asia. The incorporation of sorghum or pearl millet flour has affects the biscuits quality and acceptability. Local varieties of pearl millet and white sorghum seeds from Tidikilt oases in the Algerian Sahara, have been ground to obtain whole flours. These flours were used separate or combined (1:1) to prepare gluten free cookies as compared to conventional corn flour cookies. The physicochemical, technological and sensory characterization results showed that the flours (millet, sorghum, combined) were of good quality included a low alpha-amylase activity measured by a falling time of 264 to 333 seconds, and suitable particle size. Accordingly, to the overall sensory attributes, the incorporation of pearl millet flour improved the appearance, texture and general acceptability of the cookies. those prepared from sorghum flour were appreciated for its friability and sandy texture although the cookies prepared with 100% corn flour received the highest scores for its color, taste and flavor followed by those prepared from combination of pearl millet and sorghum flour which were appreciated for both texture and flavor.

**Keywords**: Quality characteristics of gluten free cookies prepared from pearl millet and sorghum flours

# THE USE OF LIPOPHILIZED POTATO PEEL EXTRACT AT DIFFERENT CONCENTRATIONS TO INHIBIT SUNFLOWER OIL OXIDATION

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## ABSTRACT

Vegetable oils are foods that are prone to oxidation, thus losing quality resulting in nutrient and flavor changes. The addition of various natural antioxidants to oils in order to delay oxidation has a wide range of studies in the literature. Potato peel extract is also one of these natural antioxidants which has been studied to retard the oxidation of vegetable oils. However, potato peel extract is less soluble in oil and oily media due to the excess of hydrophilic phenolic compounds it contains. The enzymatic (immobilized lipase) lipophilization method was applied to the crude potato extract to increase its solubility in oil. In addition, the modified extract was added to sunflower oil at four different concentrations (0, 1000, 2000, 3000, 5000 ppm). Oxidative stability was assessed by determination of oxidative stability index by rancimat apparatus and Schaal oven test in the oils. Mathematical models created with oxidative stability values that vary depending on the different concentrations of the added extracts have enabled the effectiveness of the extracts to be revealed. As a result, it was determined that potato peel extract can be used successfully to inhibit oxidation in sunflower oil, and the antioxidant activity of the extract can be further increased by enzymatic lipophilization method.

**Keywords**: Potato peel extract, enzymatic lipophilization, oxidative stability

# HERBAL TEA PRODUCTION TECHNOLOGY AND CURRENT APPROACHES

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## ABSTRACT

Herbal tea is produced as fresh or dried mixtures of botanical elements other than *Camellia sinensis* species. It has different advantages such as ease of use, consumer preferences, nutraceutical ingredients blended in small bags, and being profitable for both consumers and producers. The type of raw material used in the preparation of herbal teas, the diffusion rate of the tea bags, the extraction efficiency, the phytochemical potential, the loading size of the bag and the safety aspects are the most important factors affecting the success of the tea bags in the market. In this study, the information in the literature has been compiled from a current perspective regarding the production, preparation methods and packaging materials of herbal tea. In addition, the case of adulteration and the plants used in the treatment of some diseases are included. The production, risks, technological features and abaca fiber (*Manila hemp*), which is a completely natural source used in production, are mentioned. The prior consideration includes important parameters such as the type of materials used, its pore size, shape, loading capacity, infusion rate, holding time, temperature and so forth. As a result, herbal teas are products that are frequently consumed, which have distinctive sensory qualities as they contain various volatile fractions.

**Keywords**: Herbal tea, Production, Packaging materials

# AN IMPORTANT SOURCE OF BIOACTIVE COMPOUNDS: MICROALGAE

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## ABSTRACT

Microalgae are single-celled microorganisms with different morphological, physiological, and genetic characteristics. Microalgae, which grow in fresh and salt water, are essential to the aquatic ecosystem due to their photosynthetic properties. Microalgae-derived bioactive components are produced as primary metabolism sources, such as proteins, various fatty acids, and vitamins, or as secondary metabolism products. In most microalgae, bioactive components accumulate in the biomass. They produce biologically active ingredients such as carotenoids, phycobilins, polyunsaturated fatty acids, vitamins, and sterols. Various microalgae can produce different bioactive compounds. Frequently studied microalgae *Spirulin*a sp. (phycocyanin, tocopherols, phenolic acids), *Haematococcus pluvialis* (lutein, oleic acid, beta-carotene), *Chlorella* sp. (carotenoids, eicosapentaenoic acid) and *Dunaliella* (trans-betacarotene, oleic acid, linolenic acid). It has been reported that these microalgae have many uses and can gain new uses daily. They have antioxidative, antimicrobial, antihypertensive, immunomodulatory, and anticarcinogenic effects with their important bioactive components. Antioxidant properties are of great interest in industrial applications. Various microalgae are also used in the food industry. Four microalgae species are of interest in the industry as biotechnological. These are *Spiruna*, *Chlorella*, *Dunaliella salina* and *Haematococcus*. *Chlorella* contains beta-1,3-glucan, which acts as a free radical scavenger. *Spirulina* has 62% amino acid content and is a rich source of carotenoids, vitamins A, B1, B2, B12, and xanthophylls. As a result, microalgae produce many useful bio-products such as beta-carotene, astaxanthin, docosahexaenoic acid, eicosapentaenoic acid, polysaccharides, and natural dyes. It is also reported that microalgae are an under-researched source for a healthy diet.

**Keywords**: Microalgae, bioactive

# DETECTION OF ADULTERATION OF SUNFLOWER OIL WITH SAFFLOWER OIL USING FATTY ACIDS, TRIACYLGLYCEROLS AND STEROLS BY PRINCIPAL COMPONENT ANALYSIS

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## ABSTRACT

Vegetable oils are very important energy sources for human body and their authenticity has become a major issue for producers, consumers, and policy makers. Adulteration, a type of fraud, is performed by addition of cheap oils to the expensive ones. Although many advanced methods have been available to detect the adulterations in vegetable oils, it has still been an important problem for all stakeholders. While olive oil is the most adulterated vegetable oil due to its high price, the others can also be subjected to adulteration depending on their market price. Sunflower oil is one of the most consumed seed oils in the world, but it can also be adulterated with some other cheaper oils such as safflower oil. Since both oils have similar chemical compositions, detection of safflower oil in sunflower oil is a big challenge. In order to prevent consumer fraud, it is crucial to study the traceability of authentic vegetable oil. This study aimed to detect the adulteration of sunflower oil (SFO) with safflower oil (SFFO) using fatty acids, triacylglycerol components and sterol compositions. For this purpose, the blends of SFFO: SFO (2:98, 4:96, 6:94, 8:92, 10:90, 14:86, 18:72, 22:78, 26:74) were prepared and the changes in fatty acids, triacylglycerol and sterol compositions were determined. All findings were also analyzed by Principal Component Analysis (PCA) as a statistical technique. As the amount of safflower oil in sunflower oil increased in adulterated samples, there was observed an increase in the amounts of linoleic acid and palmitic acid as fatty acids, LLP and LLL as triglycerides, and campesterol and Δ-7 stigmastanol as sterols.

**Keywords**: Sunflower oil, safflower oil, adulteration, authentication, fatty acids, triacylglycerols, sterols, PCA.

# EFFECT OF PH- SHIFT TREATMENT AND ULTRASONICATION ON THE PHYSICAL STABILITY AND PROPERTIES OF HEMP MILK.

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## ABSTRACT

Hemp milk, a growing beverage with excellent nutritional content and minimal allergenicity, which offers a tasty substitute for other plant based milk types. However since it is challenging to produce thermally stable hemp milk, the application of non- thermal techniques is a need. During this resarsch, we investigated the individual and combined impact of pH-shift and ultrasound (US) on the stability characteristics of hemp milk. The effects of pH shift and US was investigated on physico-chemical properties of hemp milk, sedimentation index, rheological properties, colour, Brix, physical stability, titratable acidity, and emulsion stability index (ESI) measurements. According to the obtained data, the application of individual US techniqe showed the best results with highest stability characteristics, better rheological properties, showed the highest *L** (lightness) and Brix values, and lowest titratable acidity values. Interestingly, the individual application of pH-shift techniqe, showed the lowest physical stability results. Wherease, pH shift treatment combined with US demonstrated moderate stability. Thus, the pH - shift and US appear to be a remarkable processing methods for the production of stable hemp milk.

**Keywords**: hemp milk, pH-shift, ultrasonication, stability, rheological properties.

# MEATBALL PRODUCTION FROM BEEF WITH WET BASIL (Ocimum basilicum) ADDITION

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## ABSTRACT

Meatball is a popular meat product that is produced from several species of meat and consumed by many consumer groups including children worldwide. It can also be considered as a practical meal that is often prepared for domestic consumption. The product diversity varies according to consumption habits, and the meatballs can contain chicken, beef, pork and even fish meat with a wide variety of ingredients such as bread crumbs, grated onions, garlic, salt and all kinds of spices. The mixture is portioned into smaller amounts, shaped (round, elips, etc.) and can be cooked with several techniques including deep frying, oven-cooking, or new cooking trends such as cooking in the airfryer. In this research, meatball production was performed in three batches, where the first batch contained 80 % beef meat, 9 % grated onion, 9 % bread crumb, 1 % salt, 1 % black pepper & cumin as control group, while other two batches contained 2,5 % and 5 % per cent of ground wet basil (*Ocimum basilicum*) within the formulation. Meatballs were shaped by hand (each of them was approximately 20 g) and finally cooked in the airfryer, providing the central temperature to be reached at 72 C. Color, cooking loss, total phenolic compound, antioxidant activity was determined; sensorial evaluation and textural analysis were also performed. So, this study aims to investigate an alternative meatball formulation with better phenolic and antioxidant composition while also enhancing sensorial properties and palatability of beef meatballs.

**Keywords**: Basil, Ocimum basilicum, meatball, antioxidant character, phenolic compounds

# EFFECT OF DIFFERENT DRYING METHODS ON THE BIOACTIVE COMPOUNDS AND THE PHYSICAL PROPERTIES OF BITTER GOURD (MORMORDICA CHARANTIA)

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## ABSTRACT

In this research, it was aimed to investigate the effects of different drying methods on drying rate and time, total phenolic and antioxidant compounds of bitter gourd (*Mormordica charantia*). Then, the physical characterization of the dried product was reported after being dried with the selected (optimum) drying method. In this study, 3 mm slices of bitter gourd samples have been dried in tray dryer (80°C), airfryer (80°C) and microwave (300 W) until the weight of each sample became constant. The average drying time for each method was reported as 180 min., 72 min., and 32 minutes; while drying rates were 0.055 ± 0.001, 0.146 ± 0.012, and 0.334 ± 0.151 g H2O / min, respectively. The color measurements (ΔE, BI, h°) were also conducted for all drying methods. Regarding the effects of drying methods on the bioactive compounds, the highest total phenolic content (376.63 ± 54.43 mg GAE / 100g dry matter) and the highest antioxidant activity (84.46 ± 5.78 %) results were obtained from microwave-dried samples. Considering all parameters, microwave drying seems to be more effective than other drying methods. To further extend the characterization of the selected drying method, water activity and rehydration ratio of corresponding samples were also determined. It was concluded that, for both drying efficiency and protection of the bioactive compounds of fresh bitter gourd, microwave drying seems to be a better option than the aforementioned conventional equivalents.

**Keywords**: Bitter Gourd, Bioactive Components, Drying

# BIOACTIVE COMPAUNDS IN COMMON MEDLAR FRUITS (Mespilus germanica L.) IN DEPENDANCE OF RIPENESS STATE

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## ABSTRACT

Medlar (*Mespilus germanica* L.) is a plant rich in phytonutrients and antioxidants as bioactive compaunds (BAC). It has numerous medical benefits on human health, especially in detoxification and purification from accumulated toxins. Its strong genetic potential and the ability to grow without using pesticides and similar chemical preparations gives it an advantage over almost all other fruits that can be consumed in the autumn and early winter days. In total 15 samples were purchased from the markets and the trade network, laboratory samples were prepared from them and the following parameters were analyzed in the laboratory, such as Total Solid Soluble Content (TSS, Brix), Total Acidity (TA, %), Ascorbic Acid (AscA, mg 100 g-1), total phenolics (TPh, mg GA/g DM), Total flavonoids (TFl, mg CE/g DM), Anthocyanins (Ant, mg/g DM) and the ratio Flavonoids:Phenolics were determined. The laboratory analyzes were carried out in two phases of medlar ripening, in phase 1 (ph1) when the stone cells were 35-40% softened and in a phase 2 (ph2) with 75-80% softening. With the ripening/softening of the fruits, the content of the investigated parameters TSS (28.93 ph1- 30.52 ph2), the content of TPh (6.72 ph1-8.01 ph2), the content of TFl (3.11 ph1-3.72 ph2), the content of anthocyanins (2.224 ph1-2.76 ph2) and the ratio of TFl:TPh (0.463 ph1-0.464 ph2)) increases. Only the total acidity and the content of ascorbic acid decrease as the ripening of the fruits progresses (0.91 ph1-0.78 ph2h; 44.51 ph1-36.25 ph2), respectively. Fluctuations in phytonutrient and antioxidant content with fruit ripening are expected and research indicates that fruit maturity should be above 70-75% to utilize the maximum potential of medlar fruit.

**Keywords**: **Keywords**: Medlar, BAC, phytonutrients, antioxidants, ripeness

# CHIA SEEDS (SALVIA HISPANICA L.) IN DIETETIC REGIMES

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## ABSTRACT

Chia (*Salvia hispanica* L.) is a very often used plant using seed material in the preparation of dietary meals. Apart from being rich in minerals potassium, calcium, magnesium, and iron, it has a favorable nutritional composition along with a wealth of dietary fibers, it is a prebiotic for GUT bacteria which increases the absorption of nutrients and maintains good health. Ten average samples of organically produced commercially purchased seeds were used in the study. Of the parameters determined by laboratory analyses, the focus is on the content of total carbohydrates, proteins, fats, and fibers. The average content of total carbohydrates is 40.58 g/100 g, and of total fat 32.89 g/100 g. The average protein content indicates the fact that chia meals are high in protein with an average protein content of 18.6 g/100 g. The fact that fibers are on average represented by 38.36 g/100 g is particularly important, which confirms the conclusion that the breakfast meal in the form of chia meals prepares the body for a good start of the day from an energetic, protein-structural, and prebiotic supported aspect.

**Keywords**: **Keywords**: Chia seeds, Carbohydrates, Proteins, Fat, Fibers, Seeds, Dietetic

# DETERMINATION OF ADULTERATION BY MILK POWDER IN UHT MILK

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## ABSTRACT

Milk and dairy products, which are an essential part of the daily diet due to the protein, fat, and other vitamins and minerals they contain, are among the most fraudulently produced foods. The production and consumption of UHT milk have increased recently, particularly in developing nations. This has increased competition in the dairy industry and motivated some producers to use various frauds. One of the most frequent adulterations is adding water to milk. Milk powder can be added to milk along with water to increase the amount of protein, dry matter, and minerals that are lost since water is added to milk. This study aims to estimate the addition of water using DSC to determine the freezing point and the addition of milk powder using HPLC to measure the amount of lactulose and furosin in UHT milk sold in the markets in Turkey. According to the results of DSC analyses, it was concluded that as the amount of water added to the raw milk increased, the freezing point of the milk approaches the freezing point of the water. Reconstituted milk with 10 % dry matter was prepared by mixing distilled water with milk powder, and then 10 %, 20 %, and 30 % reconstituted milk were added to milk. It was determined that the amount of lactulose and furosin increased as the ratio of reconstituted milk added to milk increased.

**Keywords**: UHT milk, Adulteration, Furosine, Lactulose, Freezing Point

# STARCH GELATINIZATION PROPERTIES OF EINKORN WHEAT

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## ABSTRACT

In this research, micro visco amylograph analysis was used to determine the starch gelatinization properties of einkorn wheat (*Triticum monococcum* L.) obtained from six distinct locations in the province of Kastamonu during the 2017 harvest season, as well as Renan and Bezostaya bread wheat samples used as controls. The following parameters were calculated: gelatinization temperature (PT), peak viscosity (PV), start of cooling period (TV), breakdown viscosity (BV = PV - TV), end of cooling (FV), and setback viscosity (SV = FV - TV). Wheat samples' average peak viscosity ranged from 882 to 1138 mPas, start of cooling period ranged from 584 to 779 mPas, End of cooling ranged from 1199 to 1525 mPas, breakdown viscosity ranged from 272 to 447 mPas, and setback viscosity ranged from 606 to 744 mPas. The gelatinization onset temperature was between 61 and 62.4 oC. Einkorn wheat samples had substantially greater peak viscosity, start of cooling period, end of cooling and setback viscosity than bread wheat samples (p 0.01). However, there was no statistically significant difference in the temperature at which gelatinization begins between the two wheat varieties ($p > 0.05$). Based on the results, it is possible to conclude that einkorn wheat has different gelatinization properties than bread wheat. This research contributes to the knowledge of the quality characteristics of einkorn wheat and the evaluation of its potential uses for various purposes.

**Keywords**: Einkorn, Triticum monococcum L., Einkorn Whole Wheat Flour, Micro Visco Amylograph, Pasting Properties

# MICROBIAL DECONTAMINATION OF FRESH-CUT CARROTS VIA COLD ATMOSPHERIC PLASMA TREATMENT: EFFECT ON PHYSICOCHEMICAL AND NUTRITIONAL PROPERTIES DURING STORAGE

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## ABSTRACT

A versatile cold atmospheric plasma jet was utilized for surface decontamination of fresh-cut carrots. More than 4 log reductions were achieved in 60 s of each of the plasma treatments utilizing argon or dry air, where the temperature of the carrot surfaces did not exceed 50 ºC. Both of the plasma treatments resulted insignificant or very slight changes in the color parameters, β-carotene, ascorbic acid, total phenolic content (TPC) and total antioxidant activity (TAA) of fresh cut carrots. A remarkable increase was observed in TPC of plasma treated samples towards the end of the storage period. The increase in TPC during storage led to a significant increase in TAA, too. The color parameters, β-carotene and ascorbic acid content of plasma treated carrots were preserved during further storage. Opposing to untreated samples that lost their firmness with the prolongation of storage, the texture of plasma treated fresh cut carrots were maintained.

**Keywords**: fresh-cut carrot; surface decontamination; non-thermal; cold atmospheric plasma

# EFFECT OF MUSHROOM EXTRACTS ON COLOR CHANGE AND SOME CHEMICAL PROPERTIES OF DEHYDRATED SOUPS

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## ABSTRACT

The aim of this research was to produce lyophilized water extract from several mushroom species (*Suillus granulatus, Coriolus versicolor, Fuscoporia torulosa*) and to determine its influence on some chemical properties as well as on the color changes of the industrially produced Bio Soups, without the addition of monosodium glutamate. The realisation of the planned research was carried out by designing four variants of dehydrated soup. The content of mineral matters was significantly ($p<0.05$) higher in all soup variants enriched with lyophilized extracts. Moreover, the moisture content in all analyzed soup variants is in accordance with the regulations. From the aspect of the instrumental color value, constancy was established for all parameters in all tested variants from the 0th to the 90th day after production, i.e. all soups had a stable color during storage, which means that there were no changes in other chemical or biological parameters that would lead to a change in the color of the product. Therefore, statistically significant ($p<0.05$) differences were observed only between the control variant in relation to the other variants, i.e. the darker shade in the analyzed variants enriched with lyophilized extracts is a consequence of the applied extracts. In this way, a new product is obtained that does not contain chemical additives, which further increases its value.

**Keywords**: Mushroom extracts, Color, Moisture, Dehydrated soups

# NUTRITIONAL POTENTIAL OF FERMENTED WHEY AND CURRENT APPLICATIONS IN ITS PRODUCTION

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## ABSTRACT

Whey is a liquid by-product formed during the production of coagulated milk products such as cheeses and concentrated yoghurt-type fermented products. This by-product accounts for 85–95% of the milk volume and including soluble proteins (serum proteins), casein macro peptides (CMP), lipids, lactose, minerals (e.g. calcium, phosphate, magnesium, sodium and zinc), vitamins (e.g. B2, B6, B12 and C) and folic acid. Whey has a high water content and low nutrient concentration. Therefore, it is evaluated as either animal feed or environmental waste. In recent years, many studies have been carried out regarding the environmental and economic use of whey, which causes significant environmental problems due to the continuous growth of the dairy industry, increasing production amount and rich organic content. Sustainable whey management mostly focuses on the development of value-added products such as protein powders, infant formulas, hydrolysates, pharmaceuticals, food supplements, edible films/coatings, lactic acid, bioplastics, biofuels. In addition, functional food and beverages are one of the most ambitious and innovative categories in the food industry. They continue to generate great interest among consumers as they offer health benefits beyond basic nutrition. The use of whey in the production of such beverages has proven to be the most economical approach to human nutrition. Whey is sensitive to microbial spoilage due to its high water content and to heat treatments (above 60 °C) due to the proteins in its structure. In the production of fermented whey beverages, pasteurization is applied to prevent unwanted microbial growth and to make the environment suitable for starter culture development. At this stage, non-thermal techniques such as ultrasound, high pressure, and ultraviolet (UV) radiation, which preserve the natural protein structure of whey proteins, are becoming more commonly used instead of heat treatments. Formation of fermented beverages from whey is an attractive possibility due to the high water content, coupled with the presence of nutrients, favourable for the growth of fermentative lactic acid bacteria and yeasts. The enzymes produced by microorganisms during fermentation break down lactose, proteins and fats produces components such as lactic acid, alcohols, peptides and volatile fatty acids. These components provide distinct flavours, aromas and extend the shelf life of product. During fermentation, proteins are hydrolyzed to peptides and amino acids with different functional properties (protection against diseases such as cancer, diabetes and inflammatory) through the metabolic activities of fermentation cultures. Fermented beverages produced from whey are drawing significant attention as they transform whey from being an environmental pollutant into an effective food that contributes to human nutrition and health improvement. The presence of macro, and micronutrients, probiotic bacteria and their metabolites (peptides formed by the hydrolysis of whey proteins have ACE inhibitor, anticancer, antibacterial, antiviral, etc. properties) makes fermented whey beverages a functional food source. Different studies on the functional properties, sensory properties and shelf life of fermented whey beverages will help to fully reveal and spread the nutritional potential of fermented whey beverages.

**Keywords**: Fermentation, functional food, peptide, non-thermal techniques

# INVESTIGATION OF THE EFFECT OF PECTINASE AND AMILOGLUCOSIDASE ENZYME MIXTURE ON CLARIFICATION OF APPLE JUICE

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## ABSTRACT

In this study, the effect of the enzyme mixture obtained by mixing pectinase and aminoglycosidase enzymes at different concentrations on the clarification of apple juice was investigated. For this purpose, pectinase/aminoglycosidase (g/L) enzyme mixtures were prepared at the ratios of 0.005/0.0132, 0.01/0.0264, 0.05/0.06 and 0.1/0.12 (g/L). Trials were carried out at 40 °C and 55 °C to examine the effect of temperature, and at 1 h 30 min and 2 h incubation period to examine the effect of time. Physico-chemical analyzes (pH, Total acidity, Turbity, Density, Viscosity, °Brix, Clarity %) of the samples were performed. When the data obtained were examined, the best results were obtained with apple juice incubated for 1 h 30 min at an enzyme concentration of 0.1/0.12 g/L at 55 °C, which was determined to have a clarity percentage of 78.94%.

**Keywords**: apple juice, enzyme, pectinase, aminoglucosidase, clarification

# USAGE OF AGRO-INDUSTRIAL WASTES AND BY-PRODUCTS FOR BIOBASED POLYMERS PRODUCTION

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## ABSTRACT

In the food industry, the packaging material is a barrier that protects the product from external and internal effects by using engineering and technologies. It is the first step of a system that introduces the product to the consumer, ensures the transportation, storage, sale, and retrieval of the product when necessary. The material properties are affected from different factors, such as biodegradability, recycling, reusability, sustainability, zero waste approach, global perspectives on reducing carbon footprint, etc. “Green” biodegradable polymers and materials produced from agricultural residues are among the most researched topics in recent years due to the undesirable properties of petroleum-based synthetic polymers. Sunflower by products, cereals wates, by products of fruit juice processes, etc. have high importance for biodegradable polymers. In the last studies, it is aimed and encouraged to obtain products with high added value, especially from agricultural residues. These polymer materials contribute to sustainable developments in terms of degradability in a short time in world.

**Keywords**: Agro-Industrial Wastes, Biobased polymers, Cereals wates, Sunflower by products.

# USAGE OF DIFFERENT HERBS IN GOBEK KASAR CHEESE

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## ABSTRACT

Göbek Kaşar Cheese is produced by curding process obtained by coagulating the milk using rennet. According to the production method, it can be represented as fresh or ripened, and has characteristic features specific to its variety. It takes its name from the method in which it is obtained according to the production stages. Göbek Kaşar Cheese is also obtained with enriched adding thyme. In our study, it was produced by enriching it with *Satureja hortensis L.* and *Eruca vesicaria*. Thus, the physicochemical properties and sensory properties of the resulting product were evaluated.

**Keywords**: Göbek kasar cheese, Satureja hortensis L., Eruca vesicaria

# USE OF HIGH HYDROSTATIC PRESSURE IN PRODUCTION OF FRUIT WINE FROM GILABURU (VIBURNUM OPULUS L.)

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## ABSTRACT

Gilaburu (Viburnum Opulus L.) is a shrub plant belonging to the Adoxeceae family, of European origin, but spread over a wide geography including Anatolian region of Turkey. Gilaburu fruit contains organic acids such as L-malic acid, valeric acid, tannic acid and ascorbic acid. It is rich in vitamins A, C, E and minerals such as sodium, potassium, magnesium and chloride. Gilaburu also has high amounts of carotenoids, anthocyanin and phenolic acids. A fermented drink produced from gilaburu fruit in the Central Anatolian region and traditionally used for medicinal purposes. It is believed that it prevents diseases such as high blood pressure, shortness of breath, digestive problems, colds and dissolves kidney stones. Scientific studies conducted to date have revealed the anti-microbial, anti-diabetic, anti-obesity, anti-inflammatory and anti-carcinogenic properties of gilaburu. The pungent smell and bitter taste of the fermented gilaburu drink is tolerated by the consumers due to its positive effects on health, however its typical flavour and taste do not allow this drink to be consumed with pleasure by large segments of people. In this study, we tried to obtain wine from gilaburu fruit. It is difficult to obtain wine from gilaburu juice, due to low sugar content and high antimicrobial properties of the juice arising from its high phenolic compounds and organic acids content. The main problem we encountered in our studies was the delay in alcohol formation due to slow fermentation which resulted in mold formation. To overcome this problem, the must obtained from the fruit was subjected to High Hydrostatic Pressure (HHB) process and pasteurized under cold conditions (9°C) and then alcohol fermentation was started with the addition of yeast. It has been observed that with this method, alcohol fermentation progresses quickly without any mould growth. Preliminary experiments revealed that the fruit wine obtained with this method contained 12.40 ± 0.19% (v/v) alcohol and met the criteria (at least 9% (v/v) alcohol) determined in the Turkish Food Codex (Communiqué No.: 2008/67). Studies are underway to optimize the process parameters (fermentation conditions, pressure, time, filtering of the must, added sugar ratio) and sensory score used in the production of gilaburu wine.

**Keywords**: High hydrostatic pressure, fruit wine, Gilaburu, Viburnum Opulus L.

# KVASS AS A TRADITIONAL FOOD

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## ABSTRACT

Kvass is a traditional, non-alcoholic, fermented beverage, primarily made from grain sources, especially rye. Especially known and consumed for many years in Eastern and Central Europe, this beverage has a moderately sweet-sour taste, pleasant aroma, and a golden coffee-like color. The alcohol content of Kvass, while mostly being a maximum of 1.2% by volume, is also characterized by its fizzy structure. In traditional kvass production, it has been reported in studies that the cooperation of lactic acid and ethanol fermentations enhances the development of a unique taste and aroma in the product while increasing its nutritional value. Kvass, a sustainably healthy beverage, not only serves as a probiotic and functional food but also aligns with changing consumer preferences as a grain-based fermented beverage. This is particularly advantageous given the disadvantages of dairy-based fermented beverages, such as their incompatibility with vegan diets, increasing sensitivities to milk proteins, and reduced accessibility of milk. In the industrial sector, kvass is produced by adding colorants, preservatives, flavor enhancers, and artificial sweeteners to diluted cereal extracts. However, industrially produced kvass lacks the microbial diversity and probiotic qualities found in traditionally fermented kvass. Consequently, it cannot be considered an alternative food product compared to traditionally fermented kvass. The aim of this study is to introduce the beverage, which has nutritional value, in our country by providing information about the characteristics and production of kvass.

**Keywords**: Kvass, Traditional Food, Beverage

# HISTORY, PRESENT, AND FUTURE OF FOOD SALES IN THE TURKISH E-COMMERCE MARKET

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## ABSTRACT

While online sales first emerged with a pizza brand taking orders in 1994, Turkey's entry into e-commerce occurred in 1998. However, it's particularly the year 2007 that is considered a crucial turning point for the Turkish e-commerce ecosystem. Between 2010 and 2013, small farmers and producers who couldn't make it to the shelves discovered e-commerce. Entrepreneurs primarily started connecting their agricultural and food products with customers through email listings. They then progressed to establishing their own websites and opening shops on established marketplaces, where they earned the trust of customers. Thanks to the increasing presence of traditional foods and innovative products in online food marketing compared to their counterparts on traditional store shelves, the future of food sales in e-commerce, often referred to as 'e-food,' looks promising.

**Keywords**: Marketing, e-Commerce,e-Food, online sale

# HEALTH ASSESSMENT OF CORK OAK (QUERCUS SUBER) IN THE ZOUAGHA FOREST (MILA).

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## ABSTRACT

This study aims to assess the current health status of cork oak (Quercus suber) and its evolution over time in the Zouagha Forest (Mila). Eight random plots were selected for this study using dendrometric measurements (density, total height, and diameter) and the ARCHI protocol. This protocol is based on the analysis of tree architecture, involving a morphological analysis of the entire aboveground part through observation. The key observations include three aspects: the sequential structure established during growth, providing information on the tree's developmental stage; symptoms of degradation; and the canopy architecture (mortality, branching impoverishment), as well as the restoration processes resulting mainly from the development of epicormic shoots. The diagnostic results show that the majority of trees in these plots currently fall under the ARCHI R category, with a rate of 51.1%. The healthy ARCHI type ranks second with a percentage of 39.2%, and the ARCHI S type accounts for 7.3%. The ARCHI D and ARCHI I types are virtually absent. The health status of these plots is quite good, despite the negligible presence of standing dead trees.

**Keywords**: Cork oak, Quercus suber, Forest, Ecosystem, ARCHI, Dendrometry

# BIBLIOMETRIC ANALYSIS OF POLLEN CONTAMINATION DETERMINATION IN SEED ORCHARDS WITH MOLECULAR MARKERS

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## ABSTRACT

Seed orchards are special plantations established to produce genetically superior seeds/seedlings from genetically superior candidate parents. Pollen contamination is one of the most important factors affecting the yield, adaptation, and genetic quality of seeds produced from seed orchards in forest tree breeding programs. Potential pollen from the forests surrounding the seed orchard is a concern in tree breeding studies, as it causes the loss of genetic gains expected from seed orchards. It has been determined that different molecular marker techniques are used in the determination of pollen contamination. These molecular markers have advantages and disadvantages over each other. In this study, bibliometric analysis was performed to quantitatively and qualitatively evaluate the published articles on the determination of seed orchards and pollen contamination with molecular markers. Searching the Web of Science (WOS) by "seed orchard", "pollen contamination", and "marker" criteria revealed that 67 articles were published. Japan, Canada, Sweden, China, and France were the countries that contributed the most to pollen contamination studies in the seed orchards of forest trees, respectively. According to the data obtained, it has been shown that the pollen contamination level of forest tree species in seed orchards is generally between 5% and 90%. In Turkey, three studies on this subject were found. It was concluded that studies on pollen contamination were carried out in only two *Pinus brutia* orchards in Turkey, which has 189 seed orchards, most of which are coniferous, and that similar studies should be planned in other seed orchards.

**Keywords**: Bibliometric analysis, Isoenzymes, Pollen contamination, RAPD, Seed Orchards, SSRs

# FRESH BIOMASS OF STUMPS AND MERCHANTABLE ROOTS IN DURUSU COASTAL DUNE STONE PINE (PINUS PINEA L.) AFFORESTATION

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## ABSTRACT

While there are many studies on aboveground biomass estimations of various tree species in Turkey, there are still limited number of studies on belowground biomass (roots). Located in Istanbul-Durusu (Terkos) Coastal Dune, the study aims to develop equations that can be used to directly predict the biomass of fresh stumps and merchantable roots of stone pine (*Pinus pinea* L.) at the single tree and stand level. In 45 sample plots from different developmental stages, a stand representative tree was cut from each plot and roots of the cut trees were excavated. Fresh biomass of stumps and (for merchantable root biomass) the roots larger than 4 cm in diameter were weighted in field. Fresh biomass of stumps and merchantable roots of the sample trees ranged between 10.2-335.4 kg and 10.2-371.2 kg, respectively. These tree components were correlated with base diameter (d0), diameter at breast height (d1.3), tree heights (h), and stemwood overbark volumes (VKGO) using 50 models and the most significant ones were identified with statistical analyses. In both components, the Gompertz model with d0 used as the independent variable at the single tree level, was determined to be of higher importance. In order to estimate the biomass per unit area and facilitate the application on site, each tree in the sample plots were modeled by using the stemwood overbark volumes as the independent variable. Accordingly, the biomass of fresh stumps and merchantable roots per unit area in Durusu Coastal Dune afforestation varied as 13.0-249.3 t/ha and 13.3-274.1 t/ha, respectively.

**Keywords**: Biomass equation, Terkos, merchantable biomass, belowground biomass

# DEMOGRAPHIC STRUCTURE OF CORK OAK (QUERCUS SUBER) POPULATIONS IN ZOUAGHA FOREST (NORTHEASTERN ALGERIA).

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## ABSTRACT

The theme of our research is to describe the structural characteristics, natural regeneration, and demographic structure of cork oak (Quercus suber) in the Zouagha Forest (Mila). Data were collected through random sampling on 6 square plots of 0.09 hectares. The dendrometric parameters measured were the diameter at 1.3 meters above the ground and the total height of trees and seedlings with a diameter ≤ 10 cm. The average density of cork oak trees in the Zouagha forest area is 155.66 trees/ha, with a basal area of 33.65±5.53 m²/ha, and the average natural regeneration is 649.6,27%. The analysis of diameter and height structures shows a predominance of older individuals with large diameters and tall heights. These results provide a database that contributes to the improvement and sustainable management of cork oak in the Zouagha Forest.

**Keywords**: cork oak, regeneration, diameter structure, demographic structure, Zouagha, Mila

# STUDY OF THE ANTIOXIDANT ACTIVITY OF EXTRACTS OF CONES OF CUPRESSUS SEMPERVIRENS

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## ABSTRACT

Substances such as antioxidants are found in abundance in plants. The objective of this study is to determine the content of phenolic compounds and the antioxidant potential of *Cupressus sempervirens* L. cones from the Terni forest (Tlemcen, Algeria). An assay of total polyphenol and flavonoid contents by spectrometry, estimation of antioxidant potential by the DPPH free radical trapping method are carried out on extracts of the cones. The yield was 98.12% and 81.22% for the two extracts obtained by ultrasound and maceration respectively; the average contents of total polyphenols and flavonoids were 534.65 ± 1.14 mg (EAG)/g (ES) and 335.75 ± 4.72 mg quercetin equivalents/g (ES) respectively for the ultrasonic extract. The mean EC50 values for the DPPH test were 0.109±0.030 mg/ml for the ultrasonic extract and 0.294±0.002mg/ml for the macerated extract. The quantitative estimation of flavonoids and total phenols by the colorimetric method showed that the extracts are rich in these compounds and have good antioxidant activity; it can be deduced that the cones of this species can be a source of antioxidant bioactive.

**Keywords**: Cupressus, Antioxidants, Total polyphenols, Flavonoids

# ECOLOGICAL PROCESSES ON THE CONVERSION OF COPPICES TO HIGH FORESTS IN TURKIYE-THRACE

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## ABSTRACT

Currently, approximately half of Turkish forest area is covered with coppice originated forests. The stands of the coppice forests in Turkey have been created by the effects of human interventions along with the tree species and site characteristics. Moreover, more than 2/3 of coppice originated forests are degraded. The coppice management has different effects on the soil than the high forests. The short-term periodic cuttings applied in coppice management degrade the soil due to loosing of protective vegetation cover. Short periods and fine wood harvesting in a coppice management remove mineral nutrients from the forest with harvested stem bark, young stemwood and leaves. As the management period gets shorter, the benefit is made in shorter periods, and negative ecologic effects also increases. Among the forest management types, the high forest management is the most suitable for the sustainable purpose to achieve in terms of nature and healthy forest management compared to coppice. For this reason, Turkish General Directorate of Forestry has decided to conversion of coppice forests to high forests since the beginning of 2006, that is, the coppice management was mostly abandoned in a country wide. Thrace (European part of Turkey) is a region where coppice originated forests hold an important place and the decision to conversion of coppices to high forests has important consequences. In this study, an ecological evaluation of the change of Thrace forest areas was made in the process of conversion of coppices to high forest after 2006.

**Keywords**: forest management, harvesting, seed, sprouting, sustainability

# ADAPTATION OF GREEN OAK TO ENVIRONMENTAL CONDITIONS

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## ABSTRACT

The climatic changes experienced by the Mediterranean region are at the origin of the physiognomic variations of forest ecosystems. This pathology is manifested by environmental constraints that trees undergo in their natural range, affecting their growth and productivity. The most disastrous consequences are manifested by a risk of displacement of their biogeographical areas. This work focuses on the adaptability of holm oak (*Quercus ilex*) to environmental variations. The determinations of proline and soluble sugars are carried out in the leaves of seedlings of three varieties of holm oak (Batna, Tébessa and Souk Ahras). The determinations of proline and soluble sugars are carried out in the leaves of seedlings of three varieties of holm oak (Batna, Tébessa and Souk Ahras). Seedlings come from acorns without pericarps. The results obtained show a significant accumulation of proline in the leaves of seedlings from acorns with pericarps (Controls) compared to those without pericarps; this accumulation is also important in the leaves of seedlings having undergone an ablation of the pericarps (without pericarp) of the variety of Tébessa. Contrary to the previous results, the contents of total soluble sugars are higher in the leaves of the control seedlings. Regarding the varieties, the highest content is also obtained in the leaves of Tébessa seedlings (acorns without pericarps). The amounts accumulated could be linked to the level of tolerance to environmental variations, contributing to the maintenance of cell turgor, created by the osmotic adjustment for which proline and total sugars are responsible. The climatic changes experienced by the Mediterranean region are at the origin of the physiognomic variations of forest ecosystems. This pathology is manifested by environmental constraints that trees undergo in their natural range, affecting their growth and productivity. The most disastrous consequences are manifested by a risk of displacement of their biogeographical areas. This work focuses on the adaptability of holm oak (*Quercus ilex*) to environmental variations. The determinations of proline and soluble sugars are carried out in the leaves of seedlings of three varieties of holm oak (Batna, Tébessa and Souk Ahras). The determinations of proline and soluble sugars are carried out in the leaves of seedlings of three varieties of holm oak (Batna, Tébessa and Souk Ahras). Seedlings come from acorns without pericarps. The results obtained show a significant accumulation of proline in the leaves of seedlings from acorns with pericarps (Controls) compared to those without pericarps; this accumulation is also important in the leaves of seedlings having undergone an ablation of the pericarps (without pericarp) of the variety of Tébessa. Contrary to the previous results, the contents of total soluble sugars are higher in the

leaves of the control seedlings. Regarding the varieties, the highest content is also obtained in the leaves of Tébessa seedlings (acorns without pericarps). The amounts accumulated could be linked to the level of tolerance to environmental variations, contributing to the maintenance of cell turgor, created by the osmotic adjustment for which proline and total sugars are responsible.

**Keywords**: Quercus ilex, varieties, proline, total sugars, adaptation.

# SEASONAL EFFECT ON ALEPPO PINE PHYSIOLOGY

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## ABSTRACT

Our work consists in quantifying the contents of soluble sugars and total proteins in the different organs of the Aleppo pine (*Pinus halepensis* Mill.) during the four seasons of the year 2022. The contents of total soluble sugars and proteins are higher in the needles than the other organs. Regarding the seasons, the highest content of soluble sugars is obtained for the summer, while the content of total proteins is higher for the winter. One of the main reasons explaining the success of adaptation of the Aleppo pine in the Mediterranean area lies in its remarkable resistance to ecological constraints.

**Keywords**: Pinus halepensis, soluble sugars, total proteins, adaptation

# MODELLING OF THE CONTRIBUTION RATES OF BIOMASS COMPONENTS TO THE TOTAL BIOMASS IN NORTH THRACE OAK ECOSYSTEMS

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## ABSTRACT

In this study, it was aimed to model the contribution rates of biomass components (Foliage, branch, bark, stem) to the total biomass in three different oak species (*Q. frainetto*, *Q, cerris*, *Q. petraea*) to estimate the biomass amounts of biomass components. For this purpose, a total of 474 trees, 124 Hungarian oaks (*Q. frainetto),* 116 Turkish oaks (*Q, cerris*) and 234 Sessile oak (*Q. petraea*) trees, with different diameter and height values from the oak ecosystems distributed in different sites in Northern Thrace, were sampled by destructive sampling. Oven dry weights of the biomass components of the sample trees were obtained. The ratios of biomass components to the total biomass (biomass component ratios) were modeled based on the diameter at breast height (DBH) and total height (H) of the trees by multinomial logistic regression analysis. In the first step, the contribution rates of each component to the total biomass are estimated. In the second stage, the biomass values of the components are obtained by multiplying the observed (measured) total biomass values with the estimated biomass ratios for each component. In conclusion, foliage biomass was estimated between 24.7% - 34%, branch biomass 22.1% - 28.9%, bark biomass 13.2% - 18.1% and stem biomass 6.5% - 7.7% in three different oak species with mean absolute error percentages.

**Keywords**: Quercus, Regression Model, DBH, Above-ground biomass, Thrace

# ANTI HEPATOCELLULAR CANCER AGENT AND LIVER PROTECTOR ISATIN

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## ABSTRACT

Isatin is an indole derivative. In this study, cytotoxic effects of isatin on hepatocellular cancer HepG2, and its protective-proliferative effects on healthly liver AML-12 cells were investigated. For 48 h isatin application IC50 values calculated as 186.23 µM for HepG2 and 7.05 mM for AML-12 cell lines. Depending on IC50 dose of HepG2 application for both cell lines; proliferation supressed and apoptotsis induced in HepG2 cells but proliferation promoted in the AML-12 cells. In addition, expression levels of oxidative stress gene *CuZn/ Mn-SOD*, mitochondrial apoptotic genes *Bax, Cas3, APAF1, p53* were increased in HepG2 but decreased in AML-12 cells.

**Keywords**: AML-12, HepG2, isatin, anticancer, cytotoxic

# COMPARATIVE ANALYSIS OF THE GENETICALLY DETERMINED ISOENZYME POLYMORPHISM IN POPULATIONS OF PLANTS OF THE GENUS CROCUS DISTRIBUTED IN BULGARIA

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## ABSTRACT

The genetic heterogeneity in populations of plants of the genus Crocus was studied through the conducted research based on isoenzyme analysis. The probable genetic control of four polymorphic enzyme groups - non-specific esterases (EST), malate dehydrogenases (MDH), malate enzymes (ME) and superoxide dismutases (SOD) was established, appearing as appropriate markers for characterizing intra- and inter-population genetic variability. A comparative analysis of the gene pool and genotypic structure of the studied populations was carried out. More than 250 individuals were used from the species *Crocus pallasii* Goldbl., *C. chrysantus* Herb., *C. adamioides* Kernd. & Pasche, *C. pulchellus* Herb., *C. flavus* West. and *C.* cf. *biflorus* auct. bulg. The samples were examined by electrophoresis in polyacrylamide gel. The allelic frequency, polymorphism, levels and genetic distance by Nei were calculated using the BIOSYS-1 software package (Swofford & Selander, 1981). The analysis carried out in the course of the present study provides new information on genetic polymorphism and the level of genetic heterogeneity in populations of *Crocus* species. The obtained results show that malate dehydrogenases, malate enzymes, superoxide dismutases and non-specific esterases are polymorphic biochemical-genetic markers that are suitable for inter-population comparisons and investigation of intra-population heterogeneity in *Crocus* species. Acknowledgement: This work was financially supported by the National Science Fund, Ministry of Education and Science, Bulgaria (Project "Biodiversity and taxonomic structure of Iridaceae Juss. In Bulgarian flora" number KP-06-N31/5).

**Keywords**: isoenzimes, genetic polymorphism, heterozygosity, genus Crocus

# EFFECTS OF SIALIC ACID CHANGES IN SKMEL-30 CELLS ON METASTASIS

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## ABSTRACT

Melanoma cancer is a type of skin cancer that occurs as a result of cancer of pigment-producing cells called melanocytes. Sialic acid is a 9-carbon monosaccharide located at the end of glycan chains on the cell surface. There are various effects of sialic acid on cancer cells. These; tumor growth and invasion, metastasis formation, and drug resistance. We investigated at how the irisin hormone affected the sialic acid-related metastasis genes in SKMEL-30 (a melanoma cell line) cells. In our research, sialic acid levels were measured spectrophotometrically, cell viability was assessed using MTT analysis, and TIMP-1 and TIMP-2 gene expression levels were determined using qRT-PCR. In MTT analysis results, the IC50 value of irisin hormone in 24 hours was determined as 30 nM. The sialic acid level was found to be 0.41 mg/mL in the control group and 0.07 mg/mL in the group in which 30 nM irisin was applied. In qRT-PCR results, TIMP-1 and TIMP-2 gene expressions were respectively compared to control; It showed a relative fold increase of 2.292±0.74, 2.440±0.327. Irisin is effective on pathways involved in energy metabolism and glucose, as well as cell communication and proliferation processes, according to studies. It is known that sialic acid activates some receptors in intracellular signal transduction pathways and can increase the characteristics of tumor cells related to invasion, migration and metastasis. It is thought that the sialic acid level, which decreases with the application of 30 nm irisin, changes the structure of the glycans on the cell surface in SKMEL-30 cells, and it has been shown by the increases in the expression of TIMP-1 and TIMP-2 genes that they decrease the metastatic abilities of the cells. In conclusion; Decreased sialic acid levels in melanoma cells can enable immune cells to recognize and destroy cancer cells more effectively. In this case, the decrease in the level of sialic acid leads to an increase in the immune system response and a strengthening of the immune response against cancer cells. Further research is needed to understand the relationship between the molecular mechanisms of sialic acid and the development of metastases in melanoma cancer.

**Keywords**: Melanoma, irisin, sialic acid, metastasis

# THE EVALUATION OF GENOTOXIC EFFECT OF GREEN SYNTHESIZED SILVER NANOPARTICLES WITH COMET ASSAY

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## ABSTRACT

Green synthesis is an approach that is gaining importance day by day due to it has been developed to prevent pollution caused by chemical use for both environmental and living safety. Silver nanoparticles are used in a wide range of fields from industry to drug development studies, so the exposure level is high for living and environment. However, the toxicity of nanoparticles synthesized by the green synthesis method is expected to be lower. For this reason, the genotoxicity of green synthesis silver nanoparticles (6.25, 12.50, 25, and 50 µg/mL) was evaluated in our study. Silver nanoparticles obtained from postbiotics of the *Liglactobacillus salivarius* KC27L strain were used. The *in vitro* comet assay which is a rapid, reliable, and low-cost test have been used to determine DNA damage in human peripheral lymphocytes from healthy donors with one-hour treatment. Also, a positive (100 µM, H2O2) and a negative control group have been used. According to the statistical evaluation, green synthesis silver nanoparticles cause a significant increase in tail length, tail intensity, and tail moment compared to the negative control at concentrations of 25 and 50 µg/mL and cause DNA strand breaks. According to *in vitro* comet assay results in human peripheral lymphocytes, the usage of green synthesis silver nanoparticles with concentrations below 25 µg/mL may be genotoxically safe. However, these results need to be checked with different genotoxicity tests.

**Acknowledgments:** This study was financially supported by Gazi University Scientific Research Projects Coordination Unit under project number FCD-2022-8096.

**Keywords**: Green synthesize, silver nanoparticle, Liglactobacillus salivarius KC27L, Genotoxicity, Comet assay

# DNA DAMAGING EFFECT OF PIROXICAM ON HUMAN LYMPHOCYTES USING COMET ASSAY

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## ABSTRACT

Piroxicam is used to treat pain or inflammation in the body caused by rheumatoid arthritis and osteoarthritis. It is in a class of medications called nonsteroidal anti-inflammatory drugs. This study aims to evaluate the possible DNA damaging effect of Piroxicam on human peripheral lymphocytes using comet (Single Cell Gel Electrophoresis-SCGE) assay. Comet assay is a popular, sensitive, quick, and low-cost technique for detecting DNA strand breakage. This assay has become a standard test used to evaluate the safety of novel pharmaceuticals or chemicals. In this study, peripheral blood from two healthy donors (one male and one female) was suspended in PBS and then lymphocytes were isolated. Isolated lymphocytes were treated with various concentrations of Piroxicam (0.23, 0.47, 0.94, 1.88, and 3.75 µg/mL) at 37°C for 1 h. A negative and a positive (100 µM H2O2) and solvent controls (4,81 µl/mL) were also used for each treatment. Comets were scored using the tail length (µm), tail intensity (%), and tail moment of 100 comets on each slide (a total of 200 comets for each concentration). This study was approved by the ethical committee of Amasya University (2021/86). As a result, Piroxicam decreased the comet tail length at 0.23 and 0.94 µg/mL and tail moment at 0.23 µg/mL compared to solvent control. This anti-inflammatory drug slightly reduced the comet tail length in isolated human lymphocytes. Therefore, it did not cause DNA damage. However, these results should be supported by other genotoxicity assays.

**Keywords**: Piroxicam, genotoxicity, anti-inflammatory drug, human lymphocytes, comet assay

# EXPRESSION OF KI67 AND P53 AND THEIR ASSOCIATION WITH THE PROGRESSION OF DRY SYNDROME

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## ABSTRACT

Dry syndrome or Sjögren's syndrome (SS) is a systemic autoimmune disorder, which affects primarily the exocrine glands, and characterized essentially by chronic inflammation of the salivary and/or lachrymal glands. Ki67 is a nuclear antigen associated with cell proliferation which is present throughout the cell cycle and is absent in resting cells. The p53 protein behaves as a multifunctional transcription factor involved in the control of the cell cycle, programmed cell death, senescence, differentiation, DNA replication and repair. Here, we aimed to study the possible role of p53 and Ki67 in the progression and outcome pSS. Serum concentration of Ki-67 and p53 were analyzed by enzyme-linked immunosorbent assay (ELISA). Moreover, labial salivary gland (LSG) SS patients were assessed immunohistochemically to evaluate the histopathological expression of Ki67 and p53, along with the extent of inflammation. There were no statistically significant differences in serum Ki- 67 and p53 levels between the studied groups. Moreover, the immunohistochemically expression of Ki-67 revealed an abundant presence of this protein essentially in the grades 2 and 3 of Chisolm and Mason, Ki67 expression correlated with the extent of inflammation. However, we revealed a lack of expression of p53 in LSG patients. Ki67 expression was positively correlated with severity of inflammation during SS .The mechanisms underlying this differential distribution and its significance on disease severity need to be elucidated.

**Keywords**: Sjögren's syndrome; Inflammation; KI-67;p53;ELISA;Immunohistochemistry

# DIETARY DIVERSITY IN 24-MONTH-OLD CHILDREN

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## ABSTRACT

Optimal nutrition during the first two years of a child's life is particularly important as it will result in reduced morbidity and mortality rates, as well as the risk of chronic diseases, and contribute to better overall development (WHO, 2015). In Algeria, 0.7% of children aged 0-23 months received exclusive breastfeeding and only 18.1% received an acceptable diet (MICS, 2019). Our aim is to describe dietary diversification in 2-year-old children in the willaya of Batna (eastern Algeria). Methods: This study is descriptive, cross-sectional and retrospective. The questionnaire used was based on the WHO questionnaire, combined with three 24-hour recalls. Data were collected using Excel. Analysis was performed using Epi info software version 3.5.4. To assess the prevalence of malnutrition, we used Who anthro software version 3.1.0. Results: Our population consisted of 160 mothers of infants aged 24 months. The survey revealed that the rate of exclusive breastfeeding was only 1.30%. The average age of food diversification was 13.46± 27.67 days. The majority of mothers introduced complementary foods before the age of 4 months. More than half the children (56.9%) had a low child nutrition index (CCI) [0-5] and 48.1% had an average dietary diversity score (DDS). In terms of children's nutritional status, 9.1% were moderately underweight, 13% were at risk of being overweight and 4.5% were overweight. Dietary diversification in children is influenced by a number of factors, as well as by eating habits and practices specific to the region. Conclusion: In order to counteract the poor dietary practices that affect children's health and growth, a strategy of awareness-raising and support is more than necessary.

**Keywords**: Dietary diversification, nutrition index, nutritional satut, 2-year-old-children

# THERAPEUTIC BENEFITS OF ALGERIAN PROPOLIS

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## ABSTRACT

Apitherapy is one of the fastest growing areas of interest by using honey bee hive products such as beeswax, honey, pollen, propolis, royal jelly and venom. In recent years, medical problems such as pathogen resistance to antibiotics have caused a renewed interest in the medicinal use of hive products allowing them to take their place among the modern armoury of drugs. The aims of this study were to evaluate the antimicrobial and the anti-free radical activities, and to determine the phenolic compound contents of ethanolic extract of propolis (EEP) obtained by the ultrasound-assisted extraction method. In vitro inhibitory activity of propolis was investigated by the disc diffusion method against gram positive and gram negative bacteria and the anti free radical activity was assessed colorimetrically using the DPPH test. Total polyphenols and flavonoids were determined spectrophotometrically using colorimetric method. Results showed that all tested bacteria were susceptible to propolis and the EEP exhibited significant free radical scavenging activity, with an IC50 value closer to the control value. A positive correlation between antibacterial activity, free radical scavenging activity and phenolic compound content was observed, showing that polyphenol and total flavonoid content are involved in this activity. Due to increasing development of resistance by microorganisms, this natural product is a good alternative source of antimicrobial agents. These data will contribute to the growing knowledge concerning propolis and conservation measures will be needed to prevent the loss of the native honey bees and to preserve their hive products.

**Keywords**: Honey bee, Propolis, Antibacterial activity, Free radical scavenging radical, Plyphenols, Flavonoids.

# DIETARY SUPPLEMENTS AND CANCER: WHAT'S THE DANGER FOR PATIENTS?

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## ABSTRACT

A dietary supplement (DS) is a preparation intended to supplement the normal diet, providing nutrients or substances with a nutritional or physiological effect (vitamins, plant extracts, probiotics...etc). Cancer patients suffer not only from the disease, but also from the therapeutic side effects; they resort to anything that can relieve their suffering and strengthen their immunity and improve their health (such as antioxidants and probiotics etc). Our work was conducted with the aim of highlighting the food additives in the formulation of food supplements most consumed by these patients. We collected 181 local and imported supplements that we divided into 7 classes according to their uses. The results of this screening reveal the incorporation of numerous additives such as: E422, E330, E202, E420i, E322, E460, E441 etc, with varying degrees of toxicity ranging from allergies to genotoxicities. In conclusion, cancer patients are a very sensitive category, it is important that they are monitored regularly to minimize the risks and maximize the benefits of treatment. Therefore, it is necessary to consult an oncologist or nutritionist before taking any type of supplement.

**Keywords**: Dietary supplements; cancer patients, food additives, toxicity, investigation

# CLINICAL DISTRIBUTION AND DRUG RESISTANCE PATTERN (MDR, XDR, PDR) OF ACINETOBACTER BAUMANNII IN NIĞDE FROM 2022-2023.

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## ABSTRACT

The emergence and dissemination of multidrug-resistant bacteria pose a significant threat to public health worldwide; have gained considerable attention due to their ability to "escape" the effects of antimicrobial agents. We aimed to determine the prevalence and antibiotic susceptibility based on the sensitivity patterns to chosen antibiotics, (MDR, XDR, PDR) representing different categories of antimicrobial. *Acinetobacter baumannii* isolates from the clinical specimens from September 2022 _ Mart 2023 at Nigde Ömer Halisdemir University Education and Research Hospital, Turkey, using the automated Vitek2 system and Kirby-Bauer disk diffusion method. Among 334 samples of *Acinetobacter baumannii* strains, 59.0 % were from tracheal aspirate culture, 15.3 % were from blood samples, and the departments with the highest detections rates of *Acinetobacter baumannii* were intensive care (ICU) 33.0%, surgical intensive care (ICU) 29.3 %. The drug sensitivity test showed that the resistance rate of isolated strains to Antibiotics Piperacillin/Tazobactam, Ceftazidime and Imipenem was 93.1 %, 87.3 %, and 93.6 % respectively, and the resistance rate to other kinds of common antibiotics was more than 60%, Tigecycline, a highly effective antibiotic, demonstrated a resistance rate of 13.2% in the tested strains of *Acinetobacter baumannii*. However, encouragingly, 26% of the *Acinetobacter baumannii* strains exhibited sensitivity to the standard dosage of Tigecycline. Sensitivity pattern Non_MDR 16.8 %, MDR 51.2%, XDR 29.0% and PDR 3 % of the isolates observed. The 334 Acinetobacter baumannii strains that were identified were widely present in hospitals and had significant antibiotic resistance for common antibiotics. As a result, it's essential to improve medication resistance and pathogen surveillance, develop intelligent and efficient infection control strategies, and make sure antibiotics are administered effectively.

**Keywords**: multi-drug resistance (MDR); Acinetobacter baumannii; Drug resistance; Hospital antibiotic resistance

# ASSISTED REPRODUCTIVE TECHNOLOGY IN WESTERN ALGERIA

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## ABSTRACT

Infertility is a major public health problem that Assisted reproductive technology (ART) helps remedying, allowing infertile couples realizing their parental project. In Algeria, the infertility rate is about 15%. Thereupon, several ART national centers have emerged. The aim of this study is to evaluate the ART activities, provide quantified data to understand the ART practice in western Algeria and compare our results abroad. We conducted a retrospective study on 1930 women treated for an ART at the EL MAWLOUD fertility center in Oran from January 1, 2019 to December 31, 2020. Our study showed the patients' average age as 33.42 and the ICSI as the commonest ART technique in our center with 90% frequency. The pregnancy rate equals 26.59% by insemination in IUI, and 41.25 % by puncture in IVF and ICSI, i.e. an average success rate similar in Europe and USA. This study elucidates the use of ART techniques (2019-2020) in western Algeria. They are satisfactory in our region compared to international data in the literature. However, ART remains embryonic in Algeria, regarding mainly the exorbitant prices of these techniques and the non-reimbursement of this act by the National Social Security Fund, which handicaps couples with medium and low incomes.

**Keywords**: Infertility, ART, Oran, assessment, pregnancy rate

# MONITORING OF BCR-ABL TRANSCRIPT IN CML IN WESTERN REGION OF ALGERIA

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## ABSTRACT

Introduction: Chronic myeloid leukemia (CML) is a hematologic malignancy and chromosomalabnormality due to the presence of the Philadelphia chromosome (Ph) which has a balanced reciprocal translocation t(9; 22)(q34; q11), resulting in a BCR-ABL fusion gene and then an abnormal protein with tyrosine kinase activity, responsible for leukemic transformation. The molecular follow-up of patients has become precise and demanding. The Xpert BCR-ABL Monitor assay is an alternative to conventional RTQ-PCR for monitoring CML patients. The objective assigned to our study is to highlight the interest of the GeneXpert molecular biology technique in order to follow the evolution of CML by quantification of the BCR-ABL molecular transcript. The present study also aims to describe the status of CML at the EHU of Oran.
Material and methods: We performed a retrospective study on the medical records of 22 patients followed in the Hematology Department of the EHU of Oran. Results : The results of our study show that CML affects all age groups of the population with a mean age of 42.77 years, the circumstances of discovery are often diagnosed incidentally after evaluation of a routine test and that splenomegaly is a symptom found in almost all patients with CML. Molecular follow-up showed that 61.54% of patients had a major molecular response (MMR) at 12 and 18 months after treatment with tyrosine kinase inhibitors (TKIs) and 50% had an MMR at 6 months after treatment with TKIs2. These responses showed that TKI treatment decreases BCR-ABL ration quantification.
Conclusion: We conclude that the automation and rapidity of the GeneXpert assay allows us to assess treatment efficacy and monitor the molecular response of BCR-ABL transcripts in CML patients treated with TKIs to ensure better management.

**Keywords**: Chronic myeloid leukemia; Molecular monitoring; BCR-ABL; GeneXpert

# COMPARATIVE EVALUATION OF TOTAL PHENOLIC AND TOTAL FLAVONOID CONTENTS OF AQUEOUS AND METHANOLIC EXTRACTS OF CENTAUREA SIVASICA

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## ABSTRACT

**INTRODUCTION AND AIM:** *Centaurea* genus, which is one of the medicinal plants, is a genus belonging to the *Asteraceae* family and there are 168 species in Turkey. *Centaurea* species are used in folk medicine alone or together with other herbs for antidiabetic, antidiarrheic, antirheumatic, anti-inflammatory, cholagogue, choleretic, digestive, stomachic, diuretic, diuretic, astringent, hypotensive, antipyretic, cytotoxic, antibacterial purposes. *Centaurea sivasica* is an endemic species and is distributed only in the Upper Kızılırmak sub-region in Turkey. Phenolic compounds and flavonoids, which are among the secondary metabolites, are the compounds responsible for the effects of medicinal plants. In this study, it was aimed to determine and comparatively evaluate the total phenolic and total flavonoid contents of the aqueous and methanolic extracts of *Centaurea sivasica*.
**MATERIALS AND METHODS:** The aerial parts of the collected plant samples were dried in the shade. The dried samples were pulverized in the mill. Methanol and water extracts of plant parts were prepared. The determination of Procatetic acid, Chlorogenic acid, Caffeic acid, Syringic acid, p-Coumaric acid, Ferulic acid and Rutin compounds in the sample content was made using High Pressure Liquid Chromatography (HPLC) system and Reverse Phase C-18 column. The total amount of phenolic substances was determined using the Folin Ciocalteu method. The absorbance of the prepared samples was measured at 750 nm in the spectrophotometer and the results were calculated as gallic acid equivalents. Total flavonoid amount was calculated as quercetin equivalent by using aluminum chloride colorimetric method. The absorbance of the prepared mixtures was measured in a spectrophotometer at 415 nm.
**RESULTS:** It was determined that the methanolic extract prepared from the aerial part of *Centaurea sivasica* plant had a higher total phenolic content (25.75 mg ± 4.23 mg GAE/g; 19.02 mg± 4.38 mg GAE/g, respectively) than the aqueous extract. It was determined that the total flavonoid content of the methanol extract of the plant (8.25 mg± 0.52mg QE/g) also was higher than the aqueous extract (1.72 mg ± 0.22mg QE/g).

**Keywords**: Centaurea sivasica, phytochemical analysis, phenolics, flavonoids

# THE EFFECTIVENESS OF ANTI-COVID-19 VACCINES AND THEIR SIDE EFFECTS

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## ABSTRACT

The Corona-virus-like viruses represent a widespread family of viruses, which are alike known to cause illnesses that range from the common cold to more complicated diseases, such as the Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). Besides, the new Corona-virus is a new strain of Corona-virus has yet to be detected in human being. The name Covid-19 was given to the known disease SARS-CoV-2. Thus, the World Health Organization (WHO) first announced this new virus on the 31st of December 2019, after reporting a group of cases suffering from viral pneumonia in Wuhan, People's Republic of China. The degree of symptoms of Covid-19 infection varies among infected individuals, ranging from symptoms similar to seasonal flu to more severe symptoms, in respect such as difficult breathing (dyspnea), blood clots, etc. Likewise, infection can take place without symptoms, whilst the severity of symptoms has shown to be affected by a number of factors, inclusive of the age of patient, his state of immunity, medical history and the presence or absence of chronic diseases. Indeed, the greater part of people who develop symptoms (about 80%) recover from this disease without need to hospital care; whilst 15% of them develop severe complications and will need oxygenation, of which 5% become critically sick and require intensive care. In this regards, when a new disease comes out, no vaccine is yet available unless it is first manufactured, the fact of which may take several years before a vaccine against the virus is achieved. Nevertheless, in terms of Covid-19 virus, scientists in different countries of the world have managed to create many vaccines. However, the fear of most of the world's population about these vaccines has led to a relatively low rate of people participating in the vaccination campaign. In virtue of which, this issue has become an interesting topic and a fertile ground for us to study the side effects of the Covid-19 vaccine, along with the extent of effectiveness thereof.

**Keywords**: Corona viruses, Covid-19, Pandemic, vaccine, effectiveness, side effects

# CANNABIGEROL REDUCES PRE-B CELL SURVIVAL AND DIFFERENTIATION IN VITRO

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## ABSTRACT

Cannabigerol (CBG) is one of the major biologically active compounds in *Cannabis sativa* L. and has been shown to have antioxidant, antibacterial, antifungal, anticancer and anti-inflammatory properties. Pre-B cells are a subset of B cells of the immune system found in the bone marrow, and the survival, proliferation and differentiation of pre-B cells are controlled by many intracellular and extracellular signaling pathways (i.e. IL-7R and pre-BCR signaling). Any defect in the molecular circuitry controlling these pathways can lead to pathological consequences such as immunodeficiencies and pre-B cell acute lymphoblastic leukemia (ALL). As plant-derived products have been reported to have therapeutic activities, this study investigated the effects of CBG on the IL-7-dependent survival of pre-B cells and their differentiation into immature B cells in vitro. Wk3 pre-B cells derived from SLP-65 deficient animals were cultured in the absence (control) or presence of 2.5, 5 and 10mM CBG in medium supplemented with IL-7 in excess, followed by their analysis for Annexin-V and Propidium Iodide (PI) by flow cytometry. The results showed that CBG supplementation reduced the survival of wk3 pre-B cells, as evidenced by an increase in the percentage of Annexin-V+PI- apoptotic cells and Annexin-V+PI+ dead cells. It was further tested whether CBG supplementation could have any effect on the differentiation of wk3 pre-B cells into immature B cells. Cells were cultured in the presence of 2.5, 5 and 10mM CBG but in the absence of IL-7 and then analyzed by flow cytometry. The results showed that there was a significant decrease in the percentage of IgM+Igk+ immature B cells in wk3 cells treated with CBG compared to untreated control cells. In conclusion, the results of this study demonstrated that CBG is effective in inhibiting the survival and differentiation of wk3 pre-B cells, suggesting that CBG is a potential pharmacological inhibitor for pre-B cell related malignancies such as pre-B cell ALL. However, it should be noted that both in vitro and in vivo studies are needed to confirm and extend our findings, and to elucidate the possible mechanism(s) by which CBG may exert its effects.

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**Keywords**: Cannabigerol, pre-B cells, immunology

# ANTIOXIDANT ACTIVITY ASSESSMENT, PHENOLIC AND FLAVONOID COMPOUNDS QUANTIFICATION OF *EPHEDRA ALTISSIMA* AND *EPHEDRA MAJOR* GROWING IN ALGERIA

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## ABSTRACT

*Ephedra*, a medicinal plant belonging to the Ephedraceae family, is a genus of non-flowering seed plants. Ephedra genus has been used for many years in traditional Algerian medicine to treat several diseases. Investigations were carried out to determine the antioxidant properties, total phenol, and flavonoid contents of two wild species of Ephedra (*E. altissima* and *E. major*). The DPPH and FRAP (Ferric Reducing Antioxidant Power) tests were conducted to evaluate extracts for antioxidant activity. The total phenol and flavonoid contents of extracts were measured by Folin-Ciocalteu and Aluminum chloride methods, respectively. The result showed that both extracts of *Ephedra* revealed antioxidant activity with both performances. The aqueous extract of *E. altissima* demonstrated a highest antioxidant activity with the lowest value (EC50= 12.01 ± 0.23 and 11.01 ± 0.4 µg/mL for the DPPH and FRAP assays respectively). The results exhibited that both wild medicinal herbs contained phenolic and flavonoid compounds. *E. altissima* showed the highest amount with 107.18 ± 1.39 mg equivalent gallic acid per g of dried extract and 41.27 ± 2.23 mg equivalent catechin per g of dried extract, respectively. While the TPC and TFC in *E. major* aqueous extract were 130.15 ± 7.51 mg equivalent gallic acid per g of dried extract and 21.69 ± 1.09 mg equivalent catechin per g of dried extract, respectively. The results revealed that there was a strong relationship among total flavonoid contents and antioxidant activity, as flavonoids are very important plant constituents because of their scavenging ability on free radicals due to their hydroxyl groups. Therefore, the phenolic content of plants may contribute directly to their antioxidant action. Hence, these plant extracts could be used in the development of bioactive ingredients.

**Keywords**: *Ephedra altissima*; *Ephedra major*; antioxidant; DPPH, FRAP, phenolic compounds, flavonoids.

# PHYTOCHEMICAL SCREENING, POLYPHENOLS CONTENT AND ANTIBACTERIAL ACTIVITY OF THE METHANOLIC EXTRACT OF LANTANA CAMARA L.

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## ABSTRACT

*Lantana camara* L. is a species belonging to Verbenaceae, known for its aromatic and medicinal properties. Compounds extracted from its leaves are used to treat respiratory tract infections and have demonstrated antimicrobial potential. The objective of this work is to identify the main bioactive substances contained in the leaves collected in the region of Annaba (Eastern Algeria), during the flowering period "February 2021" and finally to evaluate the efficiency of the methanolic extract vis-à-vis a wide range of 22 pathogenic bacteria supplied by the Faculty of Medicine's Microbiology Laboratory. The phytochemical screening of the leaves of *L. camara* revealed the presence of high concentrations of flavonoids, tannins, coumarins, alkaloids, reducing compounds, quinones and cardiotonic glucosides, on the other hand anthocyanins and mucilage were weakly present. The polyphenol content determined by a spectrophotometric method was equal to 63.80 mg EAG / g MS. The methanolic extraction generated a yield of around 28.33%. Its activity was much more significant on Gram-positive Cocci (9-32mm of inhibition diameters) than Gram negative (8-17mm), and it did not show any action on the two fungal strains.

**Keywords**: *Lantana camara* L- phytochemical screening- Methanolic extract- Polyphenols- Antibactérial activities

# ANATOMICAL PROPERTIES OF LYCIUM BARBARUM L. (SOLANACEAE) FROM TURKEY

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## ABSTRACT

*Lycium barbarum* L. (Solanaceae), grown as a naturalized species in Turkey, is known by its Turkish name "atlangaç, yemişgen". The red-colored fruits of the species are known as Fructus Lycii (Gouqizi, goji berry) and have a history of 2000 years. *L. barbarum* fruits contain high vitamin C, B, and E vitamins, polysaccharides, phenolic acids, flavonoids, carotenoids (0.03-0.5%), sterols, amino acids, essential oil, and trace amounts of alkaloids. Atropine and scopolamine alkaloids have been detected in root bark. *L. barbarum* has been studied for its anticancer, antioxidant, antiaging-related macular degeneration, hypoglycemic, immunomodulator, antihypertension, lipotropic liver protective, antiaging, and antioxidant effects. There are reported various bioactivities of its fruits such as emmenagogue, diuretic, antipyretic, tonic, male fertility enhancer, and hepatoprotective. It has been stated that root bark (Cortex Lycii radicis) is used especially in night sweats and chronic low fever, diabetes, and hypertension. *Lycium barbarum* is an ethnobotanically valuable species due to its curative effects. However, anatomical studies have been carried out on root and stem secondary xylem anatomy, leaf anatomy, leaf anatomy of different cultivars, and fruit anatomy and are limited in number. To determine the anatomical features of this naturalized species, root, stem, and leaf anatomies were examined by light microscopy. Cross-sections of roots and stems taken by hand were treated with chloralhydrate and phloroglucin + 25% HCl, and the presence of alkaloids had demonstrated with Dragendorff reagent. Saftanin-fast green, a double staining method, was also applied to the sections. The mentioned sections have been examined under the light microscope, sections photographs have been taken, and the anatomical features of the tissues have been determined. It is the first study conducted with the species in the specified scope.

**Keywords**: Lycium barbarum L., goji berry, anatomy

# BLACK THYME, LEMON THYME AND WHITE THYME: ANTIOXIDANT AND ANTIMICROBIAL EFFECTS

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## ABSTRACT

The present study investigates the antioxidant and antimicrobial effects of three distinct Thymus species: Black Thyme (*Thymus vulgaris*), Lemon Thyme (*Thymus citriodorus*), and White Thyme (*Thymus serpyllum*). Thyme, a popular culinary herb, has been traditionally valued for its medicinal properties and culinary uses. This study aims to evaluate and compare the antioxidant and antimicrobial potential of these three Thymus species, shedding light on their potential health benefits. The research methodology involves the extraction of essential oils from the aerial parts of each Thymus species using suitable solvents. Subsequently, the antioxidant activity is determined using various in vitro assays, including DPPH (2,2-diphenyl-1-picrylhydrazyl) and ABTS (2,2'-azino-bis (3-ethylbenzthiazoline-6-sulphonic acid)) radical scavenging assays. Additionally, the total phenolic and flavonoid content of the essential oils is quantified. Furthermore, the antimicrobial potential of the extracted essential oils is evaluated against a panel of pathogenic microorganisms using agar well diffusion and broth microdilution methods. The selected microorganisms include Gram-positive bacteria (*Staphylococcus aureus*, *Bacillus subtilis*), Gram-negative bacteria (*Escherichia coli*, *Pseudomonas aeruginosa*), and a yeast strain (*Candida albicans*). The results obtained indicate significant variations in the antioxidant activity and phenolic/flavonoid content among the three Thymus species. The Black Thyme displays higher antioxidant potential and phenolic content compared to Lemon Thyme and White Thyme. Additionally, the essential oils of all three Thymus species exhibit notable antimicrobial effects against the tested microorganisms, with Black Thyme displaying the most potent antimicrobial activity. The findings of this study shed light on the potential health-promoting properties of these three Thymus species, particularly their capacity to scavenge free radicals and inhibit the growth of pathogenic microorganisms. Such insights can contribute to the development of natural antioxidant and antimicrobial agents for pharmaceutical and food industries. Nevertheless, further investigation is required to identify the bioactive compounds responsible for these effects and to explore their potential applications in medicine and food preservation.

**Keywords**: Black thyme, Lemon thyme, White thyme, Antioxidant, Antimicrobial

# Investigation of Antioxidant Activity of Hypericum cardiophyllum and Qualitative Analysis of Major Phytochemicals by HPLC-DAD

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## ABSTRACT

*Hypericum* species (Hypericaceae) have been widely used for years as a medicinal plant in the treatment of wounds, burns and eczema in folk and modern medicine. The aim of this study is to examine the antioxidant activities (DPPH, FRAP, CUPRAC, FCR), of different extracts obtained from *Hypericum cardiophyllum* by maceration method and then to analyze the active major phenolic compounds qualitatively using HPLC. The methanol extract of *Hypericum cardiophyllum* showed the strongest DPPH, FRAP and CUPRAC antioxidant activity. In addition, methanol extract were found to contain higher amounts of phenolic compounds compared to other extracts. Chlorogenic acid, fumaric acid and rutin compounds were found in the methanol extract of the plant, which showed the most biological activity according to HPLC analysis.

**Keywords**: Hypericum cardiophyllum, antioxidant, HPLC-DAD

# CYTOTOXIC POTENTIAL OF CERIUM ION

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## ABSTRACT

The role of rare earth elements in our lives has been increasing with the advancements in technology. Cerium, which is part of the lanthanide series in the periodic table, is an essential element with numerous industrial applications. As the production and utilization of cerium-containing products continue to rise, concerns regarding environmental exposure and health effects have also escalated. However, limited information is available concerning the effects of cerium ions on aortic smooth muscle cells. This research aims to understand the cytotoxicity and toxicity potential of cerium ions on these cells. In this study, the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-2H-tetrazolium bromide (MTT) assay was conducted on aortic smooth muscle cell line to determine the impact of cerium ions on cell viability. Cells were exposed to various doses of cerium ions ranging from 0 to 300 µM for 24 and 48 hours. The IC50 value was calculated using probit analysis to evaluate the toxicity potential of cerium ions in the cells. Additionally, Inductively Coupled Plasma Mass Spectrometry (ICP-MS) was employed to quantify the amount of cerium ions taken up by the cells. The results of our investigation demonstrated that cerium ions have a significant effect on cell viability. The IC50 value for a 24-hour exposure was determined as 19.94 µM, whereas it was found to be 137.9 µM for a 48-hour exposure. Furthermore, the correlation analysis within the cerium ion group revealed a negative correlation between viability and dose ($r = -0.753$, $p > 0.0001$) and a statistically significant positive correlation between viability and time ($r = 0.365$, $p > 0.01$). These findings indicate that cerium ions reduce cell viability in a dose-dependent manner while promoting an increase in cell viability with longer exposure time. ICP-MS analysis revealed that the cells received 65.08 µg/L of cerium ions after 24-hour exposure to the IC50 dose, whereas the uptake increased to 659.98 µg/L after 48-hour exposure to the IC50 dose. The data suggest that cerium ions exhibit dose-dependent toxicity potential, and exposure duration influences cell viability. Interestingly, the increased uptake of cerium ions in cells following a 48-hour exposure did not result in a proportional increase in the IC50 value, indicating the development of tolerance in aortic smooth muscle cells. These findings underscore the importance of carefully assessing the use and duration of exposure to materials containing cerium ions.

**Keywords**: Cerium, Cytotoxicity, Aort smooth muscle cells

# COMPARISON OF TOTAL PHENOLIC AND TOTAL FLAVONOID CONTENTS OF BOTH AQUEOUS AND METHANOLIC EXTRACTS OF ACHILLEA SINTENISII L.

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## ABSTRACT

**Introduction:** Plants have been used to treat diseases throughout the history of humans and continues to be used for the same purposes today. People discovered the healing effects of plants by trial and error in the past. In today's modern world these effects are being used for different puropses by a number of industries, such as food, pharmaceuticals, cosmetics, paints, agriculture, and medicine in a much more conscious manner. Turkey being an agricultural country and having a rich flora has a wide selection of medicinal aromatic plants. Many of these plant species are used in phytotherapy which also have usage in Turkey. One of these plant species is Achillea, also known as "yılan çiçeği, civan perçemi, sarı çiçek, çetuğçe, kılıç otu, sarılık otu, ayvadene, tatarcı otu" in Anatolia, which belongs to Asteraceae family and is used commonly in traditional medicine.
**Purpose:** The purpose of this doctorate thesis study is analysing the phytochemistry of Achillea sintenisii L. plant which is endemic in Turkey and determining the quantity of phenolic substance and flavanoids it has.
**Methods:** Protocatechuic acid, chlorogenic acid, caffeic acid, syringic acid, p-coumeric acid, ferulic acid and routine compounds in the sample are determined using high pressure liquid chromatography system (HPLC) with reversed-phase C-18 column.
**Chemicals and Equipments:** Methanol used for analysis is HPLC grade pure and provided from Merck company (Darmstad, Germany). Ultrapure water is provided using Direct-Q 3UV water purification system (Merck, Germany). Certified analitically pure standarts are supplied as Sigma brand (Darmstad, Germany).
**Sample Preparation:** 10.0 ± 0.1 mg of the sample weighed and resolved in 1.0 ml methanol (0.2 ml tube). Vortex applied for 1 minute and then the solution was kept in ultrasonic bath for 30 minutes. Centrifuge was applied for 5 minutes in 6000 rpm. 700µl of the supernatant was taken from upper phase and filtered with 0.45 µm injector filter and then taken to a vial. Analysis was made using Agilent 1260 series HPLC-UV system. Between 1-100 µg/ml 6 point calibration solituon was prepared in methanol for quantity assignment. Validation studies was made according to FDA and Eurochem guides.
**Results:** It is determined that the extract with methanol of the above ground portion of A. sintenisii L. plant has higher phenolic content than its aquoeous extract (35.26±4.74 mg GAE/g; 18.07±5.35 mg GAE/g, respectively). Similarly, methanol extract of the plant has higher flavonoid content compared to its aquoeous extract (28.61±0.85 QE/g; 11.43±0.54 mg QE/g, respectively).
**Conclusion:** A lot of plant and mushroom species which found commonly in nature and consumed by animals and people as a part of their diet have significant amounts of flavonoid

compounds. Achillea species can be considered as one of these plants. These plants which are used in traditional medicine throughout the history and spread in Turkey endemicly might promise hope as a remedy for a lot of diseases.

**Keywords**: Achillea sintenisii L., Asteraceae, Phytochemical analysis, Flavonoid, Phenolic

# ANTI-BIOFILM, ANTI-QUORUM SENSING, ANTI-SWARMING AND ANTIMICROBIAL ACTIVITY OF CORNUS SANGUINEA

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## ABSTRACT

Antibiotic resistance, which has increased rapidly in recent years, is one of the leading public health threats. Studies indicate that this resistance problem, which is expressed in frightening numbers, will cause great loss of life, especially in the 2050s. Alternative methods are being *investigated for effective antibiotics in the fight against resistance. C. sanguinea* is a species of the genus *Cornus* and belongs to the family *Cornaceae.* It is a deciduous shrub with dark greenish brown and thin branches. Within the scope of the study, methanol, ethyl acetate, ethanol and hexane extracts of *Cornus sanguinea* plant belonging to Rize province were prepared and their antimicrobial activities were investigated by agar well method against various Gram negative, Gram positive bacteria and two fungal species. Antiquorum sensing activity was determined using *Chromobacterium violaceum* strains and antibiofilm and antiswarming activity tested with *Pseudomonas aeruginosa* PAO1. According to the results of the study, it was determined that the methanol and etil acetate extracts of *C. sanguinea* had antimicrobial activity and the methanol extract had anti antibiofilm activities. Thus, it was concluded that the active compound potential of the plant is high and more detailed studies should be done.

**Keywords**: Quorum sensing, Cornus sanguinea, Biofilm, Pseudomonas

# CYTOTOXICITY AND ANTIVIRAL ACTIVITY OF LAURUS NOBILIS L. LEAF AND FRUIT EXTRACT

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## ABSTRACT

*Laurus nobilis* L. is an aromatic evergreen tree that is native to Mediterranean regions. Because the the leaves and the fruits of the tree exhibit antioxidant, antimicrobial, anti-inflammatory, and other health beneficial properties, the extracts of the *Laurus nobilis* L. used for pharmaceutical applications. In current study, it was aimed to investigate cytotoxicity and antiviral activity of *Laurus nobilis* L. leaf and fruit extract prepared by %70 ethanol. The cytotoxic effect of ethanol extract prepared from the leaf and fruit of *Laurus nobilis* L. plant on Vero, A549 and MDA-MB-231 cell lines was investigated by MTT method. It was determined that the *Laurus nobilis* L. leaf extract had cytotoxic effects on Vero, A549 and MDA-MB-231 cells at concentrations of 200 µg/mL, 400 µg/mL and 100 µg/mL, respectively. On the other hand, it was determined that *Laurus nobilis* L. fruit extract had no effect on Vero and A549 cells, but had a cytotoxic effect on MDA-MB-231 cells at concentrations of 100 µg/mL and above. The antiviral effect of the extracts on HSV-1 was investigated by MTT method. After Vero cells were infected with virus at a concentration of 1 TCID50, extracts were added to wells. Three wells were used for each concentration. 25-100 µg/mL concentrations of the leaf extract, and 100-400 µg/mL concentrations of the fruit extract that did not affect Vero cells were included in the study. Acyclovir was used as a positive control, and wells containing virus-infected cells were used as negative control. It was observed that the leaf extract did not have antiviral activity, while the fruit extract showed antiviral effect at 200 µg/mL and 400 µg/mL concentrations. It was understood that the leaf and fruit extracts of *Laurus nobilis* L. used in the study showed antiproliferative and antiviral effects in a dose-dependent manner.

**Keywords**: Cytotoxicity, HSV-**1** MTT

# LAVANDULA ANGUSTIFOLIA ESSENTIAL OIL-LOADED NANOEMULSIONS PRODUCED BY HIGH-PRESSURE HOMOGENIZATION: NANOFORMULATION, STABILITY, AND ANTIOXIDANT ACTIVITY

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## ABSTRACT

The interest in plant-based products and nanotechnology for therapeutic purposes has risen in recent years. In this study, we developed nanoemulsions loaded with essential oil from *Lavandula angustifolia* (commonly known as English lavender) using a high-pressure homogenization technique. We evaluated the characteristics of the nanoformulation, its stability, and antioxidant activity. The nanoemulsions were fabricated through high-pressure homogenization, followed by a thorough characterization using dynamic light scattering, zeta potential measurements, and microscopic analysis. The results showed that the nanoemulsions have a narrow size distribution with an average particle diameter below 200 nm, indicating a stable formulation. We evaluated the encapsulation efficiency of the *Lavandula angustifolia* essential oil, revealing high efficiency that assures adequate loading of the bioactive compounds. Additionally, the stability of the nanoemulsions demonstrated excellent physical and chemical stability over a six-month period. We determined the antioxidant activity of the nanoemulsions using the DPPH radical scavenging assay and compared it to the free oil. The encapsulated oil displayed significantly higher antioxidant activity, suggesting that the nanoemulsion formulation not only protects the essential oil but also enhances its therapeutic potential. In conclusion, our findings demonstrate that the high-pressure homogenization technique is an effective method for preparing *Lavandula angustifolia* essential oil-loaded nanoemulsions. These nanoemulsions, with their stability and enhanced antioxidant activity, show promise for potential applications in medicine, cosmetics, and the food industry.

**Keywords**: Lavandula angustifolia, Essential oil, Nanoemulsions, Stability, Antioxidant activity, Nanotechnology, Nano delivery systems

# LIPOSOMAL ENCAPSULATION AS STRATEGY TO IMPROVE AND MAINTAIN BIOLOGICAL ACTIVITY OF PLANT BIOACTIVES

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## ABSTRACT

The utilization of plant-derived bioactive compounds has been a focus point of research due to their numerous therapeutic properties. However, their effective use is often hindered by factors such as poor solubility, stability, and bioavailability. This study presents an approach to address these challenges by using liposomal encapsulation to enhance and preserve the biological activity of plant bioactives. In this study, the selected plant bioactives were encapsulated within nanoliposomes using the ethanol injection method. The liposomes were characterized for their size, polydispersity index, zeta potential, encapsulation efficiency. The data revealed that the liposomal formulation provided a stable environment for the plant bioactives, with an average particle size under 150 nm and a high encapsulation efficiency. The stability of the liposome-encapsulated bioactives was examined under varying storage conditions over six months. The results indicated a significant improvement in the stability of the bioactives when encapsulated within the liposomes, compared to their free form. Moreover, the biological activity of the liposome-encapsulated bioactives was assessed using a range of in vitro assays. Remarkably, the liposomal encapsulation maintained and enhanced the biological activity of the plant bioactives. In conclusion, liposomal encapsulation emerges as a promising strategy to enhance and maintain the biological activity of plant bioactives. This approach could potentially broaden the applications of plant bioactives in the fields of nutraceuticals, cosmeceuticals, and pharmaceuticals, among others. Future studies should be directed towards the in vivo efficacy and safety evaluations of these liposome-encapsulated bioactives.

**Keywords**: Liposomal Encapsulation, Plant Bioactives, Biological Activity, Improved Efficacy

# NON-ISOTHERMAL KINETIC ANALYSIS OF THE DEHYDROXYLATION OF KAOLINITE IN KAOLIN–NATURAL PHOSPHATE MIXTURES

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## ABSTRACT

In the present study, we studied the kinetics of the dehydroxylation of kaolinite in different composites under non-isothermal conditions using DTA. Different composites were prepared by reaction sintering of Kaolin and natural phosphate. Several mixtures were used while varying the percentage of the Kaolin from 30 to 70 mass% with a step of 20. The XRD patterns revealed the presence of both kaolinite and hydroxyapatite phases in all of the mixtures and full disappearing of kaolinite phase in the heat-treated samples. According to the DTA curve results, the peak temperature of the dehydroxylation of kaolinite increased as the heating rate increased and the amount of natural phosphate in the mixture decreased. The activation energy of metakolinte phenomenon was estimated using Kissinger and Ozawa analytical methods. The obtained values of the activation energy were in the range of ~ 164.5 and 112.6 kJ/mol.

**Keywords**: Kaolin, Natural Phosphate, dehydroxylation of kaolinite, Kinetics, DTA

# EFFECT OF NATURAL PHOSPHATE CONTENT ON THE GROWTH KINETICS OF MULLITE CRYSTALS GROWN FROM KAOLIN CLAY

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## ABSTRACT

In this study, DTA analysis was used to study the kinetics of mullite production in various kaolin-natural phosphate composites under non-isothermal circumstances. By reaction sintering kaolin (DD2) and natural phosphate (NP), three samples were created. Mullite and hydroxyapatite phases were found in the mixtures, according to the XRD patterns, although the hydroxyapatite phase in the 70K sample partially vanished at 1673 K. All samples' DTA curves displayed an exothermic peak between 1173 and 1323 K, which was connected to the crystallization of mullite. The Kissinger technique was used to compute the activation energy of crystallization, and the results were 332.59, 340.49, and 408.54 kJ.mol-1 for the samples 30, 50, and 70K, respectively.

**Keywords**: mullite, kinetics, kaolin, natural phosphate, DTA

# BRASSICA RAPA AND THE NOBLE FUNCTIONS (WESTERN ALGERIA)

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## ABSTRACT

*Brassica rapa* used in folk medicine for the treatment of many diseases (type 2 diabetes, hyperlipidemia, cardiovascular, disease, renal disease and hepatitis). However, so far no scientific study has been done to support its use in traditional medicine. The present study was carried out to evaluate the possible efficacy of *Brassica rapa* in the noble functions in rats. The rats were divided into three groups; each group containing six rats. Hyperlipidemia was induced by diet rich with lipid (10%). Group 1 (normal) received regular diet and water *ad libitum for 8W*, Group 2 (HL) received regular diet added lipid and water *adlibitum* for 8 weeks ,Group 3 (HL+N) received a regular diet (with lipid and *Brassica rapa*) and water *ad Libitum* for 8 weeks. at the end of the study, plasma concentrations of glycemia, l'urea, total proteins, albumin, uric acid, TGO and TGP. Glycemia, l'urea, total proteins, albumin, uric acid and TGP were no significant difference ($p>0.05$) between the three groups but TGO (Glutamate Oxalate-Transaminase) was significant. The results showed that *Brassica rapa* has an effect on the function of a liver and renal, however, we should not be unaware of adverse effects of *Brassica rapa* on glycemia.

**Keywords**: Brassica Rapa, glycaemia, rats, GTP, GTO, hyperlipidemia

# THE INTREST OF THE SPONTANEOUS LOCAL PLANT SALVIA OFFICINALIS ON THYROID ACTIVITY IN THE ATTENUATION OF CYPERMETHRIN INTOXICATION IN RATS

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## ABSTRACT

This study aims to evaluate on the one hand the toxicity of cypermethrin (Cyp) on the thyroid gland and some biochemical indicators and on the other hand the preventive effect of *Salvia officinalis* leaves aqueous extract (SO) against this toxicity. Thirty male rats were divided into 6 groups; the control group (C), which received tap water, the positive control group received the aqueous extract of SO (0,5g/kg bw), the group treated with cypermethrin Cyp1 (8,33mg/kg bw), Cyp2 (25mg/kg bw), and the groups treated with cypermethrin combined with the aqueous extract of sage Cyp1-SO(0.5g/kg bw+8.33mg/kg bw) and Cyp2-SO (0.5g/kg bw+25mg/kg bw) by gavage. After four weeks, serum lipid serum was evaluated. Results showed that cyermethrin caused a significant decrease in the body weight and in the thyroid weight as well as in glucose and Cholesterol levels compared to the control. However, the above-mentioned parameters were maintained almost at normal levels in the groups that received the aqueous extract of SO with both doses of cypermethrin. In conclusion, results revealed that SO aqueous extract has protected lipid parameters from Cyo toxicity.

**Keywords**: Salvia officinalis, cypermethrin, lipid profile, toxicity, rat

# EVALUATION OF WOUND HEALING AND ANALGESIC PROPERTIES OF ESSENTIAL OIL FROM BROCCHIA CINEREA

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## ABSTRACT

The objective of this study was to determine the main constituents of the essential oil extracted from *Brocchia cinerea* through hydro-distillation and explore its potential for wound healing and pain relief. The essential oil was found to contain several compounds, including thujone, santolina triene, camphor, and 1,8 cineol. Mice with induced wounds were treated with the essential oil through topical application, which led to a significantly accelerated wound healing and repair rate of 88.1 ± 1.1%. In addition, the analgesic activity of the essential oil was evaluated by administering intra-peritoneal injections of acetic acid to mice. The results demonstrated that the *Brocchia cinerea* essential oil, administered at a dosage of 400 mg/kg, strongly inhibited pain, with a pain inhibition percentage of 98.78%. These findings suggest that the essential oil of *Brocchia cinerea* contains bioactive compounds that may have synergistic effects, making it a promising source for therapeutic purposes in pain relief and wound healing. It is possible that *Brocchia cinerea* could serve as a substitute for synthetic analgesic compounds and wound treatment medications in the future.

**Keywords**: wound healing, analgesic, Brocchia cinerea, essential

# STRUCTURAL ANALYSIS OF POLYGALACTURONASE-INHIBITING PROTEIN1 (PGIP1) IN SOME OF THE PLANT FAMILIES

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## ABSTRACT

Polygalacturonase inhibiting protein 1 (PGIP1) is a plant protein that plays a critical role in protecting plants from pathogenic attacks by inhibiting the activity of polygalacturonase enzymes produced by pathogens. These enzymes break down pectin, which is a major component of the plant cell wall, leading to tissue damage and disease. By inhibiting polygalacturonase activity, PGIP1 helps to prevent or reduce the extent of tissue damage caused by pathogens.For the present survey, the PGIP1 protein reference sequences (RefSeq) belonging to different plant species of three families including *Mucuna pruriens, Medicago sativa, Glycine max (Fabaceae), Pyrus pyrifolia, Rubus idaeus (*Rosaceae) and *Triticum monococcum, Oryza sativa (*Poaceae) were retrieved from the National Center for Biotechnology Information (NCBI) in FASTA format. Structural analyses of the PGIP1 protein were performed online using ProtParam and SOPMA to predictprimary and secondary structures, respectively**.** PGIP1 protein in all samples ranged from 249 to 335 amino acids in length. The theoretical isoelectric points and molecular weight were calculated at a range of 5.95-8.68 and 27594.55-36866.75 kDa, respectively. The GRAVY values of this protein designated all the samples to be hydrophilic proteins in nature but *P. pyrifolia, T. monococcum* and *O. sativa* which are membranous (hydrophobic protein). Moreover, the Instability index analysis revealed that all the experimental samples were stable proteins**.** The SOPMA (Self-Optimized Prediction Method with Alignment) server showed that the most plentiful structural elements of the secondary structure were alpha helices and random coils, whereas beta turns and extended strands were occasionally distributed in the proteins.

**Keywords**: Polygalacturonase-inhibiting protein1(PGIP1), Fabaceae, Rosaceae, Poaceae, Structural Analysis

# CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF AN ENDEMIC PLANT THYMUS MUNBYANUS.

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## ABSTRACT

In order to contribute to the valorisation of local medicinal plants, we were interested in four medicinal plant *T. munbyanus* subsp. coloratus (Lamiaceae) very common in traditional medicine.Aromatic plants increasingly have a considerable asset thanks to the valorization of their essential oils in various applications in particular as (anti-inflammatory, antiseptic, antifungal, antitoxic, insecticide and insect repellent.). The objective of this study is to determine the chemical composition of essential oils of *Thymus munbyanus.* The aerial parts of *Thymus munbyanus*. Were collected in Annaba (North-East of Algeria) and subjected to a hydrodistillation by a Clevenger type hydrodistiller. The yield of EO was calculated from the fresh material of the aerial part of the plant and was estimated at 1.6 ± 0.4%. The essential oils of *T.munbyanus.*were whitish in color, highly fragrant; the essential oil was analyzed by gas chromatography coupled with mass spectrometry. Screening by GC/MS identified 58 constituents.

**Keywords**: Chemical composition, Essential oils, Thymus munbyanus, Hydrodistilation

# EVALUATION OF THE ANTIBACTERIAL AND ANTIOXIDANT ACTIVITY OF FOUR EXTRACT OF THE MEDICINAL PLANT RICINUS COMMUNIS

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## ABSTRACT

The plant *Ricinus communis* is a plant of tropical African origin known for its medicinal properties and virtues worldwide due to its richness in phenolic compounds and is also known for its industrial use. In this study, we were interested in investigating the antimicrobial and antioxidant activity of four different extracts of the leaves of the medicinal plant *Ricinus communis* (aqueous, acetone, ethyl ether, petroleum ether), exerted on four reference strains (*E.coli ATCC25922* and *Staphylococcus aureus ATCC25922 / 43300, Pseudomonas aerogenosa CIP A22)*. The extraction of bioactive compounds was carried out from the aerial part of the plant using the maceration extraction method, which allowed us to calculate the yield of each extract in relation to the dry plant material is expressed as a percentage. The extracts of the same plant showed different yield percentages, the aqueous extract representing the highest yield. The study of the antimicrobial activity of the extracts was determined on the four bacterial strains by the disc diffusion method (Aromatogram), the examined microbial strains have different sensitivities towards the studied extracts according to the diameter of the inhibition zone. We note that regardless of the nature of the extract or its concentration, Gram (-) and Gram (+) bacteria have a different degree of resistance. In search of the inhibitory activity of the different extracts of *Ricinus communis*, we tested the inhibitory effect. We were able to prove through this study the inhibitory capacity of these, with different IC50 values of the order of mg/ml. The evaluation of the antioxidant activity was evaluated using the DPPH free radical inhibition technique. The results determined by DPPH tests showed a good antioxidant capacity. The biological extracts of our plant have a strong bactericidal impact on the tested strains as well as an antioxidant power so that these resources can be valorized and used in the field of treatment as well as against infectious diseases.

**Keywords**: Antimicrobial activity, Bioactive compounds, Bacterial strains, Aromatogram, Inhibitory activity, Antioxidant activity

# EVALUATION OF ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY OF THE SPECIES HIBISCUS SABDARIFFA L. (KARKADE)

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## ABSTRACT

The *Hibiscus sabdariffa L*. plant, commonly known as Roselle or red sorrel is widely grown in central and west Africa and southeast Asia. It is a herbaceous plant that belongs to the Malvaceae family, which has a lot of health benefits. The present study was conducted to evaluate the Antimicrobial and Antifungal activity of hydro-methanolic and aqueous extracts of the species *Hibiscus sabdariffa L.* A phytochemical screening of this plant was carried out by measuring the total Flavonoids and by carrying out a screening of Tannins, Steroids, Sterols and Triterpenes, Saponosides. The hydro-methanolic and aqueous extracts were tested against three pathogenic bacteria: *Escherichia coli, Staphylococus aureus, and Pseudomonas acruginosa* and fungi (*Fusarium oxysporum f .Sp Albedinis*). The results obtained show that the hydromethanolic extract represents the highest yield (44%) compared to the aqueous extract (40 %). Methanol is a good solvent for the extraction of secondary metabolites because it has a high polarity. Phytochemical screening revealed that the bark of *Hibiscus sabdariffa L.* is rich in Gallic Tannins, Sterols, Steroids, Triterpenes and Saponosides. The results of these methanolic and aqueous extracts showed interesting antimicrobial activity against bacteria, as well as the maximum inhibitory activities were observed in the methanolic extract in comparison with the aqueous extract and which were more active on bacteria than on fungi. Conclusion: The results of the present study revealed that the species *Hibiscus sabdariffa L.* has immense potential as a source of compounds of antibacterial and antifungal secondary metabolites that could be used for medicinal reasons and to treat infections.

**Keywords**: Secondary metabolite, Antifungal activity, Antibacterial activity, Phytochemical screening, Hibiscus sabdariffa L.

# IMPACT OF WATER STRESS ON Amaranthus cruentus L. PLANTS: THE ROLE OF OSMOTIC ADJUSTMENT IN TOLERANCE MECHANISMS

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## ABSTRACT

Drought is a major abiotic stress that hinders crop yields worldwide, and its impact will continue to worsen due to climate change. Furthermore, global food security now depends on intensive fertilizer use, making agriculture more vulnerable and reducing crop genetic diversity. In this context, crop diversification is a key to sustainable agriculture, requiring the use of alternative solutions in production. Grain amaranth (*Amaranthus cruentus* L.) is one such alternative plant. This C4-metabolism pseudocereal improves water use efficiency and photosynthesis under drought and high-temperature conditions, unlike C3-metabolism crops. This study aimed to evaluate the impact of water stress caused by withholding water on eight-leaf stage amaranth seedlings. The study was conducted in a controlled greenhouse using a completely randomized experimental design. Various parameters were evaluated, including soil water content, water status of different plant parts (roots, stems, and leaves), and osmotic adjustment parameters (free proline and soluble sugars), after a severe 30-day period of water stress followed by a one-week recovery phase. The results demonstrated that a soil water content of 5% in the stress-exposed pots significantly affected the water status of amaranth plants. Leaf water content decreased by 46.8%, stem water content decreased by 25.4%, while root water content decreased by only 8.9% compared to control plants. Additionally, water-stressed plants showed a significant increase in free proline and soluble sugars levels in the leaves, with a respective increase of 58% and 82% compared to control plants. However, after the recovery period, all studied parameters returned to levels similar to those of control plants. These results highlight that *Amaranthus cruentus* L. deploys adaptive mechanisms in response to water stress, such as the accumulation of free proline and soluble sugars in the leaves, to maintain water balance and protect cells against dehydration and oxidative damage. Furthermore, the rapid recovery capacity of this species after a severe water stress period indicates that it did not suffer significant damage and possesses good resilience to water stress.

**Keywords**: Amaranthus cruentus L., drought, water content, free proline, soluble sugars, tolerance.

# ANATOMICAL FEATURES OF CHENOPODIUM AMBROSIOIDES L. (AMARANTHACEAE) GROWING WILD IN TUNISIA

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## ABSTRACT

*Chenopodium ambrosioides* L. is an aromatic and medicinal plant that has a wide range of applications in the food, pharmaceutical, medicinal, and cosmetic industries. It is distinguished from other species of the *Chenopodium* L. genus by its powerful aroma with a pleasant lemongrass odour. In the present study, the comparative anatomical features of vegetative organs; root, stem and leaf, are investigated in detail. Identification of the secretory tissues, that are the site of biosynthesis and storage of large quantities of specialized metabolites, have been also conducted. They have potential taxonomic significance and are important for phylogenetic studies. The free hand cross-sections were coloured using green-carmino of Mirande technique. Anatomical studies revealed in particular the presence of structural anomaly manifested by the presence of supernumerary cambiums. In the stem, two cambium types are identified. The first, is discontinuous and in internal position, and the second is continuous, external, forming two growth rings of wood and liber. In the root three cambiums are noted. The periderm is observed only in the root cortex. The phellogen differentiates, in the outer part, a protective cork, and an internally positioned phelloderm tissues. The leaf midrib includes collateral vascular bundles arranged in a flattened circle. Mesophyll is dorsiventral, heterogeneous and very rich in starch grains. Non-glandular multicellular and uniseriate trichomes and two types of glandular ones were identified in the stem and in abaxial and adaxial faces of the leaf blade. The first type of glandular trichomes is thin, elongated and pluricellular, provided with a small globoid apex, secreting essential oils. The second type is unicellular, very small, and with a large secretory apical cell. Moreover, the stem and the leaf transversal sections showed the presence of idioblasts, in the parenchymal tissues, containing calcium oxalate and sand crystals. These anatomical characteristics would add valuable information to the existing knowledge on the anatomical features of this potential species and could contribute to its botanical identification.

**Keywords**: Anatomy, Cambium, Chenopodium ambrosioides, Glandular Trichomes, Idioblasts

# ANATOMICAL CHARACTERS OF THE TUNISIAN HELICHRYSUM STOECHAS (L.) MOENCH VEGETATIVE ORGANS

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## ABSTRACT

*Helichrysum stoechas* (L.) Moench, commonly known as everlasting flowers in the Asteraceae family, is one of the potential aromatics and medicinal plants growing wild in Tunisia. It has been widely used in traditional medicine for its therapeutic value in treating cardiovascular, digestive, and respiratory disorders. Moreover, it is known for its richness in essential oils and bioactive compounds offering important biological activities. The present work focuses to provide detailed information of the anatomical features of *H. stoechas* and of the location and types of its secretory tissues, responsible of the biosynthesis of secondary metabolites. They have an important taxonomic significance and could contribute to its botanical identification. Hand cross-sections were made at the leaf, young and old stems, and root and coloured using the Mirande technique. Anatomical studies revealed in particular the presence of a thin leaf blade with revolute edges, and a strongly convex midrib formed by a single libero-ligneous bundles. Perivascular cells are installed around the ribs. The mesophyll is dorsiventral and heterogeneous. The young stem has a primary structure, presenting an angular collenchyma concentrated at the level of the prominent zones with cribro-vascular bundles arranged on a single circle. However, the older stem and root show a secondary structure. The periderm is observed only in the root. Clusters of sclerites are arranged in the cortical parenchyma of these two organs. A continuous pachyte occupies a large part of the stem stele. The root wood is crossed by pluriseriate ligneous rays. A dense *tomentum* covers the aerial organs epidermis. It is more abundant on the leaf abaxial face. Glandular trichomes are distinguished within this fluff. They have a multicellular peduncle and a yellowish secretory head; formed by two apical contiguous cells. These identified anatomical characteristics are important for phylogenetic studies of this medicinal species.

**Keywords**: Anatomy, Glandular Trichomes, Helichrysum stoechas, Perivascular Cells, Tomentum

# EFFECTS OF DIFFERENT ETHANOL CONCENTRATIONS IN PEPPER (CAPSICUM ANNUUM) EXPOSED TO SALINITY

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## ABSTRACT

Plants are exposed to various stress factors such as drought, salinity, heat or chemical compounds in agricultural fields. These stress factors adversely affect plant growth and development, reduce the yield and quality of plant products, and cause economic losses. Plants can cope with stress conditions by using various defense and acclimation mechanisms. Besides, exogenous application of various compounds is known to increase the stress tolerance of plants. In this study, the effects of different ethanol concentrations on stress tolerance in pepper seedlings exposed to salt stress were investigated. For this purpose, 0 and 150 mM NaCl were applied to pepper seedlings pre-treated with 20 and 40 mM ethanol. Plants were harvested 10 days after NaCl treatment. Some physiological and morphological parameters were examined in the harvested plants. According to our findings, especially 20 mM ethanol pre-treatment changed plant growth parameters such as plant height, leaf number, fresh weights of root and stem as well as carotenoid contents in plants exposed to salt stress.

**Keywords**: Pepper, NaCl, Ethanol, Plant Growth Parameters, Pigment, Total Phenolic Compounds

# SCREENING OF THE MATURITY TIME AND SOME YIELD CHARACTERISTICS OF TWO-ROW BARLEY (HORDEUM VULGARE CONVAR DISTICHUM) GERMPLASM CONVERSED IN THE OSMAN TOSUN GENE BANK

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## ABSTRACT

After wheat, barley is the most widely cultivated cool-climate cereal in Turkey and worldwide. The development of new high-yielding varieties resistant to increasing environmental stresses is a priority for breeders. One of the critical barriers limiting the development of new varieties in barley is the narrowing of the gene pool. In this study, the maturity time, flag leaf area, tillering ability and harvest index characteristics of two-row barley accessions maintained in the Osman Tosun Gene Bank were investigated. In this study, Aydanhanım and Zeynelağa varieties, which are widely cultivated in Turkey, were used as a control and 260 local and foreign genotypes from Osman Tosun Gene Bank were screened. Among the 262 two-row barley accessions used in the study, days to maturity ranged from 245 to 262 days, harvest index from 19.2 to 57.8%, flag leaf area from 2 to 19.1 cm2 and number of tillers from 4 to 22. This wide variation was further supported by principal component analysis and cluster analysis. Principal component analysis showed that the first two principal components accounted for 64.25% of the total variation and the distribution of genotypes in the direction of these traits was determined by biplot graph. Cluster analysis grouped the genotypes into seven different classes with respect to the traits studied.

**Keywords**: Barley, landraces, genebank conversation, agro-morphological traits, multivariate analysis

# DIGITALIZATION OF LOCAL PLANT GENETIC RESOURCES COLLECTED THROUGH EXPEDITIONS IN RURAL AREAS OF BULGARIA

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## ABSTRACT

Plant diversity conserved by the genebanks worldwide is of great value in the context of climate changes. The information on the local gene fund is insufficiently available to the most of its users. The aim of the present study is to enrich the digital catalogue with useful passport data describing collected traditional varieties from grain legumes – beans (*Phaseolus sp.*) and cowpea (*Vigna sp.*), and medicinal plants – *Tanacetum balsamita L.* and *Geranium sp.* with Bulgarian origin by FAO/Bioversity descriptor. The results of the genebank inventory showed that the collection includes 2019 bean and 91 cowpea local accessions. One *Tanacetum balsamita L.* accession and four wild geranium accessions are grown in the botanical garden of IPGR-Sadovo. During the period 2022-2023 different regions of Bulgaria were visited and 89 bean accessions, 11 cowpea accessions, characterized by a diverse geographical origin were collected for *ex situ* conservation. Two locations of wild geranium in the area of the town of Svilengrad and the village of Mezek are described by the descriptor for *in situ* preservation. The obtained results lead to the conclusion that a large diversity still could be found conserved *on farm.* Through expeditions the lack of synthesized information could be eliminated and the needed free access can be provided to all stakeholder. This research work was carried out with the support of the Bulgarian National Science Fund by the project "Bioactive substances from legumes and medicinal species – features and potential for use in changing climatic conditions" (КП-06-Н56/13/19.11.2021).

**Keywords**: plant diversity, collecting missions, grain legumes, medicinal plants, data base

# ENRICHMENT OF GRAIN LEGUME GENETIC RESOURCES COLLECTION THROUGH BILATERAL PROJECT BETWEEN BULGARIA AND CHINA

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## ABSTRACT

Conservation of plant genetic resources for food and agriculture is an important goal worldwide from strategically and economically points of view. Almost all the relevant documents on the genetic resources, adopted by international bodies, underline the need of crop conservation, not only for this generation, but most of all, for the future of the humanity. Last decades, more and more old and traditional landraces have been replaced by new and modern varieties. Under these circumstances, a holistic approach for biodiversity conservation by using elements of two strategies: *on farm* and *ex situ* preservation, represents a research priority. Through the implementation of the bilateral cooperation between Bulgaria and China a scientific program on inventory and collection of local plant genetic resources from grain legumes originated from the flora of both countries is carried. According to the work plan the activities are focused on collection of accessions and information from different geographical areas with a view to preserve and sustainable use of the diversity and exchange of experience in characterization and evaluation between the two partners. During the period 2021-2023 seven expeditions with the aim of surveying and inventorying rural areas in South Bulgaria according to the methodology of ECPGR were carried out. As a result, 70 local accessions of bean and cowpea species were collected from diverse agricultural conditions. A database with passport information according to the descriptor of FAO/Bioversity has been created. This research work was carried out with the support of Bulgarian National Science Fund by the project "Enrichment diversity of grain legumes between China and Bulgaria – the introduction and evaluation in correspondence with global climate change" (КП-06-Китай/7/20.11.2020) and the obtained inventory results are applying in the project "Bioactive substances from legumes and medicinal species – features and potential for use in changing climatic conditions" (КП-06-Н56/13/19.11.2021).

**Keywords**: local varieties, collection missions, rural areas, descriptor, documentation

# ECHINOCHLOA COMPLEX DIFFERENTIAL RESPONSE TO FLORPYRAUXIFEN-BENZYL

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## ABSTRACT

Since herbicides have been the backbone of complex weed management programs, particularly in modernized agricultural regions such as the Central Valley of California, weeds have evolved resistance to herbicides. Preliminary research suggested watergrasses, *Echinochloa* complex that showed differential response to florpyrauxifen-benzyl prior to its commercialization. Early watergrass (*E. oryzoides*), barnyardgrass (*E. crus-galli*), and late watergrass (*E. phyllopogon*) are the major *Echinochloa* species that occur in California water-seeded rice fields. Florpyrauxifen-benzyl is a novel synthetic-auxin-type rice herbicide newly registered in California. This research aimed to study *Echinochloa* complex biotypes' differential response to florpyrauxifen-benzyl. A dose-response study was conducted in the greenhouse in 2022 and 2023. Florpyrauxifen-benzyl was applied at 0, 5, 10, 20, 40, 80, and 160 g ai/ha use rates to nine early watergrass, ten barnyardgrass, and seven late watergrass populations. Methylated seed oil at 1% v/v was also added to all treatments. The study was a randomized complete block design with four replicates and was repeated twice. Visual injuries were rated at 0, 7, 14, 21, and 28 days after treatments (DAT) using a scale where 0 means no injury and 100 means plant kill. At 28 DAT, studies were terminated, plants were harvested, and dry weight was measured. Data were analyzed using analysis of variance and nonlinear regression analysis to determine florpyrauxifen-benzyl rate required to cause 50% dry weight reduction, using sigmoidal logistic three parameters. The florpyrauxifen-benzyl rate required to control watergrass populations was found as 300 g ai/ha for late watergrass, 220 g ai/ha for early watergrass, and 120 g ai/ha for barnyardgrass whereas the field use rate is 40 g ai/ha for susceptible biotypes.

**Keywords**: California, Echinochloa, Response, Rice, Watergrass

# CHEMICAL AND BIOLOGICAL PROPERTIES OF ULVA INTESTINALIS FROM CASABLANCA, MOROCCO

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## ABSTRACT

*Ulva intestinalis* is a cosmopolitan tubular green macroalgae. It is a good natural source of carbohydrates, proteins, minerals and contains low levels of lipids. As part of the valuation of algal biomass, this study is devoted to the evaluation of the antioxidant and bio fertilizing activities of *U. intestinalis*, sampled in April 2021 from the daya Dar Bouaaza, located 17 km from Casablanca, Morocco. The characterization of this alga showed a high ash or mineral content (61.2%), followed by carbohydrates (21.3%) and proteins (10.6%). The fat content is low (0.5%) and the main saturated fatty acid is palmitic acid. *U. intestinalis* is characterized by an incomparable richness of sodium and a high content of polyphenols. The antioxidant power of *U. intestinalis* depends on the extraction solvent. The 50% IC (50% inhibitory concentration of free radicals DPPH) requires a low concentration of the direct ethanolic extract (61mg/ml) compared to the chloroform extract (65mg/ml) and the ethanolic extract by exhaustion which requires high concentrations (88mg/ml). The evaluation of the bio fertilizing power is made by germination tests. The results obtained revealed that the aqueous extract of this macroalgae recorded a bio fertilizing effect with different concentrations. On the other hand, the algal powder of *U. intestinalis* had an antagonistic effect.

**Keywords**: Ulva intestinalis, Valorization, Antioxidant activity, bio fertilizing

# NUCLEAR DNA CONTENT ANALYSES IN ALYSSUM CARICUM T.R.DUDLEY & HUB.-MOR. (BRASSICACEAE)

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## ABSTRACT

*Alyssum* genus include about 107 species and subspecies in flora of Turkey. Several *Alyssum* reported with drought tolerance and accumulation of important amount of nickel. *Alyssum caricum* is endemic in the flora of Türkiye and classified as endangered (EN) categories by the Red Data Book of Turkish Plants. The species is a perennial semi-bushy plant and distributed in Denizli and Muğla, Türkiye. There is limited research exist about *A. carricum*. Nuclear DNA content is one of the most important and fundamental biological character of the genome. However, this essential information is missing for *A. caricum*. The objective of this study was to determine the nuclear DNA content of *A. caricum* species using 23-week-old *in vitro* germinated and grown plants. Also, the DNA content of *in vitro* propagated plantlets of *A. caricum* were analysed and compared to determine the genetic stability based on flow cytometry. For this, the plantlets that propagated in MS medium containing 2 mg/L BAP+ 0.1 mg/L NAA and the plantlets that propagated MS containing 2 mg/L KIN + 0.1 mg/L IAA with 3% (w/v) sucrose and 0.7% (w/v) phytoagar were used for analyses. The plant samples were prepared by using the Partec commercial kit (Cystain PI Absolute P) and analysed using a CyFlow space flow cytometer (Partec CyFlowR Space). Flow cytometric analysis revealed that 23-week-old *in vitro* grown plants had 1.75 pg/2C ± 0.0**1** propagated plantlets ranged from 1.65 pg/2C± 0.01 to 1.67 pg/2C ± 0.1 mean nuclear DNA content. The results proved that propagated plants had similar DNA content to the seed-derived plants which showed analysed plants were genetically stable.

**Keywords**: Nuclear DNA Content, Tissue culture, A. caricum

# NUCLEAR DNA CONTENT ANALYSES IN ALYSSUM CARICUM T.R.DUDLEY & HUB.-MOR. (BRASSICACEAE)

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## ABSTRACT

*Alyssum* genus include about 107 species and subspecies in flora of Turkey. Several *Alyssum* reported with drought tolerance and accumulation of important amount of nickel. *Alyssum caricum* is endemic in the flora of Türkiye and classified as endangered (EN) categories by the Red Data Book of Turkish Plants. The species is a perennial semi-bushy plant and distributed in Denizli and Muğla, Türkiye. There is limited research exist about *A. carricum.* Nuclear DNA content is one of the most important and fundamental biological character of the genome. However, this essential information is missing for *A. caricum*. The objective of this study was to determine the nuclear DNA content of *A. caricum* species using 23-week-old *in vitro* germinated and grown plants. Also, the DNA content of *in vitro* propagated plantlets of *A. caricum* were analysed and compared to determine the genetic stability based on flow cytometry. For this, the plantlets that propagated in MS medium containing 2 mg/L BAP+ 0.1 mg/L NAA and the plantlets that propagated MS containing 2 mg/L KIN + 0.1 mg/L IAA with 3% (w/v) sucrose and 0.7% (w/v) phytoagar were used for analyses. The plant samples were prepared by using the Partec commercial kit (Cystain PI Absolute P) and analysed using a CyFlow space flow cytometer (Partec CyFlowR Space). Flow cytometric analysis revealed that 23-week-old *in vitro* grown plants had 1.75 pg/2C ± 0.0**1** propagated plantlets ranged from 1.65 pg/2C± 0.01 to 1.67 pg/2C ± 0.1 mean nuclear DNA content. The results proved that propagated plants had similar DNA content to the seed-derived plants which showed analysed plants were genetically stable.

**Keywords**: Nuclear DNA Content, Tissue culture, A. caricum

# ASSESSMENT OF PHENOLIC CONTENTS IN BASIL GROWN INDOORS AND OUTDOOR

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## ABSTRACT

The accumulation of plant phenolic compounds varies according to the conditions of the environment in which plants are grown. The lighting conditions the plant is exposed to are among the most important factors for plant production and metabolite content. This study aimed to assess the quantity of phenolic substances with HPLC equipment in basil (*Ocimum basilicum*) grown in two different conditions. In each light condition, the phenolic contents of basil plants significantly changed depending on the natural daylight and grow cabinet lighting conditions. The results showed that the quantity of rosmarinic acid, rutin, eugenol, chicoric acid, benzoic acid, methyl chavicol, chlorogenic acid, vanillic acid, caffeic acid, and TPC significantly increased under natural daylight. However, the level of cinnamic acid, quercetin, and TFC did not alter under both conditions. Overall, natural daylight condition is the most suitable lighting strategy to increase the phenolic content of sweet basil.

**Keywords**: Ocimum basilicum, Phenolic compound, Rosmarinic acid, Light exposure

# EFFECT of SUCROSE APPLICATION on ECOLOGICAL and PHYSIOLOGICAL PARAMETERS in Brassica napus L. GROWN at DIFFERENT SALT CONCENTRATIONS

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## ABSTRACT

Salt stress is one of the most important global problems that affects the growth and development periods of plants and therefore causes losses in crop quality and productivity. Since salinity causes disruption of osmotic and ionic balances in plants, it leads changes in various physiological and metabolic processes in plants. Plants have developed an effective antioxidant defense system to deal with the harmful effects of salt. In addition, the accumulation of various osmoprotectants in plants under stress allows the plants to continue their lives under these conditions by eliminating the harmful effects caused by salinity. Exogenous applications of osmoprotectants are also associated with improved salt tolerance of plants. In this study, 3% exogenous sucrose was applied to canola plant grown at 75 and 150 mM NaCl concentrations and the effects of applied sugar supplementation on salinity tolerance in canola were investigated. Root-stem lengths, root-stem fresh and dry weights, root-stem biomass, chlorophyll a, chlorophyll b, total chlorophyll, MDA, proline and total protein amounts and changes in SOD, CAT and APX enzyme activities of canola samples were examined. It was found out that sucrose supplementation applied to canola seedlings under salt stress improves especially the growth parameters of the stem, while reducing the amounts of MDA, proline and total protein compared to the only salt-treated samples. It was noted that the amounts of chlorophyll increased in the application of 150 mM NaCl+sucrose. It was observed that SOD activity increased in 75 mM NaCl+sucrose application, and decreased in 150 mM NaCl+sucrose application, compared to only salt-applied samples. It was determined that CAT and APX activities increased in both NaCl+sucrose applications. The results showed that sucrose application with two different salt concentrations decreased the negative effects of salt stress and provided an improved salt tolerance in canola.

**Keywords**: Salt stress, Sucrose, Canola, Ecological parameters, Antioxidant enzyme

# MICROPROPAGATION OF WOODY PLANTS

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## ABSTRACT

Woody plants include a large part of commercially important crops. Since micropropagation allows rapid, disease-free, and large-scale clonal plant production, it is considered an alternative to conventional propagation methods. However, micropropagation of woody plants is considered more difficult compared to herbaceous plants for various reasons such as high contamination rates, explant oxidation, and low regeneration percentages. In addition, it has been proven in several studies that the culture media is dependent on species. To overcome the mentioned problems, numerous micropropagation protocols have been developed for surface sterilization, culture establishment, multiplication, rooting, and acclimatization stages for many different woody plant species. However, many woody species remain recalcitrant to micropropagation. Different approaches have been used to optimize components such as macro, micro salts, vitamins, and plant growth regulators in the culture medium for large-scale micropropagation of woody species. Recently, computer technologies such as artificial intelligence have provided new approaches to better understand, interpret and model the importance of factors involved in micropropagation. This review will summarize the micropropagation protocols of woody plants of high economic importance and compare different approaches, focusing especially on the developed culture media components.

**Keywords**: woody plants, micropropagation, plant tissue culture

# IDENTIFICATION OF COMMON GENES INVOLVED IN DIFFERENT MINERAL DEFICIENCIES AND BIOINFORMATICS ANALYSIS OF THEIR ASSOCIATED PATHWAYS

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## ABSTRACT

The rapidly increasing human population and the corresponding increase in food demand make it necessary to enhance the yield in plant production. However, the soils used for production often do not contain the optimum levels of mineral nutrients required by plants. The application of fertilizer to compensate for this deficiency may contribute to environmental pollution. In this context, it is important to develop plant lines that can efficiently use mineral nutrients in plant production. Therefore, in this study, we focused on the changes in gene expression associated with deficiencies in three major macronutrients for plant growth and development: nitrogen (N), phosphorus (P) and calcium (Ca) and the micronutrient boron (B). By identifying common expression changes in these four nutrient deficiencies, the study aimed to identify potential biomarker genes for the development of plant lines capable of withstanding all four stress conditions through pathway enrichment.

**Material and Methods:** In the study, datasets with access numbers GSE110171, GSE15649, GSE67768 and GSE18071 were used. Each dataset was subjected to comparative analysis using the GEO2R analysis tool provided by GEO. Genes showing significant expression changes between control and stress groups were identified ($p<0.05$). Venny 2.1 software was used to select genes that showed significant differences under different stress conditions. For each stress condition, these common genes were subjected to pathway enrichment analysis using the Webgestalt database. The analysis was performed using the Over-Representation Analysis (ORA) method in the KEGG database. Results were evaluated against genes enriched in the same pathway.

**Results:** The analysis revealed that 206 genes exhibited significant expression changes under N, P, Ca and B stress conditions. Pathway enrichment analysis identified three pathways in which these genes were significantly enriched (FDR < 0.05, $p < 0.05$). These pathways have been determined as phenylalanine metabolism, phenylpropanoid biosynthesis, and fructose-mannose metabolism. Among these pathways, fructose-mannose metabolism has been discussed in more detail because of its critical importance in energy metabolism and carbon transport in plants.

**Discussion:** Fructose-mannose metabolism is one of the metabolic pathways primarily affected by mineral nutrient deficiencies in plants making it a focus of energy metabolism research. In the mentioned nutrient deficiencies in plant cells, the presence of sorbitol in the medium activates sorbitol dehydrogenase leading to an increase in D-fructose. This increased D-fructose can participate in amino sugar and nucleotide sugar metabolism or be phosphorylated by HXK3 to ß-D-fructose-6P. Subsequently, ß-D-fructose-6P can be converted to ß-D-fructose-**1**6P2 by PFK5 activation which can further be converted to glyceraldehyde-3P by FBA1. Glyceraldehyde-3P can then undergo glycolysis and/or be converted to glycerol phosphate via TIM activation. Glycerol phosphate can be converted to D-fructose-1P by FBA1 stimulation. The resulting intermediate can be converted into compounds like ATP and pyruvate through a series of reactions. These processes play a critical role in plant energy metabolism and carbon

transport. Therefore, plant lines that express genes in this pathway more efficiently under stress conditions can better respond to these stress conditions and increasing agricultural productivity with reduced fertilizer application. Consequently, more biological studies are necessary to regulate the expression changes of genes in this pathway under specific nutrient stress conditions mentioned.

**Keywords**: nutrient deficiencies, gene expressions, deficiencies resistance, plant growth

# PHYTOCHEMICAL CONTENTS AND BIOACTIVITY OF FOUR ENDEMIC SALVIA SEEDS FROM TURKEY: A COMPARATIVE STUDY TO CHIA SEED.

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## ABSTRACT

Recently, the importance of medicinal plants such as *Salvia* species has been increasing both as medicine and in industrial branches, which includes food, feed and cosmetic raw materials. On the other hand, chia seed, is a functional food that has recently increased industrial importance due to its superior nutritional value, phytochemical components and therapeutic effects. In our study, the antioxidant activity of methanol extracts of the seeds of endemic *Salvia cadmica* Boiss var. *cadmica*, and *Salvia caespitosa* Montbret & Aucher ex Benth., *Salvia pisidica* Boiss. & Heldr. ex Benth., and *Salvia potentillifolia* Boiss. & Heldr. ex Benth. collected from Burdur-Antalya/Turkey were determined via 1,1-diphenyl,2-picryl hydrazyl radical scavenging activity, cupric (II) reducing antioxidant capacity, b-carotene/linoleic acid bleaching and total phenolic, and total flavonoid content tests and compared with that of chia seed. Antimicrobial activity was determined according to minimum inhibitory concentration values, on *S. aureus, E. coli, S. enterica, L. monocytogenes, C. albicans* strains, but it was found negligable. Phenolic and fatty acid contents of the seed extracts were also determined. *S. pisidica* and *S. potentillifolia* were found to be highly active. The major fatty acid composition of the chia seed was linolenic acid, linoleic acid, oleic acid, palmitic acid, and stearic acid while the others were linoleic, oleic, palmitic, and stearic acids. Despite fatty acid ratios of chia seed being more favorable; 1,1-diphenyl,2-picryl hydrazyl radical scavenging activity, cupric (II) reducing antioxidant capacity, total phenolic content and antimicrobial activity of *S. pisidica* seed extracts and total flavonoid content and inhibition of b-carotene bleaching of *S. potentillifolia* seed extracts was higher than that of chia seed.

**Keywords**: Salvia seed; antioxidant; antimicrobial; phenolic; fatty acid

# THE ROLE OF GIGANTEA GENE IN THE DEFENCE RESPONSES OF ARABIDOPSIS THALIANA AGAINST WILT CAUSED BY FUSARIUM OXYSPORUM

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## ABSTRACT

Flowering is a critical stage during which species ensure their survival and the continuation of their life cycles, as it enables seed production. In recent years, numerous scientific research studies have been conducted to understand the molecular basis of flowering. According to research conducted on the model plant *Arabidopsis thaliana*, several genes involved in the circadian clock, vernalization, photoperiod, sugar levels, age, temperature perception, and gibberellin (GA) pathways collectively promote simultaneous flowering. Moreover, studies conducted in the past five years have demonstrated that biotic (pathogens, nematodes, insects) and abiotic stress factors (temperature, light, cold, etc.) play also key roles in controlling the transition of plants to flowering. *Fusarium oxysporum* is a fungal pathogen that infects the root system of plants and causes vascular wilting disease in various plants, including *A. thaliana*. The pathogen spreads from the lateral root tips of the plant towards the stem through infection. Infected plant leaves exhibit chlorosis, necrosis, and subsequent defoliation, leading to significant yield losses. Literature research has reported that *A. thaliana* gi mutants, lacking the flowering gene, Gigantea (GI), exhibit resistance against this pathogen. However, the underlying mechanism of this resistance is not yet fully understood. In our study, we aim to compare the defense responses of the *A. thaliana* gi mutant and *A. thaliana* wild-type Columbia (Col) ecotype against *F. oxysporum*. For this aim, we will compare the activities of PAL (phenylalanine ammonia-lyase), peroxidase, and cell wall peroxidase enzymes responsible for cell wall strengthening and ROS (reactive oxygen species) levels in the signaling pathway in the mutant and wild-type *A. thaliana* genotypes exposed to *F. oxysporum* attack. Specifically, PAL, POX, hydrogen peroxide (H2O2) and superoxide radical (O-.2) contents as a result of lacking of GI gene in Arabidopsis plants under biotic stress were also found to be remarkable. This proposed project represents the first study on the role of the flowering gene GI in the pathogen defense of plants.

**Keywords**: Arabidopsis thaliana, Biotic stress, Flowering, Fusarium oxysporum, Gigantea, Reactive Oxygen Species

# REGULATION OF REACTIVE OXYGEN SPECIES IN THE CELL OF GLUTAMATE RECEPTOR-MEDIATED NITRIC OXIDE PRODUCTION UNDER SALT STRESS

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## ABSTRACT

Plant glutamate receptor-like channels (GLRs) are known to play important roles in plant development, immune response and defense signaling. Moreover, they may also be involved in Nitric oxide (NO) production by mechanisms showing homology to mammals. However, the role of GLR-mediated NO production in abiotic stress responses remains unclear. Therefore, in this study, we investigated the effect of GLR-mediated NO production on Reactive Oxygen Species (ROS) regulation in salt-stressed cell. For this aim, NaCl, glutamate antagonists [(DNQX (6,7-dinitroquinoxaline-2,3-dione and AP-5(D-2-amino-5-phosphono pentanoic acid)] and NO scavenger [cPTIO (2-(4-Carboxyphenyl)-4,4,5,5-tetramethylimidazoline-1-oxyl-3-oxide potassium salt))] were foliar applied to Arabidopsis thaliana Columbia. Hydrogen peroxide (H2O2) as a result of administration of GLR antagonists and NO scavenger under salt stress was also found to be remarkable. Furthermore, NO and total glutathione contents, and S-nitrosoglutathione reductase (GSNOR) activity decreased with these treatments. AP-5 and DNQX increased the activity of NADPH oxidase (NOX) in salt-stressed Arabidopsis leaves. Conversely, the combination of NaCl and GLR antagonists, NO scavenger decreased the activity of superoxide dismutase (SOD) resulting in elevated GSSG levels, a low GSH/GSSG ratio, impaired ROS scavenging, excessive ROS accumulation and cell membrane damage. The findings of this study provide evidence that GLR-mediated NO plays a crucial role in improvement of the tolerance of Arabidopsis plants to salt-induced oxidative stress. It helps to maintain cellular redox homeostasis by reducing ROS accumulation and increasing the activity of SOD, GSNOR.

**Keywords**: glutamate receptor-like channels, Nitric oxide, Reactive Oxygen Species, glutamate antagonists, redox

# SEAWEED EXTRACTS (CYSTOSEIRA BARBATA) IMPROVE SEEDLING PERFORMANCE OF WHEAT

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## ABSTRACT

Pre-sowing seed applications of biostimulants that are obtained from renewable natural resources, which are becoming more and more critical in agricultural practices, are a very practical, simple, and sustainable approach. By enhancing the pre-germination metabolism, the pre-sowing usage of biostimulants promotes better post-germination performance and seedling development. It is known that rich bioactive compounds in extracts obtained from seaweed, one of the most important natural sources of biostimulants, induce positive reactions in plants by affecting many metabolic processes. Considering that wheat represents most of the world's crop cultivation, any beneficial impact of seaweed extracts on crops could be crucial in sustaining global food security. Many studies have stated that extracts obtained from different algae species have many positive effects that increase wheat growth, yield, chlorophyll and protein content and mineral element uptake, as well as improve stress tolerance. In addition to that, applying seaweed extract at the beginning of a plant's development cycle results in more significant stimulatory effects. In this study, *Cystoseira barbata* (*C. barbata*), a brown seaweed species abundant in Mediterranean coasts, was subjected to different extraction (water, alkali, acidic) procedures, and the biostimulant activity of these extracts was tested on wheat (*Triticum durum* cv. Saricanak-98) seeds by using seed or substrate applications. These experiments were conducted on perlite media under growth chamber conditions. The effects of extracts on growth parameters, root morphology, and mineral nutrient concentrations of wheat seedlings were measured. The results suggest that seaweed extracts may act as a biostimulant to enhance the performance of wheat seedlings and positively affect various growth parameters. With high levels of all seaweed treatments, the shoot length and fresh weight were increased by 20% and 25%, respectively. Thanks to the medium concentration of water extract, root length increased by 20%, root area by 25%, and root volume by 30% in substrate experiments. The results suggest that the addition of seaweed extracts to the growth medium was more effective in enhancing seedling performance when compared to their direct applications as seed treatment agents. So, the seaweed extracts' application method plays a vital role in their use and responses by plants. This is the first study on the use of *C. barbata* as a seaweed-based biostimulant in agriculture as a seed treatment agent. *C. barbata* extracts can be used as promising agents in sustainable agriculture as they are highly efficient, environmentally friendly, and reliable products. With the results of this study, the use of seaweed extracts obtained from *C. barbata* as a biostimulant in seed applications in agriculture may contribute to the reduction of economic losses in wheat production, global food security, and sustainable agriculture. Therefore, this research reveals the potential of our country's economic resources such as *C. barbata* to be transformed into high-value goods that can contribute to the country's economy. This study was supported by TUBITAK (Project number: 121Z215).

**Keywords**: Biostimulant, Cystoseira barbata, Seaweed Extract, Seed Treatment, Sustainable Agriculture, Wheat

# POTENTIAL BIOSTIMULANT EFFECTS OF BROWN SEAWEED (CYSTOSEIRA BARBATA) EXTRACTS ON TOMATO GROWTH AND QUALITY

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## ABSTRACT

The food crisis is assumed to be the world's major problem because of the population of the world expected to reach 10 billion people by the year 2050. That's why it is crucial to shift away from the concept of conventional agricultural production to a model of green farming systems. The use of seaweed extracts as "plant biostimulants" even at low concentrations, can induce a variety of physiological plant responses, such as promoting plant growth, as well as quality and nutritional content. The brown seaweed *Cystoseira barbata* has great potential in Turkey as a candidate of biostimulant. Tomatoes as a high-value crop, are abundant sources of phytochemicals and nutrients. Turkey is the fourth-largest tomato producer in the world, so it is important to drive tomato production towards increased both yield and organoleptic quality. With the aim of analyzing reactions at the agronomic, biochemical, nutritional, and physiological levels of tomato plants in soil culture under greenhouse conditions, 3 distinct novel seaweed extracts were applied in this context. The idea is that seaweed extracts serve as biostimulants, expected to promote bioactive compounds that increase quality parameters of tomatoes and also induce growth parameters. All biostimulant treatments increased the level of total phenolic content up to 21% and the total antioxidant content up to 40%. The application of extracts promotes the nutrient benefits of tomatoes by increasing potassium concentrations, carotenoids, and vitamin C concentrations. It has been improved that the marketable fruit weight of tomatoes. It can be said that biostimulant treated fruits are commercially more valuable than the control fruits. These promising results have the potential to contribute sustainable agricultural practices for tomato cultivation and food security worldwide. Also, national biosources of Turkey can be turned into valuable products. This study is supported by TÜBİTAK 2244 (119C030) collaborated with GÜBRETAŞ.

**Keywords**: biostimulant, cystoseira barbata, drench treatment, fruit quality, seaweed extract, sustainable agriculture, tomato

# A CACTUS SPECIES IN THE NORTH OF ERZURUM: OPUNTIA FICUS-INDICA

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## ABSTRACT

The prickly pear or the cactus pear (*Opuntia ficus-indica* (L.) Mill.) is widely distributed around the world and this cactus species from *Cactaceae* family is found either wild or culture form. It is stated that the origin of *Opuntia ficus-indica* is Mexico. This plant has been spread throughout Mesoamerica and Caribbean, and possibly into South America by trade. It has been spread by European travelers to Mediterranean parts of Europe and North Africa, and then to arid and semi-arid regions of the World. Today, the prickly pear is an economically important species growed for both its edible fruit and cladodes. In Turkey, *Opuntia ficus-indica* grows widely in the Mediterranean and Aegean regions. The aim of this study was to introduce some phenotypic features of prickly pear plant materials, which is a cactus species specific to different climatic and geographical conditions and found by chance in the Çoruh valley, which is rich in plant genetic resources. The plant materials of *Opuntia ficus-indica* mentioned in this study were discovered in a region of the Coruh Valley located between Erzurum and Artvin provinces. Plant materials were obtained from the prickly pear plants during the vegetation period of 2022 (coordinates:40 45 56 8N-41 xE, altitude: 900-1100). In the study, ten vigorous and healthy looking cactus pear plants, including at least three annual plants containing three consecutive cladodes, were used in accordance with international union for the protection of new varieties of plants (UPOV) criteria. Phenotypic measurements and evaluations were carried out. In addition, some explanations about the reasons why this species can grow in the northern parts of our country are given. While the plant habitus was determined as the vertical form, the shapes of the covers were determined as medium elliptical and wide elliptical. Phenotypic characters such as average thickness of cladodes (0.85cm), average length of cladodes (9.70cm), average width of cladodes (5.65cm), average length/width ratio of cladodes (1.72) and average number of areoles in cladodes (14), average length of flowers (3.44cm), average diameter of flowers (0.93cm), number of lobes in stigmas (5) were recorded. While the color of the cladodes was determined as light green-medium green and the color of the cladode areoles as yellow-brown; perianth color of flowers, style color of flowers and stigma color of flowers were determined as yellow. Members of the *Cactaceae* family, which are distributed in arid and semi-arid areas, have a different photosynthetic mechanism than other plant species. CAM metabolism enables the plant to reach maximum photosynthetic productivity with daylight temperatures (25°C) and night temperatures (15°C). In the last few decades in Europe, it has been observed that many thermophilic plant species have moved north and their populations have increased, and it has been determined that this situation is closely related to temperature increases. According to various climate models, it is also mentioned that as of the 2030s, Turkey will be greatly affected by a climate change that will occur due to global warming, and genetic resources will be affected. It is important to investigate the distribution of *Opuntia ficus-indica*, a species specific to different climatic and geographical conditions, in Turkey and to make evaluations in terms of our genetic resources. Prickly pear plant materials, which were found incidentally in our study area, were determined in limited quantities in groups. This species, which was determined to have been brought to the region by human hands and increased over time, needs to be scanned in much larger areas in the region.

**Keywords**: Prickly pear, phenotypic assessments, Erzurum

# BIOCHAR OBTAINED AS A BYPRODUCT OF GASIFICATION CAN BE AN EFFECTIVE SOIL AMENDMENT AND PROMOTE PLANT GROWTH

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## ABSTRACT

Biochar is a carbon-rich byproduct of pyrolysis that is gaining attention in the context of sustainable agriculture due to its soil amendment and plant growth promoter capabilities. In agriculture, it has been used to manage soil acidity, enhance soil organic matter and soil fertility, increase water availability, and promote crop yield and productivity. In this study, the effect of biochar application on the growth and nutritional status of alfalfa (*Medicago sativa* cv. Sunter) and lettuce (*Lactuca sativa* var. *crispa* cv. Levistro) grown in soils with different pH levels (acidic: 5.0; alkaline: 8.0) was evaluated. The biochar used in the experiments was the byproduct of the energy production via the gasification process of waste biomass of oak wood that was not suitable to be used for other purposes. Biochar was applied to the soils in the form of powder or granules at a dose of one or two percent of the soil weight. The results showed that plant growth responses were strongly dependent on the soil pH and the size of particles. Biochar treatment in powder form significantly increased lettuce yield in acidic soil. The highest alfalfa yield was obtained in plants treated with the higher dose of biochar in powder form, in both soils. Significant changes in macro and micronutrient concentrations of alfalfa and lettuce were also observed. Potassium concentrations were increased significantly in lettuce and alfalfa grown in biochar-treated soils. The findings of these experiments indicated that the use of biochar which is obtained as a byproduct during the evaluation of waste biomass as a feedstock for energy generation has considerable potential in terms of improving barren soils and enhancing crop yield in a sustainable manner. This study was supported by TÜBİTAK 2244 - Industrial PhD Fellowship Program (Project number: 119C030) and GÜBRETAŞ.

**Keywords**: Biochar, plant growth promoter, lettuce, alfalfa, soil pH, plant nutrition

# THE EFFECT OF NUTRIENT SOLUTION ELECTRICAL CONDUCTIVITY ON GROWTH, NUTRITIONAL VALUE, AND NUTRIENT UPTAKE OF LETTUCE GROWN IN DEEP WATER CULTURE UNDER GREENHOUSE VS GROWTH CHAMBER CONDITIONS

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## ABSTRACT

Hydroponic production has gained popularity around the world and is frequently used for commercial lettuce cultivation. It is especially important in a hydroponic system to control the amount of nutrients to allow or prevent plants the accumulation of beneficial nutrients or undesirables, such as nitrate. It is also possible for the nutrient balance in the solution to deteriorate over time, which can cause yield loss, deficiency, or toxicity symptoms. In this study, the aim was to investigate the effect of electrical conductivity (EC) of nutritional solution on the growth, nutritional value, and nutrient uptake of hydroponically grown lettuce (*Lactuca sativa L.*). To examine the effect of the growing location on the EC characteristic, the plants were grown in the greenhouse and growth chamber. The ECs of the treatments were 0.8, 1.6, and 2.4 dS/m, which we called as EC1X, EC2X, and EC3X. Nutrient solutions were changed weekly, and nutrient solution samples were collected to analyze their nutrient uptake. Greenhouse plants had higher fresh and dry weights than growth chamber plants. EC3X-greenhouse plants had the highest fresh weight, while EC3X-growth chamber plants had the lowest fresh weight. The total phenolic content was increased with increasing EC level and was higher in the growth chamber plants. The vit c content of EC3X-growth chamber plants was statistically higher than all other applications. Tissue nitrate concentrations were also affected by locations and EC treatments, EC1X-greenhouse plants had the lowest nitrate concentration, and other applications were not statistically different. In all treatments, tissue nitrates were below the threshold set by the EU Regulation (0.5% of fresh weight). At the end of one week of the solution, the K, Mg, and P in the EC1X solution were nearly depleted, while the EC2X and EC3X solutions still had enough nutrients to allow for a biweekly solution change. The pH dynamics of solutions were drastically effects by location and EC treatments. The solution pH of EC3X-growth chamber plants dropped significantly and remained low but in other treatments, the solution pH initially dropped but rose back to a suitable level over time. Our results showed that there was a correlation between these pH dynamics and ammonium consumption in solutions. The optimal EC value for hydroponic lettuce production can vary depending on environmental factors. In our study, EC2X is suitable for lettuce cultivation in hydroponic conditions for both locations in terms of the providing optimum pH of the solution, the advantage it creates in the frequency of changing the nutrient solution, and the nutritional quality. Acknowledgment: This study was supported by Plant Factory (https://plantfactory.company).

**Keywords**: electrical conductivity, lettuce, nutritional quality, nutrient uptake, soilless system

# DETERMINATION OF TOTAL PHENOLIC AND TOTAL FLAVONOID SUBSTANCES IN DIFFERENT SOLVENT EXTRACTS OF POTENTILLA RECTA

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## ABSTRACT

**İntroduction and Aim:** Pancreatic cancer ranks 14th among the most common cancers in the world and 7th in cancer-related mortality. Its incidence is increasing and early diagnosis and treatment are of great importance. Although the prevalence of pancreatic cancer is increasing rapidly in the world and in Turkey, the inadequacy of early diagnosis and treatment methods brings to the agenda the search for new treatment methods and drug candidate active molecules. Potentilla recta is an endemic species from the Rosaceae family. Studies have shown the antioxidant and antitumoral effects of Potentilla recta. The aim of this study was to investigate the phytochemical analysis of Potentilla recta extract and its potential on pancreatic cancer in vitro.
**Method:** The above-ground parts of the collected plant samples were dried in the shade. The dried samples were pulverized in a mill. Methanol and water extracts were prepared for each plant. Procatechic acid, Chlorogenic acid, Caffeic acid, Caffeic acid, Sirinic acid, p-Coumaric acid, Ferulic acid and Rutin compounds in the sample content were determined by High Pressure Liquid Chromatography (HPLC) system using Reverse Phase C-18 column. The effect on pancreatic cancer was studied by MTT assay.
**Results:**The methanol extract prepared from the above-ground part of Potentilla recta was found to have higher phenolic content than the aqueous extract (459.56±6.95 mg GAE/g; 168.18±2.43 mg GAE/g, respectively). Similarly, the methanol extract of the plant was found to have a higher total flavonoid content than the aqueous extract (13.23±0.61 QE/g; 18.97±1.95 mg QE/g, respectively).
**Discussion and Conclusion:** In this study, phytochemical analysis of Potentilla recta extracts and its effect on pancreatic cancer in vitro were studied. Bioactivity studies of species such as Potentilla recta, an endemic plant growing in Anatolia, will provide useful findings in the field of medicine and pharmacy

**Keywords**: Pancreatıc cancer, Potentilla recta

# CO-APPLICATION OF SELENIUM, SULFUR, AND ZINC ON SOIL-GROWN LETTUCE

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## ABSTRACT

Selenium (Se) and zinc (Zn) are essential minerals for humans and their deficiency threatens human health. They can be applied together for biofortification purposes. Biofortification studies generally work on the focal element or elements, but the composition of other related elements is also of great importance. Sulfur (S) chemically resembles the Se, and they affect tissue concentrations by influencing each other's transport, and assimilation. In this study, our aim was to biofortify lettuce with Se and Zn simultaneously and investigate the interactions between Se, S, and Zn by supplying different levels of Se, S, and Zn. Increasing levels of Se resulted in increasing Se concentrations in lettuce without causing phytotoxicity but Se concentrations were excessively high from the nutritional perspective in high level of Se application. Safe target concentrations are achieved by low dose of Se but high-dose of S dramatically decreased tissue Se concentration and dropped it long away from the recommended daily allowance of Se. High-dose of Zn decreased tissue Se concentration only in low S conditions. High-dose Zn application increased tissue S concentration under low S conditions and indirectly decreased tissue Se concentration. On the other hand, high-dose of S increased tissue Zn concentrations only under high Zn conditions. In terms of nutritional values, High doses of all three elements increased the total antioxidative capacity, and high doses of Zn and Se increased vitamin C concentrations. In this study, it was seen that the status of S and Zn influences selenium biofortification and likewise, Zn biofortification is also affected by the S and Se status of growing medium. These results obtained in soil grow lettuce also need to be supported by soilless studies and by different crops. Acknowledgement: This study was supported by Plant Factory (https://plantfactory.company).

**Keywords**: biofortification, lettuce, nutritional quality, selenium, sulfur, zinc

# ETHNOBOTANICAL ASPECTS OF A SALT TOLERANT MEDICINAL PLANT: MALVA SYLVESTRIS L.

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## ABSTRACT

*Malva sylvestris* L. (Malvaceae) is represented by 40 taxa in all over of the world. *M. sylvestris* L. is an annual plant with lobed leaves and purple flowers that prefers damp areas, such as the salt marshes, sides of roads, railways. *M. sylvestris* is commonly used as vegetable and a medicinal plant in various countries. The leaves in particular have been reported to have potent anti-inflammatory, antioxidant, anti-complementary, anticancer and skin tissue integrity activities and the flowers are used as a remedy for cut wound, eczema, dermal infected wounds, bronchitis, digestive problems, and inflammations Results has been shown that anthocyanins from *M. sylvestris* caused decreases in total cholesterol and triglycerides of plasma. It is also shown that the extracts of some *Malva* species protected rats from gastric lesions. *M. sylvestris* can be suggested as a medicinal herb and functional food. As a result, interest in this plant has increased worldwide, thus further studies are needed to elucidate the relationships between phytochemicals and mechanisms of disease treatment.

**Keywords**: Malva sylvestris L, ethnobotanical, medicinal plant, functional food, disease treatment

# CAPPARIS SPINOSA L.: A MULTIFUNCTIONAL MEDICINAL PLANT WITH NUMEROUS AGRICULTURAL AND BIOLOGICAL FEATURES

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## ABSTRACT

Caper (*Capparis spinosa* L.), is a perennial shrub, which has a wide distribution area especially in the Aegean and Mediterranean coasts of Turkey. It can also be called by names such as kebere, gebreotu, kapari. Turkey is one of the countries that export the largest amount of capers in the world. Its seeds and green parts contain valuable nutritions and also can be used for medicinal purposes. Capers are recognized as a potential source of valuable nutrients and biochemical compounds with physiological functions. Various biological activities including antibacterial, antifungal, hepatoprotective, anthelmintic, antidiabetic, anti-inflammatory, anti-cancer, and antihyperlipidemic as well as folk medicinal uses of Caper plants have been ascribed to the presence of functional bioactives, such as phenolic acids, flavonoids, alkaloids, phytosterols, natural sugars, vitamins, and organic acids. Caper is also very resistant to drought and salinity due to its deep root system and physiological characteristics. This environmentally friendly plant, which stays green during the summer months when all other plants in the flora dry up, can also be used in erosion control. Therefore, it is important to encourage the study of this plant, which requires further research in this field.

**Keywords**: Capparis, nutritional, medicinal, bioactive, drought tolerant, agricultural

# POPULATION CHANGE OF PLANT PARASITIC NEMATODES UNDER DIFFERENT GREEN MANURE APPLICATIONS

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## ABSTRACT

Plant parasitic nematodes cause significant economic damage in agricultural areas around the world and in Turkey. Chemical control for plant parasitic nematodes is not suitable under field conditions because it is not economical and harms the environment. Green manure application is an alternative cultural control method to chemical control in order to reduce the populations of plant parasitic nematodes in the soil with the effect of secondary metabolites in plant cells. Onion plants have an important place in human nutrition. For this reason, forage turnip, brown mustard and common vetch were planted in four replications according to the randomized blocks experimental design, and green manure was applied by mixing them into the soil during the flowering period in April. In addition, metam sodium was used as positive control and bare fallow application was used as negative control. No statistically significant difference was found between negative-positive control and green manure applications in Ditylenchus spp. and Pratylenchus spp. populations. However, nematode counts as low as positive control were obtained in green manure applications. The lowest are *Ditylenchus* spp. and *Pratylenchus* spp. nematode populations were obtained in brown mustard application with soil values of 9.5 and 2.1 nematodes/100 g, respectively. In the negative control, 18 and 7 nematodes/100 g soil were recorded, respectively. In this study, it was seen that effective control of plant parasitic nematodes can be done with green manure applications.

**Keywords**: Field trial, green manure,plant parasitic nematodes

# GENE FLOW FROM IMIDAZOLINONE HERBICIDE-RESISTANT RICE CULTIVARS TO WEEDY RICE (ORYZA SATIVA L.)

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## ABSTRACT

Imidazolinone (IMI) herbicide-resistant rice technology has been used more two decades to the control of weedy rice in worldwide rice fields. In herbicide-resistant crop management technology such as the IMI resistant rice, outcrossing or cross hybridization is a possible issue. The objectiveof this study was to determine the mechanism of IMI herbicide resistance in weedy rice as well as the prevalence of known IMI-resistant genes. Weedy rice samples which are 116 suspected IMI resistant plants were collected in 2020 in Turkey. The survival plants' seed samples were gathered at harvest time after the application of Imazamox from Bafra and Terme Valley IMI-resistant rice production fields. Seeds were planted under greenhouse conditions and a double dose of imazamox (106 g ai ha-1) was applied to 21-day-old seedlings in a spray chamber. Double dose imazamox application experiment revealed that 39 plants survived. DNA samples were extracted from the surviving samples and Sanger DNA sequencing was performed for the acetolactate synthase (ALS) gene region. Single nucleotide polymorphism (SNP) was detected in 29 samples which is S563T, but no substitution was detected in 10 samples. This SNP point is the mutation point that constitutes the source of resistance of resistant materials such as Luna CL, Rekor Cl, Iskender CL, Kopru CL, Ozgur CL widely grown in the region. It has been estimated that the cause of resistance of the IMI resistant weedy rice samples might be 25% of the gene flow from IMI resistant rice varieties, and 8.6% of other resistance mechanism such as off-target resistance and other mutations. It has been concluded that IMI rice technology efficacy has significantly decreased to control weedy rice. In addition to cultural measures such as crop rotation in the control of weedy rice, new resistance sources are needed in monoculture rice cultivation system.

**Keywords**: Weedy rice, imazamox, herbicide resistant crops, gene flow.

# CYTOLOGICAL EVALUATIONS AND A METHODOLOGICAL APPROACH TO OBSERVE APOPTOTIC EFFECT OF NISO4 ON ALLIUM CEPA L. ROOT GERMINATION BY USING EB/AO FLUORESCENCE STAINING

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## ABSTRACT

Ethidium Bromide-Acridine Orange (EB/AO) is one of the fast, economical and valid methods that allows to separate living and dead cells in plant root tips. In the present study, it was aimed to investigate the apoptotic effect, nuclear abnormalities, cell division index by using *Allium cepa* test assay by using EB/AO staining and ImageJ program. NiSO4 concentrations (1.75, 3.5, 7, 14 ppm) were exposed on root germination of *A. cepa* for 48 and 72 h for to observe mitotic abnormalities/cytotoxic effect and 5-day exposure for apoptotic effect. It was observed that amorphous nuclei, vacuolisation and C-mitosis were mostly observed abnormalities and were increased at 14 ppm NiSO4 exposure after 48 and 72 hours. Total nuclear abnormalities were significantly increased at all concentration and exposure periods. ImageJ program was used to determine apoptosis rates. The data obtained showed that high concentrations of NiSO4 caused significant cell death in root tips compared to control group resulted as root growth inhibition that apoptosis were increased with the increase of concentration and exposure period. NiSO4 caused toxic activity on root growth determined as apoptosis especially at cortex and vascular region in root tips. The results of the study indicated that affected damaged/apoptotic areas on root tips were demonstrated by using EB/AO staining method, can be used as a marker of damaged tissue areas.

**Keywords**: Nickel, Allium cepa, apoptosis, nuclear abnormalities, ethidyum bromide, acridine orange

# THE DYNAMIC DUO: EXPLORING THE SYNERGISTIC EFFECTS OF SOIL INVERTASE ACTIVITY AND BIOCHAR

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## ABSTRACT

Soil enzymes have been recognized as crucial components of ecosystems since their initial report over a century ago. While enzymes in soil systems were initially used as descriptive parameters, they are now appreciated for their various properties in soil processes, microbial activities, and ecosystem responses to changes in management and climate. Invertase, an enzyme that plays a key role in the hydrolysis of sucrose into glucose and fructose, is present in microorganisms, plants, and animals. Biochar, a carbon-rich organic material obtained by carbonizing biomass such as manure, wood, or leaves at high temperatures between 300°C and 1000°C, has been applied for centuries to enhance agricultural soils, potentially leading to more sustainable plant production and reduced greenhouse gas emissions such as CO2 or CH4. Biochar can benefit soil microorganisms in numerous ways, including nutrient provision and protection from predators by adsorption in soil surfaces and pores. While the agricultural, economic, and practical applications of biochar have been extensively discussed in published books and book chapters, little information is available regarding the effects of biochar addition on soil invertase activity. The aim of this study was to investigate the impact of different biochar derived from various materials on invertase activity in soil based on the existing literature.

**Keywords**: Microbial activities, Biochar, Soil enzymes, Invertase, Soil microorganisms

# PHYTOCHEMICAL ANALYSIS AND IDENTIFICATION OF BIOACTIVE COMPOUNDS IN SPINACH LEAVES (SPINACIA OLERACEA L.)

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## ABSTRACT

Green vegetables contain various phytochemicals in suitable amounts, which are very helpful in preventing and fighting numerous diseases. They also have different types of vitamins and minerals for the effective functioning of the body system. Spinach is a leafy green flowering plant with edible leaves. The bioactive components and phytochemicals, such as flavonoids, polyphenols, carotenoids, and ascorbic acid present in the spinach (*Spinacia oleracea* L.) leaves, are responsible for their nutritional and medicinal properties. The study analyzed the bioactive compounds and phytochemicals present in spinach leaves. Phytochemicals in the spinach, including saponins, steroids, tannins, glycosides, flavonoids, phenols, phlorotannin, and ascorbic acids, were determined and screened according to the standard method using extracts from different solvents like water, ethanol and ethyl acetate. The leaf samples were collected, dried, and ground for extraction. The solvents, water, ethanol and ethyl acetate used for the extracts were incubated for 72 hours, then filtered and centrifuged. The centrifuged extracts were subjected to Gas Chromatography-Mass Spectroscopy (GC-MS) for further analysis of the bioactive compounds present. This analysis was achieved on a GC-MS Shimadzu GC–MSQP2010 Plus system equipped with an RTX-5 M.S. capillary column (0.25 mm x 30 m x 0.25 lm). The result established from the GC-MS analysis of the ethyl acetate extract and the ethanol extract of the spinach leaves was identified from 25 compounds in the chromatogram of each extract. The active compounds' names, compound structures, and molecular weights in the ethyl acetate and ethanol extracts were identified. This GC-MS spectrum proved the similarity percentage of these components as compared to the Wiley online library (WILEY8.LIB), which was the library source. This phytochemical composition's medicinal and nutritional value makes the plant highly essential for good health. However, these plant phytoconstituents have not been lost due to cooking. As a result of these positive effects seen in spinach, it is a green vegetable consumed everywhere in the world.

**Keywords**: Bioactive compounds, Gas Chromatography-Mass Spectroscopy, Phytochemicals, Spinach

# EFFECT OF SALINITY STRESS ON BIOCHEMICAL, GROWTH, AND YIELD CHARACTERISTICS OF WHEAT

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## ABSTRACT

Wheat is crucial in providing food and nutritional security, but rapidly increasing soil and water salinity severely threatens its production worldwide. Salinity has a direct impact on soil productivity and limits global yield potential. It also deleteriously impacts wheat growth and development, reducing grain production and quality. Wheat plants use a variety of physiological, biochemical, and molecular mechanisms to adapt to salt stress at the cell, tissue, and whole plant levels to optimize growth and yield while mitigating the harmful impacts of the saline environment. An experiment was conducted at the Institute of Graduate Studies and Research Department of Plant Sciences and Technologies, Cyprus International University, to examine the effect of salinity stress. In the present experiment, wheat varieties V1, V2, and V3 were tested under EC control, 7.5 dS m-1, 10 dS m-1, and 12 dS m-1 following a completely randomized design (CRD) with factorial arrangement. The findings revealed that wheat growth and yield characteristics decreased dramatically as saline levels increased. Among V1, V2, and V3, the highest reduction in plant height, SFW, SDW, RFW, RDW, number of tillers, spike length, and grain yield were noted in V3 when treated with 12 dS m-1. Furthermore, V1 performed best as compared to all other varieties.

**Keywords**: Salinity, Wheat, Antioxidants, Growth, Yield

# THE EFFECTS OF INORGANIC FERTILIZATION ON SOME MICROBIAL PARAMETERS AND SOIL CARBON STOCK IN THE SOIL.

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## ABSTRACT

This study was carried out in 2022-2023 wheat planting period to determine the effects of chemical fertilization on some soil microbial parameters. The study was carried out in a randomized block design with 3 replications under irrigated conditions. Nacibey wheat variety was used in the experiment and no fertilizer was applied to the control subject. On the fertile topic, 5 kg of phosphate per decare was applied in the form of DAP, and 18 kg of nitrogen was applied in the form of urea during planting and tillering periods. During the flowering period of wheat, soil samples were taken from 0-15 cm and soil organic carbon, microbial biomass C (Cmic), basal soil respiration (CO2-C), dehydrogenase activity (DHA), N mineralization (Nmin) and alkaline phosphatases activity (ALKPA) analyzes were made and metabolic quotient (qCO2) was calculated. Compared to the control, chemical fertilization increased in soil organic carbon (44%), microbial biomass C (23%), alkaline phosphatases activity (12%), and dehydrogenase activity (34%), while decreased metabolic quotient (27%). Basal soil respiration (CO2-C) and nitrojen mineralization were not affected by chemical fertilizer application. These results show that chemical fertilization increases soil microbial activity and carbon stock in the soil.

**Keywords**: microbial biomass C (Cmic), dehydrogenase activity (DHA), metabolic quotient (qCO2), soil organic carbon (Corg)

# CHANGE ON WHEAT YIELD, ORGANIC CARBON AND SOIL MICROBIAL BIOMASS CARBON AFTER THREE YEARS THE ADOPTION OF NO-TILLAGE *SYSTEM IN SEMI-ARID ALGERIAN ENVIRONMENT.*

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## ABSTRACT

No tillage (NT) is considered an alternative cropping system to the conventional tillage system (CT). It is widely practiced to improve crop yield and soil quality, especially in semi-arid regions. This research was conducted to assess the change in soil organic carbon, microbial biomass carbon and wheat yield after 03 years of the adoption NT system in semi-arid Algerian environment. The treatments were; conventional tillage (CT); no-till (NT) and minimum tillage (MT) arranged in a randomized full-block design with three replicates. Soil organic carbon in NT increased by 53% and 17% at the surface horizon and decreased by 28% at the subsurface horizon, compared to CT and MT. Compared to CT and MT, NT increased soil microbial biomass carbon by 44% and 14% at the surface horizon and decreased by 34% at the subsurface horizon. After three years, NT had an average grain yield 27% higher than CT and similar to MT. In this region, the integration of direct seeding is recommended for the improvement of soil quality, environmental quality and sustainable agricultural production.

**Keywords**: No tillage, Crop productivity, Organic matter, Microbial biomass

# EVALUATING THE PERFORMANCE OF LOGISTIC REGRESSION MODEL IN PREDICTING SOIL QUALITY INDEX FOR PADDY FIELDS

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## ABSTRACT

The growing human population generates an increasing need for land. This population growth not only leads to the expansion of urban and industrial areas but also contributes to the gradual exhaustion of soil, which is the fundamental and non-renewable resource. This unsustainable situation persists in our country, resulting in a continuous reduction in available agricultural land. Consequently, agricultural practices, driven by the rising population and the utilization of less productive lands, aim to achieve higher yields per unit area but ultimately contribute to soil degradation. There are several approaches aimed at developing and expanding methods to identify and evaluate changes in soil functions through soil management practices. One of these approaches is the Soil Quality Index (SQI) model. The present study aims to utilize the Neutrosophic Fuzzy-AHP (NF-AHP) and Standard Scoring Function (SSF) approaches to determine the SQI and assess the predictive accuracy of the Logistic Regression (LR) model specifically for paddy fields in the agricultural farmlands of Yesil Kure. The SQI model incorporates 28 parameters associated with soil quality, identified as crucial indicators for rice production, categorized into four main aspects: physical, chemical, fertility, and biological indicators. According to the research findings, the LR model exhibits a strong accuracy rate of 0.88.

**Keywords:** Logistic regression, Neutrosophic Fuzzy-AHP, Paddy fields, Rice production, Soil quality index, Standard scoring function

# THE EFFECT OF EARTHWORM EXCRETA AND CRUDE EXTRACT ON PLANT GROWTH.

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## ABSTRACT

The fertility of soil depends not only on texture and chemical nature but also on the impact of various biological activities. Since the earthworm represents the 1st animal mass of the rhizosphere, we were interested in studying the effect of excreta and crude extract of this biomass on plant growth. According to the results, the crude extracts of freshly-harvested earthworms (FHE) and those deprived of soil and food for 10 days (FE) as well as cutaneous excreta (EX) promote plant growth. The effectiveness of crude extracts and e cutaneous excreta on plant growth is supported not only by high growth parameters, but also by the concentrations that are many times lower than those of the conventional medium (Hoagland). Media preapared based on FHE, FE, and EX extracts would have a greater variety of nutrients and growth factors. In addition, it was discovered that the contents of the earthworms' digestive tract had no influence on the enhancement of plant growth, since the efficacy of the extract from FE (empty digestive tract) earthworms was comparable to that of the extract from FHE earthworms (full digestive tract). These findings demonstrate that the decomposition of earthworm corpses, on the one hand, and the continued production of cutaneous excreta, on the other hand, enrich the soil with nutrients and growth factors with high added value for plant development.

**Keywords**: Earthworm, cutaneous excreta, crude extract, plant

# EFFECTS OF BIOGAS DIGESTED LIQUID ON SOME SOIL PROPERTIES

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## ABSTRACT

In terms of sustainable soil management, it is becoming increasingly important to develop materials that can be used as an alternative to chemical products that cause destruction in nature with the aim of protecting soils and/or improving their properties. The use of the biogas digested liquid (BDL) released after the production of biogas energy in this direction is also very important in terms of preventing environmental pollution caused by the indiscriminate release of this material to nature or in the form of heaps. In this study, which was planned as a two-year field trial, the effectiveness of 1,3,5 and 7 tons/da BDL doses on the physical and chemical properties of the soil was investigated. All treatments, except the control, were adjusted in accordance with the N (nitrogen) needed by the maize plant. Thus, the experimental treatments were G0 (Control), G1 (1 ton BDL + 33,04 kg/da urea), G3 (3 tons BDL + 7,82 kg/da urea), G5 (5 tons BDL) and G7 (7 tons BDL). EC, pH, organic carbon and inorganic N contents of the soils were monitored monthly after BDL application. Some physical properties of the soils were determined after the harvest of maize crop. The salt content of the soils showed a statistically significant increase with BDL application, especially in the first months, while the change in the following months was not statistically significant. The pH value of the soils decreased in the first two months due to BDL application, but the effect in the following months was not significant. When evaluated in terms of the inorganic nitrogen amount required for the development of maize plant, it was observed that mineral application and BDL applications changed the inorganic nitrogen (ammonium, nitrate) amounts in the soil at similar rates. As a result of low and high doses of BDL, it was observed that the amount of ammonium in the soil was below the level likely to cause toxic effects on soil and plants. BDL application gave different results on soil organic matter depending on the years and its effect did not cause any difference in soil organic matter classification in both years. The effect of BDL on soil physical properties (bulk weight, hydraulic conductivity, available water capacity) was not statistically significant. Although it was observed that the BDL can be applied to the soil as a potential inorganic nitrogen source, the increase in the salt content of the soils in the early period in both years indicates that the use of this material may cause problems in terms of soil EC. In addition, N losses in the form of ammonia and nitrate should be taken into account in BDL applications.

**Keywords**: Biogas digested liquid, soil, nitrogen, EC, pH

# THE EFFECT OF MUNICIPAL SOLID WASTE COMPOST ON PLANT AND SOIL HEAVY METAL CONTENT IN SOILS WITH DIFFERENT PH LEVELS

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## ABSTRACT

Composts obtained from municipal solid waste are widely used as organic soil conditioners and fertilizers in agricultural fields in many countries. However, the use of composts with high heavy metal content in agricultural areas can affect plant growth and cause environmental pollution. In this study, the effect of waste compost on heavy metal content in plants and soil was investigated in soils with different pH levels. The experiment was set up as a 3-replication pot trial. Compost was applied to pots at rates of 0, 5, 10, and 15 t ha-1 on a dry weight basis. The research results showed that waste compost application increased Cu and Zn contents, but had no effect on Pb, Ni, Mn, and Fe contents. In addition, it was observed that Cu, Zn, and Fe contents of plants increased, but there was no change in Pb and Ni contents. According to the soil-plant transfer coefficients, the transfer of heavy metals from soil to plants was highest under acidic conditions. The heavy metal contents of composts should be analyzed and evaluated in detail, especially before being applied to acidic soils.

**Keywords**: waste compost, heavy metal, soil, pH

# SYNTHETIC SOIL CONDITIONERS USED IN SOIL REMEDIATION

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## ABSTRACT

A good soil structure in agriculture refers to the formation and stabilization of aggregates that allow proper aeration and drainage in the root zone and can therefore increase crop yields. Soil conditioners are beneficial as they make the soil more functional as an ecosystem and more productive as a support for crop production with creating a suitable environment for the proliferation and survival of beneficial microorganisms and earthworms in the soil. They also add nutrients to the soil, allowing plants to grow healthier, stronger and more productive. Soil conditioners can be classified into four categories as organic, inorganic, synthetic and other soil conditioners according to their origin and composition. The new generation soil conditioners are highly cross-linked polyacrylamides in which 40% of the amides are hydrolyzed to carboxylic groups. These polymers do not interact directly with soil matrices, but form aqueous gels and act as water reservoirs for the plant-soil system. The roots of the plant grow through the matrix of these hydrogel particles and draw water from them as needed. Polysaccharides and polyacrylamides, which are among the synthetic soil conditioners, are generally used to improve aggregate stability and maintain productivity. Polysaccharides (PSD), polyacrylamides (PAM), polyvinyl chloride (PVC), polyphenol hydrochloride (PPH), hydrolyzed polyacrylonitrile (HPAN), polyvinyl alcohol (PVA) and vinyl acetate-maleic acid (VAMA) copolymers are used as synthetic soil conditioners.

**Keywords**: Soil, remediation, synthetic soil conditioner

# EFFECTS OF MANURE ON STRUCTURAL STABILITY OF A SANDY CLAY LOAM SOIL

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## ABSTRACT

In this study, the effect of manure application on structural stability of a sandy clay loam (SCL) soil was investigated. After incorporating 0, 2, 4 and 6% of manure into a SCL soil in a randomized plot design with three replicates, the soil samples were incubated 6 months under field capacity moisture content in a greenhouse condition. After the incubation period wet aggregate stability (AS) and structural stability index (SSI) in the soil samples were determined as soil structural stability indexes. The manure application significantly increased AS and SSI values of the soil over the control treatment. The highest AS value (33.65%) was determined by the 6% doses of manure treatment over the control (19.31%). Although SSI values increased with manure application, increasing the application doses from 2% to 6% reduced the SSI values. But these decreases in SSI values were not significant statistically. The highest SSI value (20.55%) was determined by the 2% doses of manure treatment over the control (15.95%). It was found that manure is a good soil conditioner material to improve structural stability of SCL soil to prevent degradation.

**Keywords**: Manure, aggregate stability, structural stability index, coarse textural soil

# THE EFFECT OF ACIDIFIED BIOCHAR APPLICATIONS ON SOME MACRO-ELEMENT CONTENTS IN A CALCAREOUS SOIL

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## ABSTRACT

Biochar has recently been widely used as a soil conditioner that improves soil's physical, chemical, and biological properties. This study aims to investigate the effect of acidified biochar on some macronutrients in calcareous soil. For this purpose, the biochar obtained by the gasification process was acidified with H2SO4. Four doses (0, 1, 2, and 4%) of original(non-acidified) and acidified biochar were tested in a 90-day incubation study conducted under laboratory conditions. At the end of the experiment, all treatments increased the exchangeable K content while decreasing the exc. Ca content compared to the control treatment. Besides a few treatments, Mg and P contents also increased according to the control. The highest increment in the exc. K, Mg, and plant-available P were 95%, 31%, and 67%, respectively, in the AB4.0 treatment. As a result, it has been shown that applying acidified biochar can effectively increase the fertility of calcareous soils.

**Keywords**: Soil fertility, biochar, acidification, lime soil

# DETERMINATION OF THE BACTERIAL COMMUNITY IN SOILS ASSOCIATED WITH RARE WILD LEGUMINOUS SPECIES CICER MONTBRETII JAUB. & SPACH AND LUPINUS ALBUS L. IN STRANDZHA NATURAL PARK

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## ABSTRACT

The soil formation in Strandzha Mountain is influenced by the particular combination of the climate's unique forest tree vegetation, the extraordinary variety of root and soil-forming rocks, the hilly low-mountainous relief with significant fragmentation, a densely located hydrographic network with short slopes and dominant exposures. The diversity of soil microorganisms is crucial for plant growth and development and it makes it possible to understand in detail the plant-microbial interactions. The objectives of this study were to determine soil bacteria associated with rare wild leguminous species *Cicer montbretii* Jaub. & Spach (Constantinople chickpeas) and *Lupinus albus* L. (white lupinus) in Strandzha National Park. A new locality of *Cicer montbretii* Jaub was marked nearby village of Brodilovo. *L. albus* was found in saline-alkaline soil (A1) and yellow earth podzolic soils (A2) around the village of Brodilovo and the Great Pazvlak area. *C. montbretii* was found to grow on cinnamon forest soils (B1) and siliceous red soil (B2). A study was conducted by physio-chemical analyses and by assessing 16S rDNA metagenomics technique used to generate a total of 126,837 reads from the samples. The most significant number of observed species 2249 was found in soils saline-alkaline soil (B1) soil. According to that result, the higher diversity indices were calculated in the also in B1 soil. The α-diversity analysis reported yielded similar Shannon indices ranging from 8,322 in B2 to 9,337 in B1. The analyses revealed that B2 yellow earth podzolic soil, unique for Strandzha, has the largest composition with Proteobacteria 44% and the lowest in Actinobacteria 20%. Opposite, in A1 saline-alkaline soil have the richest composition of Actinobacteria 52% and the poorest in Proteobacteria 23%. *C. montbretii* was found in neutral A2 and B2 soils, while *L. ablus* prefer acidic A1 and B1 soils. The determination of the microbiological status of the soils associated with Constantinople chickpeas and white lupinus and the annual monitoring of the species in Strandzha Park will determine the methods for the most effective maintenance and storage outside their habitats.

**Keywords**: NGS, Cicer montbretii Jaub. & Spach, Lupinus ablbus L., expedition, Strandzha Nature Park

# EVALUATING THE PERFORMANCE OF LOGISTIC REGRESSION MODEL IN PREDICTING SOIL QUALITY INDEX FOR PADDY FIELDS

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## ABSTRACT

The growing human population generates an increasing need for land. This population growth not only leads to the expansion of urban and industrial areas but also contributes to the gradual exhaustion of soil, which is the fundamental and non-renewable resource. This unsustainable situation persists in our country, resulting in a continuous reduction in available agricultural land. Consequently, agricultural practices, driven by the rising population and the utilization of less productive lands, aim to achieve higher yields per unit area but ultimately contribute to soil degradation. There are several approaches aimed at developing and expanding methods to identify and evaluate changes in soil functions through soil management practices. One of these approaches is the Soil Quality Index (SQI) model. The present study aims to utilize the Neutrosophic Fuzzy-AHP (NF-AHP) and Standard Scoring Function (SSF) approaches to determine the SQI and assess the predictive accuracy of the Logistic Regression (LR) model specifically for paddy fields in the agricultural farmlands of Yesil Kure. The SQI model incorporates 28 parameters associated with soil quality, identified as crucial indicators for rice production, categorized into four main aspects: physical, chemical, fertility, and biological indicators. According to the research findings, the LR model exhibits a strong accuracy rate of 0.88.

**Keywords**: Logistic regression, Neutrosophic Fuzzy-AHP, Paddy fields, Rice production, Soil quality index, Standard scoring function

# WALFARE OF FARM ANIMALS: CONCEPT AND EVALUATION

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## ABSTRACT

Animal welfare in the broad sense includes not only the health and physical well-being of the animal, but also its psychological well-being and the ability to express species-specific behaviours. The five freedoms that condition animal welfare are: the absence of hunger and thirst, the absence of discomfort, the absence of pain or injury, the ability to express the natural behaviour of the species, the absence of fear and stress. This topical scientific field makes it possible to fight against a multitude of problems in this case improve the performance, preserve the health of animals but especially prevent antibiotic resistance by minimizing the administration of antibiotics. These axes are based on the analysis of animal husbandry parameters and have been tested on farms specific to our country in cows of improved or local breeds. Diet alone cannot have a positive effect on the dairy cow's repro-productive capacity if it does not live in good conditions, discomfort causes stress that can shift from the acute to the chronic, which affects immunity, health, and especially the reproduction and production of the dairy cow regardless of its origin and breed (Holstein, Montbéliarde, Normande, etc.). The objective of the work is to establish a work plan to be applied in the field in order to provide solutions to the sanitary constraints encountered in connection with animal production, and to the human - animal - environment interface, studying the health of these evolving farms and providing tools to better understand, monitor and manage it.

**Keywords**: Walfare, production, reproduction, health, dairy cows

# MORPHOLOGICAL STUDY AND BODY INDICES EVALUATION OF THE LOCAL HEN IN ALGERIA

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## ABSTRACT

The aim of this study is the identification in rural areas of local chickens with phenotypic characteristics and specific rusticity likely to represent genetic zoo resources that will contribute to the sustainability of livestock and food security in Algeria. The originality of this survey was based on the refusal of breeders to introduce foreign chickens, including industrial races in their respective regions, thus allowing safeguard their genetic heritage. The survey was conducted in the area of El Tarf, in the northeastern Algeria where 48 households were visited for a total of 279 chickens including 228 females and 51 males. The history of these chickens shows that these birds exist for several generations, depraved housing, poor food, low production and high rusticity. The complete phenotypic description revealed that among the types of birds listed, 6 groups of cocks and 5 hens have singular morphological characteristics and are dominant in term of distribution. The morpho-biometric evaluation of the massive and developmental of the pectoral muscle indices showed an IM between 87,50% and 97,87% for roosters and 76,19% to 95% for hens. The IDMP was included between 66,60% to 70,83% for hens and 78,94% to 85% for roosters with significantly higher average weight than in other studies. This survey shows in this region the presence of local hens potential with specific morphological and rusticity criteria that must be conserved and maintained in the long term in a suitable environment and a better quality of food.

**Keywords**: body indices, conservation, distribution, local hens, rusticity

# CONTRIBUTION TO THE PHYSIOLOGICAL STUDY OF STRESS IN THE ARAB-BARBE SPORT HORSE IN ANNABA. HAEMATOLOGICAL, METABOLIC, TOXICOLOGICAL, ENDOCRINE AND CLINICAL ASPECTS.

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## ABSTRACT

When the resting state is broken by a state of exertion in the Arab-Beard horse appear haematological, metabolic, endocrine, toxicological and clinical variations. The study of the physiology of exertion in the sport horse allowed to explain these different parameters and to identify the following results and findings: The recording of a hypoglycemia which would be consecutive to a hyperglycemia whose stimuli are of cognitive origin (stress-effort). To this is added an immuno-suppression which manifests itself by a decrease of the globular cellularity. These variations also concern the level of blood minerals or a hyperphosphoremia with hypocalcemia occur after exertion they are synonymous with metabolic dysfunction; however, methemoglobin toxicity analysis shows no toxicity after exertion. In contrast, the gonadotropic response through the secretion of testosterone and significantly high after exertion, this sexual impulse is related to the aggressive behavior of the animal at the time of exertion. The respiratory and cardiac frequencies are obviously significantly more pronounced after exertion.

**Keywords**: horse, sport, hematology, testosterone, stress

# PREVALENCE OF EIMERIA SPECIES, DETECTED BY ITS1-PCR, IN BROILER POULTRY FARMS LOCATED IN SEVEN PROVINCES OF NORTHEASTERN ALGERIA

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## ABSTRACT

Coccidiosis is a very important global disease that affects chickens, it is caused by intestinal protozoa, belonging to the Phylum Apicomplexa, genus *Eimeria*. The disease is clinically manifested by enteritis which can be fatal. It is found in all types of poultry production worldwide, and the disease can take many clinical forms and can cause serious economic losses in the poultry industry worldwide. Including losses during production due to the mortality rate and the costs of prophylaxis and treatment. The prevalence of the infection or diversity of the causative agent, *Eimeria spp.*, in Algeria is poorly known. The present work aimed, therefore, to determine the prevalence and composition of the species in order to put a good control strategy based on suitable treatments and control measures. Samples were taken from 187 broiler farms, located in 7 provinces of northeastern Algeria (Jijel, Constantine, Skikda, Mila, Sétif, Batna, Bordj bou-Arreridj), and internal transcribed spacer-1 PCR (ITS1-PCR) was used to determine the prevalence and species composition of *Eimeria* in chickens. The study revealed the presence of the seven species of *Eimeria* to note E. maxima (69%), E. acervulina (68.4%), E. necatrix (11.2%), E. tenella (8%) , E. praecox (4.3%), E. mitis (2.1%), E. brunetti (2.1%). Multiple infections, with up to 4 different species of Eimeria present in a single farm, were the most frequent situations in our samples (51.9% mixed infections versus 47.6% single infections). All the farms proved to be infected, which shows that coccidiosis is a parasitosis which constitutes a major problem in farms in these provinces.

**Keywords**: Algeria, Broiler, Prevalence, Eimeria, Internal Transcribed Spacer 1-PCR Infections

# FERTILITY EVALUATION OF COWS INSEMINATED FROM SOME FARMS IN ALGERIA

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## ABSTRACT

The aim of our work is to evaluate the fertility of inseminated cows from some dairy farms in the wilaya of Blida and Tipaza (Algeria). After analysis of insemination records, 160 cows were selected for our study. The estrus detection of the cows to be inseminated was carried out by the farmer based on the observation of clinical signs expressed by a cow in heat. The insemination of the cows was carried out by two experienced inseminators agreed by the national center of insemination and genetic improvement (CNIAAG). After processing the data collected, the results obtained show that the fertility rate evaluated after a first insemination was 56.3% with a fertility index of 1.7%. The fertility rate varied according to the seasons of the year, being lower in winter (20%) than in spring, summer and fall. In addition, the percentage of cows requiring 3 or more inseminations was 9%. In conclusion, the evaluated fertility parameters were relatively acceptable and showed an appropriate control of the factors related to insemination.

**Keywords**: Dairy cows, heat, insemination, parameters, fertility

# GENOTYPIC DETERMINATION OF THE VIRULENCE FACTORS OF LISTERIA MONOCYTOGENES ISOLATED FROM COW'S MILK CHEESES PRODUCED IN THE REGION OF ALGIERS

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## ABSTRACT

Raw milk and cheeses made from raw milk have been frequently implicated in outbreaks of listeriosis around the world. The objective of this study is to evaluate the prevalence of L. monocytogenes and the molecular characterization of the strains isolated in samples of cow's milk cheeses in three production units located in the region of Algiers. Listeria species were identified phenotypically according to the standard procedure EN ISO 11290. Serotyping and detection of the hly virulence gene were performed by polymerase chain reaction (PCR). 8.57% of the 385 samples tested were positive for Listeria spp., and 5.19% of them were positive for L. monocytogenes. The highest prevalence was recorded in the hard cheese processing unit (60%), then the pressed cheese production unit (35%) and finally the one producing soft cheese (5 %). Among these isolates 4 different serotypes were identified, 4b (50%), 1/2b (35%), 1/2a (10%) and 4c (5%). Molecular characterization of genes encoding listeriolysin O showed 100% amplification of the hly gene. In conclusion, the presence of serotypes 4b, 1/2b and 1/2a of L. monocytogenes in the samples is of great concern to public health, because these serotypes can cause listeriosis in humans, especially since they can express the hly gene responsible for the virulence factor of L. monocytogenes, to produce listeriolysin O.

**Keywords**: Listeria monocytogenes, Cheeses, Prevalences, Serotypes, virulence factors

# CONTRIBUTION TO THE STUDY OF THE SEROPREVALENCE OF BRUCELLOSIS IN RUMINANTS IN THE CENTRAL REGION OF ALGERIA.

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## ABSTRACT

Brucellosis is a major zoonosis in the world causing considerable losses in cattle and small ruminant farms. Through our study, we evaluated the prevalence of brucellosis in cattle and small ruminants in farms in the wilayas of central Algeria (Algiers, Blida, Médéa, Ain Defla and Tipaza). During the period from 2016 to 2020, a total of 20,591 samples from 19,728 cattle, 528 goats and 335 sheep were analyzed using three serological tests (EAT, ELISA-it and FC). The overall prevalences recorded in cattle, sheep and goats are respectively 2.93%, 4.7% and 21.92%. In conclusion, in order to optimize the fight against this disease, epidemiological surveillance must be followed by quality laboratory diagnosis.

**Keywords**: Prevalence, Brucellosis, Ruminants, EAT, ELISA-i, FC

# STUDY OF GROWTH PARAMETERS FOLLOWING THE ADDITION OF FENUGREEK SEEDS IN DRINKING WATER IN NEOZELANDASE RABBITS.

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## ABSTRACT

Fenugreek (Trigonella foenum graecum L), also known as Greek clove or foingrec, is a legume of the Fabaceae family, native to the Mediterranean region. It is classified among the species of herbaceous plants, of the section of the protein plant, listed in the pharmacopoeia since antiquity, it is used mainly as medicinal plant and condiment. Fenugreek seed is rich in minerals, alkaloids, saponins and has stimulating properties of appetite. Our study aims to test the effect of the supplementation of fenugreek seeds in drinking water with two doses of addition 5g and 3g on rabbits of 45 New Zealand breeds, divided into two experimental lots and one control lot. The results obtained in terms of carcass weight, consumption index and yield were favourable for test lots compared to the control lot.

**Keywords**: Rabbits, Fenugreek, Drinking water, Growth parameters

# EMBRYONIC MORTALITIES IN DAIRY COWS: ETIOLOGICAL FACTORS AND DEVELOPMENT OF PREVENTIVE AND CURATIVE THERAPEUTIC AND ZOOTECHNICAL STRATEGY

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## ABSTRACT

The main objective is to put in place therapeutic and zootechnical strategies to minimize the incidence of embryonic deaths. A preliminary investigation into the fertility situation was the first step in our study. To do this we used a database of artificial inseminations carried out on 03 companions (2019-2022). The second part was devoted to the trial of three therapeutic protocols. Protocol 01is a post-insemination injection of Méloxicam associated with progesterone, while for both protocols 02 and 03 a progesterone-releasing device (CIDR) with the Ovsynch protocol (PMSG in place of GnRH at J 09 was incorporated before AI) ; except that the cows that received Protocol 03, were supplemented with an injection of Meloxicam after insemination. Blood samples were taken to determine energy status (BHB, AGNE) and inflammatory status (CRP), as well as to develop progesterone hormone profile. The mean metabolite values measured were within the reference values. Clinical trials reported a gestation rate of 72.72% in cows treated with Protocol 03. This result is better than the other two treatments; moreover, the gestation rate is higher in batch 02 (50%) treated with protocol 02 compared to batch 01 who received protocol 01 (45%). The data obtained in this study will certainly help the practitioner to decide on the best course of action and the plan to be undertaken, whether zootechnical or therapeutic, to minimize the incidence of embryonic mortalities.

**Keywords**: infertility, embryonic death, insemination, progesterone, meloxicam

# EFFECT OF PGF2α TREATMENT ON REPRODUCTIVE PARAMETERS AND PREVENTION OF CERTAIN POST-PARTUM PATHOLOGIES

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## ABSTRACT

The objective of our work is to show the effect of treatment with PGF2a after the part on certain reproduction parameters and on postpartum pathologies as well on the resumption of cyclical activity. Initially, this work focuses on reviewing the various reproductive pathologies in cows, postpartum hormonal management, then we discussed the interest of using PGF2α on the various pathologies after go. Secondly, the experimental part, which consists of studying the benefit of the injection of PGF2α on postpartum pathologies and on reproductive performance. Forty cows were included in this work to study the impact of the use of PGF2a on reproductive parameters. In the light of the results obtained, we generally observed an improvement after treatment with PGF2α. We recorded for the 2 batches (T ***vs*** E) rates of 30% ***vs*** 10%, 20% ***vs*** 5%, 20% ***vs*** 5% and finally 10% ***vs*** 0% for the retained placenta, uterine involution delay, clinical endometritis, and pyometer respectively. Thus, rates of resumption of postpartum ovarian cyclicity of 15% ***vs*** 65% in batch T and batch E. The success rate for the first insemination was 45%. The interval calving was 366 days with mean values of 73 days and 13 days for the holding and breeding periods, respectively. These results confirm the beneficial effect of PGF2α during the postpartum period on the reproductive parameters of treated cows, in particular on the early resumption of ovarian activity.

**Keywords**: Reproduction, cattle, prostaglandins, cyclic, pathology, postpartum, fertility

# ANTIBIOTIC SUSCEPTIBILITY OF E. COLI AGENT ISOLATED FROM CALF DIARRHEA AND MASTITIS CASES IN SOME REGIONS OF TURKEY.

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## ABSTRACT

Mastitis is a common and economically important disease in dairy cattle. In addition, diarrheal infections in calves are among the most common diseases and cause significant economic productivity losses for livestock producers. Escherichia coli is one of the leading infectious agents associated with mastitis and calf diarrhoea. Intimin protein in E. coli is encoded by the eae gene and is required to disrupt the host cell's cytoskeleton and facilitate bacterial attachment. For this purpose, the causative agent was confirmed in PCR with the intimine gene region primers. It remains one of the most common reasons for widespread antimicrobial use on dairy farms, leading to the emergence of antimicrobial-resistant pathogens. This study aims to determine the antimicrobial resistance patterns of Escherichia coli isolates isolated from bovine mastitis and diarrhea in Aksaray and Van provinces between 2018 and 2022 and to determine the prominent antimicrobial resistance among the isolated strains. For this purpose, antimicrobial susceptibility testing against seven antibiotic groups, including Penicillin, Florfenicol, Azithromycin, Novobiocin, Ciprofloxacin, Amoxicillin/Clavulanic acid and Neomycin, was performed using the disc diffusion method. The study used 178 calf faeces with diarrhea and 135 milk with mastitis, and 32 isolates were obtained. These isolates were subjected to antibiogram testing after confirmation with intimin-K99 primers. While the study's results were resistant to Penicillin, Novobicin and Amoxicillin/Clavulanic acid antibiotics for all isolates, Florfenicol and Neomycin are the most sensitive. While some isolates are susceptible to other antibiotics, some are resistant. As a result, both the detection of virulence factors of the agent and antibiotic resistance should be considered in the fight against mastitis and calf diarrhea, and antibiotics should be administered according to the antibiogram results to prevent the development of resistance.

**Keywords**: Diarrhea, mastitis, antibiotics, disc diffusion

# WILD BOAR MEAT CONSUMPTION: ZOONOTIC PATHOGENS AND POSSIBLE TRANSMISSION OF ANTIMICROBIAL RESISTANCE

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## ABSTRACT

Game meat consumption is widespread around the world, and it is increasing in Europe (EU) and other developed regions. Wild boars are widely spread throughout the EU, thanks to their adaptability and fertility as well as the growing availability of forests and abandoned rural areas where this species can strive. Wild board meat obtained from hunting for the population control offers an opportunity for the local economy when this meat availability increases. *Salmonella* spp and *Campylobacter* spp infections are the two most common causes of foodborne diseases in the EU. Most *Salmonella* spp. and *Campylobacter* spp. infections are mildly symptomatic and do not require antibiotics; however, some patients have more severe symptoms and do require antibiotic treatment. Humans can contract antibiotic resistant (AMR) microorganisms through animal handling and contaminated meat eating, mainly during the evisceration phase. Antibiotic-resistant bacteria transmitted via food may cause infections that are difficult to treat, underlying the importance of AMR surveillance in these bacteria. *Escherichia coli* is one of the most common microorganism in the natural environment, widely distributed in the gastrointestinal tract of humans and animals, and ubiquitous in the environment. Therefore it can be used as an indicator to study the development and pattern of antimicrobial resistance. The aim of this study was to evaluate the prevalence of *Salmonella* spp and *Campylobacter* spp in the intestinal content of wild boars, collected from December 2021 until May 2023 in Central Italy. The antimicrobial susceptibility of *Salmonella* spp and commensal *E. coli* isolated from the same samples was also evaluated. These data were compared with others obtained from wild boars hunted in other national territories and other parts of Europe. A total of 75 intestinal content samples from the rectal ampulla of wild boars were analysed with standardised methods to isolate *Salmonella* spp, *Campylobacter* spp, and commensal *E. coli*. The confirmation of the bacteria isolated was performed with MALDI-TOF MS. The serotyping of *Salmonella* spp was performed according to the Kaufmann-White-Le Minor scheme. Antimicrobial susceptibility against 16 antibiotics belonging to 9 chemotherapeutic classes was carried out with Kirby Bauer's disk diffusion test, and the results were evaluated in accordance with CLSI standards. Overall, 2 animals (1,5%) were positive for *Salmonella* spp (*S.* Veneziana, *S.* IIIb;50;r;1,5), 5 animals (3,75) were positive for *Campylobacter* spp (*C. coli*). Commensal *E. coli* was recovered from each of the 75 wild boar samples. *Salmonella* spp were susceptible to all antimicrobial tested. *E. coli* strains isolated from wild boars showed resistance to ampicillin (48%); to amoxicillin (6%); to tetracycline (1,5%); to gentamicin (1,5%). No multidrug-resistant (MDR) *E. coli* strains were found in wild boar. Since the population of wild boars is growing and becoming more prevalent near urban areas, wild boars that are infected with zoonotic *Campylobacter* spp. species and *Salmonella* spp. serovars could pose a risk to the public health. Given the low prevalence of *Salmonella* (1,5%) in wild boars evidenced by this study, it is likely that the wild boars are not reservoirs for this bacterium in central Italy. However, several investigations have found different levels of *Campylobacter* spp. in wild boars, it is certain that wild boars can carry these bacteria. Surprisingly, the total incidence revealed in the current study is lower compared to previous studies conducted in different areas and countries. Furthermore, the total susceptibility of *Salmonella spp*. strains to the antimicrobials tested and

the considerable resistance of commensal *E. coli* strains implies that there are changes in selecting pressure due to antibiotic residues in different hunting regions examined in previous investigations.

**Keywords**: wild boars, Salmonella spp., Campylobacter spp., commensal E. coli, antimicrobial resistance, food safety

# PLATELETS RICH PLASMA LOADED HYDROGEL MITIGATES WOUND HEALING BY ENHANCING THE EXPRESSION OF TRANSFORMING GROWTH FACTOR-β IN EXPERIMENTALLY INDUCED WOUND MODEL

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## ABSTRACT

Wound healing is a complex physiological process involving multiple cellular and molecular events. Impaired wound healing poses significant challenges in the clinical setting, necessitating the development of novel therapeutic approaches. Platelet-rich plasma (PRP) loaded hydrogels have emerged as a promising strategy to enhance wound healing due to their ability to release growth factors and promote tissue regeneration. This study investigates the efficacy of PRP-loaded hydrogel in mitigating wound healing by enhancing the expression of transforming growth factor-β (TGF-β) in an experimentally induced wound model. In this experimental study, A total of (n=8) native breed rabbits, irrespective of color and sex, having a body weight of 2-3 kg and aged between 8-12 months were used to create full-thickness excisional wounds on their dorsal surfaces. The animals were divided into two groups: the control group and the treatment group. The treatment group received PRP-loaded hydrogel application, while the control group received a placebo. Wound healing parameters, including wound closure rate, histological analysis, and expression of TGF-β, were assessed at different time points during the healing. The healing curves demonstrated the progression of wound closure over time. process Notably, there was a rapid acceleration of healing in the wounds treated with PRP-loaded hydrogel on days 3, 6, 9, 12 and 15 post-injury ($p < 0.05$). PRP loaded hydrogel treatment enhanced cutaneous wound closure and granulation tissue formation and maturation at day 3 to 15 post-injury. Representative micrographs of H&E stained wound sections showed red blood cells, inflammatory cells, fibroblasts and new blood vessels at Scale bar =50µm. *p <0.05 *vs* control. The enhanced expression of TGF-β in the PRP-loaded hydrogel-treated wounds suggests its pivotal role in the wound healing process. PRP loaded hydrogel treatment increased transforming growth factor β expression. Representative western blotting for transforming growth factor (TGF) β in wound areas showed semi-quantitative analysis of TGF-β expression. *$p < 0.05$ *vs* control. The findings of this study highlight the therapeutic potential of PRP-loaded hydrogel in wound healing. The controlled release of growth factors from the hydrogel, specifically TGF-β, provides a sustained and localized stimulus to the wound site, creating a favorable microenvironment for tissue repair. The ability of the PRP-loaded hydrogel to modulate the expression of key growth factors involved in wound healing offers a novel therapeutic approach for promoting efficient wound closure and tissue regeneration. In conclusion, this study demonstrates that PRP-loaded hydrogel accelerates wound healing by enhancing the expression of TGF-β in an experimentally induced wound model. The findings support the potential clinical application of PRP-loaded hydrogel as an effective therapeutic intervention for impaired wound healing. Further research is warranted to elucidate the underlying mechanisms and optimize the formulation and delivery of PRP-loaded hydrogel for clinical translation.

**Keywords**: Platelet rich plasma; Hydrogel; TGF-β ; Wound healing; Rabbits

# GASTROINTESTINAL HELMINTS OF CATTLE IN SEMI INTENSIVE BREEDING AT BELGRADE AREA

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## ABSTRACT

The spread area of Belgrade has extremely favorable conditions for modern agricultural production (climate, agricultural land, watercourses, developed processing industry). This economic branch is of strategic importance for supplying Belgrade with food products, along with the resources that abound in the wider environment (Vojvodina and Šumadija). There are numerous villages here, where households keep cattle in small herds or mini-farm, usually in semi-intensive breeding. During our study performed on 2018 we examined faeces of 190 cattle from 42 herds and 29 cattle by post-mortem examination. Determination of eggs and adult parasites performed on their morphological characteristics. The coprological examination established the presence of gastrointestinal helminth eggs in 39.6% of samples. The majority of cattle were infected with two and fewer number with three or four parasite species. At post-mortem examination of cattle we found *Haemonchus contortus* we occured in 57,53%, *Ostertagia ostertagi* in 55,63%, *Trichonstrongylus axeis* in 49.37%, *Cooperia oncophora* in 32.57%, *Ostertagia trifurcata* in 29.79%, *Oesophagostomum radiatum* 21.22%, *Toxocara vitulorum*17.52%, *Dicocelium dendriticum* 15.26%, *Paramphistomum ichikawai* in 14.21%, *Strongyloides papillosus* 11.51%, *Moniezia benedeni* in 9.47% and *Trichuris discolor* in 6.52%.

**Keywords**: gastrointestinal helmints, cattle, Belgrade, Serbia

# MORAXELLA SPP. IN A CALF WITH INFECTIOUS BOVINE KERATOCONJUNCTIVITIS: ISOLATION, IDENTIFICATION AND ANTIBIOTIC SUSCEPTIBILITY

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## ABSTRACT

In this study, it was aimed to isolate and identify *Moraxella* spp. from ocular swab samples taken from a 3-month-old female Holstein calf with Infectious Bovine Keratoconjunctivitis and to report the antibiotic susceptibilities of the obtained isolates. For this purpose, the ocular swab samples brought to Erciyes University, Faculty of Veterinary Medicine, Microbiology Department Laboratory, Türkiye were subjected to bacteriological analysis. The samples were inoculated onto 7% defibrinated sheep blood agar and the inoculated plates were incubated at 37˚C in an aerobic atmosphere for 3 days. After the incubation period, the *Moraxella*-suspect colonies were evaluated and subcultured onto 7% defibrinated sheep blood agar. For the phenotypic identification of two isolates obtained, Gram staining, motility, oxidase, catalase, hydrogen sulfide (H2S), and carbohydrate-fermentation tests were used. As a result of phenotypic tests, the isolates were identified as *Moraxella* spp. For the definitive identification of the isolates, 16S rRNA gene sequence analysis (27F and 1492R primers) was performed, and according to the sequence analysis results, the isolates were identified as *Moraxella bovis* and *Moraxella bovoculi*, respectively. The susceptibility to amoxicillin+clavulanic acid, ampicillin, enrofloxacin, erythromycin, gentamicin, penicillin, and tetracycline of *Moraxella* isolates was investigated by the disc diffusion method. It was determined that *M. bovis* isolate was sensitive to all antibiotics tested. In addition, it was found that *M. bovoculi* isolate was resistant to penicillin. In conclusion, it is thought that it would be useful to consider the *Moraxella* species as the etiological agent in ocular infections of calves and to investigate antibiotic susceptibility with many clinical isolates.

**Keywords**: 16S rRNA gene sequence analysis, antibiotic susceptibility, identification, Moraxella bovis, M. bovoculi

# THE EFFECTIVENESS OF TWO DIFFERENT GNRH ANALOGUES WITH OR WITHOUT BETA CAROTENE + VITAMIN-E USED IN OVULATION SYNCHRONIZATION IN HOLSTEIN HEIFERS

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## ABSTRACT

In this study, it was aimed to investigate the effects of Ovsynch protocol using two different GnRH analogues with or without β-carotene + Vitamin E on pregnancy rates and ovulation time. For this purpose, 80 Holstein breed heifers aged at least 15 months and 350 kg weight were used. All animals were divided into four groups and subjected to the same Ovsynch® procedure (Groups 1, 2, 3, and 4). As the GnRH agent for the Ovsynch protocol, Buserelin acetate in Groups 1 and 2, and Lesireline acetate in Groups 3 and 4 were used. In addition, a single injection of β-Carotene+Vitamin-E was implemented in the heifers in Groups 2 and 4 on 7 days before the initiation of Ovsynch. All heifers were inseminated 20 hours after the last GnRH administration. In the study, the transrectal ultrasonographic examination was performed on heifers during the Ovsynch protocol, 20, 36, and 48 hours after the second GnRH injection, and 30 days after insemination. On the specified days, blood samples were also taken for the evaluation of β-Carotene, vitamin E, and progesterone (P4) levels. The highest pregnancy rate was detected in Group 4 (60%), and pregnancy rates in Groups 1, 2, and 3 were obtained at 40%, 50%, and 50% respectively ($P > 0.05$). While β -carotene and vitamin E levels were found significant ($P < 0.05$) between non-pregnant and pregnant heifers in all groups, no significant changes in serum progesterone levels were observed ($P > 0.05$). However, the difference between all groups was statistically significant when ovulation rates were evaluated ($P<0.05$). In conclusion, it was detected that the long-action GnRH analogues and the combination of β-carotene and Vitamin E used in the Ovsynch protocol increased the pregnancy rates in heifers. The combinations are thought to can be used especially as an effective and inexpensive method for getting pregnant in a short time after puberty in heifers.

**Keywords**: β-carotene, GnRH, Heifer, Synchronization of Ovulation, Vitamin E

# PHENOLIC COMPOSITION OF ALGERIAN TETRACLINIS ARTICULATA (VAHL) MASTERS LEAVES: A PROMISING SOURCE OF BIOACTIVE COMPOUNDS

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## ABSTRACT

The last decade has seen several important developments with respect to herbal medicines and many natural products have been widely used as medicinal agents for preventing and treating different types of diseases. These matrices are rich in phenolic compounds that are responsible for a wide range of health benefits, finding important applications in the food, cosmetics and pharmaceutical industries. In this context, *Tetraclins articulata* (Vahl) Masters crops are one of the most important medicinal herbs in the world, described as having antitumoral, antioxidant, antibacterial and anti-inflammatory activities, directly related with the presence of phenolic compounds. Therefore, the separation and identification of phenolic compounds of the crude aqueous extract of the leaves of *T. articulata* and its subsequent organic fractions (ethyl acetate and butanol) were studied by using high-performance liquid chromatography (HPLC) with diode-array detector (DAD) and electrospray ionization mass spectrometry (MS). The analysis of the obtained results showed that B-type (epi)catechindimer and catechin were the most abundant molecules, among the nine different flavonoids identified, namelly: ((epi)catechin, myricetin, quercetin and kaempferol glycoside derivatives). The concentration of phenolic compounds in the ethyl acetate fraction (93.1 mg/g extract) was higher than the one of the aqueous extract (21.2 mg/g extract) and also than the one of the butanol fraction (43.87 mg/g extract). These findings provide a scientific basis for the traditional uses of *T. articulata* and promotes its potential use in several industrial sectors as the food, cosmetics and the pharmaceutical ones.

***Keywords***: *Tetraclins articulata (*Vahl) Masters, HPLC-DAD-MS/ESI, aqueous extracts, organic fractions, phenolic compounds.

# IMPACT OF TWO BIOPESTICIDES, NEEM OIL AND ESSENTIAL OIL OF THYMUS MUNBYANUS, ON A STORED FOOD PEST LEPIDOPTERA, EPHESTIA KUEHNIELLA: EFFECT ON DEVELOPMENT

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## ABSTRACT

The toxicity of chemical pesticides varies in intensity. Hence, there is an interest in developing new effective biological pesticides with broad mechanisms of action and minimal adverse effects. Plants have been known for a long time for their use in biological control. Therefore, new naturally derived molecules are being investigated for their potential use in integrated pest management. Among the natural pesticides is Azadirachtin, derived from the Neem tree (Miliaceae). A commercial formulation of Azadirachtin, Neem-Azal (1% w/w Azadirachtin, Trifolio, Germany), as well as essential oil of Thymus extracted through hydro-distillation of aromatic and medicinal plants, are currently being tested on the stored food pest Ephestia kuehniella for their effects on adult emergence inhibition, nymphal development duration, induced morphological types, and weight evolution of pupae. Both molecules were administered in vivo on newly molted pupae of E. kuehniella through topical application. Both biopesticides have a negative impact on adult emergence inhibition with a dose-response relationship. Inhibition doses (ID) ID25 and ID50 were determined using non-linear regression. An increase in nymphal development duration was observed, along with the appearance of four different morphological types during imaginal molt, and a decrease in pupal weight over time during metamorphosis. These results reflect the interference of the two biopesticides with physiology and development, exhibiting a negative effect across developmental stages, which can enhance the insecticidal activity of these molecules.

**Keywords**: Pesticides, environnement, pests, biopesticides, essential oils, development

# GENDER INEQUALITY IN WORK-LIFE BALANCE; FROM ACADEMIC'S PERSPECTIVE

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## ABSTRACT

Academic working life should add positive value to academicians economically, socially and psychologically. It is common to think that it only adds economic and social values to female academics. However, women should also contribute to their emotional values. The fact that women are at the forefront in the academic field is realized later than men. Responsibilities should be shared between men and women so that this problem is not considered specific to women in their academic lives. It is important to provide financial and moral support in case women give birth and move away from their academic working life afterwards. We evaluated gender inequality in academic life. It was carried out on a voluntary basis on 52 academicians, 34 female and 18 male participants. The participants were lecturers with master's and doctorate education. Samples were made from 3 districts in Istanbul, namely Bahçelievler, Fatih and Beşiktaş. Data collection took place in December 2022 – May 2023. The collected data were analyzed with the SPSS program. There is an increase in the rate of female academics in Turkey compared to previous years. Today, due to the patriarchal structure and the lack of necessary supports, it is seen as an obstacle in front of women in working life. The fact that women take part in the academic community causes them to encounter some obstacles. Due to the patriarchal structure of the society, domestic services continue to be a duty on women, so they cannot spare enough time for academic studies. With the perception that women are mostly responsible for domestic service and child care, difficulties arise when planning a career. There is not enough space for female academics in managerial positions. Due to the prejudice that the responsibilities of the academician, who will take office in senior positions, will take precedence over working life, women's climbing the ladder is negatively affected. The fact that women have higher education opportunities over time and their ability to be in top positions in working life should not be ignored. Unfortunately, women's desire for success in employment and education and their level of being in top positions may not be at the same rate.

**Keywords**: gender discrimination, academic women, academic working life

# GENDER EQUALITY IN NUCLEAR TYPE TURKISH FAMILIES IN THE FRAMEWORK OF HOUSEHOLD DIVISION OF LABOR; IN EDIRNE PROVINCE

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## ABSTRACT

Nuclear Family: It defines it as “the smallest unit in the society, which is based on marriage and blood ties, formed by the relations between husband, wife, children and siblings”. One of the broadest international definitions of family is as follows; Although the family institution differs from society to society; It has reproductive, sexual, economic and nurturing functions. Marriage is an institution with its own social boundaries. It constitutes one of the important forces that keep societies and cultures alive. The institution of marriage has biological, social, and cultural aspects. Culture transforms the instinctive attraction between man and woman into an institution. Different cultures have different standards regarding the institution of marriage. The communication style, problem solving style and way of thinking that exist in personality traits in various societies also determine. These three elements transform marriage into a functioning union based on mutual agreement and harmony of both parties. It is a combination of many factors, generally economic, instinctive, legal and religious. The aim of this study is to examine the perception of division of labor and gender equality of households from the eyes of municipal employees in Edirne sample. The study was carried out between December 2022 and May 2023, and the population of the study consists of 92 volunteers working at a desk in the municipality of Edirne Province Central district, having a nuclear family. Demographic data of the participants, household division of labor were questioned. Housework, which is defined as technical work in the household, requires less physical effort and can be completed in a shorter time thanks to technological developments. However, the "natural" undertaking of productive labor by women; men do not share an equitable division of labor in the household; The inability to produce expert equitable solutions in the care of children causes the patriarchy to continue. Housework stands as a direct obstacle to women's participation in employment. The childcare; continues to be the most important of the factors that directly determine women's employment conditions (along with factors such as age, household structure, social class, place of residence) with its difficulty and working hours spread over 24 hours. Serious investments should be made to increase women's employment and to regulate the division of labor within the home. The consciousness and awareness level of the society should be increased by organizing seminars, symposiums and trainings.

**Keywords**: gender equality, nuclear type Turkish families, household division of labor, women

# CARAPACE ABNORMALITIES OF NARROW-CLAWED CRAYFISH (PONTASTACUS LEPTODACTYLUS) FROM ATIKHISAR RESERVOIR (ÇANAKKALE, TÜRKIYE)

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## ABSTRACT

The aim of this study was to investigate carapace abnormalities of the narrow-clawed crayfish (*Pontastacus leptodactylus* Eschscholtz, 1823). The crayfish samples were collected using 17 mm mesh-sized fyke-nets from Atikhisar Reservoir in Çanakkale, Türkiye between July 2020 and June 2021. The carapace abnormalities were classified and compared between the sexes. Totally eight individuals had carapace abnormalities. The abnormalities probably occurred after molting, due to aggression experienced during shell formation and/or intraspecific competition for food and habitat. This can also be attributed to injuries during molting or hatching. Further investigations should be planned and carried out to better understanding the reasons of carapace abnormalities.

**Keywords**: Damage, injury, anomaly, abnormal body shape

# INVESTIGATION OF THE CYTOTOXIC EFFECT OF CARBENDAZIM ON MESENCHYMAL STEM CELLS

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**Abstract**

Carbendazim (CBZ) is a broad-spectrum fungicide active compound that causes a significant threat to human and animal health. Humans can be exposed to CBZ through the consumption of food and water, and via skin contact. In this study, CBZ-induced toxicity on mesenchymal stem cells isolated from dental pulp tissue (DPSCs) was investigated. The minimum inhibitory concentration of CBZ (1.4 µg/ml) for both *Fusarium graminearum* PH-1 and *F. culmorum* FcUK99 reference strains were evaluated on DPSCs. Also, the cytotoxicity of CBZ was tested in the range of 5-20 µg/ml to determine $IC_{50}$ of CBZ for DPSCs. Cell viability was determined using the MTT assay after 24 and 48 h of CBZ exposure. The 1.4 µg/ml dose had no significant effect on DPSCs viability ($p>0.05$) after both 24 and 48 h of exposure. CBZ (5-20 µg/ml) inhibited DPSCs proliferation in a dose- and time-dependent manner. The active compound inhibited the proliferation of DPSCs, ranging from 14.33% to 59.67% ($p<0.001$) at 24 h, and from 13% to 62% ($p<0.001$) at 48 h. The $IC_{50}$ of CBZ for DPSCs was determined as 10 µg/ml. Both microscopic observations and fluorometric measurements using the DCF-DA assay showed that 1.4 µg/ml CBZ treatment did not cause oxidative stress in DPSC cultures, whereas the $IC_{50}$ (10 µg/ml) dose caused oxidative stress and led to a significant increase in fluorescence intensity (92% ($p<0.001$) at 24 h and 204% ($p<0.001$) at 48 h). This concentration also increased activity of the apoptosis indicator caspase-3 by 225% at 24 h ($p<0.001$) and 100% at 48 h ($p<0.001$) compared to control. There was no significant difference between the 1.4 µg/ml CBZ treated group and the control ($p>0.05$). This study revealed that a hazardous dose of CBZ for *Fusarium* is nontoxic to human DPSCs. However, high doses and long-term exposure to CBZ could cause a decrease in viability of DPSCs. Considering that humans are frequently exposed to CBZ through food contamination, the exposure levels of *Fusarium* spp. to CBZ should be maintained within particular limits. Our research suggests that exposure to CBZ in high doses and over an extended period of time may negatively impact stem cell differentiation and tissue regeneration.

**Keywords:** Mesenchymal stem cells, carbendazim, food contamination, dental pulp stem cells
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# SPATIAL-TEMPORAL ANALYSIS OF TEMPERATURE VALUES IN THE THRACE REGION USING INNOVATIVE TREND METHOD

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## ABSTRACT

Climate change is one of the most significant environmental challenges the world is facing, and the increasing temperature values serve as one of its most prominent indicators. In this context, climate scientists and researchers are focusing on regional analyses to comprehend the impacts of climate change at a local scale and shape future mitigation strategies. Understanding temperature trends and patterns in the Thrace region, characterized by diverse landscapes and agricultural importance, holds paramount importance for informed decision-making and sustainable development. This study aims to examine the spatial-temporal trends of temperature values occurring between 1982 and 2021 for three provinces (Edirne, Kırklareli, and Tekirdağ) situated in the Thrace region of Turkey. For this purpose, an Innovative Trend Analysis (ITA) method is employed to identify how temperature data has changed over time and its regional distribution. The ITA method is utilized to detect low, moderate, and high-density temperature trends. Subsequently, the identified trends from the ITA method are cross-validated using the widely accepted Mann-Kendall (MK) test. Ultimately, this study is expected to contribute to a deeper understanding of climate dynamics in the Thrace region, providing a foundation for evidence-based policies to conserve natural resources and enhance resilience against the ever-changing climate.

**Keywords**: Climate Change, Mann-Kendall, Temperature, Trend, Innovative Trend Analysis

# ANALYZING THE RURAL DEVELOPMENT POLICIES THROUGH THE RURAL-URBAN MIGRATION BALANCE IN COP SUMMITS

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## ABSTRACT

Climate change is one of the most pressing global issues of our time, extensively studied and debated by numerous scientists. Assessing the potential impacts of climate change on a city level necessitates addressing the relationship between urbanization and climate change. Rapid urbanization and population growth lead to the densification and expansion of cities, resulting in the covering of natural surfaces with concrete and asphalt. This issue was first highlighted in 1992 when the United Nations Framework Convention on Climate Change (UNFCCC) was established, aiming to take preventive measures against greenhouse gas emissions. Subsequent conferences and meetings discussed international mitigation measures, targets, and sanctions. One of the ongoing series of meetings addressing these issues is the Conference of the Parties (COP). During these summits, participating countries develop and implement strategies in line with their determined policies to effectively reduce anthropogenic emissions. However, given that approximately 70% of the total population is projected to reside in cities by 2050, intervention is crucial for curbing anthropogenic emissions. To halt this increase and mitigate the impact of urbanization on climate change, promoting migration to rural areas becomes imperative. The purpose of this study is to assess the influence of climate change on the rural-urban migration balance. To accomplish this, 228 documents from 24 COP (1-24) summits, including workshops and presentation decisions, were reviewed with a focus on the keyword "rural." Additionally, World Bank data were utilized to make comparisons related to rural development and migration. Considering the position of rural development within the economic system, World Bank data indicate that, except for Argentina, Kenya, and Mali, the share of agriculture in the gross domestic product of all countries decreased from 1995 to 2018. This decline serves as an indicator of the diminishing role of agriculture and agricultural activities in the economic cycle. The analysis of COP reports highlights renewable energy as a significant variable. However, despite notable rural development funding transfers through the UNDP by the World Bank, it cannot be asserted that it sufficiently attracts the labor force and promotes reverse migration when examining the proportion of the total population residing in rural areas. It has been observed that investments concentrate in areas with already high rural populations. Furthermore, despite such investments, there has been a decline rather than an increase in the proportion of the total population residing in rural areas over the years. The accelerated urbanization rate driven by rapid population growth has introduced new problem definitions and search for solutions concerning climate change. Halting the increase of urban albedo levels calls for alternative solutions beyond promoting the concentric growth of urban macro-forms. Encouraging urban populations to move to rural areas will contribute to the promotion of rural economic cycles, specialization in rural technology, and an increase in socio-cultural and local architectural examples in rural regions. This approach demands radical changes in social, economic, and environmental aspects, necessitating the generation of new models.

**Keywords**: rural area, rural development, migration, COP

# ANALYSIS OF THE RELATIONSHIP BETWEEN THERMAL COMFORT AND SKY VISIBILITY IN URBAN AREAS IN THE COLD CLIMATE ZONE

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## ABSTRACT

Urban areas continue to see a growing number of academic studies aimed at improving livability standards. In planning and design disciplines, the focus is on prioritizing comfort in spaces where living beings reside. With this objective, minimizing potential environmental issues that may arise later becomes highly important. Particularly in cold climate regions, cities face significant air pollution problems during the winter months due to heating purposes. In this study, a Sky Visibility map for the city of Erzurum has been produced using data collected between 2019 and 2021. Sky visibility values were obtained and mapped based on data gathered from over 650 different points within the urban space using the grid technique. Fish-eye lenses were used to measure sky visibility ratios from a height of 1.1 meters. Microclimate data recorded on an hourly basis for three different areas symbolizing the city center, green areas, and rural areas throughout 2022 were analyzed using RayMan Pro 2.1 to produce thermal comfort frequency analyses by months. According to measurements taken with the "Davis Vantage Pro Plus" meteorological device, the average temperature in the city center was measured as 8.1°C in 2022, while this value was calculated as 6.8°C near the airport symbolizing the rural area. Looking at the Physiologically Equivalent Temperature (PET), the PET value in the city center was 8.3°C, 2.4°C in the rural area, and 8.5°C in Ata Botanic Garden symbolizing the green area. It was determined that Ata Botanic Garden, rich in green areas and designed landscapes, had more favorable thermal comfort conditions. The importance and necessity of conducting more thermal comfort studies for sustainable and energy-efficient urbanization, as well as collaborating with local authorities, have been emphasized.

**Keywords**: Thermal comfort, green area, SVF, Erzurum, RayMan

# APPROACH TO TRANSGENDER PATIENT ON THE GROUND OF GENDER: A STUDY ON THE HEALTH SCIENCE UNDERGRADUATE SCHOOL STUDENTS

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## ABSTRACT

Purpose: To analyze opinions, identify gaps, and provide insight into future research specific to the medical services profession in university students in the health field who are likely to undertake the care of transgender patients.
Methods: The knowledge and awareness of the care of transgender patients were examined. 82 female and 65 male volunteer students from Trakya University Health School participated in our study. The students were asked about their sociodemographic characteristics. Participants' approaches to transgender patients were examined. Transgender individuals were not included in our study as participants.
Results: Three common prominent parameters related to the care of trans patients were monitored. He had concerns that there might be obstacles in front of quality patient care, that there might be problems with the patient's examination and imaging studies.
Discussion: Lack of awareness and communication problems among healthcare providers may jeopardize the care received by trans patients. Opportunities to integrate transgender-related information and hardware content into health education and training programs should be created. It can raise awareness for transgender patients and offer techniques to improve communication. Questioning pregnancy, gynecological examination, urological evaluation, and recommending screening guidelines for mammography and other imaging modalities present unique challenges for departments caring for transgender patients.
Conclusion: In order not to compromise on quality care, university students who will become health professionals need more awareness about the transgender population in their vocational training. There is a need for more research on trans patient care for young people who will work in the healthcare field.

**Keywords**: gender discrimination, transgender, academic school life, transgender patient

# THE EFFECT OF YOUNG WOMEN'S KNOWLEDGE ABOUT GYNECOLOGICAL EXAMINATION ON THE LEVELS OF DELAYING THEIR ADMISSION TO THE GYNECOLOGY CLINIC

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## ABSTRACT

Gynecological examination differs from other hospital controls with its unique features. Crowded hospital outpatient clinics and endless waiting lines that make women feel ordinary tend to raise patients' anxiety levels. In addition, fear of pain, shyness, religious and traditional thoughts, the sexual role of women in society, previous knowledge and experiences also contribute to women's anxiety levels about gynecological examination.
Purpose of the study; We aimed to examine the effects of individual evaluations about gynecological examination on the anxiety levels of young women in terms of applying to the gynecology outpatient clinic.
Methods: In this study, face-to-face interviews with young women between the ages of 18-24 studying at Trakya University were conducted between April 2023 and June 2023. Data were collected using demographic, social and economic data form and Beck Anxiety Inventory.
Results: Demographic data regarding age, place of residence, number of siblings, secondary education difference, and previous gynecological examination experience did not differ between groups ($P > 0.05$). Anxiety levels of students according to Beck scores; 38% were mild, 44% moderate, and 18% severe.
Discussion: Giving seminars and organizing meetings at universities about the gynecological examination procedure and the working discipline of clinics; It is necessary to reduce the anxiety of women applying for a gynecological examination. In the provision of quality health care, it should take its place among the practices that will increase public health.

**Keywords**: Anxiety Disorders, Gynecological Examination, Department of Gynecology, Women's Health, Young Women

# HEALTH-RELATED QUALITY OF LIFE IN THE TURKISH YOUTH POPULATION AS ASSESSED WITH THE EORTC QLQ-C30 SURVEY; TRAKYA UNIVERSITY SAMPLE

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## ABSTRACT

Objective: The aim of our study was to obtain EORTC QLQ-C30 quality of life dimensions for the general Turkish youth population. We aim to support researchers and clinicians in our country with recommendations for the expected average health-related quality of life for different socio-demographic population groups. Methods: The EORTC QLQ-C30 questionnaire, supported by a socio-demographic inquiry, was administered to 567 volunteers from Trakya University students aged 18-24. In order to represent the socio-demographic diversity of the Turkish population, students from different cities formed the participants. Responses from the participants were collected. The effect of sociodemographic characteristics on scale scores was evaluated. Results: Gender, age, and the social class in which the person evaluates himself/herself are important factors that show variability in quality of life scores in our population. Men reported better quality of life on most of the specific scales. Male students also reported less negative attitudes. There was no gender-specific difference in cognitive functioning. Mean scores tended to decrease with increasing age in both genders. Conclusions: Our study is among the first studies to examine the normative EORTC QLQ-C30 for Turkish university students. The reported expected average scores will enable Turkish oncologists to predict what the quality of life of cancer patients would be if they were not sick. Because they are obtained by common methodology, our results can be easily incorporated into other international comparisons or calculating their scores.

**Keywords**: EORTC QLQ-C30; health-related quality of life; normative values; reference data; socio-demographic determinants.

# CHANGES IN THE SOIL PROPERTIES OF AGRICULTURAL LANDS AROUND ORGANIZED INDUSTRIAL ZONE CAUSED BY INDUSTRY IN VAN, TÜRKIYE

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## ABSTRACT

In this study it was aimed that investigation of heavy metal pollution in soils and plants around Van organized industrial zone. Different six sampling points within each way were determined in north, south and east ways of industrial zone. The total set of 54 soil samples were taking from 0-20 cm depth in different three positions as 0.2 km, 1.0 km and 2.0 km far away to pollutant source. GPS readings were recorded for each sampling points. Generally Ph, electrical condactivity (EC) and lime content means decreased while the distance to industrial zone increased in soils. In soil samples the highest Ph, EC and lime content means as 9.19, 326.70 µmhoscm-1 and 42.34 % in 0.2 km far away to industrial zone; the lowest means of these parameters in 2.0 km far away to pollutant source were obtained. In the Van Organized Industrial Zone, which is the working area; paint production, tile adhesive and joint filler, packaging cardboard and bag production, car record production, pvc and drill pipes, styrofoam and heat insulation materials production / foam packaging production, food, electricity, marble business, facade coating, textile clothing, detergent and cosmetics products, construction, petroleum products, paper and towel napkin production, furniture, metal, automotive, cable and plastic production industries. It is thought that the waste materials released to the environment from these industrial activities cause changes in the soil properties studied.

**Keywords**: Industry, soil ph, soil electrical condactivity, lime content

# SYNTHESIS OF MANNICH REACTION DERIVATIVES OF NARINGENIN AND INVESTIGATION OF DRUG-LIKELINESS AND ADMET PROPERTIES

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## ABSTRACT

Most vascular plants contain large amounts of flavonoids (phenylbenzopyrones), which have a wide range of biological features, such as antioxidant, anti-inflammatory, and antiviral actions. Naringenin is also a member of the flavonoid class of compounds and can be naturally isolated from grapefruit, mandarin, and orange. It is well known that naringenin has health-promoting effects, including antibacterial, antifungal, antioxidant, anti-inflammatory, antiviral, and anticancer activity. Therefore, derivatives of naringenin are attractive, and their pharmacological properties are intensively investigated. The attachment of aminoalkyl groups to flavonoid compounds by the Mannich reaction is one of the most preferred syntheses in recent years. The Mannich reaction is frequently used for the structural modification of natural products since the addition of Mannich bases may significantly enhance the activity, hydrophilicity, and pharmacological characteristics of molecules. According to this theory, the Mannich reaction was used in this study to attach a number of aminomethyl groups to the Naringenin molecule. Further, in-silico ADMET (Adsorption, Distribution, Metabolism, Excretion and Toxicity) studies of the synthesized molecules were performed, and their drug potentials were calculated.

**Keywords:** Naringenin, Mannich, ADMET

# APPLICATION OF PERIODIC SELECTION IN MID-EARLY SYNTHETIC MAIZE POPULATION II. RESULTS FROM THE SECOND CYCLE IMPLEMENTION IN SYNTHETIC "1/2014" AND SELECTION IMPACT

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## ABSTRACT

The current research shows the results of two completed recurrent selection cycles in a mid-early synthetic maize population "1/2014" where in the first cycle as recurrent parents the inbred lines K 4652 and N 192 have been used and in the second one PHK 42, respectively. During the period 2017-2019, 55 testcrosses in the synthetic from the second breeding cycle are obtained and tested. After analyzing the results, 30 inbred lines have been combined showing the best results compared to the test standards. In 2020 they will be cross-pollinated with an equal number of seeds on isolation test plot in order to form a new and improved synthetic population. The genetic variability in the synthetic has been preserved as the selected progenies represent 55% of the initially selected ones. The variation coefficient after the cycle was increased with 12%, which allows effective work in the subsequent cycle of breeding and continuous screening in the synthetic. The effect of breeding of the two completed cycles in the synthetic population has been evaluated. As a direct outcome of the research and the second cycle of breeding, the additive genetic variances have been increased and also an yield increase in $C_2$ compared to $C_1$ with 15 % has been recorded. Subsequently, 30 perspective crosses have been pointed out. They exceed in grain yield the standard in the maturity group with 24.5%. Their testing will be resumed in competitive and ecological varietal trials. The aim of this improvement selection is to obtain inbred lines from this synthetic with increased combining ability which to be used as parental components to receive high-yield maize hybrids from this maturity group.

# COMPARATIVE ANALYSIS OF CORRELATION-REGRESSION RELATION BETWEEN SOME CHARACTERISTICS OF MAIZE HYBRID KNEJA 517 IN NORMAL AND MALE STERILITY CYTOPLASM

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## ABSTRACT

The correlation-regression relation between grain yield, the yield's element and some biometrics parameters of maize hybrid Kneja 517 in normal and male sterility cytoplasm (type "C") was tested. Both the variants of the hybrid Kneja 517 display strong positive correlations between the grain yield and the indications such as height of the ear location, height till the base of tassel and percent of grain in ear; mid-strong correlation between the yield and the height of the plants, MVK, and number of leafs and area of ear leaf. A distinctive mark of the research is the strong positive correlation between the yield of the sterile hybrid Kneja 517C and the number of the primary branches of the tassel (r=0.758 and t=13.8), while in Kneja 517F this correlation is weak and mathematically unproved (r=0.257 and t=2.12). There is also a difference in the correlation between grain yield and length of ear. For the fertile hybrid the correlation is positive and mid-strong (r=0.460 and t=4.51), while for the sterile hybrid Kneja 517C (r= -0.151 and t=1.2) it is low, negative and mathematically unproved.

**Keywords:** maize, hybrid, sterility and fertility cytoplasm, correlation and regression relation

# IN-VITRO EVALUATION OF THE CYTOTOXIC EFFECT OF CERIUM OXIDE PARTICLES WITH DIFFERENT PARTICLE SIZES ON HUMAN AORTIC VASCULAR SMOOTH MUSCLE

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## ABSTRACT

Cerium oxide nanomaterials, also known as nanoceria, belong to the class of metal oxide nanomaterials and have found applications in various fields, including combustion enhancement, solid oxide fuel cells, biosensors, UV absorption, and polishing agents. One of the remarkable properties of cerium oxide is its redox capability and self-regeneration ability, making it highly promising in the biomedical field. Its antioxidant effects have potential applications in various health-related issues, such as tissue regeneration, anti-inflammatory treatments, cancer therapy, and neurodegenerative diseases. The mechanism of action is similar to that of superoxide dismutase and catalase enzymes. Moreover, cerium oxide nanoparticles show promise not only in biomedical applications but also in energy-related fields like fuel cells, catalysts, and solar energy conversion. In our study, we aimed to evaluate the effects of micro and nano-sized cerium oxide particles on human aortic smooth muscle cells (T/G HA VSMC) by considering the particle size. To assess cytotoxicity, we used the 3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) test, which measures mitochondrial activity. The aortic smooth muscle cells were exposed to cerium micro and nano particles at IC50 levels for 24 and 48 hours. We used the qRT-PCR method to analyze the expression of caspase 3, TNF-α, caspase 9, SOD, GSH, and catalase mRNA in the cells. In summary, cerium oxide nanoparticles offer unique properties with potential applications in various fields, particularly in biomedicine and energy-related technologies. Our study aimed to understand how different sizes of cerium oxide particles affect human aortic smooth muscle cells, which could provide valuable insights for future applications and developments in nanomedicine.

**Keywords:** cerium oxide, nanoceria, cytotoxicity, apoptosis

# PHENOLIC PROFILING, ANTIOXIDANT POTENTIAL, AND ANTIMICROBIAL ACTIVITIES OF HONEYS FROM THE TLEMCEN REGION

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## ABSTRACT

Honey is a complex natural food renowned for its therapeutic properties in traditional medicine. Our study aimed to investigate the in vitro susceptibility of methicillin-sensitive and methicillin-resistant *Staphylococcus aureus* to 18 different types of Algerian honey collected in the province of Tlemcen, located in the North-West of Algeria. We also determined the phenolic and flavonoid contents of the honeys and evaluated their antioxidant properties. Significant variability was observed in the bioactive compounds. Total phenolic content (TPC) ranged from 23.38±0.30 to 121.72±4.90 mg GAE/100g of honey, while total flavonoid content (TFC) varied between 0.08±0.014 and 30.71±1.33 mg EQ/100g of honey. Antioxidant activity was assessed using four spectrophotometric methods: β-carotene, DPPH, ABTS, and FRAP. Additionally, the antibacterial activity was evaluated against both methicillin-sensitive and methicillin-resistant *S. aureus* strains using the agar diffusion method. The results revealed that six out of the 18 tested honeys exhibited activity against methicillin-sensitive *S. aureus* at concentrations of 50% and 80%. Furthermore, multifloral honey (S14) demonstrated an inhibitory effect at the higher concentration (80%). In the case of the methicillin-resistant strain, only two tested honeys derived from mild white mustard (S6) displayed activity. Notably, these honeys exhibited the largest zones of inhibition against both methicillin-sensitive and methicillin-resistant *S. aureus* strains. In conclusion, our findings highlight the variability in bioactive compounds among Algerian honeys and their potential antimicrobial activity against *S. aureus*. These results support the traditional medicinal use of honey and provide a basis for further exploration of its therapeutic applications.

**Keywords**: Honeys, Tlemcen region, bioactive compounds, antioxidant activity, *Staphylococcus aureus*

# EVALUATION OF PHYSIOGRAPHY IN CONVENTIONAL SOIL MAP AND DIGITAL SATELLITE IMAGE

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## ABSTRACT

Traditional soil surveys follow a specific methodology to identify, characterize, and fit mapping units in a classification system and to specialize them in order to produce soil maps. Following the developments in satellite technology, traditional land evaluations can be carried out with digital image interpretation, although not completely. In these traditional methods, physiography are generally determined by field observations. Gökhöyük state farm is one of the studies whose soil map was completed using traditional methods in 1984. This also constitutes the study area of our research. The physiography defined and mapped in 1984 and the elevation profile obtained from current Google Earth satellite data were transferred to the digital environment. In this study, it was aimed to investigate whether the physiography defined and mapped by the traditional method in 1984 in the study area is compatible with the physiographic section (elevation profile) obtained from current satellite data. As a result, it was determined that the physiographic unit map created according to the soil series map prepared by the traditional method completely overlaps with the elevation profile created using the Google Earth satellite image.

**Keywords:** Soil map, Physiography, Satellite imagery, Elevation profile.

# AN OVERVIEW OF THE HSP60 AND FOOT-AND-MOUTH DISEASE

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## ABSTRACT

Foot-and-mouth disease (FMD) is an economically important livestock disease that is highly contagious, rapidly spreading, and of international importance, affecting predominantly cloven-hoofed mammals, whose primary hosts are cattle, sheep, goats, and pigs. Although FMD does not have a high mortality rate in adult animals, it reduces the productivity of infected herds. Foot and mouth disease causes that negatively affects international trade in live animals and animal products, causing great economic losses, serious damage to the economies of enzootic countries by preventing the export of livestock and livestock products. Foot-and-mouth disease is caused by the FMD virus (FMDV), which belongs to the Picornaviridae family of the Aphthovirus genus. FMDV are single-stranded, small, non-enveloped, positive-sense RNA viruses and are currently classified into 7 serotypes: A, O, C, SAT (South African regions) 1–3, and Asia-1. The genome has a single ORF encoding four structural proteins (VP1, VP2, VP3, VP4) and 10 nonstructural proteins ($L^{pro}$, 2A, 2B, 2C, 3A, $3B^{1-3}$, 3C, and 3D). Foot-and-mouth disease virus (FMDV) infection causes inflammatory clinical symptoms such as high fever and vesicular lesions, even death of animals. Heat shock protein 60 (HSP60), as a molecular chaperone, is known to be involved in the regulation of virus infection. HSP60 is a quite effective key regulator of inflammation. It has been reported that HSP60 and its cofactor HSP10 are required for FMDV replication for efficient viral RNA replication and mRNA translation during FMDV infection. HSP60 plays a role in the formation of the FMD Virus replication complex (RC). It has been reported that HSP60 interacts with FMDV nonstructural proteins 3A and 2C, which are essential elements of the viral replication complex. Among other roles, HSP60 functions as a chaperone within the cell to assist in the proper folding of newly synthesized proteins and to protect the cell from denatured proteins. These molecules provide reliable biomarkers that assist the immune system in regulating inflammation. Although FMD vaccinations is the traditional way to protect against the disease, the use of FMD vaccines to prevent early infection is limited. Therefore, alternative strategies for the administration of antiviral agents are also required to control the spread of FMD in epidemic situations. Intensifying studies on HSP60, targeting host HSP60 may help design FMDV-specific antiviral drugs and contribute to the development of FMD control and prevention strategies.

**Keywords:** Cattle, FMD, FMDV, HSP60

# MICROENCAPSULATED AND NONCAPSULATED OF ARONIA EFFECT ON PARAOXONASE ENZYME ACTIVITY IN SD RATS FED WITH HIGH-FAT DIET

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## ABSTRACT

This study's objective was to assess the impact of microencapsulated Aronia (Aronia melanocarpa L) and extract on paraoxonase enzyme (PON1) measured in Sprague-Dawley rats. PON1 enzyme investigation by ELISA. The control standard diet, control high-fat diet, aronia extract (200 mg/kg and 400 mg/kg BW/day), aronia microencapsuled (200 mg/kg and 400 mg/kg BW/day) groups were weighted for 36-week-old rats. The corresponding weight in these grouping was 433.57±25.24 gr, 443.2±30.42 gr, 386.5±44.70 gr, 405.25±51.59 gr, 417.85±44.69 gr, and 406.85±45.80 gr respectively. Rats were gavaged with encapsulated and non-encapsulated versions of aronia extract; following using standarts; each of colours were a=0.01, b=-0.39, L=0.03 and each of antioxidants were chlorogenic acid=254455.6 ng/ml rutin=29902.36 ng/ml hesperidin=11067.99 ng/ml, protocatechuic acid=10455.69 ng/ml, quercetin=6912.89 ng/ml. The PON1 enzyme production averages of rats fed 200 mg of Aronia extract (0.0680±0.034 mmol/L), 200 mg of encapsulated aronia (0.026±0.019 mmol/L), and 400 mg of encapsulated aronia (0.0427±0.010 mmol/L) showed a significant correlation in the differences ($p<0.05$), according to tissue samples taken from the rat groups. Additionally, 400 and 200 mg/kg BW/day of aronia in the form of extract were found to have higher enzyme activity ($p<0.05$) when compared to the high-fat control group and the standard diet control group, respectively, according to PON1 enzyme measurements in their blood.

**Keywords:** Paraxonase enzyme, PON1, ELISA, Sprague Dawley, high fat diet, enzyme activity

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