# PROCEEDINGS OF ABSTRACTS III. INTERNATIONAL EDIBLE & OIL SEEDS CONGRESS EDIBOIL 2025

**9-10 September 2025**

**İstanbul, Turkey**

# PROCEEDINGS OF ABSTRACTS III. INTERNATIONAL EDIBLE & OIL SEEDS CONGRESS EDIBOIL 2025

**9-10 SEPTEMBER 2025**

**Istanbul, Turkey**

**Organized by**
**Trakya University**
**Istanbul Beykent University**
**International Researchers Association**

**ISBN #:**
**978-625-95132-8-7**

# WELCOME NOTES

You are welcome to our International Congress Edible and Oil Seeds which is organized by Trakya University, Istanbul Beykent University and the International Researchers Association. The congress will be in 9-10 September 2025 in Istanbul Beykent University Taksim Campus, Istanbul, Turkey with the support of several national and international partners.

The Congress topics will cover Edible and Oil Seeds: Plant Breeding and Genetics, Molecular Genetics and Biotechnology, Biology and Physiology, Genetic Resources, Plant Protection, Agronomy and Production, Animal feeding, Food Science and Nutrients Fats, lipids, and Protein studies, Trade and Economy,

Oil crops are rich sources of oils, proteins, minerals, vitamins, and dietary fibers for both human and animal feeding and provide the raw material to produce biodiesel. Oil crops are soybean, cottonseed, sunflower, canola, rapeseed, peanut, safflower, flax, sesame, coconut, castor, copra, etc.

Almost 50% of the global food protein supply comes from cereal seeds. Soybean, peanuts, common bean, pea, lupine, chickpea, faba bean, lentil, grass pea, cowpea, pigeon pea, etc. are currently the most important legumes for human consumption and animal feed. Because of the edible contents of their seeds, grain legumes, cereals, and other minor crops etc. are edible seeds growing for plant protein for food and feed.

The Congress intends that the subjects to be kept broad in order to provide opportunity to the science and research community to present their works as oral or poster presentations. The Congress languages will be in English.

Researchers, breeders and others with an interest in the genetics and breeding of oil and protein crops are invited to participate. Among the topics to be discussed are directions of breeding for resistance to abiotic and biotic stresses, improved industrial use, and conventional versus organic production.

The congress will gather scientists from around the world and present their recent achievements. The organizers will also invite relevant stakeholders to provide a view on the current situation around the world as well as prospects to overcome the limitation for sustainable crop production to feed the world.

The first meeting has been organized in Lviv, Ukraine in 2019 by Trakya University, with part of more than 200 participants from all over the world with 376 scientific papers. In the 2$^{nd}$ congress in Antalya, Turkey in November 2024; 38 orals and 63 poster presentation in the congress both joining and presenting normal and online with 141 participants from 20 different countries from the world.

The 3$^{rd}$ congress will gather scientists from around the world and present their recent achievements. There are 38 orals and 63 poster presentations in the congress both joining and presenting normal and online with 141 participants from 20 different countries from the world.

With care for our nature and environment, we aim for the green congress, meaning that as little as possible paper will be used. Abstract books are published in electronic books and are distributed to the participants by e mail for online participants. All the e-posters are prepared in electronic form and then submitted via the congress e mail and exhibited in electronical poster boards as well as in online e poster hall in our web page during the congress.

We would like to thank all of you for joining this congress 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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**CONTENTS**

**WELCOME NOTES** ... 3

**ORGANIZING COMMITTEE** ... 4

**SCIENTIFIC COMMITTEE** ... 5

**HARNESSING BIOACTIVE COMPOUNDS AND PROTEINS IN WILD SUNFLOWER SPECIES: A SUSTAINABLE PATH TOWARD ZERO WASTE AND FUNCTIONAL FOOD DEVELOPMENT** ... **8**

**SUNFLOWER – A MODEL CROP FOR SUSTAINABLE AGRICULTURE** ... **9**

**OPTIMIZATION OF SUNFLOWER GENOTYPE SELECTION FOR SUSTAINABLE PROCESSING: BALANCING OIL EXTRACTION AND BIOMASS UTILIZATION** ... **11**

**BIOLOGICAL STUDY OF PEGANUM HARMALA: ANTI INFLAMMATORY, ANTIOXYDANT AND WOUND HEALING ACTIVITIES** ... **12**

**INTERCROPPING FORAGE SPECIES ENHANCES SOIL MICROBIAL HEALTH IN OLIVE ORCHARDS** ... **13**

**PHYSIOLOGICAL AND BIOCHEMICAL RESPONCE OF SOME SUNFLOWER HYBRIDS TO WATER DEFICIT** ... **14**

**BIOLOGICAL STUDY OF PISTACIA ATLANTICA: PHENOLC PROFILE, ANTIOXIDANT, ANTI NFLAMMATORY AND WOUND HEALING ACTIVITIES** ... **15**

**IN VITRO ANTIOXIDANT, ANTI INFLAMMATORY ACTIVITIES AND TOTAL PHENOLIC CONTENT OF EXTRACTS FROM AN ALGERIAN MEDICINAL PLANT** ... **16**

**EVALUATION OF SOME HERBICIDES AND SOME ESSENTIAL OILS FOR WEED CONTROL IN PEANUT FIELDS** ... **17**

**ASSESSMENT OF BIOLOGICAL CHARACTERISTICS OF THE POLYPHENOLS FROM THE BYPRODUCTS OF COLD-PROCESSED OLIVE OIL EXTRACTION FROM THE KHENCHELA AREA** ... **18**

**STATUS OF VARIOUS SOURCES OF EDIBLE OIL AND PROSPECTS OF OIL PALM CULTIVATION IN PAKISTAN** ... **19**

**CHEMICAL CHARACTERIZATION OF THE ARGAN TREE (*ARGANIA SPINOSA*)** ... **20**

**SAFFLOWER (Carthamus tinctorius l.) IN KAZAKHSTAN: OILSEED POTENTIAL UNDER ARID CONDITIONS** ... **21**

**PERFORMANCE OF SOME F1 HYBRID CONFECTIONARY PUMPKIN (CUCURBITA PEPO L) GENOTYPES AT TRAKYA REGION IN TÜRKIYE** ... **22**

**AGRONOMIC AND NUTRITIONAL POTENTIAL OF THE FIRST RELEASED VARIETY OF WHITE LUPINE (LUPINUS ALBUS L.) AS ACONCENTRATE FEED FOR LIVESTOCK IN TUNISIA** ... **23**

**VALORIZATION OF THE ANTIBACTERIAL PROPERTIES OF THE ESSENTIAL OIL OF A LOCAL MEDICINAL PLANT *ORIGANUM MAJORANA* L.** ... **24**

**NUTRITIONAL EVALUATION OF PLANT-BASED MILK ALTERNATIVES WITH EMPHASIS ON PROTEIN CONTENT: A FOCUS ON SOY-BASED BEVERAGES** ... **25**

**EFFECTS OF HIGH-PRESSURE HOMOGENIZATION PRETREATMENT ON STRUCTURAL, FUNCTIONAL AND BIOACTIVE PROPERTIES OF GLYCATION OF SESAME PROTEIN ISOLATE** ... **26**

**INVESTIGATION OF THE EFFECTS OF BLENDING WASTE COOKING OIL WITH DIESEL FUEL IN SPECIFIC RATIOS ..... 27**

**EFFECTS OF BLENDING SAFFLOWER SEED OIL WITH DIESEL FUEL ON ENGINE PERFORMANCE ..... 28**

**ENHANCING FRYING STABILITY OF PALM OIL AND PALM OLEIN THROUGH BLENDING AND ADDITIVE SYNERGY WITH TBHQ AND DPMS ..... 29**

**COLOR STABILITY OF MARGARINE FORTIFIED WITH OIL PALM LEAF EXTRACT (OPLE): A PRELIMINARY INVESTIGATION AND ONGOING STUDY ..... 30**

**COLOR STABILITY OF MARGARINE FORTIFIED WITH OIL PALM LEAF EXTRACT (OPLE): A PRELIMINARY INVESTIGATION AND ONGOING STUDY ..... 31**

**SENSORY PROFILE OF ITALIAN OLIVE OILS AND PERCEIVE QUALITY EVALUATED BY PANEL TESTERS ..... 32**

**EFFECTS OF BLENDING DIFFERENT RATIOS OF COTTONSEED OIL WITH DIESEL FUEL IN A SINGLE-CYLINDER DIESEL ENGINE ..... 33**

**EDIBOIL 2025 CONGRESS STUDENT ORGANIZING TEAM ..... 34**

**OUR SPONSORS ..... 35**

# HARNESSING BIOACTIVE COMPOUNDS AND PROTEINS IN WILD SUNFLOWER SPECIES: A SUSTAINABLE PATH TOWARD ZERO WASTE AND FUNCTIONAL FOOD DEVELOPMENT

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## ABSTRACT

Chlorogenic and caffeic acids are essential bioactive compounds known for their potent antioxidant properties, which play a significant role in neutralizing free radicals and promoting overall health. These phenolic compounds contribute to the nutritional value of sunflower seeds, making them a promising resource for functional food development. Wild Helianthus species, with their rich genetic diversity, serve as a critical reservoir of unique traits that can be harnessed to enhance the quality and resilience of cultivated sunflowers. By leveraging the genetic potential of these wild relatives, it is possible to improve key agronomic traits, including seed composition and nutritional value, in breeding programs. The objective of this research was to assess the variability in chlorogenic acid, caffeic acid, and total protein content among seeds from ten different genotypes of wild sunflower species. Total protein content was determined using the Dumas method, while chlorogenic and caffeic acid levels were quantified through high-performance liquid chromatography (HPLC) with PDA detection. Protein content in the seeds varied significantly, ranging from 19.77% to 33.44%, highlighting the genetic diversity among the studied genotypes. Chlorogenic acid content was observed to range from 0.61 to 1.96 g per 100 g dry matter, while caffeic acid content varied between 0.03 and 0.12 g per 100 g dry matter. The findings of this study underscore the immense potential of wild sunflower species as a genetic resource for breeding programs aimed at improving cultivated sunflowers. By leveraging the diversity in chlorogenic acid, caffeic acid, and protein content, these wild species can contribute to the development of sunflower hybrids with superior grain quality and broader functional applications. This research provides valuable insights that can guide the creation of nutritionally enriched and versatile sunflower varieties tailored for diverse industrial and dietary needs.

**Key Words:** Sunflower seed, protein, chlorogenic acid, caffeic acid, antioxidant capacity

**Acknowledgements:** This work is supported by the Ministry of Education, Science and Technological Development of Republic of Serbia, grant number 451-03-136/2025-03/200032, by the European Commission through Twinning Western Balkans project CROPINNO, grant number 101059784 and Project HelEx, grand number 101081974, funded by EC.

# SUNFLOWER – A MODEL CROP FOR SUSTAINABLE AGRICULTURE

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## ABSTRACT

The average global temperature is rising and setting records every year, accompanied by abnormal climate events such as supercell storms. In addition to numerous biotic factors that create problems in growing crops, abiotic factors such as extremely high temperatures and unpredictable rainfall present increasingly challenging conditions for successful production. At the global level, sunflowers are a strategic agricultural crop, due to its relatively moderate production needs compared to other crops. Benefits of growing cultivated sunflowers are multiple, such as: 1. Food and Feed Production: Sunflower seeds are a nutritious food source for humans and animals alike. They are rich in quality oil, protein, healthy fats, vitamins and minerals, making them a valuable addition to a balanced diet; 2. Biofuel Production: sunflower seeds are rich in oil, which can be extracted and processed into biodiesel. Biodiesel is a renewable and environmentally friendly alternative to conventional fossil fuels, reducing greenhouse gas emissions and dependence on finite resources; 3. Soil Improvement - Sunflower have deep root systems that can break up compacted soil, allowing better water infiltration and aeration. After harvest, sunflower stalks and roots decompose, adding organic matter to the soil and improving its fertility; 4. Pollinator Support: Sunflower are attractive to bees and other pollinators, providing them with nectar and pollen. Supporting pollinator populations is crucial for maintaining biodiversity and ensures the pollination of many other crops; 5. Crop Rotation: Sunflower are often used in crop rotation cycles because they have different nutrient requirements than many other crops. Rotating sunflower with other crops helps prevent soil depletion and reduces the risk of pests and diseases buildup. Overall, sunflower crop is extremely important because of its many benefits in agricultural systems with impact on environmental sustainability, soil health, biodiversity conservation, and the production of renewable resources. Current research on sunflower, in the Center of Excellence for Innovations in Breeding of Climate-Resilient Crops - Climate Crops of the Institute of Field and Vegetable Crops, is based on application of modern biotechnological methods for precise phenotyping, along with genotypic and epigenetic research, in order to examine the mechanisms of adaptation of sunflower to extreme abiotic factors, primarily drought and heat, as an increasingly frequent phenomenons caused by climatic irregularities. The findings of this research, along with the simultaneous use of the genetic base of wild Helianthus species, allow us to model new directions in sunflower breeding and create genotypes for future challenges.

**Key Words:** Sunflower, climate changes, sustainability

**Acknowledgements:** This work is supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia, grant number 451-03-136/2025-03/200032, by the Science Fund of the Republic of Serbia through IDEAS project “Creating climate smart sunflower for future challenges” (SMARTSUN), grant number 7732457, by the European Commission through Twinning Western Balkans project CROPINNO, grant number 101059784, by the Center of Excellence for Innovations in Breeding of Climate-Resilient Crops

- Climate Crops, Institute of Field and Vegetable Crops, Novi Sad, Serbia, Reproductive enhancement of CROP resilience to extreme climates (RECROP) – CA22157. supported by COST (European Cooperation in Science and Technology) and by Project HelEx, funded by European Commission, grant number 101081974.

# OPTIMIZATION OF SUNFLOWER GENOTYPE SELECTION FOR SUSTAINABLE PROCESSING: BALANCING OIL EXTRACTION AND BIOMASS UTILIZATION

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## ABSTRACT

Sunflower is a major oilseed crop, but its processing generates significant by-products, primarily seed hulls/pericarp. Efficient utilization of these by-products can enhance the sustainability of sunflower production, as pericarp with high lignocellulosic content has potential applications in pellet production, whereas genotypes with lower pericarp content are preferable for oil extraction. In order to optimize the industrial processing of seeds, four sunflower genotypes (H1, H2, H3, and H4) were analyzed. Head diameter was measured at the stage of physiological maturity, and plants from the two middle rows were used for yield calculation, based on yield per head with 11% moisture. Morphometric achene and seed traits (60 per genotype) were measured using calipers, while pericarp thickness was determined using a light microscope and image analysis software. The total oil percentage in the seed was measured using Maran Ultra Resonance NMR in accordance with the manufacturer's guidelines and ISO 10565 standard. The results indicate that H3 (27.5% pericarp, 429 μm pericarp thickness, 18.75 cm head diameter, 115.62 g yield per head) and H4 (25.9% pericarp, 318.2 μm pericarp thickness, 17.25 cm head diameter, 94.88 g yield per head) are the most suitable for pellet production, as their high pericarp content provides greater biomass yield and higher energy value. In contrast, H1 (17.42% pericarp, 194.9 μm pericarp thickness, 51.36% oil, 22.50 cm head diameter, 140.11 g yield per head) and H2 (20.85% pericarp, 157.9 μm pericarp thickness, 44.55% oil, 17.50 cm head diameter, 121.53 g yield per head) are better suited for industrial oil processing, as their lower pericarp percentage and thinner pericarp allow for a higher seed proportion and more efficient oil extraction. Notably, H1's thinner pericarp facilitates easier removal during processing, increasing efficiency and reducing technological losses. This study highlights the importance of genotype selection in optimizing sunflower processing and sustainability. High-pericarp genotypes (H3 and H4) are better suited for biomass utilization, while low-pericarp genotypes (H1 and H2) enhance oil extraction efficiency, reducing processing losses. Targeted use of these genotypes can minimize waste, improve resource efficiency, and support a circular bioeconomy in sunflower production. Future research should further evaluate their energy potential and oil quality to refine industrial applications.

**Key Words:** sunflower, seed, pericarp

**Acknowledgment:** This work is supported by the Ministry of Education, Science and Technological Development of Republic of Serbia, grant number 451-03-136/2025-03/ 200032, by Center of Excellence for Innovations in Breeding of Climate-Resilient Crops - Climate Crops, Institute of Field and Vegetable Crops, Novi Sad, Serbia, and the by the European Commission through Twinning Western Balkans project CROPINNO, grant number 101059784. Project HelEx, grand number 101081974, funded by EC

# BIOLOGICAL STUDY OF PEGANUM HARMALA: ANTI INFLAMMATORY, ANTIOXYDANT AND WOUND HEALING ACTIVITIES

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## ABSTRACT

This study provides an in-depth biological evaluation of *Peganum harmala* oil, focusing on three main therapeutic properties: anti-inflammatory, antioxidant, and wound healing effects. Peganum harmala, a medicinal plant traditionally used in folk medicine, was analyzed to determine the efficacy of its oil extract. The anti-inflammatory activity was assessed using models of acute inflammation, revealing a significant reduction in edema and inflammatory markers, likely due to the presence of active alkaloids such as harmine and harmaline. Antioxidant activity was evaluated through DPPH and FRAP assays, demonstrating high free radical scavenging capacity, attributed to phenolic compounds and flavonoids in the oil. Moreover, topical application of the oil in wound models accelerated tissue regeneration, increased collagen deposition, and enhanced re-epithelialization, indicating potent wound healing properties. Histological analysis supported these findings, showing improved tissue structure in treated groups. These results highlight the therapeutic potential of *Peganum harmala* oil as a natural remedy for managing inflammation, oxidative stress, and promoting skin repair.

**Key words**: *Peganum harmala*, Anti-inflammatory, Antioxidant activity, Wound healing, Medicinal plant

# INTERCROPPING FORAGE SPECIES ENHANCES SOIL MICROBIAL HEALTH IN OLIVE ORCHARDS

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## ABSTRACT

The overreliance on chemical fertilizers and pesticides in intensive agriculture has led to significant environmental degradation and health concerns. This study explores intercropping as a sustainable, low-input alternative to improve soil quality and microbial diversity in olive orchards. We compared monoculture systems with intercropped plots integrating various cover crops, focusing on their influence on plant growth-promoting rhizobacteria (PGPR). Results revealed a significant increase in beneficial PGPR populations specifically nitrogen-fixing, siderophore-producing, and phosphate-solubilizing bacteria in intercropped systems. These changes were associated with improved soil fertility and microbial resilience. Our findings support intercropping as a promising strategy to enhance the sustainability and productivity of Mediterranean olive agroecosystems.

**Key Words**: intercropping, olive orchards, soil health, PGPR, sustainable agriculture, microbial diversity

# PHYSIOLOGICAL AND BIOCHEMICAL RESPONCE OF SOME SUNFLOWER HYBRIDS TO WATER DEFICIT

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## ABSTRACT

Drought stress is a major limiting factor in sunflower (Helianthus annuus L.) cultivation, particularly during early developmental stages, such as germination and seedling growth. This study aimed to evaluate the physiological and biochemical responses of three local sunflower hybrids (H1–H3) under controlled water deficit conditions induced by polyethylene glycol (PEG 6000) at concentrations of 10%, 20%, and 30%. Stress was applied either during germination or at the seedling stage, for durations of 3 or 6 days, with and without rehydration. Water deficit induced during germination significantly reduced germination rates by 10–24% under mild and moderate stress and up to 40–60% under severe stress (30% PEG), with some genotypes showing complete germination failure. At the seedling stage (first pair of true leaves), drought stress caused plant height reduction by about 10–57%, while root elongation increased by 10–50% in most genotypes, particularly under prolonged exposure to 30% PEG for 6 days. Biochemical analyses revealed an increase in total peroxidase activity across most genotypes, indicating enhanced antioxidant defense, particularly under severe stress. Isoenzyme profile highlighted stress-induced changes, including the de novo synthesis of two peroxidase isoforms (42 and 45 kDa), especially in genotypes showing higher tolerance. Additionally, three polypeptide bands (19.5–21.7 kDa), potentially corresponding to dehydrins, were detected with increasing intensity under stronger drought conditions. A genotype-specific response was observed, with each hybrid demonstrating increased antioxidant activity under different drought conditions. Hybrid H1 showed the highest peroxidase (PO) activity increase under mild drought stress (+79%), while H2 exhibited enhanced PO activity under both mild (+47%) and severe (+118%) stress conditions. Notably, hybrid H3 responded most strongly to severe drought, displaying the greatest increase in PO activity. These variations highlight the diverse adaptive mechanisms among the sunflower genotypes and suggest their potential for targeted breeding strategies aimed at improving drought tolerance. These findings support the use of antioxidant activity and isoenzyme composition as potential selection markers in breeding programs aimed at improving drought tolerance.

**Acknowledgement.** This work was supported by the Subprogram 011101 Genetic and biotechnological approaches to agroecosystem management under climate change, financed by the Ministry of Education and Research of the Republic of Moldova.

**Key Words**: Helianthus annuus, Drought stress, Polyethylene glycol (PEG 6000), Germination, Seedling growth, Peroxidase activity, Isoenzyme

# BIOLOGICAL STUDY OF PISTACIA ATLANTICA: PHENOLC PROFILE, ANTIOXIDANT, ANTI NFLAMMATORY AND WOUND HEALING ACTIVITIES

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## ABSTRACT

*Pistacia atlantica*, a member of the Anacardiaceae family, is a valuable plant species widely used by rural populations in arid and semi-arid regions. Its fruit is rich in vegetable oil and has long been used in traditional medicine for the treatment of various ailments, as well as in the formulation of natural cosmetic and health products. In response to increasing consumer interest in edible seed oils with high unsaturated fatty acid content and strong antioxidant capacity, this study explores the biological potential of Pistacia atlantica oil. In vitro and in vivo assays were conducted to assess its anti-inflammatory, antioxidant, and wound healing activities. Phytochemical analysis revealed a significant presence of bioactive compounds, including polyphenols, flavonoids, and unsaturated fatty acids, which may account for the observed therapeutic effects. Antioxidant activity was evaluated using DPPH and ABTS assays, while anti-inflammatory activity was assessed through protein denaturation inhibition. The wound healing potential was demonstrated in rabbits with experimentally induced skin wounds, showing enhanced tissue regeneration, reduced local inflammation, and a protective barrier effect. These results highlight the promising medicinal and cosmetic applications of Pistacia atlantica fruit oil in managing oxidative stress, inflammation, and skin damage.

**Key Words**: *Pistacia atlantica*, antioxidant activity, wound healing, medicinal plant

# IN VITRO ANTIOXIDANT, ANTI INFLAMMATORY ACTIVITIES AND TOTAL PHENOLIC CONTENT OF EXTRACTS FROM AN ALGERIAN MEDICINAL PLANT

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## ABSTRACT

*Ajuga iva* (Lamiaceae) is a medicinal plant traditionally used in North African folk medicine for its anti-inflammatory and healing properties. This study aims to evaluate the in vitro antioxidant and anti-inflammatory activities of different extracts from Ajuga iva, along with the quantification of their total phenolic content. Extracts were prepared using solvents of varying polarity (aqueous, ethanolic, and methanolic), and total phenolic content was determined using the Folin–Ciocalteu method. Antioxidant capacity was assessed using DPPH and ABTS radical scavenging assays, while anti-inflammatory activity was evaluated via inhibition of protein denaturation and heat-induced hemolysis assays. The results showed that the ethanolic extract exhibited the highest phenolic content and the strongest antioxidant activity, correlating positively with its radical scavenging capacity. Additionally, significant inhibition of protein denaturation was observed, suggesting promising anti-inflammatory potential. These findings highlight Ajuga iva as a rich source of bioactive compounds with potential applications in natural antioxidant and anti-inflammatory therapies.

**Key Words**: Phenolic content, antioxidant activity, in vitro essays, anti nflammatory activity, Bioactives compounds

# EVALUATION OF SOME HERBICIDES AND SOME ESSENTIAL OILS FOR WEED CONTROL IN PEANUT FIELDS

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## ABSTRACT

Weed competition is one of the most serious biotic stresses reducing crop productivity worldwide. In the absence of weed control, yield losses in major crops such as maize, wheat, rice, soybean, and peanut can reach up to 70% depending on the weed spectrum and crop growth stage (Oerke, 2006; Zimdahl, 2018). Peanut (Arachis hypogaea L.) is a legume with high nutritional and economic value. In Türkiye, peanut cultivation covers about 37,000 hectares, with a production of over 140,000 tons annually, predominantly in the Mediterranean and Aegean regions (TUIK, 2023). Due to its creeping growth habit and slow canopy closure, peanut is particularly vulnerable to weed competition during early development stages (Hauser et al., 1982). Effective weed management in peanut cultivation is essential to prevent early-season competition, which can severely affect flowering and pod development (Wehtje et al., 2000). While mechanical and cultural practices are viable, they are often labor-intensive and insufficient alone. Chemical weed control remains a cornerstone of modern agriculture due to its efficiency and scalability (Vencill, 2002). The findings of this study confirm the strong efficacy of bentazone at 150 ml/da in controlling a wide range of broadleaf and grass weeds. Similar efficacy of imazamox-bentazone mixtures has been reported in soybeans and maize, particularly under Mediterranean climatic conditions (Kudsk & Streibig, 2003; Jursík et al., 2008). Imazamox is known for its systemic activity, primarily absorbed through foliage and translocated to meristematic regions where it inhibits ALS activity (Tranel & Wright, 2002). This mechanism is particularly effective against annual grasses like Echinochloa crus-galli, as shown in our study and others (Heap, 2024). Bentazone, a contact herbicide, complements imazamox by providing immediate phytotoxicity to broadleaf species, including Amaranthus retroflexus and Xanthium strumarium, which are notoriously competitive in peanut fields (Soltani et al., 2007). Our findings also align with previous reports suggesting that dose optimization is critical: while lower doses (50–100 ml/da) provided moderate suppression, the 150 ml/da dose achieved statistically significant control without phytotoxicity. Higher doses (300 ml/da) did not result in further gains and pose a risk for environmental load, consistent with the law of diminishing returns in herbicide application (Radosevich et al., 2007).

**Key Words**: Essential oil, Weed control, fresh, dry weight, yield

# ASSESSMENT OF BIOLOGICAL CHARACTERISTICS OF THE POLYPHENOLS FROM THE BYPRODUCTS OF COLD-PROCESSED OLIVE OIL EXTRACTION FROM THE KHENCHELA AREA

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## ABSTRACT

The production of olive oil generates huge quantities of effluents called “margins” which have little economic value in Algeria and are a powerful pollutant discharged into nature without any prior treatment, but which could be considered a potential source of natural products of high additive value because of their content of phenolic compounds and other natural antioxidants. This study aims to highlight the biological activities of polyphenols from these margines (chemlal variety) harvested in Khenchela. The physico-chemical characterization of the samples showed acidic rejects (pH = 4.64), brown color with a high moisture content (H = 95.45%), a high content of total suspended solids (TSS = 0.55%), rich in organic matter (OM = 14%), poor in mineral matter (MM = 2%), in nitrogen with 0.42 g/l, and in dry matter with 8.55 g/l. A liquid-liquid extraction was performed using acetone (Ac). The total polyphenol determination showed the richness of the extract with 70 µg EAG/mg of extract. TLC qualitative analysis revealed a wide range of phenolic compounds. The resulting antioxidant capacity showed that the extract inhibited DPPH oxidation with a very low IC50%, namely 30µg/ml. The anti-inflammatory action has been proven in vitro by the inhibition of protein denaturation and the increase of HRBC (human red blood cells) membrane stability up to 97.77% compared to the 74.33% established by aspirin at the same concentration. Activated partial thromboplastin and prothrombin times were used to analyze the extrinsic and intrinsic coagulation pathways to determine their anticoagulant activity, which had a great impact on the lengthening of both chronometric tests. In the light of the results obtained, we can conclude that the polyphenolic acetone extract derived from recycled margines is endowed with remarkable antioxidant, anti-inflammatory and anticoagulant activity. As such, it may represent a promising natural resource for alleviating the complications of oxidative stress associated with or triggering thrombolytic and cardiovascular diseases.

**Key Words**: Margins, polyphenols; anti-inflammatory activity; antioxidant activity; anticoagulant activity

# STATUS OF VARIOUS SOURCES OF EDIBLE OIL AND PROSPECTS OF OIL PALM CULTIVATION IN PAKISTAN

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## ABSTRACT

Oilseeds are essential for food nutrition, cooking, and industrial uses like lubricants, paint, and soap. Pakistan requires about 4 million metric tons of edible oil annually, but only 0.5 million tons are produced indigenously. Cotton, rapeseed, mustard, and sunflower contribute to the oil supply, but additional sources like olive and rice bran could provide a further 0.25 million tons. Local crops have not met the food industry's needs, and the demand grows by 7% annually. Sesame has emerged as a new income source, yet self-sufficiency remains distant due to rising consumption outpacing production. The country is in high need of the setting up of olive and rice bran oil industry. Oil palm cultivation has been suggested for Pakistan's coastal regions, where up to 0.5 million hectares could be used. However, low precipitation, humidity, and heat stress during peak months hinder its growth. Early attempts to establish oil palm plantations showed promise, but the lack of an oil extraction industry led to failure. With rising palm oil demand, mostly imported from Indonesia and Malaysia, reviving domestic palm oil production is crucial. Palm oil's environmental sensitivity limits its adaptation to local conditions, but modern technologies like CRISPR/Cas9 could enable genetic modifications to improve resilience and optimize oil production, making large-scale palm cultivation viable in Pakistan.

**Key Words**: Biotechnology, Environmental adaptability, Genetic modification, Oil crop expansion, Sustainable agriculture

# CHEMICAL CHARACTERIZATION OF THE ARGAN TREE (*ARGANIA SPINOSA*)

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## ABSTRACT

This review presents a comprehensive overview of the **chemical characterization** of the **argan tree** (*Argania spinosa*), an endemic species of North Africa highly valued for its ecological, economic, and therapeutic importance. This resilient tree, well-adapted to arid environments, plays a crucial role in soil stabilization, biodiversity conservation, and supporting rural livelihoods. The most valued product, **argan oil**, extracted from the kernels of its fruit, has gained global attention due to its rich composition and beneficial properties. Its chemical makeup is notably high in **unsaturated fatty acids**, primarily **oleic and linoleic acids**, along with a variety of other **bioactive compounds**. These include **tocopherols** (vitamin E), **polyphenols**, **sterols**, **saponins**, **carotenoids**, and **squalene**, all linked to antioxidant, anti-inflammatory, cardioprotective, and anticancer effects. It's important to note that the oil's composition can vary based on geographical origin, genotype, environmental conditions, and extraction methods. Beyond the oil, other parts of the argan tree also contain valuable **phytochemicals**. Studies show that the leaves, bark, and pulp are rich in **flavonoids, phenolic acids, tannins, and triterpenoids**, which contribute to the plant's antimicrobial, anti-inflammatory, and hepatoprotective activities. However, many of these compounds remain insufficiently studied, limiting a full understanding of their mechanisms and potential applications. Recent advancements in analytical techniques, such as **HPLC, GC-MS, and FTIR spectroscopy**, have significantly improved the identification and quantification of Argania spinosa's chemical constituents. Continued research is essential to fully unlock the **multifaceted pharmacological potential** of this remarkable tree and ensure the sustainable use and valorization of all its components.

**Key Words**: Argan tree, *Argania spinosa*, Argan oil, Chemical characterization, Phytochemicals

# SAFFLOWER (Carthamus tinctorius l.) IN KAZAKHSTAN: OILSEED POTENTIAL UNDER ARID CONDITIONS

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## ABSTRACT

This article presents the results of research on the cultivation of safflower (*Carthamus tinctorius* L.) under arid climate conditions. Safflower is a highly adaptive drought-tolerant oilseed crop capable of producing stable seed yields in the Aktobe region, effectively complementing the spectrum of oilseed crops cultivated in the area. Unlike many cereal crops, safflower maintains stable productivity even in years with critically low precipitation. Average seed yields range from 600 to 1000 kg/ha, while under favorable conditions, yields can reach 1400-1800 kg/ha. Due to its high cell sap concentration, the crop utilizes soil moisture efficiently. During various stages of vegetation, the aerial biomass of safflower can be used as animal feed. The green mass is suitable for silage production, non-standard seeds may be fed to poultry, and oil pressing by-products such as oilcake are valuable feed components for livestock. The field experiments were conducted at the Kazakh Research Institute of Horse Breeding and Fodder Production (formerly Aktobe Experimental Agricultural Station), where specific elements of safflower cultivation techniques were investigated. It was established that early sowing with a seeding rate of 0.4-0.5 million viable seeds per hectare ensures the highest productivity. The maximum yield obtained on fallow lands was 1400-1600 kg/ha; following the second crop - 1000-1200 kg/ha; the third crop - 800-900 kg/ha; and under stubble conditions - 400-500 kg/ha. Safflower cultivation in arid farming systems is economically efficient, with stable seed yield and low production cost. The study identified optimal agronomic practices, including seeding rates (20-25 kg/ha), early and ultra-early sowing dates, and primary autumn tillage.

**Key Words**: safflower, agronomy, crop rotation, tillage, sowing time, seeding rate, yield

# PERFORMANCE OF SOME F1 HYBRID CONFECTIONARY PUMPKIN (CUCURBITA PEPO L) GENOTYPES AT TRAKYA REGION IN TÜRKIYE

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## ABSTRACT

This study was conducted to evaluate the performance of some confectionery pumpkin (*Cucurbita pepo* L.) F1 hybrid genotypes at Edirne and Ahmetbey, Lüleburgaz, Kırklareli locations in 2018. In this study, 20 F1 improved promising hybrid, and 3 standard cultivars were tested. Vine length, number of fruits per plant, number of seeds per fruit, thousand seed weight, seed length, seed width, and seed yield were studied. Significant differences among genotypes were identified in both locations and in the combined analysis of locations for fruits per plant. The TGK-13 × TGK-14 F1 hybrid genotype had the highest average number of fruits per plant (2.92), followed by TGK-11 × TGK-12 (2.70) and TGK-14 × TGK-9 (2.68). Significant differences were observed among genotypes at the Edirne, Kırklareli locations and combined analysis of genotypes for number of seeds per fruit. The highest number of seeds per fruit was found in the K7-36 × TGK-17 F1 hybrid with 459.1 seeds, followed by TGK-11 × TGK-9 with 450.8 seeds. Statistically significant differences were observed at the Edirne and Kırklareli locations and the combined analysis of locations for thousand kernel weight. The TGK-12 × TGK-17 F1 hybrid had the highest thousand seed weight with 257.4 g, followed by K7-36 × TGK-17 F1 hybrid with 251.8 g. Significant differences among genotypes were observed in both Edirne and Kırklareli locations and the combined analysis of locations for seed length. The TGK-17 × TGK-9 F1 hybrid had the highest average seed length with 24.05 mm, followed by the control variety Mertbey with 22.87 mm. Significant differences among genotypes were observed in both Edirne and Kırklareli locations and the combined analysis of locations for seed width. The highest seed width was observed in the senahanım cultivar with 11.33 mm, followed by the TGK-11 × TGK-6 F1 hybrid with 11.11 mm. Significant differences in seed yield were observed among genotypes in Edirne, Kırklareli, and in the combined location analysis. In Edirne, the TGK-12 × TGK-9 F1 hybrid had the highest yield with 254.3 kg/da. In Kırklareli, the highest yields were obtained from the K7-36 × K7-37 F1 hybrid with 238.3 kg/da, TGK-13 × TGK-4 F1 hybrid with 234.7 kg/da, and TGK-12 × TGK-9 F1 hybrid with 232.3 kg/da. Based on the average yield of both locations, the highest seed yields were obtained from K7-36 × K7-37 F1, TGK-12 × TGK-9 F1, TGK-13 × TGK-14 F1 hybrid and the check cultivar senahanım with respectively 245,5 kg/da, 243,3 kg/da, 241 kg/da ve 239,3 kg/da/da.

**Key Words**: confectionery pumpkin, hybrid, yield performance, yield traits

# AGRONOMIC AND NUTRITIONAL POTENTIAL OF THE FIRST RELEASED VARIETY OF WHITE LUPINE (LUPINUS ALBUS L.) AS ACONCENTRATE FEED FOR LIVESTOCK IN TUNISIA

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## ABSTRACT

Legume grains are characterized by both high energy and nutrients content. Among them, white lupine is a promising pulse crop widely used in livestock feeding and suitable for low-input cropping systems. White lupine grains have long been recognized for their nutritional value and potential health benefits. Their high protein content, dietary fiber, and bioactive compounds with low fat content make lupine seeds a suitable alternative to soybean meals and represent a valuable source of phenols and antioxidant compounds. However, lupine in Tunisia is a minor crop and is restricted to the regions of Séjnane and Cap bon where soils are acidic to neutral and sandy and sensitive to active limestone (CaCO3).

**Key Words**: white lupine, *Lupinus albus* L, nutritional value, secondary compounds, ruminants, concentrate

# VALORIZATION OF THE ANTIBACTERIAL PROPERTIES OF THE ESSENTIAL OIL OF A LOCAL MEDICINAL PLANT *ORIGANUM MAJORANA* L.

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## ABSTRACT

In Algeria, we have long relied on traditional medicine thanks to our country's rich and diverse flora. The latter constitutes a veritable phytogenetic reservoir, with some 3,000 species belonging to several botanical families, which we need to develop for use in various pharmaceutical, agri-food, and cosmetic fields. The aim of this study is to analyze the antibacterial effect of the essential oil of an aromatic and medicinal plant from the Algerian flora, called Origanum majorana L., on 4 reference bacterial strains and 18 strains of hospital origin. Extraction of the essential oil from the aerial part of dry marjoram by hydrodistillation. As for antibacterial efficacy, using the disk diffusion method (aromatogram). Using the liquid and solid dilution methods, the MICs and BMCs of the essential oils studied were assessed, respectively. All the reference strains tested demonstrated sensitivity to the EO, with extreme inhibitory activity on Staphylococcus aureus reflected by an inhibition zone diameter of 26 mm. The essential oil showed varied antibacterial properties on the 18 Gram-negative clinical strains tested, 37% of which were multidrug-resistant, with high inhibitory activity on Escherichia coli and Proteus spp. Nevertheless, E. coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, and Enterobacter spp. demonstrated high sensitivity to the aromatogram. MICs ranged from 16 to 50 mg/ml and from 20 to 100 mg/ml, respectively. The results of the BMC determination demonstrated that the essential oil studied had bactericidal action against 99% of the strains tested. The essential oil derived from Origanum majorana L. possesses exceptional bactericidal activity. It can therefore be a natural resource and an excellent alternative to antibiotics for combatting bacterial infections.

**Key Words**: *Origanum majorana* L, Essential oil, Antibacterial activity, MIC, BMC.

# NUTRITIONAL EVALUATION OF PLANT-BASED MILK ALTERNATIVES WITH EMPHASIS ON PROTEIN CONTENT: A FOCUS ON SOY-BASED BEVERAGES

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## ABSTRACT

Over the past few years, consumers all over the world, especially in south Asia and Western Europe, have increasingly adopted plant-based diets. Indeed, plant-based milk alternatives are becoming one of the fastest-growing sectors of food industry, as the consumption of these substitutes has surged, thus it is quickly becoming increasingly popular, mostly because of their high nutritional value and many other positive impacts on human health. Approximately 65% of the world's population suffers from poor lactose digestibility or lactose intolerance, making plant-based milk an ideal solution to meet these consumers' daily nutritional needs. The results show that dairy products are regarded essential protein sources with a high Digestible Indispensable Amino Acid Score (DIAAS) ranging from 100 to 200. Plant proteins, on the other hand, are likely to contain lower levels of essential amino acids and DIAAS than dairy proteins. In this case pea and rice proteins have medium and low DIAAS values of 62 and 47, respectively. The current evaluation focuses on studying the nutritional quality of plant-based milk alternatives with an emphasis on protein content and quantity. Several studies examine multiple brands of almond-, oat-, rice-, coconut-, and soy-based drinks in a comparison analysis, revealing that most contain lower levels of total protein, lipids, amino acids, and minerals than cow and goat milk. Soy-based beverages were the lone exception, as their protein content (3.47%) exceeds that of cow (3.42%) and goat milk (3.25%). In addition, soy-based drinks exhibit a similar amino acid profile and a high mineral content. Soybeans are widely consumed globally because of their nutritional richness and adaptability. However, soy is also recognized as a possible allergen capable of causing IgE-mediated hypersensitivity reactions in allergic individuals. Soy allergy is estimated to affect 0.27% of the general population, with symptoms ranging from mild gastrointestinal discomfort to severe anaphylaxis. This underlines the need to develop alternative processing methods or formulations that reduce soy allergenicity while maintaining practical and nutritional qualities. Soybeans are widely consumed globally due to their nutritional richness and adaptability. A recent analysis of 219 plant-based milk alternatives indicates that these products generally contain lower levels of protein and saturated fatty acids than dairy milk and exhibit considerable variability in the content of added sugar. Soy-based products, particularly unsweetened and fortified variants, were found to offer the closest nutritional profile to dairy milk.

**Key Words**: plant-based milk, soy milk, protein quality, DIAAS, nutritional evaluation, lactose intolerance, alternative dairy, amino acid profile, soy allergenicity

# EFFECTS OF HIGH-PRESSURE HOMOGENIZATION PRETREATMENT ON STRUCTURAL, FUNCTIONAL AND BIOACTIVE PROPERTIES OF GLYCATION OF SESAME PROTEIN ISOLATE

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## ABSTRACT

In addition to being an important source of oil, sesame seeds are also a potential source of protein. The extraction of oil from sesame seeds results in an increased protein content of the by-product, sesame meal (41.15–49.58%). Protein is a valuable ingredient in functional foods and dietary supplements. Glycation is a protein modification technique based on the principles of the Maillard reaction. It does not require enzyme catalysis and has significant potential and advantages for the food industry.

This study investigated the effect of the glycation technique in combination with high-pressure homogenization on improving the structural and functional properties of sesame protein obtained from sesame meal. To this end, a solution of sesame protein isolate extracted from cold-pressed sesame meal was homogenized at a pressure of 100 MPa in one, two or three cycles, and glycation was performed using 2% glucose. The physical, structural, thermal, functional, and bioactive properties of the sesame protein isolates and conjugates were then determined.

High-pressure homogenization applied in different cycles was effective in the modification of sesame protein and absolute zeta potential, protein solubility, denaturation temperature, surface hydrophobicity, free-SH content, water and oil binding, foam and emulsification properties were significantly improved, while there was a significant decrease in particle size. In addition, in vitro bioaccessibility of the protein in gastric and intestinal environment was increased and its allergenicity was decreased compared to the control sample. However, high-intensity homogenization (3 cycles) mostly showed negative effects. Glycation of control and homogenized sesame proteins with glucose improved the structural and functional properties and allergenicity of the protein but negatively affected the in vitro bioaccessibility. High-pressure homogenization process played a role in shortening the reaction time and was more effective in improving the properties compared to the control sample. Especially, the negative effects on the degree of browning due to glycation and in vitro bioaccessibility were limited by the high-pressure homogenization pretreatment. In conclusion, while high-pressure homogenization and glycation made a significant contribution to the improvement of the functional properties of sesame protein, high-pressure homogenization applied before glycation revealed a significant potential in terms of final product properties.

**Key Words**: Sesame, protein, modification, high level homogenization, glycation, functional properties

# INVESTIGATION OF THE EFFECTS OF BLENDING WASTE COOKING OIL WITH DIESEL FUEL IN SPECIFIC RATIOS

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## ABSTRACT

The long-term use of internal combustion engines worldwide, coupled with the increasing number of vehicles, has led to the gradual depletion of fossil fuel resources. Although there has been a recent shift toward hybrid and electric vehicles, internal combustion engines still dominate the automotive industry. Therefore, the need to reduce harmful exhaust emissions produced by these engines and the limited availability of petroleum-based fuels has brought alternative fuels into greater focus. Due to its dependence on imported petroleum, Turkey stands to benefit economically and environmentally from blending biodiesel with conventional diesel fuels. In particular, incorporating renewable biodiesel into diesel fuel is considered a promising alternative for reducing reliance on fossil fuels and improving sustainability.

This study investigates the effects of blending 20% biodiesel produced from waste cooking oils with conventional diesel fuel. By utilizing waste derived biodiesel in internal combustion engines, a significant portion of waste oil can be repurposed, contributing to environmental sustainability. Experimental results revealed that when using a 20% waste cooking oil blend in a single-cylinder, four-stroke diesel engine, engine power and carbon monoxide (CO) emissions remain at similar levels to those produced by standard diesel fuel. However, a slight increase was observed in both fuel consumption and nitrogen oxide (NOx) emissions. Despite these increases, the overall findings suggest that it is feasible to use waste cooking oil-derived biodiesel blends in diesel engines, offering a practical and environmentally beneficial alternative to conventional fuels.

**Key Words**: Energy, diesel engines, waste cooking oil, emissions

# EFFECTS OF BLENDING SAFFLOWER SEED OIL WITH DIESEL FUEL ON ENGINE PERFORMANCE

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## ABSTRACT

In recent years, the depletion of fossil fuel resources, economic concerns, and increasing environmental awareness have significantly boosted interest in alternative energy sources. Biodiesel derived from vegetable oils have attracted attention due to its environmentally friendly properties and compatibility with diesel engines. In this context, safflower (Carthamus tinctorius L.) oil offers both economic and technical advantages, thanks to its high content of unsaturated fatty acids, low viscosity, and adaptability to a wide cultivation area.
In this study, 10% volume of safflower seed oil was blended with standard diesel fuel to investigate its effects on engine performance and exhaust emission levels. The experimental results indicated that the use of this biodiesel blend (90% diesel + 10% safflower oil) did not lead to any significant changes in engine power or carbon monoxide (CO) emissions compared to conventional diesel fuel. However, fuel consumption increased by a maximum of 50 ml per hour depending on the applied engine load. Furthermore, under all load conditions (25%, 50%, 75%, and 100%), nitrogen oxide (NOx) emissions increased by up to 150 ppm. Based on the results of this study, it can be concluded that blending 10% safflower seed oil with conventional diesel fuel can be a feasible option for use in single-cylinder, four-stroke diesel engines. However, for the continuous use of such biodiesel blends, it is important to make minor modifications to the fuel system, including replacing seals and components made of nitrile materials with biodiesel-resistant alternatives.

**Key Words**: Energy, diesel engine, safflower seed oil, emissions.

# ENHANCING FRYING STABILITY OF PALM OIL AND PALM OLEIN THROUGH BLENDING AND ADDITIVE SYNERGY WITH TBHQ AND DPMS

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## ABSTRACT

The study examines the frying performance of a specially formulated blend of refined, bleached, and deodorized (RBD) palm oil and RBD palm olein. This blend is enhanced with tertiary-butylhydroquinone (TBHQ) and dimethylpolysiloxane (DPMS). The objective of the study is to evaluate the synergistic effects of the oil blend and these additives in improving oxidative and physical stability during repeated deep-fat frying. Three frying media were compared: (i) RBD palm olein (IV 60) with TBHQ and DPMS, (ii) RBD palm oil with TBHQ and DPMS, and (iii) a 50:50 blend of palm oil and palm olein with TBHQ and DPMS. Each oil was subjected to intermittent frying cycles using pre-fried potato strips at a temperature of 180 ± 5 °C over five consecutive days. The parameters measured included peroxide value (PV), p-anisidine value (AV), total polar compounds (TPC), free fatty acids (FFA), and foam stability. Induction time was determined using the Rancimat method at 110 °C. The results showed that the blend of palm oil and olein, fortified with TBHQ and DPMS, significantly delayed oxidative degradation. It exhibited lower total polar compound (TPC) accumulation and longer induction periods compared to the single-oil systems. The addition of DPMS effectively suppressed foam formation throughout the frying process. Comparisons with existing studies by Jaswir et al. (1999), Norazura et al. (2016), and Che Man & Liu (1999) confirmed the enhanced performance of this dual-additive strategy in extending frying life and maintaining oil quality. This approach is a viable option for manufacturers looking to improve the durability of frying oils while preserving the sensory and physicochemical quality of fried foods.

**Key Words**: Palm olein, palm oil, TBHQ, dimethylpolysiloxane, deep-fat frying, oxidation stability, total polar compounds

# COLOR STABILITY OF MARGARINE FORTIFIED WITH OIL PALM LEAF EXTRACT (OPLE): A PRELIMINARY INVESTIGATION AND ONGOING STUDY

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## ABSTRACT

Color stability is a key quality indicator in margarine, with strong influence on consumer perception and product acceptance. The use of natural antioxidants, such as Oil Palm Leaf Extract (OPLE), is gaining attention as a clean-label alternative to synthetic additives. This study evaluates the initial effects of OPLE on the color characteristics of margarine using the colorimeter and outlines a longer-term assessment of color retention over two months.
Margarine samples were formulated with control (commercial standard), and OPLE at 200 ppm, 400 ppm, and 600 ppm. Each sample was analyzed in triplicate for L* (lightness), a* (red-green), and b* (yellow-blue) using a calibrated colorimeter. Chroma (C*) and Hue Angle were derived to interpret color intensity and tone. The 200 ppm OPLE sample exhibited the highest Chroma and hue consistency, indicating a vibrant and stable yellow tone. The 400 ppm group also demonstrated good uniformity, while the 600 ppm dosage resulted in greater variability across triplicates, suggesting formulation instability at higher concentrations.
Ongoing weekly measurements over a two-month storage period will provide a longitudinal understanding of OPLE's effectiveness in maintaining margarine color during shelf life. This work aims to inform formulation strategies for natural, halal-compliant antioxidant systems in margarine and other lipid-based food products.

**Key Words**: Oil Palm Leaf Extract (OPLE), Margarine, Color Stability, Chroma, Natural Antioxidant, Clean-label

# COLOR STABILITY OF MARGARINE FORTIFIED WITH OIL PALM LEAF EXTRACT (OPLE): A PRELIMINARY INVESTIGATION AND ONGOING STUDY

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## ABSTRACT

Color stability is a key quality indicator in margarine, with strong influence on consumer perception and product acceptance. The use of natural antioxidants, such as Oil Palm Leaf Extract (OPLE), is gaining attention as a clean-label alternative to synthetic additives. This study evaluates the initial effects of OPLE on the color characteristics of margarine using the CIELAB color space and outlines a longer-term assessment of color retention over two months. Preliminary, emulsion samples were prepared with OPLE at concentrations of 0 (control), 200, 400, 600, 800, and 1000 ppm. Color measurements were recorded in antivalues were assessed using a colorimeter, and Chroma (C*) and Hue angle were calculated to evaluate color intensity and tone

Results showed that the 400 ppm OPLE treatment maintained the highest color saturation (Chroma ~12.8 initially), with acceptable stability in hue over the 10-day period. The 200 ppm dosage demonstrated similar chroma values but slightly greater variability, suggesting a viable cost-effective alternative. In contrast, the 800 ppm showed where the hue shift is ~98° to 75°and 1000 ppm treatment exhibited significant hue shift (from ~97° to -38°), indicating undesirable red/orange discoloration.

Thus, based on the preliminary investigation, 200ppm, 400ppm and 600ppm are applied in margarine. However, these samples contains beta carotene with dosage same as the margarines available in the market, which makes the color analysis varied from the preliminary results.

Margarine samples were to be formulated with a control (commercial standard), and OPLE at 200 ppm, 400 ppm, and 600 ppm. Each sample was to be analyzed in triplicate for L* (lightness), a* (red-green), and b* (yellow-blue) using a calibrated Konica Minolta Color Chromameter. Chroma (C*) and Hue Angle were to be derived to interpret color intensity and tone. Ongoing weekly measurements over a two-month storage period provided a longitudinal understanding of OPLE's effectiveness in maintaining margarine color during shelf life. This work aims to inform formulation strategies for natural antioxidant systems in margarine and other lipid-based food products.

**Key Words**: Oil Palm Leaf Extract, OPLE, Margarine, Color Stability, Chroma, Natural Antioxidant, Clean-label

# SENSORY PROFILE OF ITALIAN OLIVE OILS AND PERCEIVE QUALITY EVALUATED BY PANEL TESTERS

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## ABSTRACT

Olive oil is one of the most appreciated products in the Mediterranean basin and is well-known at an international level for its nutritional and health benefits. However, the sensorial characteristics are difficult to recognize. The purpose of the present study is to compare the sensorial characteristics of three different types of extra virgin olive oil (EVOO) in terms of their certifications: one without a quality certification, an EU Organic EVOO, and a Protected Designation of Origin EVOO. A specific questionnaire was submitted to Italian consumers, to understand their habits in relation to olive oil consumption, their perception in terms of olive oil quality, and purchase intention. Subsequently, an evaluation by different panels of testers was performed. The evaluation took place in two different tasting sessions by a group of professional tasters, one of semi-trained experts, and another of habitual consumers of olive oil, first through a blind test first and then a normal one. The panels' performances were estimated using the coefficient of variation. The analysis demonstrated that the two more experienced panels recognized the sensory attributes as positive qualitative characteristics of the oils, unlike the panel of regular consumers. The participants in general were positively influenced by the PDO and organic certifications, demonstrating their comprehension of the sustainability of the product. Few studies investigate the ability to recognize the qualitative characteristics of extra virgin olive oil. Therefore, this study can help to contribute to the valorization of the olive oil supply chain from a qualitative and sustainability perspective.

**Key Words**: Olive oil consumption, Sustainable production, Sensorial quality, Certification

# EFFECTS OF BLENDING DIFFERENT RATIOS OF COTTONSEED OIL WITH DIESEL FUEL IN A SINGLE-CYLINDER DIESEL ENGINE

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## ABSTRACT

The persistent reliance on internal combustion engines, particularly within the transportation sector, continues to pose significant environmental challenges due to the emission of exhaust gases. This issue has intensified global efforts to identify and develop alternative fuels that can mitigate greenhouse gas emissions associated with fossil fuel consumption. Concurrently, the gradual depletion of petroleum reserves and volatility in fuel prices have introduced economic sustainability concerns. In this experimental study, the impact of blending conventional diesel fuel with 10% and 20% cottonseed oil by volüme on engine performance and exhaust emissions was evaluated using a single cylinder direct injection diesel engine. The results demonstrated that the addition of cotton-seed oil did not significantly affect engine power output or brake specific fuel consumption. However, a notable decrease in carbon monoxide (CO) emissions was observed, accompanied by an increase in nitrogen oxides (NO) emissions with higher biodiesel ratios. These findings indicate that cottonseed oil–diesel blends up to 20% by volume can be considered a technically viable partial substitute for conventional diesel fuel in compression ignition engines, with trade offs in emission characteristics.

**Key Words**: Energy, diesel engine, emissions, cotton seed oil

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