



جامعة الجوف  
Jouf University



كلية العلوم  
College of Science

# Book of Abstract & Conference Program

College of Science, Jouf University, Al-Jouf, Kingdom of Saudi Arabia

March 14-15, 2023



المؤتمر الدولي للاتفاق المستقبلية  
لزراعة الزيتون والنهوض بصناعاته

The International Conference on Olive  
Cultivation Future and Industry 2023



# The International Conference on Olive Cultivation Future and (2023 ICOCFI) Industry

Organized by

College of Science, Jouf University, Al-Jouf City, Kingdom of Saudi  
Arabia

2023 ,15-14 March

Higher Organization Committee

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President, Jouf University

**Dr. Nabil Alruwaili**

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Venue

Main Campus, Jouf University, Sakaka, Saudi Arabia



## Preface:

In KSA, olive cultivars have been introduced through the cuttings and the import of young trees from Jordan and Syria. Many studies reported that the significant factor affecting olive productivity and yield was insufficient pollination due to self and cross incompatibility. The olive industry has emerged as an essential sector in KSA. The olive industry has emerged as an essential sector in KSA, where the plantation of olive trees started in 1980. Since then, the number of olive plantations has increased and were distributed in the northern parts. The amount of olive consumption of irrigation water is the lowest among the fruitful trees. The Kingdom of Saudi Arabia will soon join the International Olive Council, and this will increase interest in the future. They cover now large areas in Al-Jouf (Sakaka, Quarait, Bousaita), Hail, and Tabouk provinces.

The International Conference on Olive Cultivation Future and Industry (ICOEFI 2023) at its first edition at Jouf University aims to bringing together leading academic scientists, researchers, and research scholars to exchange and share their experiences and research results on all aspects of Science and Techniques for the Development of a Sustainable Olive culture and Olive Oil. It also provides a premier interdisciplinary platform for researchers, practitioners, and educators to present and discuss the most recent innovations, trends, concerns, practical challenges encountered, and solutions adopted in the fields of Science and Techniques for the Development of a Sustainable Olive culture and Olive Oil. From Jouf University, located in the Al Jouf region, we are organizing this event in which researchers, organizations, and companies related to the olive tree and olive products will gather to pursue the aims of the conference further. Among those aims is to bring together the latest advances and knowledge in the areas of molecular biology, breeding and propagation; reproductive and, genomics and biotechnology; crop response to biotic and abiotic stresses and crop management; economics of the olive crop and olive products; table olive and olive oil quality, authenticity, technology, and by-products; and nutrition and health.



The ICOCFI 2023 conference provides an energetic platform for scientists to discuss and share advanced research in the areas of olive cultivation and industry. Attendees will have an exceptional chance to discover technological advancements, meet with researchers, academicians, industrialists, and experts from various fields. The conference promises excellent presentations and discussions to promote knowledge exchange and advancement in olive cultivation and industry.

The topics of interest include but are not limited to:

- Appropriate Agricultural Practices for Olive Tree Cultivation.
- Biotechnology and Molecular Biology of the Olive Tree and other Agricultural Processes.
- Processing, Recycling and Green Chemistry of Olive Tree Waste and Related Industries.
- The Nutritional and Economic Value of Olive Oil and its Products.
- Physics, Biology and Chemistry for Environmental Studies and Computational Studies for Environmental Applications.

Full Papers submitted to this conference, but also all papers covering the topics of the conference and/or the journals are invited to be submitted to the Special Issue in:

•Agriculture MDPI (Open Access), IF: 3.40, Quartile: Q1  
[https://www.mdpi.com/journal/agriculture/special\\_issues/ICOCFI\\_2023](https://www.mdpi.com/journal/agriculture/special_issues/ICOCFI_2023)



•Molecules MDPI (Open Access), IF: 4.92, Quartile: Q1  
[https://www.mdpi.com/journal/molecules/special\\_issues/ICOCFI\\_2023](https://www.mdpi.com/journal/molecules/special_issues/ICOCFI_2023)





## Keynote Speakers:

**Dr. Vlontzos Georgios**, Professor at University of Thessaly, Greece.

**Prof. Juan de Dios Alche**, Professor at Estación Experimental del Zaidín (CSIC), Granada, Spain

**Prof. Camposeo Salvatore**, University of Bari Aldo Moro, Bari, Italy

**Prof. Khalid Asiry**, Department of Arid Land Agriculture, King Abdulaziz University, Saudi Arabia

**Dr. Juan Vilar Hernández**, Jaén University, and CEO & founder of Juan Vilar Strategic, Spain.

**Dr. Aldo Mazzini**, IOC & MOOOIC Panel Leader & Consultant, Italy.

**Prof. Maurizio Servili**, Department of Agricultural, Food and Environmental Sciences, The University of Perugia, Italy.

**Prof. Mahdi Fendri**, Olive Tree Institute of Tunisia - Ministry of Agriculture. Tunisia

**Prof. Mohamed Triki**, Olive Tree Institute of Tunisia - Ministry of Agriculture. Tunisia



## General Conference Agenda

1<sup>st</sup> day: March 14, 2023

Time	Events	Sites
08:00-11:15	Registration and Opening Ceremony	Main Lobby, University Building
11:15-12:00	Keynote speakers (Plenary Lectures)	Main Lobby, University Building
12:00-1:00	Break	
1:00-5:00	Keynote speakers (Plenary Lectures)	Main Lobby, University Building





## 2<sup>nd</sup> day: March 15, 2023

Time	Events	Sites
08:00-9:00	Registration	College of Science, Main Campus
9:30-12:00	Keynote speakers (Plenary Lectures)	
12:00-1:00	Break & Poster Session	
1:00-5:00	Keynote speakers (Plenary Lectures)	College of Science, Main Campus
	Lectures and presentations related to the themes of the conference	RoomsX1, X2, X3.....
	Selected Workshops	College of Science, Central Laboratory

## ICOCFI 2023 Program

1 <sup>st</sup> day: March 14, 2023			
8:00-9:45	Registration		Main Lobby, University Building
10:00-11:00	Open Ceremony		
Time	Keynote Speakers	Title	
11:15-12:00	Dr. Vlontzos Georgios	Olive Orchards: Economic, Social, and Environmental Challenges Associated with Production, Processing and Marketing of Their Products	
12:00-1:00	Break		
1:00-1:45	Prof. Juan de Dios Alche	Multi-omic approaches boost basic knowledge and future applications of olive fruits, oils and by-products arising from alternative processing methods	
Session Time	1 <sup>st</sup> Invited Lecturers (1-12)		
2:00-5:00	Lecturer 1-12		







2<sup>nd</sup> Day: March 15, 2023

2 <sup>nd</sup> Day: March 15, 2023			
8:00-9:00	Registration		College of Science, Main Campus
Time	Keynote Speakers	Title	
9:00-9:30	Dr. Aldo Mazzini	The olive oil market during the difficult times: what opportunities?	
9:30-10:00	Prof. Khalid Asiry	Sustainable Approaches on Controlling Key Insect Pests Within Olive Agroecosystems	
10:00-10:30	Dr. Juan Vilar Hernández	The international olive culture and its future and Challenges	
10:30-11:00	Prof. Camposeo Salvatore	Sustainability of the oil olive high and super high density cropping systems	
11:00-11:30	Prof. Maurizio Servili	The main technological innovations in the olive oil industry and their effects on olive oil quality	
11:30-12:00	Dr. Mahdi Fendri	Olive oil volatile compounds used as a marker for Spanish and Tunisian extra virgin olive oil: potential and Applications	
12:0-1:00	Break & Poster Session		
Discussion sessions			
1:00-1:45	Dr. Mohamed Triki	Olive tree dieback diseases and prevention strategy against <i>Xylella fastidiosa</i> in the MENA region	
1:45-2:30	Analytical Chemistry Unit at Central Lab, Jouf University	Workshop in ICP-MS and Olive Oil Analysis	
Session Time	Invited Lecturers		Seminar Room, College of Science, Main Campus
2:45-5:00	2 <sup>nd</sup> Invited Lecturers (13-39) & Selected Workshops		
5:15-5:30	Closure of Conference		College of Science, Main Campus

#	Authors	Country	Title
1	Hanan Mossalem	Egypt	Mucus and tissue extracted from Biomphalaria alexandrina snails as therapeutic agents on mice infected with Schistosoma mansoni
2	Mohamad Alnafissa	Saudi Arabia	Investigating the contribution of different characteristics in the olive oil prices in the Saudi market: An Hedonic price analysis
3	Khaled Alotaibi, Khalid Almutairi, Fahad Alotaibi and Saud Aloud	Saudi Arabia	Potential Uses of Olive Mill Waste in Arid Soil
4	Basheer Alshammari	Saudi Arabia	Utilization of Olive Oil and Plastic Wastes to Develop Greenhouse Covering Materials and Accelerate the Biodegradation Process of Plastic Products in the Kingdom of Saudi Arabia's Weather
5	Ahmed Hamdy, Samir Nouh, Soad El-Fiki and Hanan Diab	Egypt	Radioactivity in foodstuffs and doses to the Egyptian populations as derived from the phosphate fertilizers industry fallout
6	Ahmed Gelany and Reda Attalla	Egypt	Red ochre pigment and its role in ancient Egyptian agricultural soil between heritage and modern science
7	Khalid Al-Sharari and Ibrahim Abdel-Farid	Saudi Arabia	Allelopathic potential of olive leaves on seed germination and seedling growth of Triticum aestivum and Brassica nigra
8	Saleh Al-Rashidi and Ibrahim Abdel-Farid	Saudi Arabia	Effect of olive compost on seeds germination and seedlings growth
9	Prof. Dr. Ahmed El Ghorab	Saudi Arabia	The Use of Date Seed Oil Capsules As A Functional Food For The Stability of Olive Oil
10	Hassan Shokry, Marwa Elkady, Kamal Diab, Saad Mahmoud and Raya Al-Dadah	Egypt	Eco-Friendly Zr-Metal Organic Framework Material for Efficient Remediation of Different Types of Dyes





#	Authors	Country	Title
11	Marwa Elkady, Hassan Shokry, Kamal Diab, Saad Mahmoud and Raya Al-Dadah	Egypt	Biomimetic Zr-based-MOF for CO2 capture for air purification
12	Raja Jarboui, Mona Saber Azab, Shaimaa Mohamed Nabil Mostafa and Hallouma Bilel	Saudi Arabia	Antifungal activity of fresh and stored olive mill wastewater (OMW) and its ethyl acetate extract against plant pathogens fungi
13	Haifa Abdul Aziz Sakit Alhaithloul	Saudi Arabia	Genetic diversity between four olive cultivars from two different ecosystems
14	Mohammed Elmoghazy	Saudi Arabia	Prevalence and Assessment of the Population Density of Mites Associated with Olive Trees ( <i>Olea europaea</i> L.) at Aljouf, Saudi Arabia
15	Juan de Dios Alché, Antonio Jesús Castro, Adoración Zafra, Salvador Priego, Andrea Román, Mahdi Fendri and Elena Lima	Spain	Multi-omic approaches boost basic knowledge and future applications of olive fruits, oils and by-products arising from alternative processing methods.
16	Ola Aziz, Elsayed Salama, Doaa El nashar and Assem Bakry El-Sedfy	Egypt	The effect of bismuth on the mechanical and gamma attenuation properties of natural rubber/NBR blend for environmental and human radiation protection
17	Rawabi Alzaid, Fatma Galal, Maged Fouda and Alaaeddeen Seufi	Saudi Arabia	Comparative Study of Insect Succession Pattern and Decomposition Stages of Rabbit Carcasses Placed Around Olive Trees and Palm Trees
18	Mohamed Samir Mohyeldin Saad, Ahmed M. Omer and Tamer M. Tamer	Egypt	Management of olive cultivation future irrigation process in water shortage environment: Application of biopolymer based soil conditioner hydrogel in sand soils
19	Ahmed Sallam and Mohammad Al-subaie	Egypt	Nano-Graphene Oxide: A novel material for consolidation of Mud Mortar The Palace of Al-Juhfa Saudi Arabia : Case Study
20	Bassam Aowaiesh	Saudi Arabia	A biochemical and physiological study of three olive cultivars and their gene expression under drought stress

#	Authors	Country	Title
21	Muhammad Azhar Iqbal, Muhammad Ramzan Anser, Inam Ul Haq, Humara Umar and Muhammad Zaffar Iqbal	Pakistan	Optimizing pruning Intensity for olive Production under Pothwar agro-climatic condition of Pakistan
22	Mahdi Fendri, Fadwa Jendoubi, Rafael Núñez Gómez, Ajmi Larbi and Juan de Dios Alché	Tunisia	Olive oil volatile compounds used as a marker for Spanish and Tunisian extra virgin olive oil: potential and applications
23	Bassam F Alowaieeh, Ali Ben Dhiab, Amine Khouni, Khaled Ouertani and Ajmi Larbi	Tunisia	Comparative study of the agronomic behavior of Arbequina and Arbosana varieties grown under high density planting system in Saudi Arabia and Tunisia.
24	Amine Khouni, Hakim Boulal, Ali Ben Dhiab and Ajmi Larbi	Tunisia	Can supplementary potassium and calcium improves stomatal, photochemistry and end-product down co-regulation in salt-stressed olive?
25	Yaakoub Gharbi, Emna Bouazizi, Karim Ennouri, Manel Cheffi, Samira Krid Hadj Taeib and Mohamed Ali Triki	Tunisia	Olive tree dieback diseases and prevention strategy against Xylella fastidiosa in the MENA region
26	Modather Farouk and Hassan M. A. Hassan	Saudi Arabia	Synthesis and characterization of biodiesel from olive waste oil using cerium cobalt nickel ferrite as heterogonous base catalyst
27	Ali Atta and Eslam Abdeltwab	Saudi Arabia	Surface Characteristics and Structural Properties of Irradiated Flexible Nanocomposite Films
28	Eslam Abdeltwab and Ali Atta	Saudi Arabia	Influence of Nanoparticles on the Dielectric Properties of Flexible Polymeric Films
29	Ali Ben Dhiab, Bassam F Alowaieeh and Ajmi Larbi	Tunisia	Impact of climate parameters on floral phenology and on the chronological pollen emission of the olive tree ( <i>Olea europaea</i> L.) in Tunisia and KSA.
30	Islam Mohi Eldeen, Elsayed Salama, Heba Saudi and Assem Bakry	Egypt	Optical and Radiation Shielding Characteristics of Transparent Low Lead Borate Tellurite as an Environmentally Friendly Glass Composite





#	Authors	Country	Title
31	Shaymaa Mahmoud	Egypt	Thermal fluctuation induced alterations in spinosad susceptibility and heat stress genes expression of <i>Bacterocera oleae</i>
32	Maged Fouda, Nahed Abdou and Ahmed Rady	Saudi Arabia	Occurrence pattern of macro-invertebrate Fauna of Mangrove Ecosystem in South Sinai, Egypt
33	Abdelbaky M. El-Shaib, Mohammed F. Ebad-Allah Ebad-Allah and Mohammad Al-Sanea	Saudi Arabia	Economics of olive production in Al-Jouf area, Saudi Arabia
34	Ibrahim Sabouni and Mohammad Al-Sanea	Saudi Arabia	Effect of BT-MAX on the content of total polyphenols in different olive cultivars
35	May Osman Hamza, Haifa Samier and Kiran Ganji	Saudi Arabia	The apprise of the olive oil and glycerin oil on the clinical performance of acrylic resins denture base
36	Shaima M.N. Moustafa, Hallouma Bilel, Hanan Taher and Yasser M. Ahmed	Saudi Arabia	Activity assessment of Clove Essential oil and Lemon leaves extract as sustainable sources in bio-pollution treatment against fungi and Parasite associated with Pet-Birds
37	Shaima Moustafa, Hanaa Ghabban, Samia Alghamdi, Sameera Al-Ghamdi, Laila Alqarni, Touseef Amna, Nasser Alotaibi and Amr Nassar	Saudi Arabia	High antimicrobial and antiparasitic activities of biogenic silver nanoparticles synthesized via recycled olive leaf extract
38	Fahad Alotaibi, Khalid Almutairi, Saud Aloud and Khaled Alotaibi	Saudi Arabia	Structural and functional characteristics of stress-tolerant root-associated microbiome of field-grown olive trees in Al Jouf, Saudi Arabia
39	Shaima Moustafa, Barakat Alrashdi, Mona Azab and Sherifa Ahmed	Saudi Arabia	Evaluation of the pathogenicity of fungal aerospora distributed in female students calss-rooms.
40	Barakat M. ALRashdi	Saudi Arabia	Protective effect of olive oil against the aluminum-induced brain damage in mice



## Mucus and tissue extracted from *Biomphalaria alexandrina* snails as Therapeutic agents on mice infected with *Schistosoma mansoni*

Hanan S. Mossalem <sup>1\*</sup>, Maha M. Abou-Gamra <sup>2</sup>, Rania M. Sarhan <sup>2</sup>, Mona M. Anwar <sup>2</sup>, and Esraa H. Nafie <sup>2</sup>

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### Abstract

therapeutic efficacy of mucus and nucleoproteins extracted from *Biomphalaria alexandrina* snails on miracidia, cercariae and *Schistosoma mansoni* adults in vitro and in vivo effect on mice experimentally infected with *Schistosoma mansoni* through parasitological, pathological and biochemical parameters. The in vitro study proved that the mucus had a better lethal effect on cercariae than miracidia, on contrast to NPs which was better on miracidia. The in vivo study proved that the combined NPs or mucus to PZQ added to the effect of individual PZQ considering its effect on ova count, oogram pattern and granuloma parameters. The histopathological results denoted a relevant potential for NPs when compared to the rest of the groups and the control though, the PZQ still showed the best findings. The effect of PZQ alone or combined with mucus or NPs was equivocal resulting in 100% TWB reduction. This study concluded that mucus and NPs had cercaricidal, miracidial and antischistosomal effect in vitro and that their combination could be considered as a sharing therapeutic adding to PZQ potentiality in vivo for the treatment of schistosomiasis for further investigations.

**Keywords:** Antischistosomal, *Biomphalaria alexandrina*, in vitro, in vivo, mucus, nucleoproteins, praziquantel, *Schistosoma mansoni*





## Investigating the contribution of different characteristics in the olive oil prices in the Saudi market: An Hedonic price analysis

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### Abstract

This study was conducted with the objective to estimate the implicit values for various olive oil attributes in Riyadh, Saudi Arabia. A hedonic price model was applied to examine 558 olive oil samples taken from nine hypermarkets with different olive oil brands. The attributes under consideration include the package size, extra virgin label, level of acidity, organic certification, purity, country of origin, place of retail market, and packaging type. Results show agreement between signs and magnitudes for the implicit values for the most attributes. The significant attributes of olive oil identified in this study are package size, level of acidity, and variables describing the country of origin, place of retail market, and packaging type. The results reveal a negative relationship between (i) the price and the size of container and (ii) the price and the level of acidity for olive oil. Furthermore, olive oil products with organic and pure label have a higher price compared to those without them. The country of origin and the type of packaging may also influence the olive oil price.

**Keywords:** implicit value, hedonic price model, attributes, differentiation, olive oil, Saudi Arabia.



## Potential Uses of Olive Mill Waste in Arid Soil

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### Abstract

Olive cultivation has dramatically increased in Saudi Arabia during the last decade, and this includes a large expansion in olive oil production as well. Olive oil processing production also generates huge amounts of two byproducts: a solid waste called olive pomace (OP) and olive mill wastewater (OMWW). These olive industry waste streams can create environmental threat if not properly managed. An effective method of recycling these byproducts needs to be sought, including their potential use in arid soil as fertilizers or amendments. Two research studies were carried out: The first study was to evaluate the impact of OP and its derived biochar on plant growth and nutrient uptake and microbial respiration in arid soil, and the second study was to evaluate the impact of direct addition of OMWW to calcareous soil on plant germination and growth. Results description and interpretation will be provided upon the completion of data analysis.

**Keywords:** olive pomace, olive mill wastewater, arid soil, plant growth





## Utilization of Olive Oil and Plastic Wastes to Develop Greenhouse Covering Materials and Accelerate the Biodegradation Process of Plastic Products in the Kingdom of Saudi Arabia's Weather

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### Abstract

The utilizing of recyclable, natural and renewable materials for various industrial applications are growing rapidly. One of the promising materials in this regard are agricultural and plastic wastes. This is mainly because of some properties like abundance, easy processing, low density, low-cost and biodegradability in case of agricultural wastes. Although there are some efforts have been carried out to benefit from such wastes, it has not properly exploited and invested in the industry; as they are sent to landfills despite the environmental and health damages. Therefore, it should be exploited by converting them to value added materials to be used in several of industrial applications. In this study, effort has been made to recycled samples of olive oil solid waste (JEFT) and recycled plastic bottle caps to develop a prototype of composites material films with a very small thickness. At first, JEFT was cleaned, dried and then produced Nano- and/or micron size of it through mechanical ball milling process. The downsizing of waste materials without chemical treatments to such sizes is a viable option from an environmental and commercial point of view. The composites material films were fabricated using a melt compounding method followed by a compression molding technique associated with a rapid cooling system to control the crystallinity (flexibility) and to obtain thin films. The density, water absorption, tensile strength, thermal stability, water permeability, functional groups and biodegradation process of these composite films were characterized using a wide range of analytical and testing techniques. The results revealed that the addition of 50 % loading of JEFT into the recycled bottle caps accelerate both thermal degradation (by 42.7 %) and the biodeg-

radation (by 13.4 % After 60 days) as JEFT act as reinforcement agent to enhance the biodegrading process, respectively. However, tensile strength of the investigated film samples declined upon adding more JEFT due to agglomeration effects. In addition, the water absorption and permeability increase reasonably with increasing quantity of JEFT amounts. For instance, water permeability of composite films containing 50 % of JEFT increased only by 1 % during 60 days of the test. In addition, results proved that JEFT has no influence on the chemistry surface of recycled bottle caps. Consequently, these results suggest that the developed composite films from agricultural and plastic wastes could be used as potential greenhouse covering to improve production, raise the efficiency of water and energy consumptions through blocking ultraviolet rays and for enhancing the biodegradation process of plastics in the Kingdom of Saudi Arabia.

**Keywords:** olive pomace, olive mill wastewater, arid soil, plant growth



## Radioactivity in foodstuffs and doses to the Egyptian populations as derived from the phosphate fertilizers industry fallout

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### Abstract

The transfer of radionuclides soil-plant-human chain through the ingestion pathway led to determine the natural radioactive concentration in foodstuffs. Foodstuffs surveys were carried out around a phosphate fertilizers plant to identify radionuclides concentrations in some foods consumed by both rural populations in villages and urban populations lived in the northern part of Cairo. The results of this study can be considered as a first step towards calculating the baseline levels of radioactivity in foodstuffs around non-nuclear industries in Egypt. To provide a more complete overview of radiological implications to the public, samples of root and green vegetables were collected from different sites, including regions of potential <sup>226</sup>Ra enhancement. Although that no significant results for <sup>226</sup>Ra and <sup>232</sup>Th concentrations in foodstuffs reported (in Egypt) in the literature, Considerable variability was evident in levels of <sup>226</sup>Ra and <sup>232</sup>Th from all sites and in most food types investigated. The global average effective dose from natural radiation sources is estimated to be 2.4 mSv y<sup>-1</sup>. Nevertheless, local variations in the radiation exposure may differ by orders of magnitude. The annual internal effective dose rates were 61.32 μSv and 146.54 μSv for <sup>226</sup>Ra and <sup>232</sup>Th respectively. Finally, the transfer of radionuclides from soil to plants was discussed.

**Keywords:** Radioactivity, Foodstuff, Dose to public

## Red ocher *ḥdj* and its role in ancient Egyptian agricultural soil between heritage and modern science

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### Abstract

As a precursor to the principles of sustainability, the ancient Egyptian farmers made optimal exploited natural resources, for example, they used soils containing iron, phosphate and lime oxides to improve the properties of agricultural clay soil, so they used the red ocher in increasing soil fertility and raising plant quality (from the perspective of the myth of the destruction of mankind). One of the bright sides in the legend of “the destruction of mankind” that was clarified by the study: the ancient Egyptian vocabulary and its specifications, starting with the name and linguistic connotation of red ocher *ḥdj*, mentioned in the text of the ancient Egyptian myth, passing through the nature and the compounds of this ocher, and its importance in improving the contents of soils and fertilization of agricultural lands. The physical and chemical properties of red ocher are quite similar to the physical and chemical properties of Khuzam formation, which was confirmed by XRD analysis. In the east of Luxor, irregular quarries are used by some farmers to fertilize the soil until the present time. Many modern researches in the fields of Earth Sciences, Soil, Edaphology, Pedology, Agriculture and Plants integrated to exploitation of natural and environmental resources, such as Khuzam formation, based on the principle of sustainability

**Keywords:** red ocher, soil fertility, myth, Khuzam formation





## Allelopathic potential of olive leaves on seed germination and seedling growth of *Triticum aestivum* and *Brassica nigra*

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### Abstract

In vitro, allelopathic potential of different concentrations of the aqueous extract of olive leaves (0.5, 1, 1.5 and 2 %) on seed germination and seedling growth of one of economic plants (wheat), as well as one of the weeds associated with wheat (black mustard) was evaluated. The results indicated that although the aqueous extract of olive leaves had a negative effect on the germination of seeds and the growth of seedlings in the black mustard plant, where the plant growth was completely inhibited with the highest concentrations used, the extract also affected the germination of wheat grains and the growth of its seedlings, especially with high concentrations of the leaves extract. It is obvious that the olive leaves extract had a negative effect on the germination of wheat grains and black mustard seeds, as well as negatively affecting the growth of their seedlings. Although, the aqueous extract of the olive leaves negatively affected the seeds germination of black mustard, put also negatively affected the grains germination and seedling growth of wheat. It is desirable to cultivate the economic crops such as wheat far from the olive trees as the secondary metabolites of olive leaves will influence the growth and development of the cultivated crops

**Keywords:** Allelopathic potential, Black mustard, Germination, Olive leaves, Seedlings growth, Wheat.



## Effect of olive compost on seeds germination and seedlings growth

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### Abstract

Allelopathic effect of different concentrations of the aqueous extract of olive compost (residues after pressing and extracting oils (olive waste) (2.5, 5, 7.5 and 10 %) on seeds germination and seedlings growth of wheat and black mustard was assessed in vitro. The results indicated that although the aqueous extract of olive leaves had a negative effect on the germination of seeds and the growth of seedlings in the black mustard plant, where the plant growth was completely inhibited with the highest concentrations used, the extract also affected the germination of wheat grains and the growth of its seedlings, especially with high concentrations of the leaves extract. The aqueous extract of olive compost had a significant effect on the germination of black mustard seeds. Seeds germination was completely inhibited with the highest concentrations used. The percentage of inhibition in wheat grains with the two highest concentrations used reached about 10 and 17%, respectively. There was no significant difference between germination percentages with the concentrations used and that of control samples. Interestingly, Olive compost extracts increased the shoot and root lengths in wheat plants. From the foregoing, it is clear that the olive leaf extract had a negative effect on the germination of wheat grains and black mustard seeds, as well as negatively affecting the growth of their seedlings. The olive plant waste extract had a negative effect on the germination of black mustard seeds and the growth of its seedlings, especially with high concentrations, while the extract did not affect the germination of wheat grains and significantly increased the shoot and root lengths of the wheat plant compared to the control sample. Olive compost can be used not only to eliminate weeds associated with wheat plants, such as black mustard, but also as a fertilizer for wheat plants, as it did not negatively affect the germination of wheat grains and increased shoot and root lengths of wheat seedlings. It is desirable to study the allelopathic potential of olive compost extract on





plants growing in soil to confirm the possibility of using these residues as weed control and as bio-fertilizer for economic plants at the same time.

**Keywords:** Allelopathy, Black mustard, Germination, Olive compost, Seedlings growth, Wheat



## The Use of Date Seed Oil Capsules As A Functional Food For The Stability of Olive Oil

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### Abstract

**Background and objective:** The encapsulation of oils in a dried powder using the spray dried method is an excellent method to prevent oxidation. From this point of view, the research aims to study the effect of adding date kernel oils as a microcapsule on the stability of olive oil.

**Materials and Methods:** Date seed oil was extracted from different cultivars of dates, for example, dates Al-Ramli and Hilwat Al-Jawf dates. Experiments were also carried out on saponification, acidity, peroxide values, and fatty acid analysis. Gum Arabic and Maltodextrin with a 1:1 structure were used using a spray dryer used for microencapsulation of date seed oils. It was found to distinguish the date seed oil powder, as well as the total and radical phenolic content, and the gain activity and oxidative stability of olive oil were measured after adding a date kernel oil capsule.

**Results:** The results showed that the oils of Ramli and Halwa Al Jouf contain acidity value, as well as the peroxide value, iodine number, and other measurements. The results also showed fatty acids 17.13% linoleic acid (C18: 2) and 2.3% linolenic acid (C18: 3). In the sandy date seed oil, while the sweet variety contained 6.73% linoleic acid and did not contain linolenic acid. The results showed that the phenolic content of sweet date seed oil was 55% more than that of sandy date, and this is the main reason for the stability of the oxidative number of olive oil.

**Conclusion:** The date seed oil, Sweet Al-Jawf, Halwa Al-Jawf, and Al-Ramli date seed oils showed oxidative stability compared to olive oil without any additives. Therefore, the encapsulated date seed oil protects olive oil and improves its nutritional value and function.

**Keywords:** Date seeds, Encapsulation, Functional foods, Olive Oil







## Eco-Friendly Zr-Metal Organic Framework Material for Efficient Remediation of Different Types of Dyes

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### Abstract

Bio-MOF using aspartic acid as an organic linker and water as a solvent was performed to create an ecofriendly material. The chemical composition, structure, and morphology of the synthesized zirconium Bio-MOF (MIP-202) was evaluated using X-ray diffraction (XRD), energy dispersive X-ray (EDX) spectroscopy, transmission electron microscopy (TEM), scanning electron microscopy (SEM), and X-ray photoelectron spectroscopy (XPS). The adsorption capability of the synthesized Zn-adeninate bio-MOF was confirmed by its notable surface area of 52.62 m<sup>2</sup> g<sup>-1</sup> and total pore volume of 0.183 cm<sup>3</sup> g<sup>-1</sup>. The bio-MOF adsorption profiles of anionic direct red 81 (DR-81) and cationic methylene blue (MB) dyes were investigated under different operating parameters. The optimum dosages of Zn-adeninate bio-MOF were 0.5 g L<sup>-1</sup> and 1 g L<sup>-1</sup> for MB and DR-81 decolonization, respectively. Kinetic parameters were wellfitted with pseudo second-order kinetics, and the adsorption process was described by the Freundlich isotherm.

**Keywords:** Zirconium Bio-MOF; adsorption process; ecofriendly materials; Kinetic models; methylene blue



## Biomimetic Zr-based-MOF for CO<sub>2</sub> capture for air purification

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### Abstract

In order to safe clean environment and overcome the climate change problems, new developments in controlling greenhouse gas emissions have been implemented to address the global climate conservation concern. As, CO<sub>2</sub> has a major role in global climate change, thus, carbon capture technology has been employed as a promising route to reduce the CO<sub>2</sub> concentration into the atmosphere under autogenic pressure. Considering the low CO<sub>2</sub> partial pressure in the practical industry, improving CO<sub>2</sub> adsorption and separation performance at low pressure (including atmospheric pressure) is more meaningful. In this regard, porous metal organic frameworks (MOFs) have been known as the promising materials for CO<sub>2</sub> adsorption. A novel, green, thermally stable, and biocompatible zirconium metal-organic framework (MIP 202) was evaluated as green adsorbent for CO<sub>2</sub> separation from polluted air. The physicochemical properties of synthesized MIP 202 were identified using various techniques. The crystalline and morphological structures of the bio-material were investigated using X-ray diffraction (XRD) and scanning electron microscopy (SEM), transmission electron microscopy (TEM) respectively. The BET surface area that recorded as 58.8m<sup>2</sup>/g confirms the production of MIP 202. The prepared bio-MOF were utilized as fixed bed adsorbent for CO<sub>2</sub> at ambient conditions. The influence of CO<sub>2</sub> concentration at low





concentrations (30- 100 ppm) was studied to evaluate the separation efficiency of MIP 202 at low gas concentrations. It was evident that the eco-friendly MIP 202 displayed high uptake (51.34 mg CO<sub>2</sub>/ gm MIP 202) capacity at ambient conditions, making it a potentially useful adsorbent material for postcombustion carbon dioxide capture and biogas stream purification.

**Keywords:** MIP-202, Bio- MOF, CO<sub>2</sub> uptakes, Air purification greenhouses gas



## Antifungal activity of fresh and stored olive mill wastewater (OMW) and its ethyl acetate extract against plant pathogens fungi

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### Abstract

Olive mill wastewater (OMW) has serious environmental problems considering its high organic matter, especially its phenolic compounds. The OMW application in crop protection is an alternative environmentally eco-friendly method reducing the chemicals pesticides impact on human health and the environment. The present work aimed to study the antifungal activity of fresh and stored OMW and its ethyl acetate extract against phytopathogenic fungi: *Syncephalastrum racemosum* (*S. racemosum*), *Paramyrothecium roridum* (*P. roridum*), *Fusarium oxysporum* (*F. oxysporum*) and *Verticillium dahlia* (*V. dahlia*). The OMW was stored at 25 and 45 °C for 3 months. Fresh and stored OMW were used non-sterile, sterile and centrifuged. Phenolic and flavonoid compounds were extracted and identified by HPLC analysis. The results showed a high inhibition of all phytopathogenic fungi experimented by fresh OMW and its derivative compounds, while OMW storage, sterilization, and centrifugation increased the mycelium growth of the studied fungi, especially *S. racemosum* that showed a relative resistance against the effect of stored OMW and its ethyl acetate extract. It was found that under storage conditions, some phenolic and flavonoid compounds disappeared (resorcinol and vanillic acid), while the concentration of other compounds increased





(gallic acid, chlorogenic acid and quercetin). This work highlighted the ability to use fresh OMW as a bio-agent to protect plants from fungi diseases.

**Keywords:** Olive mill wastewater, antifungal activity, phytopathogenic fungi, phenolic compounds, storage



## Genetic diversity between four olive cultivars from two different ecosystems

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### Abstract

The present study was designed to estimate genetic diversity between four olive cultivars from two different ecosystems, and to investigate the correlation of genetic diversity and geographical origin of the cultivars. Two marker systems were employed: RAPD and ISSR. Analyses of the results revealed that RAPD markers were more informative than ISSR markers. 88.89%, 45.45% and 72.41% polymorphism were recorded for RAPD, ISSR and combined RAPD-ISSR profiles, respectively. The mean heterozygosity measures ( $H_o$ ,  $H_e$  and  $H_{av}$ ) were 0.467, 0.755 and 0.021, respectively, in the case of RAPD. Meanwhile, they were 0.750, 0.307 and 0.019, respectively, in the case of ISSR. Simultaneously, these measures were 0.609, 0.531 and 0.02, respectively, in the case of combined profile. The average PIC, EMR, MI, DP and RP values were 0.367, 1.862, 0.038, 0.788 and 2.404 per primer, respectively, in the case of RAPD. Meanwhile, the average PIC, EMR, MI, DP and RP values were 0.236, 3.00, 0.048, 0.414 and 2.00 per primer, respectively, in the case of ISSR. The average PIC, EMR, MI, DP and RP values were 0.302, 2.431, 0.043, 0.601 and 2.202 per primer, respectively, in the case of combined profile. The average  $N_e$ ,  $h'$ ,  $I$ ,  $G_{st}$  and  $N_m$  values were 1.705, 0.411, 0.601, 0.137 and 3.149, respectively. The four olive cultivars exhibited moderate (0.05- 0.15) to great ( $> 0.15$ - 0.25) values of  $G_{st}$ . Meanwhile, the  $N_m$  values of the 4 olive cultivars were more than 1, in the case of RAPD profile. The average  $N_e$ ,  $h'$ ,  $I$ ,  $G_{st}$  and  $N_m$  values were 1.950, 0.487, 0.679, 0.360 and 0.889, respectively. The four olive varieties showed great ( $> 0.15$ - 0.25) to very great ( $> 0.25$ ) values of  $G_{st}$ . Meanwhile, the  $N_m$  values for the 4 olive varieties were less than 1 except for EG1 variety (1.50), in the case of ISSR profile. The average  $N_e$ ,  $h'$ ,  $I$ ,  $G_{st}$  and  $N_m$  values were 1.791, 0.441, 0.633, 0.025 and 19.572, respectively. The four olive varieties showed lower genetic differentiation values of  $G_{st}$ . Meanwhile, the  $N_m$  values for the 4 olive varieties were more than 1, in the case of RAPD-ISSR profile.





Chi2 and Fisher's tests revealed significant differences between SA2 and EG1 cultivars, between SA2 and SA1 cultivars, between EG2 and EG1 cultivars, between EG2 and SA1 cultivars and between EG1 and SA1 cultivars. However, there was insignificant difference between SA2 and EG2 cultivars. The present study did not position the cultivars in accordance to their environmental origin.

**Keywords:** *Olea europaea*, RAPD, ISSR, genetic diversity, geographic origin.



## Prevalence and Assessment of the Population Density of Mites Associated with Olive Trees (*Olea europaea* L.) at Aljouf, Saudi Arabia

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### Abstract

Olive trees are characterized by tolerating dry weather conditions but used chemical pesticides, herbicides and chemical fertilizers on olive trees contributed substantially to the olive trees' mite diseases. Numerous mite species frequently affect olive trees worldwide; phytophagous mites had induced leaf, bud and fruit damage. This research work conducted an exploratory assessment of the mite fauna of olive trees, population prevalence composition and assessment of the mites in Aljouf region, Saudi Arabia. The mites were collected from olive orchards [olive trees (leaves, buds, fruits) and plants in its vicinity]. The current study recorded 21 species from 17 genera belonging to 9 families. Mite species gathered were classified based on their trophic group into three different groups: phytophagous mites eleven species, predaceous mites five species, and five species miscellaneous feeding habits, of the total number of mite species collected. In addition, the current work revealed that the eriophyid mite species were more prevalent of phytophagous mite species associated with olive aerial parts. On the other hand, the phytoseiid mite recorded represented more numerous species when compared with the other predaceous mite species. This information is required to support future agricultural programs in integrated pest management to obtain healthy agricultural products.

**Keywords:** *Olea europaea*, mite, predaceous, phytophagous, miscellaneous.





## **Multi-omic approaches boost basic knowledge and future applications of olive fruits, oils and by-products arising from alternative processing methods.**

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### **Abstract**

The olive tree is a fundamental basis of the economy of Mediterranean countries, and one of the most important crops particularly in Spain. In addition to the wide productivity of this plant, currently based in both the generation of olive oil and table olives, a high number of other secondary materials are generated nowadays by the olive industry. Some of them, particularly the olive seeds, display an extremely high potential for further applications including the generation of flours, oils, and isolated proteins and metabolites of nutritional and nutraceutical interest. We use a holistic approach to the analysis of the olive reproductive tissues and particularly these by-products, which serves us to analyze their biological relevance in the reproductive biology of the plant as well as to develop future applications and uses. In the case of olive seeds, we have determined their proximal composition, generated an annotated transcriptome, detailed their proteome, and identified most relevant metabolites present in their tissues. We have also characterized the histological characteristics of the seed tissues along their development, and localized a large number of specific proteins of interest by using immunocytochemical methods. Moreover, olive seed derivatives have been used as alimentary complements to feed several animal models including invertebrate (sea urchin), mouse and zebrafish. Protein extracts and isolated proteins have been used to test anti-inflammatory and anti-diabetic properties in both human cell cultures and ex vivo cultivated blood of patients subjected to oxidative and inflamma-

tory challenges. Finally, we have developed a number of molecular tools (antibodies, purified proteins, probes...) based on this knowledge, which will be used in the development of further biotechnological applications and to test the adaptive responses of the plant to different physiological situations.

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**Keywords:** animal models, by-products, antibodies, inflammation, localization, metabolites, nutraceuticals, oil, olive, proteins, seed, transcriptomics.





## The effect of bismuth on the mechanical and gamma attenuation properties of natural rubber/NBR blend for environmental and human radiation protection

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### Abstract

In this work, Nano silica loaded  $\text{Bi}_2\text{O}_3$  filled (0 - 45 phr part per hundred parts of rubber) natural rubber (NR)/Acrylonitrile Butadiene Rubber (NBR) blend composites have been prepared by using an ordinary standard rubber mixer. The mechanical properties such as hardens, tensile strength and elongation have been investigated. Gamma attenuation properties of the prepared samples at the different concentrations have been determined. Maximum tensile strength and elongation at break are obtained at 20 phr  $\text{Bi}_2\text{O}_3$  concentration. The measured values of the mass attenuation coefficient with increased  $\text{Bi}_2\text{O}_3$  concentration from 0 - 45 phr ranged from 0.083-0.090  $\text{cm}^2/\text{g}$  at 0.662MeV. Moreover, the neutron fast removal cross sections are also determined at different bismuth concentrations. Comparison between the attenuation parameters of the prepared composites and similar composites previously made in literature has been introduced. The obtained results of the gamma radiation attenuation along with those obtained for the mechanical parameters indicated that the prepared composites could be used for several radiation-protection applications.

**Keywords:** Natural Rubber, bismuth, sustainable natural material, Gamma shielding



## Comparative Study of Insect Succession Pattern and Decomposition Stages of Rabbit Carcasses Placed Around Olive Trees and Palm Trees

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### Abstract

The study of arthropods including insects accompany to the cadavers to solve criminal cases is called 'Forensic Entomology'. It plays very significant role in the estimation of Post-Mortem Interval (PMI). Decomposition process of a dead body is an uninterrupted procedure which starts at death point and terminate when the body is skeletonized. The current study was designed to identify forensic insects encountered in Al-jouf, Saudi Arabia, to determine succession pattern of forensic insects in each decomposition stage of rabbit cadaver to estimate the succession pattern of accompanied insects under two types of death and two different fruit trees. This study was conducted on 20 rabbits on a farm in Sakaka, Al-jouf region, Saudi Arabia. The experiments have been done between 20th November 2021, and 22nd December 2021. This study showed five decompositional stages starting with fresh stage, bloating stage, active decay stage, advanced decay stage and ending with dry stage, also, different colonization of insects species and duration of decomposing period. Furthermore, the incorporated entomofauna included three orders (Diptera, Coleroptera and Hymenoptera), represented by 9 families (Sarcophagidae, Calliphoridae, Muscidae, Drosophilidae, Tenebrionidae, Dermestidae, Coccinellidae, Histeridae, and Formicidae), and 13 species. Thirteen samples were identified morphologically and confirmed by molecular identification based on COI gene sequences.

**Keywords:** Forensic insects, entomology, decomposition stages, plantation, olive tree, palm tree, PMI, Aljouf, Saudi Arabia.





## Management of olive cultivation future irrigation process in water shortage environment: Application of biopolymer based soil conditioner hydrogel in sand soils

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### Abstract

The scarcity of water and the soil nature in Saudi Arabia represents a quite challenge to the sustainable development of national plans. Super absorbent hydrogels present a solution. In soil reclamation fields, the hydrogel is used for increasing the amount of available moisture in the root zone, thus implying longer intervals between irrigations and for improving soil physical properties which include water-holding pores, bulk density, porosity, structural stability, infiltration rate, and hydraulic conductivity. As a controlled-release formulation, the superabsorbent polymers can be also used for enhancing the absorption of nutrients by plants. The aim of this project is to develop superabsorbent hydrogels based on alginate for application in sandy soil reclamation as a soil conditioner and nutrient carrier for future olive cultivation. This goal will be achieved through the grafting of alginate biopolymers with hydrophilic polymers. Nutrient model compounds will be immobilized into the hydrogel crosslinked structure. The impact of the grafted alginate superabsorbent hydrogel on the properties of the cultivated olive trees and the reclamation sandy soil will be evaluated.

**Keywords:** Olive cultivation, irrigation management, sand soil, nutrients, soil conditioners



## **Nano-Graphene Oxide: A novel material for consolidation of Mud Mortar The Palace of Al-Juhfa Saudi Arabia: Case Study**

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### **Abstract**

The existing study focuses on an important type of the early Islamic architecture the palace of al-Juhfa is located in the site of al-Juhfa about 187 km northwest of the Holy City of Mecca in Saudi Arabia. The palace dates back to the early Umayyad period during the reign of the founder of the Umayyad state, Caliph Muawiyah bin Abi Sufyan (41-60/661-680). All the materials in this palace were built from the black basalt blocks and mud mortar as a binder. Mud mortar are one of our ancestors precious legacies; however, they face chance factors of deterioration from harsh weather, which caused mud mortar decay and mechanical properties reduction which need to be urgently consolidation. Nowadays, nanotechnology provides advanced concept and new materials for the protection of mud mortar. In this study, a novel method for the consolidation of mud mortar was proposed with graphene Oxide nanomaterial. Mud mortar were investigated, characterized by using different techniques and methods such as; Scanning Electron Microscopy (SEM-EDX), Polarized Microscopy (PLM), X-ray Fluorescence (XRF), X-ray diffraction (XRD) and mechanical properties. The results referred that graphene Oxide nanomaterial has enhanced the mechanical properties of mud mortar.

**Keywords:** Mud mortar, graphene Oxide, palace of al-Juhfa, deterioration, Consolidation



## **A biochemical and physiological study of three olive cultivars and their gene expression under drought stress**

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### **Abstract**

Olive (*Olea europaea* L.) is one of the important horticultural crops in Saudi Arabia. It is traditionally cultivated in dry farming or high-water demanding irrigated orchards. Drought stress is among the most severe threats jeopardizing the economic yield of Olive. In particular, in response to withholding irrigation, the reduction in performance and quality of a precious plant such as the olive tree is remarkable. Therefore, the selection of cultivars that are tolerant to drought has been recognized as one of the most effective long-term strategies for sustainably alleviating the adverse effects of this stress. In this view, our study evaluated the response of three olive cultivars (Manzanillo, Eggizi, and Tofaahi) to water shortage. A factorial pot experiment was conducted in greenhouse conditions using a completely randomized design during two seasons, 2021 and 2022. Olive seedlings underwent three levels of irrigation treatment, including 100% full irrigation (control), 75%, and 50% deficit irrigation. Physiological, biochemical, and leaf anatomical parameters such as seedling length, shoot length, number of leaves, number of branches, root length, number of roots, moisture content, leaf area cm<sup>2</sup>, N %, P%, K%, and proline content were measured. Furthermore, molecular analysis was studied through gene expression analysis for three genes: OeDREB, OeDHN, and OeCAT. Our results exhibited considerable genotypic differences among the studied cultivars. In this regard, most studied parameters were reduced by increasing water stress, while water stress-induced increasing proline content. In contrast, full irrigation led to an increase in all the studied parameters. At the same time, the Tofaahi cultivar showed the highest values for most of the studied parameters under 50% and 75% irrigation regimes. Leaf anatomical parameters showed drought stress

increased the upper epidermis and palisade mesophyll thickness. These changes were more characteristic in cv. Tofaahi leaves also revealed a lower specific leaf area. In the same context, the relative expression of OeDREB, OeDHN, and OeCAT genes were higher in Tofaahi cultivar than in other genotypes under 75% and 50% deficit irrigation. Our study showed that Tofaahi cultivar had the best adaptive physio-biochemical and molecular mechanisms to cope with the detrimental effects of drought stress. In addition, these data represent an essential contribution to further understanding how dry-farming olives will cope with drought episodes.

**Keywords:** Olive; Drought stress; biochemical and physiological traits; gene expression







## Optimizing pruning Intensity for olive Production under Pothwar agro-climatic condition of Pakistan

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### Abstract

Olive cultivation in Pakistan is at a fast pace but unfortunately, no scientific study about standard pruning practices was carried out. The aim of the study was to determine how the type and degree of pruning affect the physiological and phenological traits ultimately verifying the effect on productivity and quality attributes. Four pruning treatments regarding severity i.e. control, 15 %, 30%, 45%, with the method of branch removal were applied. All the treatments depicted significant results regarding fruit set percentage, fruit weight, fruit yield, oil contents, oil quality, and physiological activities. Maximum fruit set %age, yield per plant, net photosynthetic activity, and respiration rate were found under 30 % pruning while maximum oil percentage was recorded under the 45% pruning intensities. Oleic acid was found in the decreasing trend with the increase of pruning severity. A high level of acidity was observed in the control treatment. Un-pruned plants ranked at the bottom while 30% were found at the top followed by 15% pruning intensity in the majority of quality and productivity parameters.

**Keywords:** Olive, Pruning, Photosynthetic, Pakistan, Pothwar



## Olive oil volatile compounds used as a marker for Spanish and Tunisian extra virgin olive oil: potential and applications

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### Abstract

There has been a growing trend of the international olive oil market toward quality, authenticity and diversity of products over the last decade. This comes with an increasing awareness about consuming high quality olive oils and its benefits. Actually, volatile compounds are among the most important molecules that define the olive oil aroma and flavor profile and thus consumer's acceptability. It's adverse set of components with a low molecular weight contained in the minor fraction such as aldehydes (hexanal, (Z)-hex-3-enal, (E)-hex-2-enal), alcohols (hexanol, (Z)-hex-3-enol, (Z)-hex-2-enol), acetyl esters (hexyl acetate, (Z)-hex-3-enyl acetate), hydrocarbons, ketones, furans and sesquiterpene that can be assessed in order to determine olive oil authenticity and traceability. The lipoxygenase (LOX) pathway involves many enzymes catalyzing a cascade of reactions: the acyl hydrolase (AH), the lipoxygenase (LOX), the hydroperoxydelyase (HPL), the alcohol dehydrogenase (ADH) and the alcohol acetyl transferase (AAT). Based on the precursors of the lipoxygenase pathway reactions -notably the linoleic acid (LA) and linolenic acids (LnA)-, this study aimed at identifying the volatile profiles obtained in 5 different extra virgin olive oils from Tunisia and Spain using gas chromatography-mass spectrometry. Results showed a diversity of volatiles composition among the analyzed samples confirming the potential of this method for tracing extra virgin olive oil. Noticeably, all volatile compounds (including the dominant ones), showed divergences between Spanish and Tunisian olive oils. These compounds were associated with their natural occurrence according to literature showing a huge potential of application for olive oil authenticity, food uses and traceability.

**Keywords:** Olive oil; volatiles; identification; traceability





## **Comparative study of the agronomic behavior of Arbequina and Arbosana varieties grown under high density planting system in Saudi Arabia and Tunisia.**

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### **Abstract**

Super high-density (SHD) olive orchard is considered as the main olive production system in Saudi Arabia with a surface of 15000 ha among 42000 ha, while in Tunisia it covers only 7500 ha among 2 millions of ha of olive growing. The same varieties are used in both countries in SHD olive orchards, mainly Arbequina, Arbosana and to less extent Koroneiki. The aim of this work is to compare the behavior of Arbequina and Arbosana planted at a density of 1666 trees ha<sup>-1</sup> in two commercial orchards located in Saudi Arabia (Aljouf region) and Tunisia (Zaghouan region). Currently, both olive orchards are 12 years old. Over nine years we have evaluated the performance of Arbequina and Arbosana varieties. Results obtained here indicate that accumulated olive yield after 9 harvests of Arbequina and Arbosana are similar in both locations. Indeed, total olive yield per tree for Arbequina was about 76 Kg and 75 Kg per tree in Tunisia and Saudi Arabia, respectively while for Arbosana it was about 66.6 and 72.4 Kg in Tunisia and Saudi Arabia, respectively. Contrary to olive yield per tree, the alternate bearing index was higher in Saudi Arabia in comparison to Tunisia as it was approximately about 0.48 and 0.56 for Arbequina and Arbosana in Saudi Arabia while in Tunisia it was around 0.13 and 0.31 for the same varieties. The highest alternate bearing index observed in Saudi Arabia is mainly due to the winter frost wave that took place during December 2016 and January 2017. This winter frost caused severe damage to productive structure and even main branches which required the application of severe pruning to renovate the trees. In addition, we note that the alternate bearing index



during the last three years increased significantly for both varieties in Saudi Arabia and in Arbosana variety in Tunisia. The highest alternate bearing in Saudi Arabia during the last years could be explained by the higher vigor of these varieties and to the saline water used for irrigation in Tunisia, as Arbosana is very sensitive to salinity. Indeed, the canopy volume of Arbequina and Arbosana were higher for Arbequina and Arbosana in Saudi Arabia as compared to Tunisia. It must be pointed out that canopy volume and TCSA was significantly higher for Arbequina in both locations in comparison with Arbosana.

**Keywords:** SHD olive planting system, Canopy volume, TCSA, alternate bearing index





## Can supplementary potassium and calcium improves stomatal, photochemistry and end-product down co-regulation in salt-stressed olive?

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### Abstract

Global climate change threatens plant growth, food security and soils through direct impacts (increasing drought and salinity) and indirect impacts (installation of minerals deficiencies). Hence, Olive (*Olea europaea* L.), an important fruit-tree crop species widely distributed in marginal lands of the Mediterranean basin, is usually exposed to excess soil salinity concentrations. The objective of this study was to assess the effects of potassium (K) and calcium (Ca) application on the physiological and biochemical behavior of two-year-old potted olive plants grown under greenhouse conditions using two salinity levels (100 and 200 mM NaCl). Results showed that salinity treatments significantly decreased photosynthetic assimilation rate ( $P_n$ ) and stomatal conductance ( $G_s$ ). In addition, salinity decreased the maximal and the quantum yield of photosystem II ( $F_v/F_m$  &  $\Phi_{PSII}$ ) compared to the control plants, this effect was accompanied by a decrease of photochemical quenching ( $q_P$ ) and an increasing of the energy fraction dissipated in non-photochemical pathways (NPQ). Moreover, salinity increased concentrations of proline as well as soluble sugars in leaves. Addition of K and Ca to both salinity doses markedly increased photosynthetic parameters, PSII yields, and photochemical transfer of energy. That was accompanied by a decrease of non-photochemical dissipation and proline and soluble sugars concentrations. These results showed that addition of K and Ca alleviate salinity effects on photosynthetic and proline and soluble sugars synthesis. This approach could form a potential technique to improve olive production under salinity conditions and contribute to efforts of climate change adaptation.

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**Keywords:** Salinity, olive trees, Photosynthesis, proline, soluble sugars, PSII efficiency

## Olive tree dieback diseases and prevention strategy against *Xylella fastidiosa* in the MENA region

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### Abstract

Like in many Mediterranean countries, olive tree is of great importance in Tunisia. However, due to the changes in the olive cultivation practices and horticultural techniques, a syndrome of dieback, wilt and death of young olive plantations has frequently occurred in the main olive growing regions of Tunisia. The disease is characterized by rapid dieback of shoots, twigs and branches followed by death of the entire tree. In fact, previous studies of the disease etiology based on pathogenicity tests, revealed the involvement of some branch and soil-borne pathogens in the occurrence of olive dieback and death in many olive groves. However, it was recently shown that the decline and death of the olive tree is not only caused by phytopathogenic fungi but also by bacteria such as *Xylella fastidiosa*. It represents a real threat for all the Mediterranean countries, where olive is extensively grown. Following the detection of *X. fastidiosa* in olive trees in Apulia in 2013, the bacteria spread progressively to southeastern of France in 2015, Spain in 2016 and Portugal in 2018. Prevention measures such as the program launched by the FAO are seen as imperative to prevent the potential spread of *X. fastidiosa* to other regions of the world. In this context, a technical cooperation program has been launched by the United Nations Food and Agriculture Organization (FAO) in order to improve the technical capacity of local institutions and farmers and raise awareness on how to prevent the spread of *X. fastidiosa* through early detection, diagnosis, monitoring, and phytosanitary measures. It began in response to requests by the governments of the seven target countries, which include Algeria, Egypt, Lebanon, Libya, Morocco, Palestine and Tunisia.





Following the success of the FAO-IPPC-CIHEAM initiative, a second international workshop was jointly organized by the International Olive Council (IOC) and the CIHEAM in 2016. It was aimed at developing capacity and raising awareness on the threat of *X. fastidiosa* for the safeguard of olive trees worldwide. In fact, the major outcomes of the meeting emphasize that no treatment solutions are currently applicable for pathogen elimination in the open field; however, specific treatments for the control or mitigation of the pathogen/disease in olive trees and the evaluation of tolerance/resistance of olive cultivars are under investigation. On other hand, the certification of plant propagating material of olive and ornamental host plants should be mandatory for *X. fastidiosa*. Finally, International organizations and institutions dealing with this emergency should strengthen the cooperation for combating *X. fastidiosa* worldwide.

**Keywords:** olive tree, dieback, *Xylella fastidiosa*, detection, monitoring.



## **Synthesis and characterization of biodiesel from olive waste oil using cerium cobalt nickel ferrite as heterogonous base catalyst**

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### **Abstract**

The purpose of this paper is to synthesize and characterize environmentally friendly biodiesel from olive cake utilizing cerium cobalt nickel ferrite as a heterogonous base catalyst. By using several techniques like FT-IR, XRD, SEM, surface area, and XPS, the produced catalyst was characterized. Time, the methanol to oil ratio, temperature, and catalyst concentration were the various elements that affected the transesterification reaction and were optimized using RSM statistical design. Different methods, including FT-IR, HNMR, Kinematic viscosity, density, and GC-MS, were used to characterize the produced biodiesel. Cetane index and calorific value were used to analyze the fuel characteristics of the produced biodiesel. The physical, chemical, and fuel properties of the manufactured biodiesel were compared to those of fossil diesel. When used as a substitute for fossil fuel, the created biodiesel adds value.

**Keywords:** Biodiesel, Olive waste, Response surface Methodology, Calorific value





## Surface Characteristics and Structural Properties of Irradiated Flexible Nanocomposite Films

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### Abstract

The present work aimed to studying the induced surface modification on flexible polymeric nanocomposite films using low energy beam for enhancing the performance of polymeric films. X-ray Diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, and scanning electron microscopy (SEM) were used to analyze the films. While FTIR peaks show inorganic nanoparticles bonded to the polymer chains, the XRD confirmed the successful synthesis of the polymeric composite films. The SEM pictures showed that the inorganic nanofiller had been evenly loaded and dispersed throughout the polymeric layer. The Tauc's formula was used to determine the bandgap, absorption edge, and Urbach energies of pure and ion-exposed films. The improved structural and linear/nonlinear optical properties of the irradiated samples made them appropriate for application in optoelectronics

**Keywords:** Polymer films, Structural, Surface properties, Ion irradiation, Optoelectronics

## Influence of Nanoparticles on the Dielectric Properties of Flexible Polymeric Films

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### Abstract

Herein, we report on the fabrication of flexible polymeric nanocomposite films to study the synergistic effects of inorganic nanofiller for enhancing the performance of polymeric films. The frequency range of 100 Hz to 5 MHz has been used to test the conductivity, permittivity, electric modulus, impedance, and energy density efficiency of the polymer and composite films. X-ray Diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, and scanning electron microscopy (SEM) are used to characterize the films. While FTIR peaks show inorganic nanoparticles bonded to the polymer chains, X-ray diffraction (XRD) has validated the successful synthesis of the polymeric composite films. The polymeric film has been loaded and dispersed with inorganic nanofiller in a homogenous manner, according to pictures from a scanning electron microscope (SEM). These findings pave the way for using flexible films in a variety of settings, including energy storage and battery technology.

**Keywords:** Nanocomposite, Dielectric properties, Energy storage applications



## Impact of climate parameters on floral phenology and on the chronological pollen emission of the olive tree (*Olea europaea* L.) in Tunisia and KSA.

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### Abstract

The olive tree is a species characterised by its plasticity under various environmental conditions. The objective of this study is to show that olive cultivars change their phenological behaviour according to climate parameters. To reach this goal, we selected two commercial olive orchards in KSA (JADCO) and Tunisia (SDA Zitouna) planted with the same varieties Arbequina and Arbosana. Both orchards are 12 years old. We have determined the amount of chilling and heat required for flowering. For that, seven models were used to determine the chilling units, and heat requirement has been determined by 6 models to select the most appropriate chilling and heating models for each country. The requirement of the chilling units began from November 1st until the end of March. However, for the heat, we selected the day following the chilling peak day of each year as the start of heat units until the start of flowering. The choice of the most appropriate models was selected on the basis of the smallest difference between the RMSE. Results showed that the most reliable chilling and heat models for bloom differ between both countries. Indeed, in Saudi Arabia, the dynamic model combined with the GDD or HU model was satisfactory in predicting flowering dates for both cultivars, whereas in Tunisia it was rather the Low model combined with GDD or the Dynamics model combined with HU that satisfied and showed the best RMSE. However, the threshold temperature showed a considerable difference between the two regions. The Threshold temperature in KSA is 11°C, while in Tunisia it is 13°C. Our results show that both cultivars Arbequina and Arbosana have the same needs of heat degree regardless of the growing region and that the chronology of the appear-

ance of production structures varies according to the climatic resources available in each region.

**Keywords:** Chilling, Heat, Threshold temperature, bloom, Forecast, Olive cultivar





## Thermal fluctuation induced alterations in spinosad susceptibility and heat stress genes expression of *Bacterocera oleae*

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### Abstract

Olive fruit fly, *Bacterocera oleae*, is the key pest and biotic stressor of cultivated olive trees in several areas of the world. Alternative approaches are needed in the control of olive fruit fly instead the heavy use of chemicals. Among these approaches, studying the impacts of thermal tolerance and temperature fluctuations resulting from climate change on the olive fruit fly are critical in order to achieve sustainable control methods and improving control protocols. This research aimed to determine the effect of different levels of temperature in combination with spinosad on its susceptibility and heat stress genes. Data showed a significant interaction effect between temperature and biological aspects of *B. oleae* and altered expression of Cytochrome P450, heat shock transcription factor, heat shock and (Hsp70 and Hsp90) anti-freeze proteins. It can be concluded that temperature fluctuation resulted from climate changes negatively impacted the response of *B. oleae* to insecticides and consequently lowering its efficiency.

**Keywords:** *Bacterocera oleae*, Cytochrome P450, heat shock proteins, anti-freeze proteins, spinosad, climate change



## Occurrence pattern of macro-invertebrate Fauna of Mangrove Ecosystem in South Sinai, Egypt

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### Abstract

A field survey was carried out on the macro-invertebrate fauna of the mangrove ecosystem in Ras Mohamed and Nabq Protectorates in South Sinai, Egypt, during the period from June 2013 to May 2014. The studied area of Nabq known as Wadi-Kid, it has four sites of mangrove: El-Gharqana, Arwashia, El-Manqata and Abu Zubad. A total of 29087 specimens of all species were recorded from the different sites during this study. Out of them 21910 specimens (75.3%) were Mollusca, 6792 specimens (23.3%) were Crustacea, 257 specimens (0.9%) were Cnidaria and 128 specimens (0.5%) were Echinodermata. The macro-invertebrate groups exhibited marked seasonal variations in their occurrence in the mangrove sites at Ras Mohamed and Nabq Protectorates. The species richness of macro-invertebrate species in different seasons was recorded in mangrove sites of Ras Mohamed and Nabq Protectorates. Some groups exhibited clear zonation in distribution, others were just visitors but the majority was resident in the mangrove.

**Keywords:** Macro-invertebrates, Mangrove, Zonation





## Economics of olive production in Al-Jouf area, Saudi Arabia

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### Abstract

The research aimed to study the economics of olive production in Al-Jouf area, Saudi Arabia, and to demonstrate the feasibility of investing in olive cultivation. The study is based on field data collection from a sample of 3 specialized companies in olive production during the agricultural year 2022. Analysis of collected data revealed that the production of olives in Al-Jouf area represents 77.7% of the total olive production in Saudi Arabia. The area cultivated with olives in the three companies was 10.3 thousand hectares, producing about 53 thousand tons and representing a fifth of the total olive production in Al-Jouf area. The method of olive cultivation varied between intensive cultivations (211 trees/hectare) with an area of 4.6 thousand hectares, representing 44.7% of the total area, and high-density cultivations (1667 trees/hectare) with an area of 5.7 thousand hectares, representing 55.3% of the total area of olives in the studied sample. The average productivity of a hectare was about 7.8 tons and 1.8 tons and the tree productivity was about 4.5 kg and 8.7 kg in the high-density and intensive cultivations, respectively. The average water productivity was about 1.3 kg/m<sup>3</sup>, and the estimated water yield was 4.8 SAR/m<sup>3</sup>. The estimated costs of producing a ton of olives were 2.4 thousand SAR, of which fixed costs represent about 20.4% and variable costs about 79.6%. The net return from high-density olive cultivations amounted to about 10.2 thousand SAR/hectare (1.3 thousand SAR/ton), and the product margin was 35.4%. The internal rate of return was about 10.36%, and the payback period was about 9.7 years. The research results demonstrate the feasibility of investing in olive cultivation



and the high return of the water unit and recommend the expansion of olive cultivation.

**Keywords:** Economics, olive production, Al-Jouf area





## Effect of BT-MAX on the content of total polyphenols in different olive cultivars

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### Abstract

BT-MAX is an organic fertilizer with a special composition of Zn, Mn, and Cu were applied at different concentration (0.1% to 0.55%) on olive farms of the Picual and Arbequina cultivars. BT-MAX fertilization was carried out 50 days after the start of flowering and for 170 days. In this investigation, we have found the following: an increment in the content of total polyphenols in the fruit, an increase in the oleuropein content for both olive cultivars, and an increase in the antioxidant activity of the derived virgin oil. The investigation was performed mainly by Jouf University, and funded by a joint project with the Universities of Granada and Cordoba

**Keywords:** BT-MAX, olive cultivars, polyphenols, oleuropein

## The apprise of the olive oil and glycerin oil on the clinical performance of acrylic resins denture base

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### Abstract

Separating media are materials used for filling porous surface to effect easy separation of other materials which are later poured against them. Separating media is a coating applied to a surface and serving to prevent a second surface from adhering to the first. However, glycerin oil and vaseline were used as a separating medium for acrylic prosthesis. Major limitations of such separating materials include porosity in the fabricated acrylic dentures. Hence the current study aimed to estimate the necessary effect of olive oil and glycerin oil as a separating medium on the porosity of both (heat and cold) cured acrylic resins denture base. In total 60 semi square stainless steel plate with dimensions of (65 x 62 x 64 x 61 mm), with (3 mm) thickness according to (ADA specification No.12) were constructed. Each experimental group consisted of three sub-groups: G1) olive oil, G2) glycerin oil, and G3) tin foil. The separating medium such as tin-foil was adapted to the stone surface in each half of the flask, with fingers, while, in case of olive oil and glycerin oil the separating medium was measured by using a disposable syringe and applied onto the stone surface in the flask, with a fine brush. The amount of porosity of specimens was determined by immersing them in black ink and counting the pores under a microscope. The results revealed that the cold cure acrylic specimens in general showed more porosity than heat-cure acrylic specimens, and the tin-foil is the best separating medium concerning porosity in heat and cold-cure acrylic specimens, while the porosity are comparable in both olive oil and glycerin lined specimens of heat and cold-cure acrylic. Hence, it was concluded from this study that olive oil can be safely used as a separating medium for processing acrylic denture base resins.

**Keywords:** Olive oil; Separating media; Acrylic resin; Denture base





## Activity assessment of Clove Essential oil and Lemon leaves extract as sustainable sources in bio-pollution treatment against fungi and Parasite associated with Pet-Birds

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### Abstract

Recently, plant essential oil (Eos) has been shown to protect plants from both abiotic and biotic attacks. This research aims to isolate, and identification of pathogenic fungi present in two types of Pet birds. Also, study the possibility of using natural, environmentally friendly, and cheap products as a sanitizer to eliminate the spreading of these fungi. Samples were isolated from birds found in houses selling birds and studied the effect of Clove Essential oil (CEO) and Lemon leaves extracts against isolated fungi. Results showed a variation in numbers and percentages of isolated fungi. *Penicillium glabrum* was the most common fungus in birds, its percentage of isolates is 39.5% while the lowest one is *Alternaria alternate* represents 4% in *Melopsittacus undulates* and *Serinus canaria*, *Aspergillus niger* is the lowest percentage of isolates (1.5%). Antifungal activity of CEO and Lemon leaves extract were tested against isolated fungi in different concentrations ranging from 5 mg/ml to 25 mg/ml. In addition, CEO had high antifungal efficiency compared to Lemon leaves extract, where 20 mg/ml of CEO highly inhibited fungi growth (70.6%), while lemon leaves extract had a moderate effect (41.2%). Mite infestation is one of the commonly encountered ectoparasite infestations in pet and wild birds causing itching and discomfort and, on several



occasions, associated with a secondary bacterial infection. Also *Isospora serinus* n. sp. is described from a single domestic canary *Serinus canaria* forma was recorded with varied percentages.

**Keywords:** Antifungal efficiency; Clove oil; Lemon leaves extract; Pet birds.



## Antimicrobial and antiparasitic activities of biogenic silver nanoparticles synthesized via recycled olive leaf extract

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### Abstract

The present study demonstrates the facile green synthetic approach for the preparation of silver nanoparticles (Ag-olive) using silver nitrate and aqueous olive leaf extract as precursors. The calcination of Ag-olive at 500 °C led the production of pure Ag (Ag-pure) nanoparticles. The synthesized nanoparticles were characterized by various physicochemical techniques such as Thermal gravimetric analysis (TGA), Infrared spectra (FT-IR), Absorption spectra (UV-Vis), X-ray diffraction (XRD), Scanning electron microscopy (SEM) equipped with Energy dispersive X-ray analysis (EDX) and Transmission electron microscopy (TEM). In this investigation for the first time the in vitro antiparasitic activity of Ag-NPs against adult ticks (*Hyalomma dromedarii*) (Acari: Ixodidae) was assessed. Furthermore, the antimicrobial activity was evaluated against Gram positive bacterial strains *Bacillus subtilis* and Gram negative *Pseudomonas aeruginosa*, whereas, the tested fungal strains were *Aspergillus niger* and *Candida albicans*. In both an-

tiparasitic and antimicrobial tests, the as-synthesized Ag-olive outperformed Ag-pure and olive leaf extract. The findings of this research show that Ag-olive might be a potential future antiparasitic and antibacterial material.

**Keywords:** Silver Nanoparticles, Olea europaea, Optimization, Characterization, Antiparasitic, Antimicrobial.





## Structural and functional characteristics of stress-tolerant root-associated microbiome of field-grown olive trees in Al Jouf, Saudi Arabia

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### Abstract

The development of sustainable approaches to improve agricultural productivity without expanding the cultivable land area has become a challenge to ensure food security. One possible mean to achieve this goal is the use of plant growth-promoting bacteria (PGPB) as biological inputs. However, the use of such beneficial root-associated bacteria as an inoculant to improve olive production under arid region conditions requires careful selection of isolates with multiple plant growth-promoting (PGP) capabilities as well as heat and salt-tolerance characteristics. A collection of 255 bacteria originating from the roots microbiome of 5 different olive cultivars grown under organic management practices in Aljuof region, Saudi Arabia was screened for several PGP traits, heat and salt tolerance activities. Results indicated that traits such as indole-3-acetic acid (IAA) synthesis, ammonia production and nitrogen fixation are common among our culture collection. Phosphate solubilization activity was detected in 105 isolates. Additionally, 46 and 37 bacterial isolates in our collection were able to tolerate salt and heat stresses, respectively. 16S rRNA gene sequencing of smaller subset (n=92) of the isolates that were positive for multiple PGP traits belonged predominantly to the genera *Pseudomonas*, *Bacillus*, *Arthrobacter*, and *Paenarthrobacter*. Organically managed olive orchards are the potential habitat for such bacterial isolated which can promote growth of host plants directly or indirectly. This culture collection of diverse bacteria with multiple PGP traits represents a valuable resource for future use as bio-fertilizers for olive crops grown under arid conditions.

**Keywords:** Root-associated; Microbiome; Characteristics; Olive trees; Al Jouf



## Evaluation of the pathogenicity of fungal aerospora distributed in female students classrooms

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### Abstract

**Background:** It has been reported that the air quality inside the classroom is one of the essential factors that impact the health of people. Crowded classrooms are generally considered a proper environment to spread fungi, thus infested air carries many microbes that may pose a threat to human health. The current study aimed to isolate and identify indoor air fungi distributed in classrooms and the pathogenicity of the predominant fungus was assessed. **Methods:** Eleven fungal species belonging to 7 genera were isolated in pure cultures from 12 classrooms and identified. Essential oils (camphor, mint, basil, lavender, rose and lemon) were used to get rid of the most isolated fungus; *Trichoderma longibrachiatum* fungal spores. Oral administration of 50 mg/kg of *Trichoderma longibrachiatum* for 14 days was carried out to assess its pathogenicity on rabbit's hematological, biochemical as well as histopathological aspects. **Results:** *Aspergillus flavus* (JU-F 0045), *Aspergillus niger* (JU-F 0046), *Aspergillus terreus* (JU-F 0047), *Cladosporium cladosporioides* (JU-F 0048), *Penicillium frequentus* (JU-F 0049), *Penicillium purporogenum* (JU-F 0050), *Paecilomyces lilacinus* (JU-F 0051), *Paecilomyces variotii* (JU-F 0052), *Rhizopus stolonifera* (JU-F 0053), *Trichoderma longibrachiatum* (JU-F 0054) and *Ulocladium* sp. (JU-F 0056) were isolated from 12 classrooms. Air drenched with each of camphor and mint oil suppressed *Trichoderma longibrachiatum* growth by 100% as compared to the control. While, basil, lavender, rose and lemon oil did







not show any antifungal activity. *Trichoderma longibrachiatum* oral administration induced a significant decrease in RBCs count, Hb concentration, MCV and MCH values. A remarkable reduction of WBCs count and Neutrophil were also observed. Moreover, *Trichoderma longibrachiatum* induced a significant elevation of hepatic biomarkers (ALT and AST), No variations were noticed in the values of albumin, LDH activity and Creatinine. Histopathological assay revealed a hepatic and pulmonary deterioration subsequently to *Trichoderma longibrachiatum* administration.

**Keywords:** indoor fungi; essential oil; *Trichoderma longibrachiatum*, pathogenicity.



## Protective effect of olive oil against the aluminum-induced brain damage in mice

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### Abstract

Aluminum (Al) is one of the abundant elements on the earth and considered as a neurotoxic metal. Olive oil consumption revealed many protective effects in different diseased conditions. Therefore, we hypothesized that olive oil might protect against the Al-induced brain damage. In order to study this hypothesis, this study investigated the potential neuroprotective effect of different doses of olive oil against aluminum trichloride ( $\text{AlCl}_3$ )-induced brain damage in Alzheimer's disease (AD) mice model. Mice were grouped as follows: control; olive oil-treated group (OL);  $\text{AlCl}_3$ -exposed group (AD model); low dose of olive oil +  $\text{AlCl}_3$ -treated group (OLL+ $\text{AlCl}_3$ ); and high dose of olive oil +  $\text{AlCl}_3$ -treated group (OLH+ $\text{AlCl}_3$ ). Olive oil counteracted the  $\text{AlCl}_3$ -induced changes in the oxidative molecules (malondialdehyde and nitric oxide) and antioxidative enzymatic activities. Also, olive oil restored the pro-inflammatory cytokines (tumor necrosis factor- $\alpha$ , interleukin- $1\beta$ , and interleukin 6) to their normal levels and downregulated the mRNA expression of the glial fibrillary acidic protein, showing their inhibitory effect on the neuroinflammation. In addition, Olive oil reduced the  $\text{AlCl}_3$ -induced neuronal apoptosis, as indicated by a reduction in the pro-apoptotic Bax and caspase-3 levels, and an elevation of the anti-apoptotic Bcl-2 level. Moreover, olive oil could modulate the Al-induced changes in the neurotransmitters' levels including norepinephrine, acetylcholinesterase, dopamine, and 5-hydroxytryptamine. This data concluded the neuroprotective activity of olive oil, by their antioxidant, anti-inflammatory, and anti-apoptotic effects, along with their effect on the neurotransmitters' modulation. Olive oil exhibited its neuroprotective effect in a dose-dependent manner, suggesting its potential as a supplementation in treating the neural diseases such as AD.

**Keywords:** olive oil; Aluminum; Alzheimer's; oxidative; neuroinflammation; apoptosis; neurotransmitter; neuroprotection.





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