



Book of Abstracts

1st National Seminar 2026

Science, Knowledge, and Valorization of Natural Resources:
In Light of Digital Transformation and Scientific Innovation

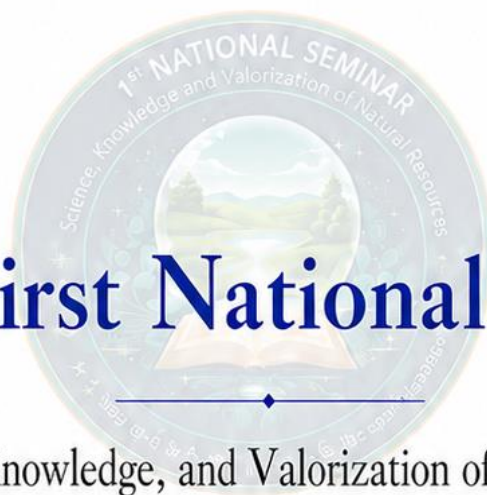
22-23 June 2026, Bordj Bou Arreridj, Algeria



Faculty of Nature and Life Sciences
and Earth and Universe Sciences



Laboratory of Characterization and
Valorization of Natural Resources



The First National Seminar

On Science, Knowledge, and Valorization of Natural Resources:
In Light of Digital Transformation and Scientific Innovation
(SKVNR-DTSI 2026)

22-23 June 2026, Bordj Bou Arreridj, Algeria

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Preamble

In recent times, growing demand for natural resources, along with climate change and ecosystem degradation, highlights the urgent need for multidisciplinary approaches that integrate fundamental and applied sciences with innovative solutions. Interdisciplinary research is essential for advancing our understanding of biological processes, enhancing biotechnology, improving plant and animal health, developing renewable energy solutions, and promoting sustainable management of natural resources. Progress depends on a combination of laboratory studies, computational modeling, and field applications to generate evidence-based, practical, and scalable solutions. This seminar is organized as an academic platform bringing together researchers, academics, experts, and socio-economic actors to present recent scientific advances, exchange expertise, foster interdisciplinary research collaboration, and promote knowledge and technology transfer. The seminar further aims to stimulate high-level scientific dialogue on how innovation and digital transformation can support natural resource valorization and sustainable development, contributing to the design of future-oriented strategies grounded in science, knowledge, and strong national research partnerships.

Objective

The seminar aims to promote scientific research that ensures the sustainable valorization of natural resources, delivering both ecological and social benefits. It seeks to define priority action lines that integrate the principles of sustainable development while exploiting resources responsibly. By supporting interdisciplinary research and fostering innovation in biology, biotechnology, plant and animal health, and ecology, the initiative enhances production efficiency, optimizes resource use, and strengthens national resilience to climate and environmental challenges.

The seminar provides an institutional framework to advance research valorization, strengthen cooperation between higher education institutions, research centers, and economic stakeholders, and facilitate technology transfer, thereby contributing to a knowledge-based economy, sustainable socio-economic development, and the achievement of food and environmental security.

Program Overview

	22 June 2026	23 June 2026
Morning	Opening Welcoming and Registration of Attendees Opening Ceremony Plenary lectures	Session 1 : Biological and therapeutic properties of natural products (<i>in vitro</i>, <i>in silico</i>, <i>in vivo</i>) Session 2 : Biotechnologies, innovation and sustainable improvement of production systems Session 4 : Ecology, environment and sustainable management of natural resources Session 5 : Food sciences and technologies for food security
Afternoon	Session 1 : Biological and therapeutic properties of natural products (<i>in vitro</i>, <i>in silico</i>, <i>in vivo</i>) Session 3 : Plant and animal health Session 4 : Ecology, environment and sustainable management of natural resources	



The 1st National Seminar 2026

Faculty of Nature and Life Sciences and Earth and Universe Sciences. University of Mohamed El Bachir El Ibrahimi, Bordj Bou Arreridj

SKVNR-DTSI 2026 Program

Day 1 - June 22, 2026	
08:00 – 09:30	- Welcoming and Registration of Attendees - Welcome Speech by the Chair of the Seminar : Prof. Abdelouahab BENTABET - Welcome Speech by the Head of the LCVRN : Prof. Riad AYECHÉ - Welcome Speech by the Dean of the Faculty SNV-STU : Prof. Tahar BOUBELLOUTA - Welcome speech by the Rector of the University of Bordj Bou Arreridj : Prof. Ali BOUKAROURA

Time	Speakers	Titles
Conference Chair (Auditorium)		
09:40 – 10:00	Abdelouahab BENTABET	الحياة والطبيعة وتأمين الموارد الطبيعية في ظل النظريات العلمية الحديثة: الجزء 1 Life and nature and the valorization of natural resources in the light of modern scientific theories : Part 1
10:00 – 10:30	Coffee Break / Poster Session 1	
Plenary Lectures (Auditorium)		
10:30 – 11:00	Djebbar ATMANI, Dina KILANI, Souad KASMI, Naima SAIDENE, Kenza MOULAOU, Nassima CHAHER	Medicinal plants in human history: From ancestral use to modern scientific knowledge
11:00 – 11:30	Abdelkader BENBELKACEM, Salvatore CECCARELLI, Salama El FATEHI, Sourour AYED, Silvia FOLLONI, Gianni GALAVERNA, Laura GAZZA	Adapting new perennial grains: A step toward climate resilience in mediterranean region
11:30 – 12:00	Nabil BENAZI	Comparison of the evolutionary phylogenetic of Delta and Omicron variants of SARS-CoV- 2
12:00 – 14:00	Lunch Break	
Topic 1	Conference Room 2	
14:00 – 14:15	Dina ATMANI-KILANI, Djebbar ATMANI, Malika BENLOUKIL, Naima SAIDENE	Exploring for the presence of saponins in <i>Clematis flammula</i> extracts by using TLC and phytochemical screening
14:15 – 14:30	Bachra KHETTAL	Biocapteurs analytiques à base de substances naturelles : Nouvelles approches de valorisation
14:30 – 14:45	Widad FATMI, Abba HARICHE, Ismahene BOUDERBALA	α -amylase inhibitory activity of phenolic compounds from <i>Corchorus olitorius</i> L. leaves.
15:00 – 15:30	Coffee Break / Poster Session 2	
15:30 – 15:45	Nacim BARACHE, Liza OUARABI, Farès BOUDJOUAN, Walid ZEGHBIB, Yanath BELGUESMIA, Rabia LADJOUZI, Ghania ZIDI, Farida BENDALI, Djamel DRIDER	Valorization of fruit microbiota: <i>Lactiplantibacillus plantarum</i> and <i>Kluyveromyces marxianus</i> as novel probiotic candidates
15:45 – 16:00	Mohamed Reda AIDEL, Yuva BELLIK, Sabah BOUMERFEG, Hassina GUERGOUR, Asma MEZITI, Samira BOUSSADA, Hiba GHERZOULI, Fatima CHEBIRI, Rania HACHEMI, Abdellali LAZAZGA	Solvent-dependent phytochemical profiling and antioxidant activity of the Saharan plant <i>Stipagrostis pungen</i>
16:00 – 17:00	Debate and Closing of the First Session	

Day 1 - June 22, 2026		
Topic 3	Conference Room 3	
14:00 – 14:15	Mohamed BRAHIMI	From research to field: utomated plant disease detection, Farmy, and the Agri Challenge
14:15 – 14:30	Said BOUDEFFEUR , Djamilia YATTA EL-DJOUI, Abdelkader LAABOUDI, Ahmed SID AMOR, Hafida KHELAFI, Mohamed Said GUERBOUZ, Mohamed KHARSI, Hadjira Amina MESSAADI	The alarming decline in date palm genetic biodiversity caused by <i>Fusarium oxysporum</i> f.sp. <i>albedinis</i> , a causal agent of Bayoud disease in the Tidikelt region (Adrar)
14:30 – 14:45	Nasreddine LOUAHDI , Ryma LABAD, Amine FEDDAL, Haroun BELGUET	Response of durum wheat (<i>Triticum durum</i> Desf.) genotypes to water stress: Assessment through vegetation indices under semi-arid conditions
14:45 – 15:00	Mounira BELKHARCHOUCHE	Epidemiological dynamic of two animal diseases in Tiaret region (Northwest of Algeria): Blue tongue and Epizootic hemorrhagic
15:00 – 15:30	Coffee Break / Poster Session 2	
15:30 – 16:30	Debate and Closing of the Session	

Day 1 - June 22, 2026		
Topic 4	Plenary Lecture (Auditorium)	
13:30 – 14:00	Pr. Amel CHOUTRI , Loubna NACER, Tarek YALLOULI	The use of behavioural economics dimensions in resources preservation within the context of sustainable development
Time	Speakers	Titles
14:00 – 14:15	Ali Yacine SAHNOUN , Riad AYECHÉ	Activated carbon production from palm residues for efficient removal of dyes from waste water
14:15 – 14:30	Hamida BENRADIA , Ouissem MOUMENI, Faten Selma HAMOUDI, Hinda BERGHICHE	Morphophysiological and biochemical characterization of the toxicity of a mixture of the insecticides acetamiprid and tefluthrin on the snail <i>Helix aspersa</i>
14:30 – 14:45	Radia BOUFERMES , Seloua MORSELI, Hadjira BERREDJEM	Seasonal adrenal steroid variations of plasma adrenal steroids in the desert rodent <i>Meriones libycus</i>
14:45 – 15:00	Noura ZEGGARI	Olive-based agroforestry as a pathway to sustainable agriculture in sub-humid zones: a critical literature review
15:00 – 15:30	Coffee Break / Poster Session 2	
15:30 – 15:45	Wafa TIAIBA , Soriya MELOUKI	Development of a low-cost bio-adsorbent from palm waste for organic dye removal: Towards sustainable environmental management
16:00 – 17:00	Debate and Closing of the First Session	

Day 2 - June 23, 2026		
Time	Speakers	Titles
Topic 1	Conference Room 2	
9:30 – 9:45	Mohammed ALLOUANI , Noui HENDEL, Dahou MOUTASSEM, Yuva BELLIK	Phytochemical composition, antioxidant, antiproliferative activities and molecular docking analysis of <i>Lavandula Multifida L.</i> extracts against the HTC116 colon cancer cell line.
9:45 – 10:00	Rayane CHELALI , Radia AYADI	The first qualitative and quantitative assessment of <i>Echinops spinosus</i> sp. Extracts of the Sahara
10:00 – 10:30	Debate and Closing of the Second Session	
10:30 – 11:00	Coffee Break / Poster Session 3	

Day 2 - June 23, 2026		
Time	Speakers	Titles
Topic 2	Conference Room 1	
9:00 – 9:15	Abdelmalek MERIBAI , Abia SADI, Ikram MEBREK, Lamia TALEB-HACINE	Carnobacterias species: Probiotics, nutraceuticals, and bacteriocytogenic potentialities: Biotechnological roles in the biopreservation and biotransformation of fish and/or meat products
9:15 – 9:30	Abia SADI , Abdelmalek MERIBAI, Chaima MOUSSAI, Kenza BAATOUCHE	Dualistic role and safety aspects of <i>Enterococcus Faecalis</i> and <i>Enterococcus Faecium</i> in food biotechnology: New insights
9:30 – 9:45	Lounis SEMARA , Charef Eddine MOUFFOK, Farida BELKASMI, Farid DJELLAL	Towards sustainable modernization of livestock systems in Algeria through innovation.
9:45 – 10:00	Meriem IMELHAYENE , Dahia SAIDJ, Ilyes HADBAOUI	Dietary supplementation with bioactive nutrients: a sustainable approach to enhance reproductive performance in Algerian Hamra rams.
10:00 – 10:30	Debate and Closing of the Session	
10:30 – 11:00	Coffee Break / Poster Session 3	

	Day 2 - June 23, 2026	
Time	Speakers	Titles
Topic 4	Auditorium	
9:00 – 9:15	Fatma Zohra ZAAFOUR , Amel LAZLI, Nesrine HACINI, Choukri BAROUR	Morphological variability and climate resilience in selected durum wheat genotypes
9:15 – 9:30	Kenza TAMRABET , Ghania BARECH, Mourad KHALDI, Marc DE MEYER	Biodiversity of fruit fly communities (Diptera: Tephritidae) and population dynamics of <i>Ceratitis capitata</i> (Wiedemann, 1824) in Khenchela, Eastern Algeria
9:30 – 9:45	Soumeya KAOUCHE , Nouredine ADJLANE	Honeybees facing the challenges of environmental change in Algeria
9:45 – 10:00	Aya TRAD , Ammar FOUFOU, Ibtissem SAYED	The utilisation of agricultural by-products as a driver of sustainable agriculture: an integrated management approach in sub-humid areas
10:00 – 10:15	Chalabia CHABETDIS , Nabila MESLEM, Mohamed Djamal Eddine INCHACOUT, Khadra FERHANI, Ammar DILMI, Amira DIDANI, Fatima Zohra MAHIDDINE, Mohamed HAMIDAT, Foued TABOUCHE, Messaoud KACHI, Ayoub HAMDI, Farid HAMMAMOUCHE, Ismail SOUFFI, Hafid HEMEIR, Mustapha BOUDJENAH	Potential of yeast as a feed for <i>artemia</i>
10:15 – 10:30	Debate and Closing of the Session	
10:30 – 11:00	Coffee Break / Poster Session 3	
Closing Lecture		
12:30 – 13:00	Abdelouahab BENTABET	الحياة والطبيعة وتأمين الموارد الطبيعية في ظل النظريات العلمية الحديثة: الجزء 2 Life and nature and the valorization of natural resources in the light of modern scientific theories : Part 2
13 : 00	Closing Conference Speech	

Day 2 - June 23, 2026		
Time	Speakers	Titles
Topic 5	Conference Room 3	
9:00 – 9:15	Amir BENAMIRA , Farida ALANE	Nutritional value of the pods of several Algerian annual alfalfa varieties
9:15 – 9:30	Malika ALILI , Roukia BENYAMMI, Mohamed NADRI, Houda ZEROUATI, Soumeiya KRIMAT, Rabiaa MERROUCHE, Aicha BENLOUNISSI, Chafia TIGRINE	Chitosan–keratin composite films for sustainable food packaging
9:30 – 9:45	Ilham NOUI MEHIDI , Amine BELBAHI, Abdenour AIT OUZZOU, Yamina BENMERIE	Physicochemical characterization and enhanced antimicrobial efficacy of <i>Satureja battandieri</i> essential oil nanoemulsion for food preservation applications.
9:45 – 10:00	Soraya HIHAT , Nouredine TOUATI, Ikram SELAMI, Chourouk NASRI	Impact of ultrasonic pretreatment on microwave drying kinetics, specific energy consumption, and bioactive compound preservation in <i>Mentha spicata</i> stems
10:00 – 10:15	Imene KERBOUAI , Asma BENBETKA, Nesrine BOUROUH	The effect of flavoring with mandarin fruit exocarps & myrtle leaves on the olive oil quality
10:15 – 10:30	Debate and Closing of the Session	
10:30 – 11:00	Coffee Break / Poster Session 3	

Poster Communications Program

Session 1 – Posters

Monday 22/06/2026 – 10:30 to 11:00

(Topic 1)

- P1 Amel BOUDJELAL, Sarra CHABANE, Antonella SMERIGLIO.** A phenolic-rich extract of *Calendula arvensis* promotes burn wound healing via antioxidant and anti-inflammatory mechanisms.
- P2 Hanane ABED, Sara OUALI, Ahlem MECHATIA, Amel SAIDI.** Clove essential oil against fruits fungal pathogens.
- P3 Aziouz AIDOU, Sidali RAMDANE, Abdelkrim AITBELKACEM, Youcef MERZOUKI.** Fortified edible oils: a nutritional strategy for oxidative stress control.
- P4 Naima BAAZIZ, Hanane ABED, Souaad CHIBI.** Impact of extraction methods on the antimicrobial efficacy of *Allium sativum*: A sustainable approach to poultry meat preservation.
- P5 Faiza BELAKEHAL, Khaoula MAKHLOUF, Sirine Amina TAKARLI.** Antimicrobial activity of parsley "*Petroselinum crispum*" extract.
- P6 Meriama BELGHOUL, Nacer DJIRAR, Mustapha BOUNECHADA.** Antioxidant potential and phenolic content of *Cucurbita pepo* L. aqueous extract.
- P7 Oum Elkheir BELHADDAD, Wafa ZAIBET, Sabrina MOHAMADI, Kenza BOUCHELOUCHE, Salima ZIDANE, Hocine BOULEGHLEM.** Physicochemical properties and antioxidant activity of water-soluble polysaccharide from *Carthamus caeruleus*.
- P8 Abderrahim BETKA, Abdelouahab BENTABET.** Using equivalent geometry to assess the 131-iodine therapeutic activity in case of Basdow disease.
- P9 Yamina MEHDI, Nouredine BOUACHRIA, Fatima MAZOUZI, Saida Abir BELHEGUETE, Nawel SEHIMI.** In vitro antioxidant, antibacterial and anti-proliferative activities of thyme extract from Tiaret region, Algeria.
- P10 Souhila BOUNAB, Sifeddine MAAZOUZ, Ibtissem SOUFFI.** A contribution to the study of the chemotypes of the essential oils of *Saccocalyx Satureioides* Coss. & Dur from Boussaada and Djelfa.
- P11 Ouahiba BOURICHE, Hicham KOUADRI.** Étude des propriétés multifonctionnelles des nanocomposites PVK/TiO₂ : Synergie entre performance électrique, photostabilité et activité antibactérienne.
- P12 Mounira DEHIRI, Abdelouahab DIAFAT, Widad FATMI, Rania HACHEMI, Riadh BEN MANSOUR.** Biological activities of the hydromethanolic extract of *Peganum hamala* L.
- P13 Radja DJEBBARI, Amina Maya LAHNECHE, Ammar HAOUAT, Djamila ZAMA, Samir BEN AYACHE, Fadila BEN AYACHE.** Antioxidant activities, phytochemical screening of bioactive ethyl acetate extract from the aerial parts of *Chrysanthemum trifurcatum*.
- P14 Hamida GHORAB, Khalid BOUHEDJAR, Zahia KABOUCHE, Ahmed KABOUCHE.** Proteomic characterization of sweet kernel of an Algerian apricot variety (*Prunus armeniaca* L.) by LC-MS/MS and *In Silico* prediction of bioactive peptides.
- P15 Lamia HANIFI, Nassima CHAHER-BAZIZI, Yuva BELLIK, Lydia KAROU, Nabil DRIS, Taous KADDOUR, Naima SAIDENE, Mostapha Bachir BEY, Dina ATMANI-KILANI, Djebbar ATMANI.** Hawthorn anthocyanins: biological properties and in vitro therapeutic potential.
- P16 Lydia KAROU, Dina ATMANI-KILANI, Lamia HANIFI, Sarra BELKHIR, Nassima CHAHER-BAZIZI, Nabil DRIS, Taous KADDOUR, Djebbar ATMANI.** *Clematis flammula* as an eco-friendly source of natural compounds with antiulcer activity: toward a sustainable alternative to synthetic treatments.
- P17 Abdellali LAZAZGA, Abdelghani MADANI, Yuva BELLIK, Mohamed Reda AIDEL, Maroua HADDAD, Hanane HALLIS.** Phytochemical characterization and *in vitro* antioxidant activity of *Lawsonia inermis* L. leaf extracts.

- P18 Sabira LACHACHE, Ghania BENAICHE, Rebbas KHELLAF.** Green synthesis of silver nanoparticles using polyphenolic extract: Characterization and evaluation of their antimicrobial activity.
- P19 Narimane LAMMARI, Mehdi LOUAER, Hadjira RABTI, Ouahida LOUAER, Abdeslam Hassen MENIAI.** Computational and experimental insights into the anti-diabetic potential of *Cinnamomum zeylanicum* oil: In vitro bioactivity, molecular docking and pharmacokinetics.
- P20 Hendel NOUI, Madani SARRI, Djamel SARRI.** Evaluation of the polyphenolic content, antioxidant and antimicrobial activities of *Salvia aegyptiaca* L. from Bou Saâda – M'sila, Algeria.
- P21 Hadda MEBARKI, Mouloud GHADBANE, Daoud HARZALLAH.** In vitro antioxidant and antimicrobial activity of *Asphodelus microcarpus* tuber juice.
- P22 Khaoula MAKHLOUF, Faïza BELAKEHAL, Sirine Amina TAKARLI.** Valorization of biomolecules extracted from parsley "*Petroselinum crispum*" in the development of a cream/gel with therapeutic properties.
- P23 Meriem MOHAMADI, Adel AYARI, Amel BOUDJELAL.** Production of an antibiotic pigment by a rhizospheric *Streptomyces* using solid-state fermentation (SSF).
- P24 Leila MOSTEFAOUI, Mohammed HADJARI, Hadj Mostafa KHALADI.** Cardiovascular risk factors and glycemic control in algerian patients with metabolic syndrome treated with SGLT2 inhibitors.
- P25 Hendel NOUI, Djamel SARRI, Madani SARRI.** *Santolina africana* Jord. & Fourr. from M'sila, Algeria: polyphenolic content, antioxidant and antimicrobial activities of its extracts.
- P26 Narimane LAMMARI, Hadjira RABTI, Ouahida LOUAER, Abdeslam Hassen MENIAI.** Targeting breast cancer: molecular docking and ADMET profiling of plant derived compounds for novel therapeutic strategies.
- P27 Meriam SALEMI, Hassiba Amir METROUH, Georgia SPIGNO.** *Hammada scoparia*: Natural source of antioxidants for oil protection against oxidation.
- P28 Madani SARRI, Ammar SASSOUI, Zakaria HEDJOULI, Hendel Noui, Djamel SARRI.** Biological characterization of leaf, seed, and pod extracts of *Leucaena leucocephala*.
- P29 Samiha SOUAGUI, Hafid BOUDRIES, Firdousse LAINCER, Badria KERAMANE, Ibtissem DJINNI, Warda DJOUDI, Hanane BELABBAS, Wissam RETI, Sara HADDAD, Mouloud KECHA.** Biological and therapeutic potential of anti-infective metabolites from *Streptomyces albidoflavus* s19 isolated from wastewater.
- P30 Mohammed Esseddik TOUMI, Fethi Farouk KEBAILI, Redouane REBAI, Sara HALIMI, Douaa MERGHID.** Evaluation of biological activities of Algerian medicinal edible mushroom *Leaporus sulphureus* strain TEMS43: Antioxidant and antimicrobial studies.
- P31 El Khamsa SOLTANI, Rima GHEMIT, Abdesselam MAKHLOUFI Maria Angeles ESTEBAN.** In vitro effects of propolis extracts on the innate immune responses of sea bream.
- P32 Safia BERRAHIA, Samira SELLAMI.** Evaluation of the nematicidal activity of *Raphanus sativus* and *Nasturtium officinale* leaf and root extracts on the egg hatching of *G. rostochiensis*.
- P33 Sara CHADI, Sabah BOUMERFEG, Thoraya GUEMMAZ, Abderahmane BAGHIANI.** Hepatoprotective activity of the methanolic extract of *Salvia argentea* against carbon tetrachloride-induced hepatotoxicity in mice.
- P34 Rima GHEMIT, Abdesselam MAKHLOUFI.** Phytochemical characterization and computational investigation of the antioxidant activity of *Ephedra alata*.
- P35 Amal SAIDI, Samira MEBDOUA, Amel HAMMANI, Salima GUERROUDJ, Fairouz BOUBRIK, Hanen ABED.** Sustainable control of *Fusarium Verticillioides* in wheat using microorganisms.
- P36 Aicha TRAKA, Yuva BELLIK, Dahou MOUTASSEM, Zine El Abidine FELLAHI, Abdellali LAZAZGA.** Bioprospecting *Apium nodiflorum* extracts for integrated management of tomato phytopathogens: phytochemical profiling and antioxidant potential.
- P37 Meriem NASRI, Imene BAKHOUCHE, Hizia KELAECHE.** Bioactive compounds and therapeutic potential of lavender extract.
- P38 Nouari SADRATI, Amina ZERROUG, Kaouthar MHAMDIA, Zahra ZOUAOU, Samira BOUSSADA.** Antibacterial activity of a Rhizospheric actinomycete isolate producing bioactive secondary metabolites.
- P39 Amina ZERROUG, Nouari SADRATI, Katia BENDIFALLAH, Asya NOUFEL, Samira BOUSSADA, Sabrina BAKLI.** Promising antibacterial properties of secondary metabolites extracted from rhizospheric fungus *Aspergillus niger*.
- P40 Hichem MEZDOUR, Maroua SENOUCI, Anfel CHETTOUH.** Methadone in public health: Epidemiological perspectives on use, misuse, and mortality.

- P41 Yuva BELLIK, Mohamed Reda AIDEL, Houria BELALIT, Zahia MAYOUF.** Evaluation of the antioxidant and antihemolytic activities of *Marrubium vulgare* and *Laurus nobilis* under glucose-induced oxidative stress.
- P42 Rania HACHEMI, Yuva BELLIK, Tahar BOUBELLOUTA, Mounira DEHIRI, Mohammed reda AIDEL, Samira BOUSAADA.** Influence of solvent polarity on phytochemical recovery and antioxidant capacity of *Ruscus* sp. extracts.
- P43 Sabrina BAKLI, Amina ZERROUG, Nouari SADRATI, Mouna BENDJEDDOU, Wissem AYAD, Asma BOUGUERRA, Oumaima NAILI, Daoud HARZALLAH.** In vivo impact of a pesticide on physiological and reproductive parameters in rabbits and the modulatory effect of bay laurel.
- P44 Ghania BELGOUMRI, Abdelouahab BENTABET.** Wide band gap BeX, MgX (S, Se and Te) semiconductors in medical applications.

Session 2 – Posters

Monday 22/06/2026 – 15:30 to 16:00

(Topic 3)

- P1 Yasmine BENHALIMA, Ismail BOUTRIK.** Major bioagressors of cereal crops in Algeria: Impacts and integrated management strategies.
- P2 Hana Nedjma BELABED, Ilhem LAADJAL.** High prevalence of hepatic *Escherichia coli* contamination in broiler chickens with suspected colibacillosis in Biskra, Algeria.
- P3 Nor El Houda BELALMI, Nassim SID, Sorya OUIDA, Amina SAFSAF.** Clinical and pathological characterization of a natural peste des petits ruminants (PPR) outbreak in a goat herd in Bordj Bou Arréridj.
- P4 Hassane BENSEGHIR, Djamila HEZIL, Leyla BENAMMAR, Bouchera BARROU, Salsabil BEDDAR, Amina BESSA, Zineddine RADJA.** Study of *Staphylococcal Otitis* in domestic carnivores in the Batna region.
- P5 Amina MENACHE, Abdelkrim AIT BELKACEM, Amel MILLA, Faiza MARNICHE, Youcef MARZOUKI.** Prevalence and diversity of intestinal parasites in Turkeys (*Meleagris gallopavo*) across different localities in Djelfa, Algeria.
- P6 Sonia HAMID, Nadia BOUGHELIT.** Study of the antagonism of a fungal strain towards the causal agent of olive verticillium wilt.
- P7 Ahmed ADJEBLI, Abdelaziz MESSIS, Karim TIGHILET, Riad AYECHÉ.** Isolation and characterization of *Botrytis cinerea* strains from vineyards in the Bejaia region.
- P8 Abderrazek BENDRIMIA, Faouzi MATALLAH, Bochra MOUASSA.** Ectoparasites diversity and distribution in Wild Rabbit and Cape Hare collected from the High Plateaus of Algeria.
- P9 Ouissal BENZEBOUCHI, Nada NOURI, Meftah TAHAR.** Diversity of ectoparasites infesting the Mallard (Aves: Anseriformes) at a Ramsar site in north-east Algeria.
- P10 Sara Hadj MERABET, Mohamed Malik MAHDJOUB, Mebarek BOUCHIBANE.** Assessment of environmental and anthropogenic constraints on the long-term survival of the endemic *Pinus nigra* subsp. *Mauretanica*.
- P11 Abdelmouman LAMOURI, Miryam OUIS, Fethi BENBELAÏD.** Investigation of avian coccidiosis in chickens and Turkeys: from detection to natural therapeutic strategy.
- P12 Naouel MABREK, Amine ABDELLI, Zakia CHERIFI.** Impact of black soldier fly larvae meal as a sustainable protein source on broiler performance : Evidence from a preliminary meta analysis.
- P13 Mohammed MAZOUZI, Fedjria YACCOUB, Boussaada TAREK.** Assessment of the microbiological and physicochemical quality of animal feed in the arid region of Biskra.
- P14 Tahar MEFTAH, Mourad AHMIM, Nacera BOUTERA, Sabah TIGHLIT, Ouissal BENZEBOUCHI.** Trophic data of the lesser mouse-tailed bat (*Rhinopoma cystops*) in the arid ecosystems (Bousaada, Algeria).

- P15 Lotfi BOUTAHAR, Zahir ROUABAH, Salah DAOUD, Nadhira BIOUD.** Early detection of animal lameness: Design of a low cost intelligent system.
- P16 Samia REBAHI, Abdelouaheb ALOUANI, Mohamed Nadir MEGUINI, Tarek KHENENOU.** Toxic impact of Clodinafop propargyl herbicide in adult male rabbits.
- P17 Lina KANOUNI, Rayene DAILI, Meriem MAHGOUN, Nour el houda MESSAI.** Microbial diseases of animals in Sétif.
- P18 Chahinez BELOUAHRI, Nora CHAHBAR, Hamdi BENDIF.** Acute toxicity of *Thymus willdenowii* essential oil on *Apis mellifera* and its chemical characterization by HSPM E.
- P19 Habib LASGA, Rachida KERZABI, Imén LAFRI.** Impact of multi-species grazing on sheep health and performance in steppe areas (case of Djelfa).

Session 2 – Posters

Monday 22/06/2026 – 15:30 to 16:00

(Topic 4)

- P20 Nedjma LAHMAR, Mokhtar DJEHICHE, Marwa BACHIRI.** Removal of the synthetic dye E110 by in situ chemical oxidation (ISCO) via thermal activation of persulfate
- P21 Anissa MAHLEB.** Study of the impact of soil degradation on agriculture in the province of Bordj Bou Arreridj.
- P22 Djamila MADANI, Fatima HIOUANI, Souhila BOUNAB.** Governance of natural resources and ecological transition in selected municipalities of M'sila province (Msif, El Khebbana and El Houamed)
- P23 Younes BEKRAR, Amel BOURAHLA, Soufiane BENSFIA.** Assessment of irrigation water quality for tomato (*Solanum lycopersicum*) in the Biskra region (Algeria).
- P24 Naima BAAZIZ, Souaad CHIBI, Hanane ABED, Hadda KEBIR.** Physicochemical and bacteriological analyses of well water in Bordj Bou Arreridj.
- P25 Hassina SEDDIKI, Abdelmadjid CHELLI, Kamel HAMADI.** A study of the diversity and dynamics of *Oedipoda caerulea* at the Sidi Abdoun station (Theniet El Had National Park).
- P26 Amel SALAMANI, Fayçal BAHLOULI, Nacira CHOUREGHAL, Khelifa MAAMRI, Ibtissam LEBACHICHE, Fazia CHAABANE.** Application of the technique of ozonation to the treatment of surface water: Case of the unit of production of Ain Zada-El.
- P27 Warida NAILI, Mouna. CHERAIRIA.** Sand flies and biodiversity: challenges for the conservation and restoration of natural habitats in Algeria
- P28 Amel BOURAHLA, Seddik MOUSSAOUI, Mabrouk KHINOUCHE, Younes BEKRAR, Mourad TAIBI.** Effects of biostimulants on spike length in Durum wheat in a semi-arid region.
- P29 Rania ATIG, Youcef MERZOUKI, Abdessalam MANNA, Ahlem ADJER, Ahlem CHELBABI.** Study of the trophic behavior of the Algerian hedgehog (*Atelerix algirus* lereboullet, 1842) (Mammalia: Erinaceidae) in the Sidi Bel-Abbès region.
- P30 Foued MIHOUB, Amel HAMMA, Aida ZAABAR, Sihem KERMICHE.** Eco-valorization of organic waste: extraction, characterization, and evaluation of the antioxidant potential of phenolic compounds within a sustainable natural resource management perspective.
- P31 Ouissem MOUMENI, Hamida BENRADIO, Rima AMAMRA, Zoubir AZZOUZ, Mohamed Réda DJEBAR.** Assessment of the impact of environmental pollution on a phytoremediating plant: *Typha latifolia*.
- P32 Warda ATTOUI, Elhadi DEBIH, Azzedine MELOUKI, Azzedine BENYAHIA.** Waste valorization in alkali-treated alfa fiber-recycled rubber composites.
- P33 Nedjouda SEKHRI-ARAFA, Anfel MERABET, Fatima Zohra BEKAKRIA, Sirine Nedjouda AMOKRANE.** Valorization of olive mill wastewater from traditional oil mills in El Milia region.

- P34 Nesrine LAKHZOUME, Mohamed GUETTAF, Hichem KHAMMAR, Abderrazaq CHEBOUT, Naama KACHA, zohra SAHRAOUI.** Physiological response of pepper (*capsicum annum* l.) to irrigation water salinity in a semi-arid agroecosystem.
- P35 Fella ALLALI, Abdelkader AISSAOUI, Mouloud AIT MECHEDAL, Sofiane BENSEFIA.** Spatial assessment of soil organic carbon stocks in surface horizons (0–5 and 5–15 cm) in the semi-arid region of eastern Algeria: the case of Bordj Bou Arreridj.
- P36 Samira BOUCHAREB, Wafa TIAIBA, Mansour ROKBI.** Multiscale investigation of seasonal effects on alfa fibers: linking structural properties to environmental sustainability and food security.
- P37 Riad AYECH, Ali Yacine SAHNOUN.** Characterization and valorization of carbide lime waste from acetylene manufacture for heavy metal removal from wastewater.
- P38 Mohamed BIBAK.** Lithological, sedimentological study and paleoclimatic evolution of Oued El Hai, Batna region (Northeastern Algeria).
- P39 Amel FERAHTIA.** Assessment of physicochemical and bacteriological quality of well and borehole water in Bordj Bou Arreridj (BBA), Algeria: Implications for public health.
- P40 Fahima BENHAMMA.** A data-driven framework for assessing agri-food reverse logistics and waste valorisation performance in Algeria.
- P41 Nesrine BOURAHILI, Mourad KHALDI, Ghania BARECH.** The impact of invasive ants on urban biodiversity: the case of the Botanical Garden of Hamma (Algiers, Algeria).
- P42 Nacira CHOUREGHAL, Abdel Aziz Ahmed ABDI, Nedjoua KHRAMSIA.** Agrometeorological assessment of the vulnerability of olive cultivation under current and future climatic conditions : Case of the Wilaya of Bordj Bou Arreridj
- P43 Ibtissem DJINNI, Hanane BELABBAS, Warda DJOUDI, Wissam RETI, Amel HAMMA, Samiha SOUAGUI, Sara HADDAD, Mouloud KECHA.** *Streptomyces coeruleorubidus* SALG1 derived seashore plastic bottle for plastic polymer degradation potential
- P44 Lamia CHERIT, Nihed BARGHOUT, Soulef SAOUDI.** Ethnobotanical knowledge and valorization of medicinal plants in Algeria.
- P45 Karima TEBBAKH, Karim BAZIZ, El kahina Akila MESBAH.** Dynamics of chromosomal evolution: a comparative analysis of two populations of *Lotus ornithopodioides* L.
- P46 Abdelkrim AIT BELKACEM, Amina MENACHE, Aziouz AIDOU, Djamel MOKRANI, Youcef MARZOUKI.** Phenotypic divergence and mitochondrial DNA introgression in hybridizing sparrow populations (*Passer domesticus* and *Passer hispaniolensis*) in the Saharan Atlas
- P47 Khelifa MAAMRI, Nacira CHOUREGHAL, Faycal BAHLOULI, Sawsane Chaima KHARCHOUCHE, Ibtissem LEBACHICHE, Fazia CHABANE;** Quantification of water stress in durum wheat (*Triticum durum* Desf.) under semi-arid Mediterranean conditions: phenological analysis, water balance and yield impact.
- P48 Hemza BELGUERRI, Nacira CHOUREGHAL, Khelifa MAAMRI, Samia HADROUG, Hanane BOUSEBHA.** Effect of sowing date and seeding density on the performance of two durum wheat (*Triticum durum* Desf.) varieties under semi-arid conditions.
- P49 Rima LAMRI, Khalissa CHENITI-ABED.** The effect of different salinity levels on the early growth of common vetch (*Vicia sativa*) and Narbonne vetch (*Vicia narbonensis*) in the semi arid region of Setif.
- P50 Fazia CHABANE, Khelifa MAAMRI, Ibtissem LEBACHICHE, Fayçal BAHLOULI, Hemza BELGUERRI, Nadjya CHALABI, Nacira CHOUREGHAL.** Regional climate analysis of rainfall in Northwestern Algeria (1950–2014): toward sustainable management of water resources.
- P51 Abdelkader AISSAOUI, Fella ALLALI, Sofiane BENSEFIA, Mouloud AIT MECHEDAL.** Assessment of the quality indices of soils irrigated with wastewater and groundwater in a semi-arid environment under climate change conditions case study: Ziban region (Biskra).
- P52 Ibtissem LEBACHICHE, Hemza BELGUERRI, Khelifa MAAMRI, Fayçal BAHLOULI, Fazia CHABANE; Nadjya CHALABI, Nacira CHOUREGHAL.** Climate warming and resource sustainability in a semi-arid region : a multi- model study under RCP 4.5.
- P53 Saoussene Cheima KHERCHOUGH, Nacira CHOUREGHAL, Khelifa MAAMRI, Fayçal BAHLOULI, Hemza BELGUERRI, Ibtissem LEBACHICHE, Fazia CHABANE, Nadjya CHALABI.** Climate change and precipitation variability: implications for sustainable olive production in western Algeria.

- P54 Nadia MADI DJEDID, Mohammed SAID METAHRI, Malika BOUDIAF NAIT KACI, Nasreddine LOUAHDI, Noria SAADOUN.** Response of the genus *Pochonia* to tillage systems and interannual variability in the roots of *Triticum durum* and *Lens culinaris* under semi-arid conditions in Algeria.
- P55 Amel HAMMA, Foued MIHOUB, Sihem KERMICHE, Ibtissam DJINNI, Warda DJOUDI.** Metal–organic frameworks: A next-generation nanomaterial for water treatment.
- P56 Hasna BOULKROUNE, Mokhtar GUISSOUS.** Sustainable valorization of olivepomace via natural co-composting.
- P57 Mohammed BENAINI, Amirouche MOUHOUH.** Remote sensing and GIS-based monitoring of urban expansion and agricultural land consumption in semi-arid environments.
- P58 Mohamed Djalil ZAAFOUR, Samir CHEKCHAKI, Imen BAKHOUCHE, Hana CHALABI, Racha NAMEUR.** Physicochemical assessment of Oued El Ksob water quality (Algeria).
- P59 Meriem SAHARAOU, Nassima BEHIDJ, Fadila NEFFAH BAZIZ, Sihem ZIOUCHE.** Aphid parasitoid communities associated with fruit trees in northeastern Algeria.

Session 3 – Posters

Tuesday 23/06/2026 – 10:30 to 11:00

(Topic 2)

- P1 Fayçal BAHLOULI, Amel SALAMANI, Nadja CHALABI.** Study of the current state of irrigation implementation in olive groves (*Olea europaea* L.) in the Bordj Bou Arreridj region.
- P2 Ouahiba GAHFIF, Hanane ABED, Amal SAIDI, Abdelmalek MERIBAI, Linda MAKHLOUFI.** Isolation and identification of filamentous fungi producing amylolytic enzymes.
- P3 Abderrahmane HANNACHI, Zine El Abidine FELLAHI, Aicha TRAKA, Abou-Bakr RABTI.** Optimizing multi-trait selection in durum wheat using selection indices and economic weights under semiarid conditions.
- P4 Fella AISSIOU, Houria HADJ ARAB, Ikram FERDJALLAH, Manel REZZAZ.** Floral biology and reproductive system of *Lonchophora capiomontiana* Dur. (Brassicaceae).
- P5 Tassadit BENHAMMOUCHE, Ouarda DJAOUDENE, Souhila MAZGUEN, Zita MARTIN, Miguel A. FARIA, Susana. C.M. PINHO, Isabel M.L.P.V.O. FERREIRA.** Plant-based proteins recovery and quality: Comparative evaluation of alkaline and enzymatic extraction methods.
- P6 Sara Narimane MAZAOUI, Laid BENDERRADJI, Zine El Abidine FELLAHI, Abdelkader BENBELKACEM, Abderrahmane HANNACHI, Walid SAIB.** Conditions MGIDI-based multi-trait selection for durum wheat adaptation under semi-arid.
- P7 Khalil OUADAH, Zine El Abidine FELLAHI, Abderrahmane HANNACHI, Halima SADOUNE.** Genetic parameters and path analysis of yield-determining traits in durum wheat under rainfed semi-arid conditions.
- P8 Messoud BENSALAM.** Study of behavior and varietal adaptation of durum wheat (*Triticum durum* Desf.) under semi-arid conditions.
- P9 Rabiaa Nawal BOUREZAK, Mohamed LAZALI, Chiraz BOUZOUANI.** Valorisation of rhizobial strains as bio-inoculants to improve chickpea growth under phosphorus deficiency.
- P10 Amir BRINIS, Houda BOUZERAA.** Effect of saline stress on morphological and biochemical parameters in three varieties of durum wheat (*Triticum durum* Desf.).
- P11 Milouda TAMINE, Anfal SUICI, Sabrina MEKIDECHE.** Optimization of baker's yeast production using carob-based medium through response surface methodology.
- P12 Mouna BOUADI, Aicha TIRTOUIL, Boumediene MEDDAH, Kaddour ZIANI.** Inactivated lactic strains for optimized the production of exopolysaccharid after addition of polyphenolic extract from *Arbutus unedo* plant.
- P13 Halima SADOUNE, Zine El Abidine FELLAHI, Abderrahmane HANNACHI, Khalil OUADAH.** Evaluation of drought tolerance in diverse bread wheat genotypes based on germination and seedling growth traits under PEG-induced osmotic stress.
- P14 Saida LEBOUKH, Hicham GOUZI.** Partial biochemical characterization of tyrosinase from Algerian dates.
- P15 Zoulikha TIZEMMOUR, Manel MECHMECHE, Nesrine MESSADI, Moktar HAMDI, Faten KACHOURI.** Evaluation of the physicochemical, nutritional, and antioxidant activities of acorn from *Quercus* spp.: A comparative study between Algerian and Tunisian varieties.
- P16 Zine El Abidine FELLAHI, Abderrahmane HANNACHI, Aicha TRAKA.** Grain yield stability and adaptability of bread wheat genotypes in rainfed environments: A GGE biplot analysis
- P17 Houda BOUZERAA, Amir BRINIS.** The toxic effects of pesticides on honeybees (*Hymenoptera apidae*) in Northeastern Algeria: Acetylcholinesterase activity and glutathione S-transferase activity.
- P18 Amel BOUNECHADA, Fatima BETKAOU, Abba SACI, Abdelmalek MERIBAI.** The microbiological characteristics and viability of probiotic lactic starters during production and storage in Algerian yoghurt.
- P19 Roumeissa DJERBOUA, Laid BENDERRADJI, Zine El Abidine FELLAHI, Abderrahmane HANNACHI, Faical BRINI, Abdelkader BENBELKACEM.** Genetic variability and performance of bread wheat genotypes under semi-arid rainfed conditions.

Session 3 – Posters

Tuesday 23/06/2026 – 10:30 to 11:00

(Topic 5)

- P20 Walid AIT HAMMOUDA, Sidali RAMDANE, Nouredine TOUATI, Amel FERAHTIA.** Food safety knowledge, attitudes, hygienic practices of poultry slaughterhouse workers in Algeria: a cross-sectional study.
- P21 Nadja CHALABI, Fayçal BAHLOULI, Agustí J. ROMERO-AROCA.** Correlative assessment of the relationships between vegetative growth, qualitative characteristics of olive oil, and sensory attributes in a collection of Algerian and European cultivars of *Olea europaea* L.
- P22 Rebiha SLIMANI, Abdelouahab BENTABET, Abdennour BENMAKHLOUF.** The indirect contribution of perovskites to food security through energy and sensing technologies.
- P23 Sirine MANSOURI, Amel BOUNECHADA, Fatima BETKAOU, Imen GUELIANE, Abba SACI, Abdelamlek MERIBAI.** Microbiological quality assessment and investigation of physical-chemical stability of processed soft cheese preparations marketed in Algeria-preliminary study.
- P24 Mohamed GHELLAM, Lotfi Chakib MEGHAMMEL, Mohamed El Amine ZEMMOURI.** Date and carob powder: An innovative alternative to sugar for Tahini halva.
- P25 Sabrina MOBAREK, Amir BRINIS, Khalil OUADAH.** Early-stage salinity tolerance and adaptive mechanisms in Algerian wheat landraces.
- P26 Ibtissem SANAH.** Impact of black cumin seed meal and whey on the physicochemical properties of gluten-free bread.
- P27 Amel KERBOUCHE, Lynda ABDELLAOUI, Mohammed Tahar BOUBEZARI.** Assessment of *Escherichia coli* O157:H7 Contamination in the beef supply chain: A literature review and implications for carcass safety.
- P28 Djamila MADANI, Fatima HIOUANI, Souhila BOUNAB, Yasmina SMAILI.** Impact of climate change on food security in the M'sila region: An agronomic approach.
- P29 Naima BELGUEDJ, Ilhem LAADJAL, Khodir MADANI.** Extraction of the date-pulp aqueous extract from the "*Mech-Degla*" cultivar using conventional and eco-friendly water extraction methods.
- P30 Hizia KELAECHE, Nasri MERIEME, Chafia BENIDER, Nabila ADOUI.** Assessing drought-adaptive traits in canola (*Brassica napus* L.) as a strategy for stabilizing oilseed raw material supply in semi-arid zones.
- P31 Ilhem LAADJEL, Tahar SEDRATI, Tahar BOUBALLOUTA.** Antimicrobial resistance in foodborne bacteria: A one health perspective.
- P32 Sihem KERMICHE, Amel HAMMA, Foued MIHOUB, Said BOUHELAL.** Biosynthesized nanomaterials: A green chemistry approach for innovative and sustainable food packaging.
- P33 Souhila MAZGUENE, Ouarda DJAOUDENE, Tassadit BENHAMMOUCHE.** Fermentation: From ancestral practice to food biotechnology: Toward the improvement of natural preservation strategy.
- P34 Nasreddine MEKHOUKH, Dahmane ALILI, Nouredine TOUATI, Hadjer TABAKHI, Chaima MORSLY.** Nutritional value of dried leaves of *Moringa oleifera*: traditional preparation of couscous.
- P35 Fairouz BOUBRIK, Rima YAKOUBI, Amal SAIDI, Salima GUERROUDJ, Amel HAMMANI, Tahar BOUBELLOUTA.** Exploring bioactive extracts of green tea (*Camellia sinensis* L.) as natural preservatives in orange juice for food security.
- P36 Bilal MADAGH, Nouredine TOUATI, Soraya HIHAT.** Corn silk (*Zea mays* L.) as a source of bioactive compounds for food safety and quality: Microwave assisted extraction and RSM oriented phytochemical characterisation.

Opening Plenary

Life and nature and the valorization of natural resources in the light of modern scientific theories.

Part 1: The Natural versus the Manufactured

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Abstract

A natural thing is defined as that which grows according to the laws of nature, with no human intervention in its composition, formation, or pattern of growth. Conversely, a thing is considered manufactured if it has undergone human intervention intended to alter its composition, form, or growth rates in order to achieve a specific end. The natural falls into two categories: pure and hybrid. Hybridization of plants is not a recent development; it has been practiced by humans for hundreds, even thousands, of years, in an effort to boost yields. However, ancient hybridization was carried out between closely related natural species, rendering it, in most instances, safe and preservative of the natural essence. In our present era, however, the intensive use of veterinary drugs, agricultural chemicals, and synthetic fertilizers has compromised the health safety of food. This has led broad segments of consumers to enter into agreements with farmers, stipulating that they refrain from using any drugs or chemical compounds to enhance production, whether of plant or animal origin.

Scientists, thinkers, physicians, and philosophers, from antiquity to the present day, have consistently acknowledged that nature is distinguished by three core attributes: beauty, majesty, and perfection. By perfection here, we do not mean absolute perfection, but rather the flawless and optimal performance of functions in their most sublime and complete forms. As for majesty, it signifies the exalted status and noble worth that natural things possess in comparison to their manufactured counterparts.

Modern science has established that nature is created upon a precisely balanced measure, and that its essential language is mathematics, as every atom, cell, and galaxy is governed by rigorous mathematical equations. From an epistemological standpoint, the mathematical fabric of nature exhibits three input characteristics—simplicity, elegance, and economy—which yield three output characteristics: strength, beauty, and balance. This proposition is validated by two fundamental principles that govern the physical world and wave phenomena: the Principle of Least Action and Fermat's Principle. These two principles, taken together, lead us to the firm conviction that nature, in its intrinsic course, when compared to humanity, stands unique across the ages. It is the greatest physicist, the most accomplished chemist, the most renowned physician, the most perceptive biologist, the most inventive artist, and the wisest architect. Indeed, above all, it is the supreme teacher of mankind. Evidence of this lies in the fact that many human inventions are merely an emulation of nature. This natural inspiration is evident across all fields, including the humanities, linguistics, sociology, technology, and biology. Based on the foregoing, we can confidently assert that whenever nature deliberates on a course of action, it is impossible to conceive of a better or more effective choice than the one it makes.

Keywords: nature, the natural and the manufactured, pure nature, hybrid nature, characteristics of nature, autobiography of nature.

Topic 1: Biological and therapeutic properties of natural products (*in vitro*, *in silico*, *in vivo*)

Plenary Session

Medicinal plants in human history: From ancestral use to modern scientific knowledge

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Abstract

Herbal medicine or phytotherapy is the study of pharmacognosy and the use of medicinal plants, basis of traditional medicine. The link between man and his search for drugs in nature dates from the far east, of which there is ample evidence from various sources. Science has included in modern pharmacotherapy a range of drugs of plant origin, known by ancient civilizations and used throughout the millennia. Today, valorization of plant-derived molecules endowed with therapeutic value has become the milestone in the perpetual search for newer and safer remedies to meet the needs of a fast-growing world population. Large-scale statistical studies reported by the International Union for Conservation of Nature and the World Wildlife Fund have indicated that around 80000 flowering plants are used because of their nutritional, medicinal and recreational values. Moreover, according to a recent report of the World Health Organization, about 80% of the world population depend solely on phytomedicine. Now, it is widely established that medicinal plants exert their therapeutic effects through a wide range of ubiquitous molecules known as secondary metabolites, such as alkaloids and flavonoids, with wide uses in palliative and complementary medicine. This study will address the use of medicinal plants throughout the history of mankind in an attempt to shed light on their phytochemistry and biological activities, with a special emphasis on selected plants used in Algerian traditional medicine, in view of scientific validation. In this regard, *Clematis flammula* (Renonculaceae), *Fraxinus angustifolia* (Oleaceae), and *Pistacia lentiscus* (Anacardiaceae) were found to exert various and promising biological activities, thus making them potential candidates for application in human medicine and cosmetology. Consequently, plant-based formulations and ointments have been developed to help fight against various life-threatening diseases.

Key words: medicinal plants, Secondary metabolites, *Clematis flammula*, *Fraxinus angustifolia*, *Pistacia lentiscus*.

Oral Session

Exploring for the presence of saponins in *Clematis flammula* extracts by using TLC and phytochemical screening

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Abstract

Saponins are strongly bitter tasting, surface active agents (surfactants), which can cause intensive foaming activity in aqueous solutions. They can form complexes with proteins and lipids (e.g. cholesterol) and possess characteristically a hemolytic effect. Although saponins are toxic to tissues, they are only absorbed in small amounts, and their main effect is restricted to the intestinal tract. Their health-promoting effects are numerous, including anti-carcinogenic, anti-microbial, cholesterol decreasing, immune modulating, as well as anti-inflammatory, which is why they present a lot of interest to the medical community. These compounds are commonly found in the roots of *Clematis* species from Asia. However, their presence in Mediterranean *Clematis flammula* has not been reported yet. We aimed to detect their presence in *C. flammula* leaves extracts from Algeria, by using different extractive solvents, mainly ethyl acetate (EA), petroleum ether (PE) and n-butanol (NB). Phytochemical screening was equally conducted followed by TLC characterization. The results of the Libermann-Burchard and the foam tests indicated the presence of saponins in the three extracts, which was confirmed by the dosage procedures. The highest tenure in saponins was found in the PE extract (631 µg eq OA/ mg extract), reasserted by the hemolysis test. Two TLC systems were used to characterize the extracts by comparing with oleanolic acid and diosgenin. Revelation with anis aldehyde and UV disclosed the presence of compounds with R_f and color similar to those of oleanolic acid, but no spot was identical to that of diosgenin. The chromatographic profiles of EA and PE extracts were similar, indicating the presence of identical compounds. These results represent new perspectives for the use of *C. flammula* leaf extracts as source of triterponoid saponins with important therapeutic potential.

Key words: *Clematis flammula*, saponins, TLC, reactive oxygen species, wound healing, anti-inflammatory.

Biocapteurs analytiques à base de substances naturelles : nouvelles approches de valorisation

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Résumé

Les ressources végétales constituent une source importante de substances bioactives présentant un fort potentiel dans le domaine des biocapteurs analytiques. Les composés d'origine végétale, tels que les enzymes, les polyphénols, les flavonoïdes, les anthocyanes et certains polysaccharides naturels, possèdent des propriétés biologiques et électrochimiques intéressantes permettant leur intégration dans des systèmes de détection sensibles, sélectifs et éco compatibles. La valorisation de ces biomolécules naturelles dans les biocapteurs représente une approche innovante visant à développer des dispositifs analytiques plus durables, moins coûteux et respectueux de l'environnement. Grâce à leurs activités antioxydantes, catalytiques et redox, ces substances végétales peuvent être utilisées dans diverses applications biomédicales, agroalimentaires et environnementales, notamment pour la détection des métaux lourds, des pesticides, des composés phénoliques ou des biomarqueurs biologiques. Cette communication mettra en évidence les principales substances bioactives d'origine végétale exploitées dans les biocapteurs analytiques, ainsi que les nouvelles stratégies de valorisation basées sur les biotechnologies et les nanomatériaux. Une attention particulière sera portée aux perspectives offertes par les ressources naturelles végétales dans le développement de biocapteurs innovants et durables.

Mots clés: substances naturelles, enzymes, biocapteurs, analyse.

α -amylase inhibitory activity of phenolic compounds from *Corchorus olitorius* L. leaves

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Abstract

The inhibition of α -amylase represents a key therapeutic strategy for controlling postprandial hyperglycemia, particularly through the use of natural bioactive compounds such as plant-derived phenolics. In this context, the present study investigates the phenolic profile of *Corchorus olitorius* L. leaves (commonly known as Mouloukhia in Algeria) and evaluates their contribution to α -amylase inhibitory activity. A hydromethanolic extract (70% methanol) was obtained by maceration. Phytochemical analysis revealed a high content of phenolic constituents, including total polyphenols (193.84 mg GAE/g DE), and flavonoids (14.26 ± 0.039 mg QE/g DE). The biological potential of the extract was primarily assessed through its α -amylase inhibitory activity, which showed a notable effect with an IC_{50} value of 4.62 ± 0.98 mg/mL, suggesting a significant role of phenolic compounds in enzyme inhibition. In addition, the extract exhibited considerable antioxidant activity, as demonstrated by total antioxidant capacity (TAC), DPPH radical scavenging, and ferric reducing antioxidant power (FRAP) assays. Overall, these findings highlight the richness of *Corchorus olitorius* leaves in bioactive phenolic compounds and support their potential application as natural α -amylase inhibitors, with possible relevance in the management of postprandial hyperglycemia.

Key words: *Corchorus olitorius* L., polyphenols, flavonoids, anti-enzymatic activity, α -amylase inhibitors.

Valorization of fruit microbiota: *Lactiplantibacillus plantarum* and *Kluyveromyces marxianus* as novel probiotic candidates

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Abstract

Mediterranean fruits represent a promising source of probiotic microorganisms with technological and health-related interest. However, the potential of lactic acid bacteria and yeasts isolated from Algerian fruit matrices remains poorly explored. Strains of *Lactiplantibacillus plantarum*, *Kluyveromyces marxianus*, and *Saccharomyces cerevisiae* were isolated from fruits collected in the Kabylia region (Algeria). Identification was carried out using MALDI-TOF, molecular sequencing, and whole-genome sequencing for *L. plantarum* F2. The strains were evaluated for safety criteria and probiotic properties, including tolerance to gastric acidity and bile salts, cell aggregation, hydrophobicity, and adhesion ability. Additional biological activities were also investigated, namely antibacterial activity, antioxidant potential, cholesterol assimilation, and α -amylase inhibition. The selected strains exhibited a satisfactory safety profile and good survival under simulated gastrointestinal conditions. They also showed strong aggregation and adhesion capacities. The strain *K. marxianus* GBC2 was particularly distinguished by cholesterol assimilation (54%), α -amylase inhibition (81%), and antibacterial activity against *Staphylococcus aureus*. The genome of *L. plantarum* F2 revealed the presence of plantaricins, explaining its antimicrobial activity. These findings confirm the strong probiotic and technological potential of Algerian fruit derived strains for the development of innovative functional foods.

Key words: probiotics, *Lactiplantibacillus plantarum*, *Kluyveromyces marxianus*, antibacterial activity, antioxidant activity, cholesterol assimilation.

Phytochemical composition, antioxidant, antiproliferative activities and molecular docking analysis of *Lavandula multifida* L. extracts against the HTC116 colon cancer cell line

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Abstract

Lavandula multifida L. is a well-known medicinal plant widely used across Mediterranean regions. Despite extensive research on its essential oil, the composition and bioactivity of its organic extracts remain underexplored. This study aimed to investigate the phytochemical composition and assess the antioxidant and antiproliferative activities of *L. multifida* extracts, specifically the methanolic (LMM), aqueous (LMA), and ethyl acetate (LME) extracts. Phytochemical characterization involved the determination of total phenolic and flavonoid contents, along with HPLC/ESI-QTOF-MS profiling, while antioxidant activity was evaluated through three complementary *in vitro* assays DPPH, ABTS, and FRAP. Antiproliferative activity was evaluated using the MTT assay against human colon adenocarcinoma (HCT116) cell lines, and molecular docking was employed to investigate the molecular basis of the observed anticancer activity, focusing on interactions with the target proteins Thymidylate Synthase (TS), Epidermal Growth Factor Receptor (EGFR), and B-cell Lymphoma 2 (Bcl-2). The HPLC/ESI-QTOF-MS analysis revealed a rich structural diversity, dominated by fatty acids, particularly oxylipins, along with a diverse array of phenolic compounds, flavonoids, and terpenes. LMM exhibited the strongest DPPH scavenging activity (IC₅₀ = 14.19 µg/mL), LME displayed the highest ABTS activity (IC₅₀ = 28.07 µg/mL), and LMA demonstrated the greatest FRAP value (246.62 µg TE/mg). LME reduced cell viability by 97% (IC₅₀ = 28.78 µg/mL) in HCT116 cells, followed by LMM with a 66% reduction (IC₅₀ = 62.58 µg/mL), while no significant antiproliferative effects were observed for LMA. Molecular docking analysis showed strongest binding to TS (-9.239 kcal/mol), followed by Bcl-2 (-8.335 kcal/mol) and EGFR (-7.687 kcal/mol), suggesting the potential roles of the tested compounds as inhibitor of key cancer pathways. These findings highlight *L. multifida* as a promising source of natural antioxidant and anticancer agents, with potential to target key cancer-related pathways.

Key words: *Lavandula multifida*, phytochemical composition, antioxidant, antiproliferative, molecular docking.

Solvent-dependent phytochemical profiling and antioxidant activity of the Saharan plant *Stipagrostis pungens*

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Abstract

Natural products from arid environments are recognized as valuable sources of bioactive compounds with significant antioxidant potential. This study investigates the effect of solvent polarity on the phytochemical composition and antioxidant activity of selected extracts of *Stipagrostis pungens*. Three extracts (hydro-ethanolic, hydro-methanolic, and hydro-ethyl acetate) were prepared and comparatively analyzed. The hydro-ethyl acetate extract exhibited the highest extraction yield (9.12%) and total phenolic content (43.74 µg GAE/mg), indicating its efficiency in extracting semi-polar compounds. LC–ESI–MS/MS analysis identified 19 phenolic and flavonoid compounds, with rosmarinic acid as the predominant constituent across all extracts. Antioxidant activity assays revealed significant differences among extracts. The hydro-ethyl acetate extract showed the strongest DPPH radical scavenging activity ($IC_{50} = 0.1357$ mg/mL), followed by the hydro-ethanolic ($IC_{50} = 0.1499$ mg/mL) and hydro-methanolic extracts ($IC_{50} = 0.2764$ mg/mL). In the ABTS assay, the hydro-ethyl acetate extract ($IC_{50} = 0.214$ mg/mL) showed stronger activity than the hydro-methanolic extract ($IC_{50} = 0.242$ mg/mL). The hydro-methanolic extract demonstrated strong reducing power (FRAP = 570 µmol TE/g), confirming its balanced antioxidant profile. These findings highlight the strong influence of solvent polarity on phytochemical recovery and antioxidant activity, positioning *Stipagrostis pungens* as a promising source of natural antioxidants.

Key words: Natural products, LC–ESI–MS/MS, Total phenolic content (TPC), DPPH radical scavenging activity ABTS assay, Ferric reducing antioxidant power (FRAP), Solvent polarity.

The first qualitative and quantitative assessment of *Echinops spinosus* sp. Extracts of the Sahara

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Abstract

As part of our efforts to promote Algerian flora of the Sahara, we conducted a phytochemical study on *Echinops spinosus* sp. extracts to determine the content of the secondary metabolites most relevant to the therapeutic use in treating certain digestive disorders. Locally, its roots are used in infusions to treat stomach infections, diarrhea, parasites. Qualitative screening revealed the presence of flavonoids, terpenoids, tannins, alkaloids, phenols, quinons and reducing compounds in both aerial and roots extracts which indicates the plant's ability to withstand the biotic and abiotic stresses of the southern harsh conditions. In quantitative screening, total phenolic content (TPC) of roots was about 9.72 ± 0.64 mg EGA/DW which is higher than in aerial part reaching 5.74 ± 0.26 mg EGA/DW. this distinction is more emphasized in the total flavonoid content (TFC) where 7.27 ± 0.82 mg EQ/DW is recorded in root extract and 3.35 ± 0.61 mg EQ/DW in aerial part. Since we pointed out the significant presence of reducing compounds and polyphenols, we then attempted to assess the antioxidant capacity of our extracts by the related tests. IC_{50} of roots and AP extracts is equal to 0.106 ± 0.14 mg/ml and 0.21 ± 0.76 mg/ml respectively against 0.71 ± 0.08 mg/ml of the ascorbic acid and 0.15 ± 0.15 mg/ml of quercetin for the DPPH reducing test. Trolox was used as a standard for the ferric reducing test, its half absorbance ($A_{0.5}$) gave a concentration of 84.25 ± 0.78 μ g/ml, similarly, $A_{0.5}$ of roots gave 62.35 ± 1.08 μ g/ml and $A_{0.5}$ from AP 66.12 ± 1.32 μ g/ml. Finally, IC_{50} of root extract recorded was equal to 122.17 ± 0.3 μ g/ml while IC_{50} of AP extract was equal to 343.67 ± 0.46 μ g/ml against 52.13 ± 0.97 μ g/ml of the ABTS IC_{50} in the ABTS scavenging test. This result marks the beginning of *in vitro* exploitation of a species with such phytochemical importance to preserve or improve it.

Key words: *Echinops spinosus* sp., aerial part (AP), roots, secondary metabolites, tests.

Poster Session

A phenolic-rich extract of *Calendula arvensis* promotes burn wound healing via antioxidant and anti-inflammatory mechanisms

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Abstract

Calendula arvensis has long been used in traditional medicine for the treatment of skin disorders, including burn injuries. However, comprehensive scientific evidence supporting its therapeutic efficacy and underlying mechanisms remains limited. The present study aimed to characterize the phytochemical profile of the methanolic extract of *C. arvensis* and to evaluate its antioxidant, anti-inflammatory, and burn wound healing activities. Phytochemical profiling was performed using LC-QTOF-MS, revealing a complex composition predominantly rich in phenolic acids and flavonoids. Antioxidant activity was evaluated using the DPPH radical scavenging assay, demonstrating strong free radical scavenging capacity compared with the standard. The anti-inflammatory effect was evaluated *in vivo* using the xylene-induced ear edema model, where the extract significantly reduced ear swelling compared to the control group. The wound healing potential was investigated using a rat burn model by monitoring wound contraction over time and performing histological analysis of regenerated tissues. The extract significantly accelerated burn wound closure compared to both untreated and reference drug-treated groups. Histological findings revealed enhanced re-epithelialization, improved collagen deposition, and better overall tissue organization. These biological effects may be attributed to the synergistic action of phenolic compounds, which are known to modulate oxidative stress and inflammatory responses, thereby promoting tissue repair. Overall, this study provides scientific validation for the traditional use of *C. arvensis* in burn management and highlights its potential as a promising source for the development of novel therapeutic agents for skin regeneration.

Key words: *Calendula arvensis*, LC-QTOF-MS, phenolic compounds, DPPH, ear edema model, burn model, histology.

Clove essential oil against fruits fungal pathogens

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Abstract

Post-harvest fungal infestation leads to losses in food sources, especially when caused by *Penicillium*. There is, therefore, a need to find sustainable antifungal agents. In this paper, the antifungal activity of clove essential oil from *Syzygium aromaticum* was investigated against Fruits Fungal Pathogens. The antifungal effects of the oil were tested using the agar diffusion method on Potato Dextrose Agar (PDA) medium. The minimum inhibitory concentrations (MICs) were evaluated on Sabouraud Dextrose Agar (SDA) medium. Based on both macroscopic and microscopic observations, it was possible to identify the following fungal species: *Aspergillus sp.*, *Geotrichum sp.*, *Fusarium sp.*, *Alternaria sp.*, *Peacilomyces sp.*, *Botrytis*, and *Penicillium sp.* Minimum inhibitory concentrations (MICs) were quantified, and their effects on fungi. The oil showed high antifungal properties as its MIC was found to be 6 µL/mL against all fungal species. Along with marked changes in their morphology and physiology. The results indicate that clove essential oil is a very effective eco-friendly replacement for chemical fungicides and emphasize the role of computational methods in understanding the mechanisms of anti-fungal action.

Key words: *Syzygium aromaticum* L., antifungal activity, essential oils, fruits Fungi.

Fortified edible oils: A nutritional strategy for oxidative stress control

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Abstract

This study assessed the effects of various dietary *Pistacia lentiscus* oil (PLO) and Virgin Olive Oil (VOO), alone or in combination with tomato lycopene (Lyc), on lipid metabolism and oxidative stress-related cardiovascular risk. Both VOO and PLO are rich in unsaturated fatty acids and bioactive antioxidants, which are known to modulate oxidative stress and lipid peroxidation, key mechanisms involved in the development of cardiovascular diseases (CVD). The present study aimed to enrich VOO and PLO with lycopene in order to enhance their antioxidant potential and reduce CVD risk. Fifty male Wistar rats (Pasteur Institute of Algeria) were subjected to dietary treatments for 9 weeks. Total cholesterol (TC) was determined by the CHOD-PAP enzymatic method, HDL-C using Biotrol diagnostic kits, and LDL-C was calculated using the Friedewald formula ($LDL-C = TC - HDL-C - TGs/5$). Triglycerides (TG) were measured by the PAP-1000 enzymatic method, and serum phospholipids (PL) by an enzymatic colorimetric method. The plasma atherogenic index (PAI) was calculated as $TC/HDL-C$. The results showed that ingestion of PLO and VOO significantly reduced TC, LDL-C, TG, and PL levels, while HDL-C levels increased in all treated groups. These lipid improvements are consistent with a reduction in oxidative stress-induced lipid peroxidation, attributable to the antioxidant components of both oils. Moreover, the lowest plasma atherogenic index was observed in the VOO-Lyc group after 3, 6, and 9 weeks of treatment, suggesting enhanced protection against oxidative modification of lipoproteins. Enrichment of PLO and VOO with lycopene amplified the beneficial effects of both oils on serum biochemical parameters, likely through synergistic antioxidant actions that limit oxidative stress and improve lipoprotein stability. These findings suggest that lycopene-enriched PLO and VOO may serve as functional dietary components for the prevention of oxidative stress-related cardiovascular disorders, including hyperlipidaemia and hypercholesterolaemia.

Key words: Lycopene, *Pistacia lentiscus* oil, virgin olive oil, oxidative stress, LDL-C, HDL-C, triglyceride.

Impact of extraction methods on the antimicrobial efficacy of *Allium sativum*: a sustainable approach to poultry meat preservation

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Abstract

In response to the growing demand for organic and eco-friendly food preservation techniques, natural alternatives to chemical additives are being extensively explored. Garlic (*Allium sativum* L.) is recognized for its potent antimicrobial properties, primarily attributed to its allicin content. This study aimed to evaluate the inhibitory effects of various garlic extraction methods against common pathogenic and spoilage microorganisms, and to assess its efficacy in preserving chicken meat. Four extraction methods were tested: hydro-distillation, hot maceration (1h at boiling point), cold maceration (24h at room temperature), and fresh garlic juice. The antibacterial activity was screened *in vitro* using the agar disc diffusion method against *Bacillus subtilis*, *Escherichia coli*, *Micrococcus*, *Proteus*, *Pseudomonas*, and *Salmonella*. Furthermore, the Minimum Bactericidal Concentration (MBC) of the most effective extracts was applied to chicken meat stored at $4 \pm 1^\circ\text{C}$ for 16 days. The findings revealed that antibacterial activity is dose-dependent, with Minimum Inhibitory Concentrations (MIC) ranging between 1.25 and 10 $\mu\text{l/ml}$. Fresh juice and cold macerate (at 7 $\mu\text{l/ml}$) exhibited the highest inhibitory effects, whereas hydro-distillation and hot maceration yielded no significant results due to the thermal degradation of active compounds. Regarding meat preservation, the treatment significantly inhibited the growth of total Coliforms (58.19%), Fecal Coliforms (35%), and Total Aerobic Count (6.50%) by the end of the storage period. The study demonstrates that cold-processed garlic extracts can effectively complement refrigeration in poultry preservation, offering a sustainable and biological hurdle technology to enhance food safety and shelf-life.

Key words: *Allium sativum* L., antimicrobial activity, maceration, bio-preservation, chicken meat.

Antimicrobial activity of parsley "*Petroselinum crispum*" extract

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Abstract

Medicinal plants and their compounds, increasingly recognized for their multiple benefits, offer a promising alternative for the development of innovative therapeutic formulations and thus reduce the side effects of synthetic molecules. In this context, parsley (*Petroselinum crispum*), an aromatic and medicinal plant widely used throughout the world, was chosen as the object of study with the aim of adding value to the biomolecules extracted from parsley. Our approach included the evaluation of their biological activities. The results obtained highlighted the richness of parsley in secondary metabolites, with a high content of polyphenols (99.96 mg EAG/g extract) and flavonoids (42.78 mg EQ/g extract). Evaluation of the antimicrobial activity of the hydro-ethanolic extract of *P. crispum* showed variable results depending on the microbial strains tested. The extract demonstrated moderate antibacterial activity against *Escherichia coli* (10.88 mm) and very strong activity against *Staphylococcus aureus* (47.75 mm). In contrast, no activity was observed against *Pseudomonas aeruginosa*, *Salmonella*, and *Bacillus subtilis*. For *Candida albicans*, inhibition was very low (7mm). This product represents a promising advance in the use of plant resources for the development of natural and effective topical solutions, emphasis parsley's role as a key ingredient in the formulation of future phytotherapeutic treatments.

Key words: medicinal plants, *Petroselinum crispum*, biomolecules, antimicrobial activity.

Antioxidant potential and phenolic content of *Cucurbita pepo* L. aqueous extract

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Abstract

Natural products, derived from plants, exhibit a remarkable range of biological and therapeutic properties that have been harnessed for centuries in traditional medicine and modern drug discovery. The evaluation of the phenolic content and the antioxidant activity of *Cucurbita pepo* aqueous extract were the main aim of the present study. In vitro, antioxidant activity was evaluated by DPPH radical-scavenging activity, reducing power test, and OH radical-scavenging activity. Quantitative analysis revealed that polyphenols content was ($76,33 \pm 0,57$ mg GAE/g of dry extract) and flavonoids content was ($19,53 \pm 0,35$ mg QE/g of dry extract). The results obtained displayed that the aqueous extract exhibit a scavenging activity against DPPH radical with IC₅₀ values of $0,030 \pm 0,01$ mg/ml), the reducing power assay of the extract had an IC₅₀ of ($1,36 \pm 0,30$ mg/ml), while OH radical-scavenging activity had an IC₅₀ of ($0,18 \pm 0,00$ mg/ml). These results validate the plant's historical application in folk medicine. However, its strong antioxidant properties require more in-depth study to optimize its medicinal benefits.

Key words: *Cucurbita pepo* L., DPPH scavenging activity, reducing power, OH radical-scavenging activity, phenolic content.

Physicochemical properties and antioxidant activity of water-soluble polysaccharide from *Carthamus Caeruleus*

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Abstract

The use of natural polymers has significantly increased in recent years due to their wide range of applications in the food and pharmaceutical industries. Among these, plant-derived water-soluble polysaccharide has attracted considerable interest because of its functional and physicochemical properties. The present study aims to extract water-soluble polysaccharide from the roots of *Carthamus caeruleus* and to evaluate its composition, structural characteristics, and potential functional applications. water-soluble polysaccharide was extracted using thermal extraction combined with hydration. The extracted crude polysaccharides were analyzed for total sugar content. Acid hydrolysis was performed using 4 M hydrochloric acid at 80°C for 30 minutes, followed by thin-layer chromatography (TLC) to identify monosaccharide composition. Structural characterization was carried out using Fourier Transform Infrared (FT-IR) spectroscopy. Functional properties, including water- and oil-holding capacities and pH, were measured. Antioxidant activity was evaluated using the DPPH radical scavenging assay, and IC₅₀ values were determined. The highest mucilage yield (64%) was obtained through thermal extraction with hydration. The crude extract showed a high carbohydrate content, with total sugars reaching 90.98%. TLC analysis revealed that glucose is the major monosaccharide component of the polysaccharides. FT-IR spectra confirmed characteristic carbohydrate functional groups. The water-soluble polysaccharide exhibited good functional properties, with water-holding capacity of 2 g/g and oil-holding capacity of 1.2 g/g. Its mildly acidic pH (4.8–5) supports emulsifying properties, which are beneficial for product stabilization. Antioxidant activity, assessed by the DPPH assay, showed relatively low activity for both polysaccharides, with IC₅₀ values of 1.357 ± 0.502 mg/mL. The water-soluble polysaccharide from *Carthamus caeruleus* roots demonstrated promising physicochemical and functional properties, including high carbohydrate content and good water- and oil-binding capacities. Although its antioxidant activity is limited, its stabilizing and emulsifying characteristics suggest strong potential for application in the food and pharmaceutical industries.

Key words: *Carthamus caeruleus*, water-soluble extract, polysaccharide, antioxidant activity, carbohydrate content.

Using equivalent geometry to assess the iodine-131 therapeutic activity in case of basedow disease

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Abstract

Iodine-131 is a radioactive isotope. Like any radionuclide from nuclear fission, ¹³¹I is produced naturally in the little spontaneous fission that occurs in natural uranium, but quickly disappears because of its half-life (8 days). Several radioactive isotopes of iodine are used in medicine, especially ¹³¹I, which is of great interest for the functional exploration of the thyroid and treatment of hyperthyroidism (especially Basedow disease) and some thyroid cancers. In the context of biological and therapeutic properties of natural products, this work contributes to optimizing radionuclide-based therapies for endocrine disorders. Given the importance of such a radioactive element in the treatment of thyroid diseases and the complexity of determining accurate personalized therapeutic activity, we tried to find a simpler expression of the personalized patient dose, facilitating the task of medical treatment based on thyroid weight, to find an equivalent geometry to the thyroid gland of a patient with Basedow disease. Our Monte Carlo simulations (Penelope code) show that the absorbed gamma dose varies non-linearly with thyroid volume, with a difference of up to 25 % between spherical and ellipsoidal equivalent geometries for glands larger than 30 mL. This study demonstrates that equivalent geometry can improve dose estimation without complex voxel-based modeling. In order to find a simple expression of therapeutic activity of ¹³¹I, we studied the variation of the absorbed gamma dose as a function of the size of the thyroid gland. This study was achieved using Monte Carlo simulation (Penelope code). These findings provide a practical tool for nuclear medicine physicians to personalize ¹³¹I activity based on easily measurable thyroid dimensions.

Key words: Iodine-131, Monte Carlo simulation, thyroid gland, Basedow disease, therapeutic activity, equivalent geometry.

***In vitro* antioxidant, antibacterial and anti-proliferative activities of thyme extract from Tiaret region, Algeria**

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Abstract

Thyme is an aromatic medicinal plant recognized for its significant therapeutic properties. The aim of this study was to evaluate the *in vitro* biological activities of a methanolic extract of Thyme harvested from Tiaret region in Western Algeria. Additionally, the total polyphenol content was determined using the Folin-Ciocalteu method. Antioxidant activity was assessed via the DPPH assay, and antibacterial activity against eight pathogenic bacterial strains was determined using the agar diffusion method. The viability of human breast cancer MCF-7 cells was determined using the 3-(4,5-Dimethyl-2-thiazolyl)-2,5-diphenyl-2H-tetrazolium bromide (MTT) colorimetric assay. After methanolic extraction of polyphenols via sonication, a yield of 4% was obtained. The polyphenol extract has a phenolic content of 103.92 ± 0.67 mg/EAG. For antioxidant activity, an IC₅₀ value of 3.501 μ g/ml was recorded, suggesting that Thyme possesses a significant percentage of antioxidants. The investigation into antibacterial activity revealed that Thyme extract exhibited moderate effectiveness against all eight pathogenic strains tested: *Vibrio parahaemolyticus* CECT511, *Escherichia coli* CECT515, *Bacillus cereus* ATCC11778, *Listeria monocytogenes* ATCC13932, *Staphylococcus aureus* ATCC 25923, *Staphylococcus hominis* ATCC27844, *Shigella sonnei* CECT4887, and *Enterobacter aerogenes* ATCC13048, with average inhibition zones ranging from 10 to 16.5 mm. The methanolic extract of Thyme reduced growth of MCF-7 cells in a dose-dependent fashion in mitogen-free media with IC₅₀ value of 127,70 μ g/mL. This study supports the traditional use of Thyme in alternative medicine and confirms its efficacy as a natural remedy against various diseases, thus positioning this plant as a valuable ingredient for therapeutic applications.

Key words: Thyme, Polyphenols, DPPH, Biological activities, MCF-7 cell line, western Algeria.

A contribution to the study of the chemotypes of essential oils from *Saccocalyx satureioides* coss. & dur from Boussaada and Djelfa

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Abstract

This study focuses on the characterization of the chemotypes of essential oils extracted from *Saccocalyx satureioides* Coss. & Dur, a plant known for its potential biological properties. The main objective is to analyze the variability in the chemical composition of the essential oils based on the origin of the samples. The aerial parts of the plant were harvested in different regions of Boussaâda and Djelfa, then subjected to steam distillation to obtain the essential oils. Chemical analysis was performed using GC-MS. The results showed the presence of 59 compounds representing 98.46% of the total composition of *Saccocalyx satureioides* essential oil, with yields of 0.94% characterized by a predominance of monoterpenes and sesquiterpenes. Carvacrol (54.06%), α -terpineol (36.27%), borneol (25.33%), thymol (22.80%), linalool (14.25%), camphene (8%), terpinen-4-ol (4.61%), and ethyl o-methylbenzoate (2.6%) are the major compounds. Three chemotypes were identified in the populations of Djelfa and Boussaada: the α -terpineol/borneol chemotype, the carvacrol chemotype, and a mixed chemotype containing α -terpineol, thymol, and linalool. This variability is influenced by ecological factors (climate, soil, altitude) as well as genetic parameters. These results suggest potential interest in the use of *Saccocalyx* essential oils in the pharmaceutical, cosmetic, and food industries. In conclusion, this study highlights the importance of the chemical diversity of *Saccocalyx* essential oils and the need to select the most promising chemotypes for targeted applications.

Key words: *Saccocalyx satureioides*, essential oil, chemotype, Boussaâda, Djelfa.

Étude des propriétés multifonctionnelles des nanocomposites PVK/TiO₂ : Synergie entre performance électrique, photostabilité et activité antibactérienne

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Abstract

This study investigates the development and characterization of nanocomposite thin films based on poly(N-vinylcarbazole) (PVK) doped with nano-crystalline titanium dioxide (TiO₂). The integration of TiO₂ aims to enhance the polymer's functional properties, specifically focusing on its morphological evolution, electrical resistance, and biological resistance against bacterial pathogens. The composite materials were synthesized by dissolving PVK and TiO₂ in dimethyl sulfoxide (DMSO). Various doping concentrations 10⁻²M, 3.10⁻²M and 5.10⁻²M were prepared and deposited onto Indium Tin Oxide (ITO) glass substrates using the drop-casting technique. The structural and optical properties were analyzed via SEM, FTIR, and UV-Visible spectroscopy. Electrical resistance was evaluated using an Automatic Mapping Four-Point Probe System, while antibacterial activity was tested against *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Staphylococcus*. SEM analysis revealed a porous microstructure, confirming successful incorporation and significant morphological modification of the PVK matrix by TiO₂. FTIR and UV-Visible studies confirmed the complexation and enhanced UV radiation resistance of the films. Characterization showed a remarkable variation in electrical resistance at higher TiO₂ concentrations compared to pure PVK. Furthermore, antibacterial assays demonstrated that inhibitory activity against both Gram-negative and Gram-positive bacteria increased with doping levels. The PVK-TiO₂(5.10⁻²M) composite exhibited the highest efficacy, particularly against *Escherichia coli*. The results indicate that TiO₂ effectively modifies the PVK matrix, resulting in improved dispersion and an activated surface area. These nanocomposites demonstrate great potential for applications requiring high UV stability, tunable electrical properties, and robust antimicrobial performance.

Key words: N-Vinylcarbazole, DMSO, TiO₂, *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Escherichia coli*.

Biological activities of the hydromethanolic extract of *Peganum hamala* L.

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Abstract

Peganum harmala L., is a plant widely used in traditional Algerian medicine. The objective of the present work is the evaluation of some biological activities of *P. harmala* hydromethanolic extract (HmE). Colorimetric methods were used to quantify the phenolic compounds, while the antioxidant activity was estimated *in vitro* by two methods (the DPPH radical scavenging test and the β -carotene bleaching test). To evaluate the *in vivo* antioxidant effect of *P. harmala*, the capacity of plasma to scavenge the DPPH radical and to reduce Fe^{+3} to Fe^{+2} , as well as their effect on the hepatic redox state were measured. The antiproliferative and cytotoxic activity of *P. harmala* against *HeLa cell* lines was evaluated by the method of MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide). The hydromethanolic extraction has a high yield ($24.88 \pm 0.74\%$). Phytochemical analysis showed that HmE has higher levels of polyphenols, flavonoids and flavonol. *In vitro* antioxidant tests revealed that HmE has the best effect against the DPPH[•] radical, with IC_{50} of $52.41 \pm 2.03 \mu\text{g/ml}$. The result of β -carotene/linoleic acid bleaching revealed that HmE inhibited β -carotene bleaching ($76.18 \pm 0.21\%$). The *in vitro* study of antioxidant activity shows that HmE improved plasma antioxidant capacity and hepatic redox state. HmE strongly inhibited *HeLa cell* proliferation by $99.77 \pm 0.15\%$. It is concluded that the selected plant could be a potential source of bioactive compounds with strong antioxidant and antiproliferative activity. Additional studies of this plant *in vitro* and *in vivo* (such as toxicity) are desirable in order to confirm the safety and effectiveness of *P. harmala* extracts in humans.

Key words: *Peganum harmala* L., antioxidant activity, antiproliferative activity, hydromethanolic extract, *HeLa cell* lines, phenolic compound.

Antioxidant activities, phytochemical screening of bioactive ethyl acetate extract from the aerial parts of *Chrysanthemum trifurcatum*

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Abstract

Natural antioxidants have significant importance in human health. Recent investigations have shown that the antioxidant properties of plants could be correlated with oxidative stress defense and different human diseases and aging process etc. In addition, reactive oxygen species (ROS) contribute to diseases and aging, while plant-derived antioxidants help reduce oxidative stress. The aim of this study was to assess the *in vitro* potential of ethyl acetate extract of *Chrysanthemum trifurcatum* as a natural antioxidant. The DPPH scavenging activity of the extract at different concentrations (2.5- 50µg/ml) was increased in a dose dependent manner with an IC₅₀ found to be 136.41± 5.25 µg/ml. In addition, the extract demonstrated the ability to inhibit the formation of TBARS in a concentration dependent manner and the IC₅₀ was found to be 172.85 ± 4.73 µg/ml, in each of these assays, ascorbic acid was used as a reference substrate. Measurement of total phenolic and total flavonoids contents of ethyl acetate extract of *Chrysanthemum trifurcatum* were achieved using Folin-Ciocalteau reagent and AlCl₃ respectively. The results showed that this extract containing 74766 µg of gallic acid equivalents/mg extract and 87.64 µg of quercetin equivalents/mg extract respectively. Therefore, this study confirmed that this ethyl acetate extract of *Chrysanthemum trifurcatum* is a potent source of beneficial antioxidant.

Key words: antioxidant activity, *Chrysanthemum trifurcatum*, phenolic compounds, flavonoids, oxidative stress, lipid peroxidation.

Proteomic characterization of sweet kernel of an Algerian apricot variety (*Prunus armeniaca* L.) by LC-MS/MS and *in silico* prediction of bioactive peptides

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Abstract

Prunus armeniaca L. (family Rosaceae), widely known as “apricot”, is an edible plant widely cultivated for its delicious fruits. Algeria is currently the 5th world producer with 269,308. The plant is renowned for its nutritional richness, containing sugars, mono- and polysaccharides, polyphenols, fatty acids, sterol derivatives, carotenoids, glucosides, and volatile compounds. From time immemorial, *P. armeniaca* L. has been used in folk medicine as a remedy for various diseases, and only recently has it been investigated for its biological activities, such as antimicrobial, antioxidant, hepatoprotective, and anti-inflammatory effects. The proteomic analysis based on Combinatorial Peptide Ligand Library technology (CPLL), coupled to mass spectrometry, has been applied to extensively map the proteome of apricot seed identifying 175 proteins. A preliminary investigation using an *in-silico* web-available BIOPEP tool suggested that the two most abundant expressed proteins, Prunin1 and Prunin2 appear to contain tetra- and tripeptides with potential angiotensin-converting enzyme I (ACE) inhibitory, potential dipeptidyl peptidase-IV (DPP-IV) inhibitory and antioxidant activity.

Key words: apricot; LC-MS/MS; proteomics; DPP-IV inhibitor; ACE inhibitor; antioxidant activity.

Hawthorn anthocyanins: biological properties and *in vitro* therapeutic potential

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Abstract

Natural products constitute an important source of bioactive molecules with therapeutic properties. Hawthorn fruits, rich in anthocyanins, are of particular interest in the prevention of pathologies related to oxidative stress, inflammation, and metabolic disorders. This study aims to evaluate *in vitro* the biological properties of an anthocyanin-rich extract. The total anthocyanin content was determined using the pH differential method. Antioxidant activity was assessed by the DPPH radical scavenging assay and reducing power. Antidiabetic activity was evaluated through α -amylase inhibition. Anti-inflammatory activity was assessed via cyclooxygenase (COX) inhibition and nitric oxide (NO) radical scavenging capacity. The extract showed a high anthocyanin content ($340 \pm 0.08 \mu\text{g CRE/g ES}$). Significant antioxidant activity was observed ($\text{IC}_{50} = 207.12 \pm 10.28 \mu\text{g/mL}$ for DPPH; $\text{A}_{0.5} = 193.25 \pm 6.69 \mu\text{g/mL}$ for reducing power). A notable inhibition of α -amylase ($\text{IC}_{50} = 7.78 \pm 0.26 \text{ mg/mL}$) indicates potential antidiabetic activity. A dose-dependent anti-inflammatory activity was also recorded, with COX inhibition ($\text{IC}_{50} = 88 \text{ mg/mL}$) and NO radical scavenging activity ($\text{IC}_{50} = 1.802 \text{ mg/mL}$). These results confirm the biological properties and therapeutic potential of hawthorn extract, highlighting its role in modulating oxidative, inflammatory, and metabolic mechanisms. This study contributes to the valorization of natural products and opens perspectives for the development of biomedical applications.

Key words: hawthorn, anthocyanins, antioxidant activity, anti-inflammatory activity, antidiabetic activity.

***Clematis flammula* as an eco-friendly source of natural compounds with anti-ulcer activity: toward a sustainable alternative to synthetic treatments**

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Abstract

Proton pump inhibitors (PPIs), including omeprazole, are among the most commonly prescribed drugs for the management of gastric disorders. Nevertheless, mounting evidence suggests that their excessive or long-term use may be associated with adverse health outcomes. As a result, the identification of natural, biodegradable, and biocompatible molecules has become an important research focus for the development of safer and more sustainable therapeutic strategies. This study evaluates the potential inhibitory capacity of *Clematis flammula* (*C. flammula*) extract on the gastric H⁺/K⁺-ATPase enzyme. In vitro results indicate a notable inhibition (IC₅₀ = 0.195 ± 0.003 mg/mL), comparable to that of omeprazole (IC₅₀ = 0.074 ± 0.0001 mg/mL). Molecular docking studies revealed a strong affinity of the main compounds, particularly luteolin (-9.3 kcal/mol) and quercetin (-9.0 kcal/mol), for key residues of the active site (Cys813, Asp137, Glu343, Glu795), which are involved in proton and potassium transport. The anti-ulcer potential of the extract, along with its biodegradability and eco-friendly nature, suggests a promising alternative to synthetic proton pump inhibitors. This approach contributes to safeguarding human health while protecting aquatic ecosystems.

Key words: Omeprazole, H⁺/K⁺ ATPase, *C. flammula*, human health, molecular doking.

Phytochemical characterization and *in vitro* antioxidant activity of *Lawsonia inermis* L. leaf extracts

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Abstract

This study aims to evaluate the *in vitro* antioxidant activity of extracts obtained from the aerial parts of *Lawsonia inermis*; a medicinal plant widely used in traditional pharmacopoeia. Extraction was performed by maceration using polar solvents (ethanol 70%, methanol 70%, and distilled water). Quantitative determination of total polyphenols and flavonoids contents were carried out using standard spectrophotometric methods. Antioxidant activity was assessed using the DPPH free radical scavenging assay. Quantitative analysis revealed that *Lawsonia inermis* extracts are rich in phenolic compounds, with the highest content observed in the methanolic extract (130.44 ± 8.92 mg GAE/g of dry extract), followed by the ethanolic extract (69.74 ± 2.18 mg GAE/g of dry extract) and the aqueous extract (55.81 ± 0.77 mg GAE/g of dry extract). Flavonoid contents followed the same order as for TPC, with the methanol extract showed the highest quantity (30.30 ± 0.59 mg QE/g of dry extract). The results of antioxidant activity revealed that methanol extract showed the strongest DPPH radical scavenging potency among the tested extracts ($IC_{50} = 0.2 \pm 0.01$ methanol μ g/mL), however, ascorbic acid was the most potent with an IC_{50} value of 0.01 ± 0.00 μ g/mL. These findings indicate a strong correlation between phenolic compound content and antioxidant activity. *Lawsonia inermis* thus represents a promising natural source of bioactive molecules with potential antioxidant activity and may be further investigated for its pharmacological properties and therapeutic applications.

Key words: *Lawsonia inermis*, polyphenols, flavonoids, antioxidant activity, DPPH.

Green synthesis of silver nanoparticles using polyphenolic extract: Characterization and evaluation of their antimicrobial activity

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Abstract

The development of eco-friendly approaches for nanoparticle synthesis has gained significant attention in recent years. In this study, silver nanoparticles (AgNPs) were synthesized using a polyphenolic-rich plant extract as a reducing and stabilizing agent. The green synthesis method offers a sustainable alternative to conventional chemical and physical techniques by minimizing the use of toxic reagents and reducing environmental impact. The formation of silver nanoparticles was confirmed through visual color change and further characterized using standard analytical techniques such as UV–Vis spectroscopy, FTIR, and electron microscopy. The role of polyphenolic compounds in the reduction of silver ions and stabilization of nanoparticles was highlighted. The antimicrobial activity of the synthesized AgNPs was evaluated against a range of pathogenic microorganisms, including Gram-positive and Gram-negative bacteria. The results demonstrated significant inhibitory effects, suggesting that the nanoparticles possess strong antimicrobial properties.

Key words: green synthesis, Cytisus, silver nanoparticles, antibacterial, M'sila.

Computational and experimental insights into the anti-diabetic potential of *Cinnamomum zeylanicum* Oil: *In vitro* bioactivity, molecular docking and pharmacokinetics

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Abstract

Diabetes represents a major challenge with regards to the life quality and imposes a consistent economic burden on the global health care systems. Treatment with oral hypoglycemic agents is generally linked to several adverse effects, including skin reactions, gastrointestinal discomfort, hematological disorders, nausea, and weight gain. Therefore, scientists throughout the world turn to natural products from plants and other sources to avoid the adverse effects associated with conventional hypoglycemic drugs. In this context, the present work emphasizes an integrated *in silico* and *in vitro* approaches to elucidate the antidiabetic potential of *Cinnamomum zeylanicum* bark essential oil. First, the essential oil was extracted by hydrodistillation and characterized by GC-MS analysis. Then, an integrated *in silico* approach including molecular docking and ADMET was carried out. Finally, the inhibition potential of cinnamon essential oil was evaluated *in vitro* against α -amylase. Results revealed that cinnamaldehyde was the major compound, representing 86.35 % of the oil. Molecular docking analysis depicted that benzyl benzoate and isosativene exhibited the highest binding affinities (-7.6 kcal.mol⁻¹), surpassing that of the native ligand (acarbose). These findings were consistent with *in vitro* analysis, where cinnamon essential oil shows an antidiabetic effect more pronounced than acarbose. The IC₅₀ values were 212.96 $\pm$ 1.42 and 365.03 $\pm$ 10.70 μ g.mL⁻¹ for the oil and acarbose, respectively. Moreover, all essential oil constituents displayed favorable pharmacokinetic profiles. This study highlights the potential of cinnamon oil as a safe and effective therapeutic approach for diabetes and illustrates the value of integrating *in silico* and *in vitro* strategies in drug development.

Key words: diabetes, cinnamon essential oil, *in vitro*, *in silico*, ADMET, alpha-amylase.

Targeting breast cancer: molecular docking and ADMET profiling of plant-derived compounds for novel therapeutic strategies

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Abstract

Breast cancer remains one of the leading causes of global morbidity and mortality, creating an urgent need for effective therapies. Despite the significant progress in treatment strategies, there remains a critical demand for novel agents capable of targeting breast cancer cells while reducing side effects. Plant-derived compounds have shown promising anticancer potentials, making them a source of new therapies in the management of breast cancer. In the present work, computational studies through molecular docking and ADMET analysis were carried out on various bioactive compounds including mulberoside from *Morus alba* (white mulberry), epigallocatechin gallate from *Camellia sinensis* (green tea), cyanopictin from *Cynodon dactylon* (Bermuda grass), silymarin from *Silybum marianum* (milk thistle), curcumin from *Curcuma longa*, withanolide from *Withania somnifera* (ashwagandha) and ginsenoside from *Panax ginseng* (ginseng). The protein targets were: estrogen receptor α (ER α) (PDB: 3UUC) and matrix metalloproteinase-9 (MMP-9) (PDB: 2OVX). Docking results revealed that silymarin exhibited binding energies of -10.41 and -10.26 kcal/mol against 3UUC and 2OVX, respectively, which were more pronounced than the native ligands and reference drugs (lapatinib, doxorubicin and sorafenib). Subsequent *in silico* ADMET profiling indicated that silymarin demonstrated an excellent safety profile but may require formulation strategies to improve gastrointestinal absorption. These findings suggest that silymarin is a promising candidate for further experimental validation as potential anticancer agent.

Key words: breast cancer, bioactive compound, silymarin, molecular docking, ADMET.

***In vitro* antioxidant and antimicrobial activity of *Asphodelus microcarpus* tuber juice**

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Abstract

The *in vitro* biological activities of *Asphodelus microcarpus*, a medicinal plant belonging to the Liliaceae family and known as “Berouag” were evaluated from the tubers extracted juice. The aim of the study was to assess the tubers juice antioxidant capacity using two methods: DPPH and FRAP. Antimicrobial activity was determined by the disc diffusion method on an agar medium, against Gram-positive (*Staphylococcus aureus*, MRSA, *Bacillus subtilis*, *Enterococcus faecalis* and *Listeria monocytogenes*), and against Gram-negative (*Escherichia coli*, *Pseudomonas aeruginosa*, and *Citrobacter freundii*) bacteria. Antifungal activity was tested against the yeast *Candida albicans*. The results obtained reveal that the FRAP test has a reducing power (IC₅₀) of 0.40 ± 0.002 mg/ml, while the DPPH method demonstrates a radical scavenging capacity, characterized by an IC₅₀ of 0.30 ± 0.01 mg/ml. Regarding antibacterial activity, the results show that the tuber juice, at various concentrations, is more effective against Gram-positive bacteria than against Gram-negative bacteria. *Staphylococcus aureus*, MRSA, *Bacillus subtilis*, *Listeria monocytogenes*, *Enterococcus faecalis*, and *Citrobacter freundii* were moderately susceptible strains. While *Pseudomonas aeruginosa* and *Escherichia coli* proved highly resistant to the extract studied. Furthermore, the strongest activity was observed against *Candida albicans*. These results highlight the medicinal properties of *Asphodelus tubers* in traditional medicine.

Key words: biological activities, *in vitro*, *Asphodelus microcarpus*, medicinal plant.

Valorization of biomolecules extracted from parsley "*Petroselinum crispum*" in the development of a cream/gel with therapeutic properties

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Abstract

Synthetic drugs have revolutionized the treatment of many diseases, but they are often associated with undesirable side effects or long-term toxicity. Faced with this challenge, medicinal plants and their compounds, increasingly recognized for their multiple virtues, offer a promising alternative for the development of innovative therapeutic formulations and thus reduce the side effects of synthetic molecules as well as their dependencies. In this context, parsley (*Petroselinum crispum*), an aromatic and medicinal plant widely used throughout the world, was chosen as the object of study with the aim of adding value to the biomolecules extracted from parsley. Our approach included the evaluation of their biological activities, followed by the development and formulation of a cream/gel with therapeutic properties. Our results show that the hydroethanolic extract yield from the aerial parts (leaves and stems) of *P. crispum* is 13.75%. Evaluation of the biological properties of parsley extract demonstrated significant antioxidant activity $IC_{50}=196.18 \mu\text{g/mL}$, compared to that of ascorbic acid (the standard), which has an IC_{50} value of $8.06 \mu\text{g/mL}$, and particularly significant antiinflammatory activity with up to 60% inhibition of inflammation *in vitro* (IC_{50} value for the extract is $IC_{50}=19.91447 \mu\text{g/mL}$, while that for diclofenac sodium is $IC_{50}=15.311433 \mu\text{g/mL}$). The formulation we have developed has demonstrated interesting anti-inflammatory potential *in vivo* (edema inhibition rate of 35.37%, which is very close to that obtained with 1% diclofenac gel 36.16%), thus helping to reduce local inflammatory processes. Parsley represents a promising advance in the use of plant resources for the development of natural and effective topical solutions, underlining its role as a key ingredient in the design of future phytotherapeutic treatments.

Key words: biological activity, medicinal plants, *Petroselinum crispum*, biomolecules, antiinflammatory activity.

Production of an antibiotic pigment by a rhizospheric *Streptomyces* using solid-state fermentation (SSF)

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Abstract

Antibiotic resistance represents a major global challenge, emphasizing the urgent need for new antimicrobial agents. Actinomycetes are among the most promising sources of bioactive secondary metabolites with important pharmaceutical potential. In this study, actinomycetes were isolated from the rhizospheric soil of the medicinal plant *Marrubium vulgare* collected in Algeria. Selected isolates were screened for antimicrobial activity, leading to the identification of strain (MVR66), affiliated with *Streptomyces*, which exhibited notable antibacterial activity against *Staphylococcus aureus*. The bioactive compound was extracted and partially purified using chromatographic techniques (TLC and HPLC), suggesting that the produced violet pigment is associated with the observed antimicrobial activity. Furthermore, pigment production was evaluated under solid-state fermentation (SSF) using wheat bran as a low-cost substrate. The results demonstrated that pigment biosynthesis is influenced by cultivation conditions, particularly substrate characteristics, highlighting the potential of SSF for efficient pigment production without additional nutrient supplementation. Further studies are required for purification, structural elucidation, and understanding the mechanism of action of this compound.

Key words: medicinal plant, *Marrubium vulgare*, actinomycetes, *Streptomyces*, antimicrobial activity, violet pigment, solid-state fermentation.

Cardiovascular risk factors and glycemic control in Algerian patients with metabolic syndrome treated with SGLT2 inhibitors

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Abstract

This study investigates the comparative effects of metformin and SGLT2 inhibitors on cardiovascular biomarker profiles in patients with type 2 diabetes mellitus, a population at high risk of cardiovascular disease. While metformin is widely used as first-line therapy, recent evidence suggests that SGLT2 inhibitors may offer additional cardioprotective benefits beyond glycemic control. The objective of this study was to evaluate and compare cardiac-related biomarkers among patients treated with metformin, those receiving SGLT2 inhibitors, and healthy controls. A cross-sectional comparative design was used, including 450 participants divided equally into three groups (n=150 each). The groups consisted of metformin-treated patients, SGLT2 inhibitor-treated patients, and healthy individuals. Data were retrospectively collected from medical records and included key cardiovascular biomarkers such as troponin, NT-proBNP, C-reactive protein (CRP), low-density lipoprotein cholesterol (LDL-C), and systolic blood pressure (SBP). Statistical analysis was performed using one-way ANOVA followed by Tukey's post-hoc test. The results showed significant differences across all groups ($p < 0.05$). Patients treated with SGLT2 inhibitors exhibited significantly lower levels of troponin (12.2 ± 5 ng/L), NT-proBNP (130 ± 55 pg/mL), CRP (3.0 ± 1.3 mg/L), LDL-C (104 ± 20 mg/dL), and SBP (128 ± 9 mmHg) compared with the metformin group. Healthy controls showed the most favorable cardiovascular profiles overall. In conclusion, SGLT2 inhibitors were associated with a more favorable cardiovascular biomarker profile than metformin. These benefits appear to extend beyond glucose lowering and may involve anti-inflammatory and hemodynamic effects, supporting their role in reducing cardiovascular risk in patients with type 2 diabetes mellitus.

Key words: SGLT2 inhibitors, type 2 diabetes mellitus, metabolic syndrome, cardiovascular risk, glycemic control, cardiac biomarkers.

***Santolina africana* Jord. & Fourr. from M'sila, Algeria: polyphenolic content, antioxidant and antimicrobial activities of its extracts**

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Abstract

This study evaluates the therapeutic potential of *Santolina africana*, a medicinal plant traditionally used in the Maghreb region, through phytochemical profiling and biological activity screening. Extracts were prepared using two standard methods: methanolic maceration and aqueous decoction. Both extracts were rich in polyphenols (236.34 µg GAE/mg) and flavonoids (63.15 µg QE/mg). Antioxidant activity, assessed by the DPPH radical scavenging assay, gave IC₅₀ values ranging from 47.33 to 59.11 µg/mL. Antimicrobial testing revealed differential, extract-dependent activity: the methanolic extract exhibited pronounced inhibition against *Staphylococcus aureus* (zone of inhibition = 15.67 mm), whereas the aqueous extract showed strong antifungal activity against *Aspergillus niger* (52.52% growth inhibition). These complementary effects suggest distinct mechanisms, possibly involving membrane disruption (methanolic) versus oxidative stress induction (aqueous). Promising minimum inhibitory concentration (MIC) values (0.586–9.375 mg/mL) further support the bioactive potential of *S. africana* from the M'sila region. Collectively, these findings position this species as a valuable source of natural antimicrobial and antioxidant agents. However, isolation of active principles and *in vivo* validation are necessary to progress toward pharmacological applications.

Key words: *Santolina africana*, antioxidant activity, antibacterial activity, antifungal activity, polyphenols, flavonoids, methanolic extract, aqueous extract.

Evaluation of the polyphenolic content, antioxidant and antimicrobial activities of *Salvia aegyptiaca* L. from Bou Saâda – M'sila, Algeria

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Abstract

Algeria possesses an exceptional floral heritage, comprising over 3,000 plant species, 15% of which are endemic. As part of ongoing efforts to promote the valorization of local flora, this study aimed to evaluate the phytochemical (polyphenol and flavonoid content) and biological (antioxidant and antimicrobial) potential of *Salvia aegyptiaca* collected from the Bou Saâda–M'sila region. The methanolic extract (ME) exhibited higher total polyphenol (72.61 µg GAE/mg) and flavonoid (54 µg QE/mg) contents than the aqueous extract (AE). The ME also demonstrated strong antioxidant activity (IC₅₀ = 26.9 µg/mL), comparable to that of ascorbic acid. Antimicrobial assays revealed that the ME was more effective against Gram-positive bacteria (e.g., *Bacillus subtilis*: inhibition zone = 15.8 mm) and certain fungi (e.g., *Alternaria alternata*: 28.1% inhibition). However, high minimum bactericidal concentration values (>300 mg/mL) suggest a primarily bacteriostatic effect. These findings highlight the potential of *S. aegyptiaca* as a source of bioactive compounds, with efficacy depending on the extraction solvent and target strain. Further studies are required to identify the active principles and elucidate their mechanisms of action. Nonetheless, this plant holds promise for applications in pharmacology, food processing, and cosmetics, and its development could contribute to addressing public health challenges.

Key words: *Salvia aegyptiaca*, antioxidant activity, antibacterial activity, antifungal activity, polyphenols, flavonoids, methanolic extract, aqueous extract.

***Hammada scoparia*: Natural Source of Antioxidants for Oil Protection Against Oxidation**

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Abstract

This study aims to evaluate the potential of *Hammada scoparia* as a natural source of antioxidants, with emphasis on its antioxidant activity and its effectiveness in protecting vegetable oils against oxidation. Extracts were obtained under optimized conditions to maximize total phenolic compound content. Antioxidant activity was determined using several complementary assays, including DPPH and ABTS free radical scavenging tests, as well as reducing power evaluation (FRAP and phosphomolybdate). The results revealed high antioxidant activity of the extracts, correlated with their polyphenol richness. The efficacy of the extracts in stabilizing the oxidative degradation of a vegetable oil was also investigated. The results showed significant inhibition of lipid peroxidation, demonstrating the ability of *Hammada scoparia*'s bioactive compounds to delay oxidation processes. These findings confirm that *Hammada scoparia* represents a promising source of natural antioxidants, which can be valorized as an alternative to synthetic antioxidants in lipidic systems. This study thus highlights its potential interest in agro-food and pharmaceutical applications.

Key words: *Hammada scoparia*, phenolic compounds, antioxidant activity, oxidative stability.

Biological characterization of leaf, seed, and pod extracts of *Leucaena leucocephala*

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Abstract

This research investigates the physicochemical and bioactive characteristics of aqueous and methanolic extracts derived from the leaves, seeds, and pods of *Leucaena leucocephala*. To enhance preservation and extraction efficiency, leaf moisture content was measured. Methanolic extraction yielded higher results, especially in seeds, which were found to be particularly abundant in polyphenols and flavonoids. These phytochemicals are responsible for the extracts' strong antioxidant activity, as demonstrated by the DPPH radical scavenging assay. Antibacterial effects, evaluated using solid medium diffusion, showed considerable inhibition—most notably in seed and leaf extracts. In addition, the insecticidal potential was tested against *Ocnogyna baetica* larvae, with lethal concentration (LC₅₀, LC₉₀) and time (LT₅₀, LT₉₀) values indicating high efficacy, particularly for seed based extracts. Overall, the findings underscore the value of *L. leucocephala* as a promising natural source of antioxidant, antimicrobial, and insecticidal compounds, with potential applications in biopesticide development and therapeutic formulations.

Key words: *Leucaena leucocephala*, antioxidant activity, antibacterial effect, insecticidal potential, polyphenols.

Biological and therapeutic potential of anti-infective metabolites from *Streptomyces albidoflavus* s19 isolated from wastewater

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Abstract

Wastewater microbial diversity represents a promising and sustainable source of bioactive compound. This study explores the potential of *Streptomyces albidoflavus* S19 isolated from a municipal wastewater treatment plant for the production of anti-infective metabolites. The strain was cultivated under submerged conditions, followed by ethyl acetate extraction and C18 solid-phase fractionation. Chemical profiling was performed using HPLC-DAD and LC-MS. Biological activities were evaluated through antimicrobial assays (agar diffusion and MIC), antibiofilm tests in microplates, and antioxidant assays (DPPH, ABTS, and reducing power). Stability was assessed under different temperature, pH, and storage conditions. Bioactivity was distributed across several fractions, with the 50% acetonitrile fraction showing the highest antimicrobial activity against *Escherichia coli*, *Vibrio cholerae*, MRSA, and *Candida albicans*. LC-MS analysis revealed multiple metabolites (m/z 559, ~1025–1026, ~1085–1086). The crude extract exhibited MIC values as low as 4.6 mg/mL, significant antibiofilm activity (up to 66% inhibition), and notable antioxidant capacity. Bioactivities remained stable under thermal, pH, and storage variations. *Streptomyces albidoflavus* S19 from wastewater represents a valuable bioresource for the development of stable antimicrobial and antioxidant compounds, supporting sustainable biovalorization strategies.

Key words: Actinobacteria, *Streptomyces albidoflavus*, antimicrobial, antibiofilm, bioresource valorization, LC-MS.

Evaluation of Biological activities of Algerian Medicinal Edible Mushroom *Leatiporus sulphureus* Strain TEMS43: Antioxidant and antimicrobial studies

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Abstract

The purpose of this study aims to enhance the medicinal properties of fungi in Algeria, through the study of the species *Laetiporus sulphureus* strain TMES43. For this, an in -depth analysis of the chemical composition was carried out, accompanied by an evaluation of its antioxidant and antimicrobial potential. The extraction of these compounds was studied using different chemical solvents, at first via an extraction: solid-liquid by a solvent system constitutes methanol/water (80/20 V/V), then followed by liquid-liquid extraction using increasing polarity solvents: chloroform, ethyl acetate and n-Butanol. The evaluation of contents in phenolic and flavonoid compounds of the extracts from *Laetiporus sulphureus* revealed a significant variation according to the solvent used. Ethyl acetate extract presented the highest concentration in total polyphenols (TPC), reaching 111.90 ± 3.29 µg EAG/mg of extract. The n-Butanol, have TPC as 11.12 ± 5.52 µg EAG/mg, concerning flavonoids, the Ethyl acetate extract displayed the highest content 29.8 ± 0.00 µg re/mg of extract, followed by the aqueous extract with 7.21 ± 0 µg re/mg of extract. Ethyl acetate extract turned out to be the most active in the radical DPPH trapping test, with an IC₅₀ of $314,1 \pm 9,23$ µg/ml; $165,91 \pm 9,43$ µg/mL for the trapping of ABTS cation, and for phenanthroline, the n-butanol was the major effective extract at C_{A0,5} <3.125 µg/ml. Ethyl acetate extract shows an antibacterial activity with 18 mm inhibition area observed against *Staphylococcus aureus* and for *pseudomonas aeruginosa* a 15 mm area.

Key words: *Leatiporus sulphureus*, mushroom, polyphenols, flavonoids, antioxidant, antibacterial.

***In vitro* effects of propolis extracts on the innate immune responses of sea bream**

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Abstract

Aquaculture is the fastest-growing food production sector in the world. Immunostimulants primarily enhance the non-specific immune response of fish. Considering these factors, the antibacterial and immunostimulatory activity of aqueous and ethanolic extracts of Setifian propolis on the leukocyte activity of gilthead seabream (*Sparus aurata* L.) was investigated. The bactericidal activity of the ethanolic extracts was very high against *Shewanella putrefaciens* (non-pathogenic), while it was moderate against *Photobacterium damsela* and very low against *Vibrio harveyi*, two marine pathogenic bacteria. The lowest bactericidal activity was consistently observed with the aqueous extracts. Ethanol extracts and two aqueous extracts (from Babor and Ain-Abbassa) caused a significant decrease in cell viability when used at concentrations of 100 and 200 µg/mL. Furthermore, significant inhibitory effects were observed on leukocyte respiratory burst activity. This effect was dose-dependent in all cases except for the Boutaleb sample. The results suggest that some Algerian propolis extracts possess bactericidal activity against important bacterial pathogens of sea bream and significantly modulate leukocyte activity *in vitro*, confirming their potential as a source of novel natural biocides and/or immunomodulators for aquaculture.

Key words: Setifian propolis, bactericidal activity, sea bream (*Sparus aurata* L.), innate immunity.

Evaluation of the nematicidal activity of *Raphanus sativus* and *Nasturtium officinale* leaf and root extracts on the egg hatching of *G. rostochiensis*

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Abstract

Potato cyst nematodes (PCN), particularly *Globodera rostochiensis*, are among the most destructive pests affecting potato production worldwide and are classified as quarantine organisms. In Algeria, their management relies mainly on chemical nematicides, which pose serious risks to the environment, human health, and food safety. Consequently, the search for eco-friendly alternatives has become a major research priority. This study aimed to evaluate the nematicidal activity of aqueous extracts from leaves and roots of *Raphanus sativus* and *Nasturtium officinale* on the egg hatching of *G. rostochiensis*. Experiments were conducted under *in vitro* conditions. *G. rostochiensis* encysted eggs were exposed to three different concentrations of leaf or root extracts (100%, 50%, and 25%). The hatching rate of second-stage juveniles (J2) from encysted eggs was recorded using hatching assays in 6-week-old potato root leachates (PRL). The results showed that all aqueous extracts significantly inhibited the egg hatching of *Globodera rostochiensis*. The nematicidal activity increased with both extract concentration and exposure time. Root extracts of *Raphanus sativus* exhibited the strongest effect, achieving up to 65.5% inhibition of egg hatching compared to leaf extracts. In contrast, *Nasturtium officinale* showed lower inhibitory effects. These findings highlight the potential of brassicaceous plant extracts as eco-friendly alternatives for the management of potato cyst nematodes.

Key words: *Globodera rostochiensis*, potato, aqueous extracts, brassicaceous plants, eggs hatching.

Hepatoprotective activity of the methanolic extract of *Salvia argentea* against carbon tetrachloride-induced hepatotoxicity in mice

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Abstract

Carbon tetrachloride (CCl₄) is an industrial solvent known for its hepatotoxic and nephrotoxic effects. Its toxicity results from its metabolic conversion into reactive free radicals, particularly the trichloromethyl radical (CCl₃•), which reacts with oxygen to form the trichloromethyl peroxy radical (OOCCl₃•). These species trigger lipid peroxidation and cause structural damage to proteins and DNA. Antioxidants such as vitamins C and E, as well as phenolic compounds from plant extracts, can reduce these harmful effects. This study aimed to evaluate the antioxidant and protective effects of the methanolic extract of *Salvia argentea* against CCl₄-induced hepatorenal toxicity in mice. The extract was administered at doses of 200 and 600 mg/kg/day for seven days, followed by intraperitoneal injection of CCl₄ on day eight. Blood and liver samples were then collected for biochemical analysis. Results showed a significant reduction in serum biochemical markers of liver and kidney damage in treated mice. Additionally, antioxidant defenses were enhanced, as indicated by increased catalase (CAT) activity and glutathione (GSH) levels, along with decreased malondialdehyde (MDA) levels. These findings suggest that *Salvia argentea* extract exerts strong antioxidant, hepatoprotective, and nephroprotective effects, likely by scavenging reactive radicals and reducing oxidative stress.

Key words: toxicity, hepatoprotective, *Salvia argentea*, carbon tetrachloride.

Phytochemical Characterization and Computational Investigation of the Antioxidant Activity of *Ephedra alata*

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Abstract

Oxidative stress, resulting from an imbalance between free radical production and antioxidant defenses, is a major etiological factor in the development of chronic diseases such as cancer. Due to the toxicity and side effects of synthetic compounds, there is growing interest in the exploration of bioactive natural substances. This study evaluates the *in vitro* antioxidant potential of various extracts (ethanol, petroleum ether, ethyl acetate, n-butanol, and aqueous) of *Ephedra alata* using the DPPH free radical scavenging assay. The experimental results demonstrate significant antioxidant activity for all fractions. This analysis was supplemented by a molecular docking study using MOE software to model atomic-level interactions between the identified phytoconstituents and protein targets associated with tumor progression. This integrated approach highlights the potential of *Ephedra alata* as a promising source of new natural therapeutic agents.

Key words: oxidative stress, ephedra alata, DPPH test, MOE, SuissADME.

Sustainable control of *Fusarium verticillioides* in wheat using microorganisms

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Abstract

Fusarium verticillioides is frequently reported as the major pathogen in maize production; however, it has not been previously identified as a causal agent of Fusarium head blight in wheat in Algeria. The aims of this work are to study the pathogenicity of a *Fusarium verticillioides* strain isolated from wheat grains and to perform preliminary assays to control this pathogen using microorganisms (*Akanthomyces muscarius* and *Pseudomonas fluorescens*) The identity of the strain was confirmed using morphological and molecular methods. The pathogenicity tests were carried out using both durum and bread wheat grains. the direct confrontation method was used to assess the antifungal activity of the three microorganisms. The results showed that the strain was pathogenic to both durum and bread wheat. Direct confrontation tests revealed inhibition rates of 55% and 52% for *A. muscarius* and *P. fluorescens*, respectively. *A. muscarius* and *P. fluorescens* may offer alternative solutions to the use of fungicides.

Key words: biocontrol, *Fusarium verticillioides*, *Akanthomyces Muscarius*, *Pseudomonas Fluorescens*

Bioprospecting *Apium nodiflorum* extracts for integrated management of tomato phytopathogens: phytochemical profiling and antioxidant potential

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Abstract

Apium nodiflorum (L.) Lag. (Apiaceae) is an aquatic medicinal herb native to Algeria, traditionally used yet underexplored as a source of characterized bioactive compounds. This study investigated the phytochemical composition and antioxidant activity of hydro-ethanolic (HEE; yield: 26.38%) and hydro-ethyl acetate (HEAE; yield: 12.75%) extracts, in the context of developing plant-based strategies against phytopathogenic fungi threatening local tomato production. Quantitative profiling revealed that total polyphenol content (TPC) reached 28.96 ± 2.47 and 41.87 ± 6.97 μg GAE/mg, total flavonoid content (TFC) 8.94 ± 0.09 and 12.89 ± 0.06 μg QE/mg, and condensed tannins (CT) 16.85 ± 1.89 and 12.89 ± 1.39 μg CE/mg in HEE and HEAE, respectively. The higher TPC and TFC in HEAE reflects the selective affinity of semi-polar solvents for phenolic metabolites. Antioxidant activity, assessed via three orthogonal assays, demonstrated extract-specific profiles: DPPH radical scavenging was superior in HEE ($\text{IC}_{50} = 0.15 \pm 0.002$ mg/mL), while HEAE showed greater ferric reducing power (FRAP $\text{EC}_{50} = 0.271 \pm 0.027$ mg/mL) and total antioxidant capacity (TAC $\text{IC}_{50} = 0.711 \pm 0.027$ mg/mL). These divergent profiles reflect the solvent-driven selectivity of phenolic extraction and highlight the necessity of multi-assay antioxidant assessment. Taken together, the results position *A. nodiflorum* as a phytochemically substantiated candidate for natural antifungal applications, warranting further bioassay-guided investigation into its mode of action against economically relevant tomato pathogens.

Key words: *Apium nodiflorum*, phytopathogenic fungi, *Solanum lycopersicum*, polyphenols, antioxidant activity, biocontrol.

Bioactive compounds and therapeutic potential of lavender extract

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Abstract

Lavandula angustifolia is a medicinal and aromatic plant widely used in traditional medicine because of its therapeutic properties. Lavender contains several bioactive secondary metabolites such as phenolic acids, flavonoids, tannins, coumarins, and essential oils, which are responsible for its antioxidant and anti-inflammatory activities. The aerial parts of lavender were dried, powdered, and extracted using methanol or ethanol solvents. Phytochemical screening was carried out to identify the presence of secondary metabolites, while antioxidant activity was evaluated using DPPH and ABTS free radical scavenging assays. Anti-inflammatory activity was assessed through inhibition of protein denaturation assay. The phytochemical analysis revealed that lavender extract is rich in phenolic compounds and flavonoids, with a total phenolic content of approximately 85.4 ± 2.1 mg GAE/g extract and a flavonoid content of 41.7 ± 1.3 mg QE/g extract. The extract exhibited strong antioxidant activity with a DPPH radical scavenging percentage of 78.6% and an IC₅₀ value of 42.5 µg/mL, while the ABTS assay demonstrated an antioxidant capacity reaching 81.2%. In addition, lavender extract showed significant anti-inflammatory activity by inhibiting protein denaturation up to 69.4%. These biological effects are mainly attributed to the synergistic action of flavonoids, phenolic acids, and essential oil constituents. Therefore, lavender represents a promising natural source of bioactive compounds with potential pharmaceutical and nutraceutical applications.

Key words: *Lavandula angustifolia*, secondary metabolites, antioxidant activity, anti-inflammatory activity, phenolic compounds, free radical scavenging.

Antibacterial activity of a rhizospheric actinomycete isolate producing bioactive secondary metabolites

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Abstract

Rhizospheric microorganisms represent a valuable source of secondary metabolites with biological activity, particularly antibacterial agents effective against antibiotic-resistant bacteria. In this context, a bacterial isolate obtained from the rhizospheric zone of a medicinal plant and identified as belonging to the genus *Actinomycetes* was evaluated for its antibacterial potential. Preliminary assays, performed using the cylinder-agar method, showed significant activity against *Escherichia coli* (18.5 mm), *Micrococcus luteus* (29 mm), and *Staphylococcus aureus* (15 mm). The extract obtained after secondary metabolite extraction with ethyl acetate exhibited marked activity against a wide spectrum of Gram-positive and Gram-negative bacteria, with the exception of *Klebsiella pneumoniae*, which proved to be totally resistant. The inhibition zone diameters ranged from 21 to 32 mm: *Klebsiella pneumoniae* (21 mm), *Escherichia coli* (24 mm), *Staphylococcus aureus* (23 mm), *Micrococcus luteus* (24.5 mm), *Enterococcus faecalis* (25.5 mm), and *Bacillus subtilis* (32 mm). The minimum inhibitory concentration (MIC), determined by the microdilution method in microplate, was estimated at 4 mg/mL against *Bacillus cereus*, *Streptococcus pyogenes*, and *Enterococcus faecalis*; 2 mg/mL against *Staphylococcus aureus* and *Micrococcus luteus*; whereas against *Escherichia coli* the MIC was 16 mg/mL. These results highlight the potential of isolate B26 as a promising source of secondary metabolites with antibacterial activity against pathogenic bacteria resistant to antibiotics.

Key words: rhizosphere microorganisms, actinomycetes, secondary metabolites, antibacterial activity, antibiotic resistance.

Promising antibacterial properties of secondary metabolites extracted from rhizospheric fungus *Aspergillus niger*

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Abstract

To address the challenges posed by pathogenic and multidrug-resistant bacteria, we focused our interest on rhizospheric fungi, particularly the isolate *Aspergillus niger*. In the preliminary screening of the antimicrobial activity of this isolate, performed using the agar cylinder method, three pathogenic bacteria were tested: *Escherichia coli* ATCC 25922, *Micrococcus luteus* NRLL-4375, and *Staphylococcus aureus* ATCC 2856. The isolate exhibited inhibition zones of 21, 33, and 22.5 mm, respectively. Subsequently, fermentation followed by the extraction of secondary metabolites with ethyl acetate was carried out. The antimicrobial activity of the extracts was then assessed using the agar well diffusion method against a broader range of pathogenic bacteria. The inhibition zones recorded were 22.5 mm against *Escherichia coli* ATCC 25922, 12 mm against *Salmonella typhimurium* ATCC 13311, 19 mm against *Klebsiella pneumoniae*, 18 mm against *Micrococcus luteus* NRLL-4375, 17.75 mm against *Staphylococcus aureus* ATCC 2856, 14 mm against *Bacillus cereus* ATCC 10876, and 14.5 mm against *Enterococcus faecalis* ATCC 49452. These results suggest that the isolate *Aspergillus niger* could represent a promising source of bioactive molecules with antibacterial potential.

Key words: Antibacterial activity, *Aspergillus niger*, pathogenic bacteria, rhizospheric fungi.

Methadone in public health: Epidemiological perspectives on use, misuse, and mortality

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Abstract

Methadone is a synthetic opioid initially developed in the 1940s, primarily used today in two clinical contexts: opioid use disorder (OUD) treatment through methadone maintenance therapy (MMT), and chronic pain management. Its unique pharmacological profile — long half-life, high oral bioavailability, and low cost — has made it a cornerstone of addiction medicine worldwide. However, its epidemiological footprint is marked by a complex duality between therapeutic benefit and public health risk. Globally, methadone maintenance therapy has demonstrated significant efficacy in reducing illicit opioid use, HIV transmission, criminal behavior, and opioid-related mortality. The World Health Organization includes methadone on its List of Essential Medicines, and over 50 countries have incorporated MMT into national drug treatment programs. Coverage remains highly unequal, however, with low- and middle-income countries facing significant barriers to access, including regulatory restrictions, stigma, and limitations in healthcare infrastructure. From a mortality standpoint, methadone presents a paradox. While MMT reduces all-cause mortality among people with OUD by approximately 50%, methadone itself is disproportionately implicated in opioid overdose deaths, particularly in the United States. Between 2002 and 2015, methadone accounted for nearly one-third of prescription opioid overdose fatalities, despite representing only a small fraction of opioid prescriptions — largely due to its use in pain management outside specialized addiction clinics. Risk factors for methadone-related overdose include co-ingestion with benzodiazepines or alcohol, cardiac arrhythmias (QTc prolongation), unsupervised take-home dosing, and diversion to illicit markets. Vulnerable populations include individuals newly initiating treatment, those with low opioid tolerance, and patients with comorbid respiratory or cardiovascular disease. Epidemiological surveillance, stricter prescribing guidelines, expanded naloxone access, and equitable MMT scale-up remain essential pillars of a comprehensive public health response to methadone-associated harm.

Key words: methadone, opioids, toxicity, public health, epidemiology.

Evaluation of the antioxidant and antihemolytic activities of *Marrubium vulgare* and *Laurus nobilis* under glucose-induced oxidative stress

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Abstract

The present study aimed to evaluate the antioxidant activity of two medicinal plant extracts, *Marrubium vulgare* and *Laurus nobilis*, and to investigate their protective effects on human erythrocytes exposed to hypoosmotic stress under increasing glucose concentrations. Phytochemical analysis revealed that the extract of *Laurus nobilis* contained higher levels of total polyphenols and flavonoids than *Marrubium vulgare*, with values of 24.75 ± 0.75 mg GAE/g versus 15.52 ± 0.33 mg GAE/g for total phenolics and 8.48 ± 1.36 mg QE/g versus 2.67 ± 0.93 mg QE/g for flavonoids, respectively. These findings indicate that both plants are important sources of bioactive compounds. The antioxidant activity was assessed using the DPPH free radical scavenging assay at a concentration of 0.05 mg/mL for both plant extracts and ascorbic acid used as a reference antioxidant. The results demonstrated a remarkable radical scavenging activity for the studied extracts, with inhibition percentages of $96.06\% \pm 1.04$ for *Marrubium vulgare* and $95.18\% \pm 1.02$ for *Laurus nobilis*, compared to $81.81\% \pm 0.00$ for ascorbic acid. These results suggest that the investigated extracts possess a strong ability to neutralize free radicals. The anti-hemolytic activity was evaluated under hypoosmotic conditions in the presence of increasing concentrations of glucose (1, 5, 10, and 100 mg/mL). The results showed that both extracts exerted a protective effect on human erythrocytes against glucose-induced oxidative stress. The extracts significantly reduced hemolysis and limited hemoglobin denaturation, indicating stabilization of the erythrocyte membrane and preservation of cellular integrity. Overall, the findings of this study highlight the therapeutic potential of *Marrubium vulgare* and *Laurus nobilis* as natural sources of antioxidant and anti-hemolytic agents. These medicinal plants may represent promising candidates for the development of phytotherapeutic products intended to prevent oxidative stress-related cellular damage and complications associated with hyperglycemic conditions.

Key words: *Marrubium vulgare*, *Laurus nobilis*, antioxidant properties, oxidative stress, glucose, erythrocytes, anti-hemolytic activity.

Influence of solvent polarity on phytochemical recovery and antioxidant capacity of *Ruscus sp.* extracts

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Abstract

Medicinal plants represent a valuable source of bioactive compounds widely exploited in the pharmaceutical and food industries; among these plants, the genus *Ruscus* occupies an interesting position due to its traditional uses. This study aims to valorize this plant by quantifying its secondary metabolites and evaluating their antioxidant capacity. Extraction by maceration of the aerial parts of the plant yielded varying results depending on the solvents used. The results showed that the ethanolic extract had the highest yield ($18.4\% \pm 3$) compared to the acetonic extract ($14.79\% \pm 2.4$). Quantitative estimation of total polyphenols and flavonoids using colorimetric methods (Foli- Ciocalteu and aluminum chloride), showed that the acetonic extract had a higher polyphenol content than the ethanolic extract, with 72.12 ± 10.26 mg and 71.9 ± 9 mg GAE/g DE, respectively. Regarding flavonoid content, the acetonic extract contained 26.57 ± 2.79 mg QE/g DE, whereas the ethanolic extract contained 25.16 ± 5.93 mg QE/g DE. The antioxidant capacity was evaluated using the DPPH free radical scavenging method. Observations of the radical scavenging activity at different concentrations of *Ruscus sp.* The results confirm the superiority of the acetonic extract, which displays an EC₅₀ of 1.91 mg/mL compared to 2.95 mg/mL for the ethanolic extract. In conclusion, the studied plant could be a potential source of bioactive compounds with strong antioxidant activity. These in vitro results represent only a first step in the search for biologically active substances of natural origin; an in vivo study is necessary to obtain a deeper insight into the antioxidant properties of this plant.

Key words: methadone, opioids, toxicity, public health, epidemiology.

***In vivo* impact of a pesticide on physiological and reproductive parameters in rabbits and the modulatory effect of bay laurel**

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Abstract

The present study aimed to evaluate the toxicity of metribuzin, a widely used agricultural herbicide, and its effects on hepatic, renal, and reproductive functions. Eighteen male rabbits *Oryctolagus cuniculus* were randomly divided into three groups (n = 6 each): a control group receiving tap water by oral gavage, a group treated with metribuzin (10%), and a group receiving a combination of metribuzin (10%) and an infusion of *Laurus nobilis* (4 mg/mL). Hematological and biochemical parameters, along with selected markers of male fertility, were assessed and complemented by histological examination of target organs. The results showed that metribuzin exposure induced hemolytic anemia, evidenced by a significant decrease in red blood cell count and hemoglobin levels, accompanied by an increase in leukocyte count. Biochemically, marked alterations in hepatic and renal functions were observed, as indicated by elevated plasma levels of glucose, creatinine, urea, cholesterol, and triglycerides, as well as a significant increase in transaminase activities (AST and ALT). In addition, a significant reduction in sperm concentration, motility, and viability was recorded in treated animals. Histopathological analyses of the liver, kidneys, testes, and epididymis corroborated these physiological disturbances. In conclusion, metribuzin exposure induces significant impairments in hepatic, renal, and reproductive functions. However, administration of *Laurus nobilis* resulted in a partial improvement of the evaluated parameters, suggesting a potential protective effect likely related to its bioactive compounds, particularly polyphenols.

Key words: Fertility, rabbit, *Laurus nobilis*, metribuzin, polyphenols, toxicity.

Wide band gap BeX, MgX (S, Se and Te) semiconductors in medical applications

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Abstract

Wide bandgap (WBG) semiconductors like binary Beryllium and Magnesium chalcogenides are transforming medical technology by enabling biocompatible, flexible, and high-performance devices for sensing and treatment. Key applications include implantable bioelectronic sensors, wearable health monitors, and advanced UV diagnostics, utilizing their chemical inertness, high-temperature operation, and durability.

In this paper, we aim to investigate the structural, electronic and optical properties of beryllium and Magnesium chalcogenides BeX, MgX (S, Se and Te) compounds using ab initio calculations within both the generalized gradient approximation and the local density approximation as well. Therefore, the optical properties like the frequency-dependent complex dielectric constant $\epsilon(\omega)$, the refractive index $n(\omega)$, the reflectivity coefficient R , dielectric susceptibility χ , which are connected with each other and can be derived from the real part $\epsilon_1(\omega)$ and the imaginary part $\epsilon_2(\omega)$ of the dielectric function, which is known to describe the optical response of the medium at all photon energies $E = \hbar\omega$. The dielectric and refractive constants suggest that the strong absorption spectrum appears mostly in the ultra-violet region, and the optical absorption decreases with photon energy in the high energy range.

Our WBG materials allow for highly efficient Ultraviolet (UV) light absorption, used in UV photodetectors for medical imaging, sterilization, and detecting fluorescence from biological markers.

Key words: Photodetectors; Density functional theory; medical applications; Electronic properties; Optical constants.

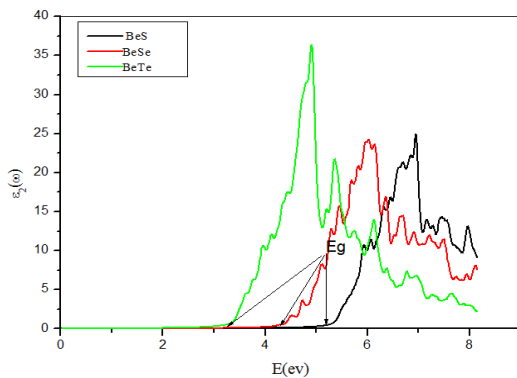


Fig. 1 Calculated imaginary part $\epsilon_2(\omega)$ of the dielectric function of BeX (X: S, Se, Te)

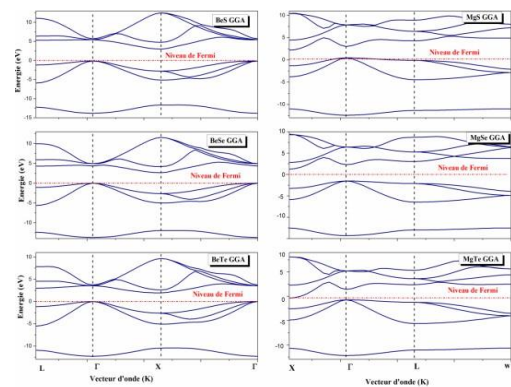


Fig. 2 Band structure calculated along high symmetry lines.

**Topic 2 : Biotechnologies, innovation and sustainable
improvement of production systems**

Oral Session

Exploiting the bacteriocinogenic, nutraceutical and probiotic potential of *Carnobacterium* species for the biopreservation of protein matrices

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Abstract

By offering a thorough bibliographic synthesis, data collecting, and critical analysis of the bacteriological, physiological, biochemical, probiotic, genetic, and bacteriocinogenic characteristics of *Carnobacterium* species, this study seeks to further knowledge of these species. The genus *Carnobacterium*, which is a member of the Carnobacteriaceae family, is similar to classical lactic acid bacteria (LAB) in that it is a facultative anaerobe, heterotrophic, psychrotrophic (15°C), and heterofermentative organism that can produce lactate, volatile compounds, aromas, and amines. About thirteen (13) species make up this diverse genus, which has chromosomal sizes between 2.5 and 3.5 Mb and a Chargaff coefficient (G+C%) of 34- 39%. Owing to their widespread ecology, carnobacteria inhabit a variety of niches, such as the digestive tracts of fish and mammals, meat, seafood, dairy products, and polar sediments. A key feature of this genus is its genetic and ecological diversity, coupled with its protective bacteriocinogenic potential. They produce class IIa thermostable proteinaceous bacteriocins, primarily encoded by chromosomes, which exhibit strong activity at low temperatures and a broad inhibition spectrum targeted against Gram-positive bacteria. Consequently, *Carnobacterium* species are gaining significant interest in the agri-food, aquaculture, medical, and pharmaceutical sectors due to their probiotic attributes and technological affinities with meat and fish matrices. However, further systematic research is required to elucidate their precise impact on protein matrices, optimize culture conditions, and regulate metabolic pathways involved in the synthesis of secondary metabolites, such as aromatic compounds and biogenic molecules. These insights will support both basic and applied research strategies aimed at enhancing food quality and safety.

Key words: Bacteriocins, Biotechnologic, *Carnobacterium*, Fermentation, lactic acid bacteria, probiotic.

Dualistic role and safety aspects of *Enterococcus faecalis* and *enterococcus faecium* in food biotechnology: New insights.

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Abstract

This study aimed to review recent scientific data, relating to probiotic potential, technological applications and *GRAS status of *Enterococcus faecalis* and *Enterococcus faecium*, these species are traditionally considered enteric bacteria, opportunistic pathogens and indicators of fecal contamination. *Enterococcus* (formerly classified under the Lancefield group D streptococci) species, are ubiquitous microorganisms, commonly found in nutrient-rich foods particularly meat and dairy products; Gram-positive cocci, occurring in pairs or short chains, and exhibit a homofermentative metabolism. In food and industrial microbiology, their detection and enumeration are routinely performed using selective media such as Rothe broth (presumptive test) and Eva–Litsky medium (confirmatory test). *Enterococcus faecalis* and *Enterococcus faecium*, belong to the lactic acid bacteria (LAB) group, widely used, as homofermentative, producing lactate from lactose (acidifying power). These species are used in some countries, particularly in Nordic regions, as pure or mixed starter cultures in cheese ripening, as well as probiotic adjuvants in cattle feed. They contribute through their proteolytic, lipolytic enzymes in cheese ripening (*Enzymatic*), improving flavor and texture via the production of aroma compounds (aromatic profile) and exopolysaccharides (rheological profile). They also produce a variety of bacteriocins (bacteriocinogenic potential), enhancing their antimicrobial activity. Due to their enteric origin, they are considered potential probiotic candidates. Conversely, both *Enterococcus* species harbor stable genetic determinants encoding virulence factors and toxins. They are not granted GRAS status, recognized as opportunistic pathogens, involved in various veterinary and human infections such as nosocomial infections, urinary tract infections (UTIs), wound infections, dental caries, and endocarditis. They also exhibit intrinsic and acquired multidrug resistance. Some strains have been reported to exhibit bacteriophage resistance. Conclusion: It is evident that both *Enterococcus* species are at the center of a scientific debate, with current knowledge supporting the cautious, strain-dependent use of selected isolates in food and pharmaceutical industries.

Key words: Biotechnology, *Enterococcus faecalis*, *Enterococcus faecium*, GRAS, probiotic.

*GRAS: Generally Recognized as Safe.

Towards sustainable modernization of livestock systems in Algeria through innovation

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Abstract

Agricultural innovation is a key driver for improving the productivity, sustainability, and competitiveness of livestock systems. It encompasses technological, biological, organizational, and environmental dimensions, including digital tools, genetic improvement, biotechnologies, and agroecological practices. In Algeria, the modernization of animal production has become a structural necessity due to the continuous growth in demand for animal products and the persistent limitations of domestic supply, particularly for milk and, in recent years, for red meat, with increasing dependence on imports. Livestock systems remain largely extensive, characterized by low self-sufficiency, limited resilience, and insufficient flexibility. In this context, several innovation pathways are considered priorities, including farm digitalization, genetic improvement of livestock, valorization of local feed resources, value chain structuring, and capacity building in biotechnology. These efforts must be supported by appropriate public policies, training programs, and the strengthening of professional organizations. However, the adoption of external technologies is often constrained by economic costs and limited adaptation to local conditions. Therefore, promoting endogenous innovation based on context-specific, accessible solutions that integrate local knowledge and resources is essential. In conclusion, a coherent integration of technical and organizational innovations is crucial to strengthen the autonomy, resilience, and flexibility of livestock production systems, particularly in response to recent pressures in the red meat sector, while ensuring food security and sustainable development in Algeria.

Key words: agricultural innovation, livestock systems modernization, sustainable development, Algeria, food security, endogenous innovation.

Dietary supplementation with bioactive nutrients: a sustainable approach to enhance reproductive performance in Algerian Hamra rams

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Abstract

The Hamra sheep breed (Beni Ighil) represents one of the most valuable genetic resources in Algerian livestock farming, particularly due to its remarkable adaptation to the arid and semi-arid conditions of the Tell and the High Plateaus. Despite its strategic importance in the national sheep industry, the reproductive performance of rams of this breed remains inadequate, constituting a major obstacle to the intensification and genetic improvement of the flock. The objective of this study is to evaluate the effect of nutritional supplementation based on natural stimulants including vitamin E, organic selenium, zinc, and omega-3 polyunsaturated fatty acids on semen quality parameters in Hamra rams. The experiment was conducted on two homogeneous groups of adult rams in good body condition: a control group receiving the basic diet, and an experimental group fed an enriched diet for a period of eight weeks. The results revealed a statistically significant improvement ($p < 0.05$) in all semen parameters evaluated in the experimental group, including ejaculate volume, sperm concentration, progressive motility, and the percentage of morphologically normal sperm, compared to the control group. These findings confirm the value of a targeted nutritional strategy for improving the effectiveness of natural reproduction and artificial insemination in the Hamra breed. This approach represents an accessible and sustainable biotechnological tool for harnessing the nation's sheep genetic potential and strengthening food sovereignty.

Key words: Hamra breed, ram development, reproductive performance, sperm quality, reproductive biotechnologies.

Poster Session

Study of the current state of irrigation implementation in olive groves (*Olea europaea* L.) in the Bordj Bou Arreridj region

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Abstract

This study was undertaken to understand the situation of olive cultivation, particularly the state of irrigation application in olive orchards in the Bordj Bou Arreridj province. Through field surveys conducted among around forty farms distributed across the eight subdivisions of agricultural services in the province, several observations were noted, highlighting differences between municipalities and subdivisions. In summary, the main findings are as follows: the Chemlal variety is widely cultivated, the average age of olive trees is around 10 years, planting density decreases with slope, organic fertilizers are preferred over chemical ones, orchards are often affected by diseases and pests, drip irrigation is the most used method, and wells are the main source of water. Irrigation has become an essential operation for effective management of olive orchards; however, farmers in the region face several challenges during irrigation, including water scarcity and high material costs.

Key words: olive, Bordj Bou Arreridj, municipality, farming, irrigation.

Isolation and identification of filamentous fungi producing amylolytic enzymes

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Abstract

Microbial α -amylases are among the most widely used enzymes in the food, pharmaceutical, textile, paper and detergent industries, owing to their high productivity and thermal stability. They are also characterized by their low cost, environmental friendliness, versatility and wide availability. Microbial α -amylases are among the most widely used enzymes in the food, pharmaceutical, textile, paper and detergent industries, owing to their high productivity and thermal stability. They are also characterized by their low cost, environmental friendliness, versatility and wide availability. This test revealed that 10 of these strains produced hydrolysis zones with significant diameters. A second selection process, based on measuring amylase activity in a liquid medium or liquid fermentation (quantitative screening) using wheat bran as a substrate, enabled the selection of the most effective strains. The screening analysis shows that strain BAS2 is the most amylase-productive strain, with an activity of 44.67 IU/ml, followed by strain Mtr6 with 40.20 IU/ml, and finally BAL2 with an activity of 35.46 IU/ml. The study of morphological and physiological characteristics indicates that the strains producing the highest levels of amylase belong to the genera *Aspergillus* (BAS2), *Trichoderma* (Mtr6) and *Alternaria* (BAL2).

Key words: amylase, *Aspergillus*, liquid fermentation, screening, wheat Bran.

Optimizing multi-trait selection in durum wheat using selection indices and economic weights under semiarid conditions

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Abstract

Simultaneous improvement of multiple agronomic traits is essential for durum wheat breeding under semiarid Mediterranean conditions. This study aimed to identify the most effective combinations of selection indices and economic weighting strategies to maximize genetic gains across key agronomic, physiological, and yield-related traits. A durum wheat germplasm collection was evaluated at the ITGC Agricultural Experimental Farm of Sétif, using a randomized complete block design with three replications. Selection indices including Smith-Hazel (SHI), Mulamba & Mock (MMI), Pesek & Baker (PBI), Cruz (CI), and Williams (WI), among others were tested under multiple economic weights, including heritability (h^2bs), standard deviation (SDg), genotypic coefficient of variation (CVg), and variation index (VI). MMI paired with VI achieved the greatest reduction in days to heading (-2.53%), while MMI with VI and h^2bs yielded the highest chlorophyll content gains (up to 9.96%). CI weighted by h^2bs maximized flag leaf area improvement (16.06%). For yield components, SHI achieved a gain of 16.74% in spike number under SDg, and SI reached 17.97% for grain yield. Biomass traits were best improved by WI, reaching 16.32% for above-ground biomass under VI. Coincidence-based multi-index selection proved valuable for identifying broadly adapted genotypes suited to semiarid environments, with genotype Orjaune emerging as the most consistently superior genotype across all strategies.

Key words: coincidence index, economic weights, heritability, index-based selection, *Triticum durum*, yield components traits.

Floral biology and reproductive system of *Lonchophora Capiomontiana* Dur. (Brassicaceae)

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Abstract

Lonchophora capiomontiana is a Brassicaceae species endemic to North Africa and characteristic of the Algerian steppe. This study investigates its reproductive mode and examines floral morphology to assess potential influences on reproduction. To this end, we analyzed multiple floral traits and conducted controlled pollination experiments across different populations. Pollen tube counts using fluorescence microscopy revealed both self-incompatible and partially compatible individuals within the studied populations. The species therefore exhibits a mixed mating system that combines allogamy and autogamy. This reproductive flexibility facilitates gene exchange and ensures seed production in the absence of pollinators, while residual outcrossing helps maintain genetic diversity within populations. Several floral traits vary among individuals and populations, including flower size, stamen spacing, and the pistil-to-stamen length ratio. Outcrossing appears to be favored by traits such as relatively large flowers, which likely enhance pollinator attraction. In contrast, partial self-compatibility is associated with a pistil-to-stamen ratio below 1, which may promote self-fertilization. Overall, our findings provide new insights into self-incompatibility levels and their relationship with floral structure in this species.

Key words: Allogamy, Floral trait, *Loncophora capiomontiana*, Ratio pistil- stamen, Self-incompatibility,

Plant-based proteins recovery and quality: Comparative evaluation of alkaline and enzymatic extraction methods

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Abstract

As alternatives to conventional animal sources, human diets have been trending toward sustainable plant based proteins. However, the limitation of their widespread adoption related to the complex structure of plant cell walls, the presence of dietary fiber and antinutritional factors that affect their nutritional profil and bioavailability. Biotechnology is actively being applied to overcome these challenges. by improving protein yield, quality and functionality. This study explores comparative effectiveness of alkaline and enzymatic extraction methods in producing higher quality plant-based proteins, *Moringa Oleifera* (fam. Moringaceae), as a perennial foliated tree, widely cultivated in tropical and subtropical countries due to its high adaptability to climatic conditions and dry soils. *Moringa Oleifera* Leaves (MOL) account for numerous tones of biomass per year, and has potential to be a good protein source, since the protein content ranges between 22.2% to 31.4%. Moreover, it has a good balance of essential amino acids and biopeptides. Protein extraction from MOL was achieved by the adoption of alkaline extraction method, at different concentrations of KOH (0.5 M, 1M, 2M and 4M), for 2h at 40°C followed by protein precipitations at pH =4.5. The obtained results revealed relatively ($p \leq 0,05$) higher protein recovery (as 9.2%, 10.9%, 12.9% and 19.7% respectively). The optimum extraction yield was 15%, with improved balance of EAAs profil. Overall, for applications requiring high protein quality, enzymatic extraction methods are preferred. This innovative environmentally clean process may have several uses in food and pharmaceutical fields.

Key words: alkaline extraction, enzymatique extraction, essential amino acids, plant protein, yield.

Conditions MGIDI-based multi-trait selection for durum wheat adaptation under semi-arid

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Abstract

Durum wheat represents a crop of strategic importance in Algeria; however, its productivity remains limited under rainfed conditions due to unfavorable agro-climatic constraints. In this context, 55 genotypes, including 50 advanced breeding lines and 5 check cultivars, were evaluated across four environments representing two cropping seasons (2021–2022 and 2022–2023) at two sites in Constantine. A total of eight morpho-agronomic traits were evaluated, namely plant height (PH), spike length (SL), flag leaf area (FLA), number of spikes per meter (NS), number of grains per meter (NG), thousand-kernel weight (TKW), grain yield (GY), and aboveground biomass (BIO). The results revealed a highly significant environmental effect for all traits, along with notable genotype × environment interactions (GEI) for key characteristics, indicating that genotype performance is strongly influenced by environmental conditions and highlighting the importance of multi-environment trials. Heritability estimates were generally moderate to low, suggesting a predominant environmental influence on trait expression. To improve selection efficiency, the Multi-Trait Genotype–Ideotype Distance Index (MGIDI) was applied, identifying eight high-performing and broadly adapted genotypes, with a total predicted genetic gain of 33.75%. These findings demonstrate the effectiveness of the MGIDI approach for simultaneous selection of multiple agronomic traits and its potential to enhance yield and adaptability of durum wheat under Mediterranean semi-arid conditions.

Key words: durum wheat, genetic gain, heritability, MGIDI, semi-arid conditions.

Genetic parameters and path analysis of yield-determining traits in durum wheat under rainfed semi-arid conditions

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Abstract

Seventy *Triticum durum* genotypes, including 67 tested varieties and three check cultivars (Vitron, Simeto, and Bousselam) were evaluated under rainfed conditions during the 2023–2024 growing season at the ITGC experimental farm in Sétif, Algeria, using an augmented randomized complete block design. Nineteen morpho-physiological and agronomic traits were assessed. Results showed significant genetic variation for 18 of 19 traits; spike length was the sole exception. Narrow phenotypic-to-genotypic coefficient of variation gaps, combined with broad-sense heritability exceeding 70% for all traits, confirmed the predominance of genetic over environmental effects in trait expression. High heritability paired with high genetic advance for grain yield, spike weight, above-ground biomass, and proline content indicated predominantly additive gene action, suggesting strong prospects for effective direct selection. Path coefficient analysis identified spike weight as the only trait exerting a sizeable positive direct effect on grain yield ($\beta = 0.734$). Canopy temperature and days to heading were the principal yield-depressing factors, both acting indirectly through spike weight reduction. Collectively, these findings indicate that selection for high spike weight combined with low canopy temperature and optimized heading date represents the most effective strategy for improving durum wheat yield under semi-arid Mediterranean conditions.

Key words: canopy temperature, genetic advance, heading, heritability, spike weight, *Triticum durum*.

Study of behavior and varietal adaptation of durum wheat (*Triticum durum* Desf.) under semi-arid conditions

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Abstract

Durum wheat (*Triticum durum* Desf.) is a major cereal crop in North Africa, yet its productivity is constrained by semi-arid conditions and recurrent water stress. Improving varietal adaptation and resilience is therefore essential for sustainable production. The present study was conducted during the 2020/2021 agricultural campaign at the experimental site of the University of Sétif, within the framework of a PRIMA project. Seventeen North African durum wheat varieties were evaluated under semi-arid conditions using a randomized complete block design with three replications. Agronomic, morphological, and physiological parameters were measured, including yield components, biomass, plant height, chlorophyll content, and water relations. Results revealed wide variability among the tested genotypes. Grain yield ranged from 4.85 q/ha in the variety Khiair to 32.54 q/ha in the cultivar Oued El Bared. Significant correlations were observed between ear yield and both thousand-kernel weight ($r = 0.283$) and harvest index ($r = 0.287$), suggesting that enhancing spike density and harvest efficiency could improve productivity. Biomass was positively associated with plant height ($r = 0.375^{**}$) and negatively with canopy cover ($r = -0.362^{*}$). Heading delay correlated positively with plant height ($r = 0.544^{**}$), indicating trade-offs between growth vigor and earliness. In conclusion, the study highlights the existence of substantial genetic diversity among North African durum wheat varieties. However, achieving stable adaptation and tolerance to abiotic stress remains challenging under semi-arid conditions, underscoring the need for integrated breeding and management strategies.

Key words: Semi-arid, *Durum wheat*, yield, north African varieties, drought, water stress.

Valorisation of rhizobial strains as bio-inoculants to improve chickpea growth under phosphorus deficiency

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Abstract

Chickpea (*Cicer arietinum* L.) is a legume of strategic importance for food security, particularly in semi-arid regions where abiotic constraints, especially phosphorus deficiency, severely limit its productivity. In this context, *rhizobia*, as bio-inoculants, represent a sustainable alternative to chemical fertilizers due to their dual ability to fix atmospheric nitrogen and mobilize phosphorus. The objective of this study was to select and characterize *rhizobial* and endophytic bacterial strains associated with chickpea, capable of solubilizing phosphorus and promoting plant growth under stress conditions. A collection of strains was isolated from root nodules and evaluated for their functional traits, including phosphorus solubilization on NBRIP medium and phytase production. The most efficient strains were further tested under controlled greenhouse conditions on chickpea genotypes. The results revealed significant variability among the strains in terms of phosphorus solubilization and symbiotic efficiency. Some selected strains significantly improved nodulation, biomass, and plant growth, particularly under phosphorus-limited conditions. These findings highlight the strong potential of these isolates as biofertilizers adapted to nutrient-poor soils. In conclusion, this study demonstrates the relevance of multifunctional *rhizobia* as an agroecological lever to enhance phosphorus nutrition and chickpea productivity. Their application could contribute to more sustainable agriculture by reducing reliance on chemical inputs.

Key words: abiotic stress, biofertilizers, *Chickpea*, *Phosphorus*, *Rhizobia*, solubilization.

Effect of saline stress on morphological and biochemical parameters in three varieties of durum wheat (*Triticum durum* Desf.)

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Abstract

Wheat is an important cereal crop for human consumption in many countries around the world. It is grown primarily in the Mediterranean basin, in regions with arid and semi-arid climates. In these areas, salinity is one of the factors limiting agricultural productivity. The objective of this study is to monitor the morphological and biochemical behavior of three durum wheat varieties (Cirta, Oued Zenati, and GTA dur) exposed to increasing concentrations of NaCl (0.9 g/L, 1.2 g/L, and 1.5 g/L) compared to the control. The results showed that salt stress caused a decrease in growth parameters (coleoptile length, root length, number of roots, and leaf area) in the three varieties studied; this decrease became more pronounced as salt concentration increased. Regarding soluble sugar and total protein content, accumulation was positively correlated with increasing salt concentration. For this study, we note that osmoregulation and/or osmoprotection is one of the key mechanisms for salt stress tolerance.

Key words: *durum wheat*, salinity, stress, tolerance, adaptation.

Optimization of baker's yeast production using carob-based medium through response surface methodology

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Abstract

The increasing demand for cost-effective and sustainable substrates in industrial fermentation has encouraged the exploration of agro-industrial by-products such as carob pods. In this study, a carob-based medium was investigated for the optimization of baker's yeast production. The objective was to evaluate the effects of initial sugar concentration and yeast extract concentration on yeast biomass production using a central composite design (CCD) within the framework of response surface methodology (RSM). Experimental results demonstrated that both factors significantly influenced yeast growth. Statistical analysis revealed that yeast extract concentration had a pronounced positive effect on biomass yield, highlighting its role as a key nitrogen source and growth promoter. The interaction between sugar concentration and yeast extract was also found to be important in determining optimal fermentation conditions. The developed quadratic model showed good agreement with the experimental data, confirming the reliability of the optimization approach. The highest biomass production was obtained at an initial sugar concentration of 75 g/L and a yeast extract concentration of 5 g/L, with an optical density (OD) value of 0.8. These results indicate that the carob-based medium represents a promising and economical alternative substrate for baker's yeast cultivation. This study contributes to the valorization of local natural resources and supports sustainable biotechnological processes.

Key words: Baker's yeast, biomass production carob pods, central composite design, optimization, response surface methodology.

Inactivated lactic strains for optimized the production of exopolysaccharid after addition of polyphenolic extract from *Arbutus unedo* plant

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Abstract

The aim of our study is to optimize the production of exopolysaccharid extracted from *Lactobacillus* sp. probiotic strain after optimization of their culture conditions. While to assess the impact of an aqueous polyphenolic extract from the medicinal plant *Arbutus unedo* L. on the exopolysaccharid production after inactivation process using two different techniques: ultraviolet irradiation and ultrasonication. In this research, we conducted EPS production experiments, varying several parameters, the resulting exopolysaccharide yields exhibited a profound reliance on the fermentation conditions, such as sucrose concentration with (90 g/l), pH levels (6.5), incubation duration (24H), temperature (37°C), and the composition of the production medium (hypersucrose broth). Then, the ideal fermentation it was in presence of oxygen. Furthermore, in comparison to the applied ultraviolet irradiation method, the ultrasonic method for inactivating the tested bacteria was the most efficient method to optimize the production of EPS from *Lactobacillus* sp. strain (785.17 ± 5.7 mg/L), the EPS amount increased to (817.86 ± 3.04 mg/L) with the addition of 200 μ L of polyphenolic aqueous extract of *Arbutus unedo* L. leaves which was much greater than the concentration obtained from free strains (543.06 mg/L). Our results confirm that our obtained compounds can serve as valuable additives within the food industry. Moreover, their applications extend to the pharmaceutical sector, where they can be employed in the formulation of certain medications. This study confirmed that our isolated strain showed good probiotic properties, and EPS produced by this strain enhanced the tolerance to gastrointestinal stress and probiotic properties of the strain, suggesting the possibility of developing novel probiotic resources. EPS production may be accelerated by the synergy of polyphenolic extract from medicinal plants and inactivation lactic strain by ultrasonic method. Relatively few studies in the literature discuss probiotic bacteria immobilized by sonication and their immediate health advantages, with little comparison to other settings or inactivation methods. Additionally, further development is needed to create procedures for assessing the effectiveness of probiotic production methods and looking at how well they function in both in vitro and in vivo settings.

Key words: Eps, Immobilization, Polyphenol, Probiotic, Ultrasound, UV-irradiation.

Evaluation of drought tolerance in diverse bread wheat genotypes based on germination and seedling growth traits under PEG-induced osmotic stress

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Abstract

Drought represents a major constraint to wheat production, particularly under climate changing conditions. Developing drought-tolerant genotypes is therefore essential for sustainable agricultural systems. This study aimed to evaluate the variability in drought tolerance among 48 bread wheat (*Triticum aestivum* L.) genotypes at the germination and seedling stages under polyethylene glycol (PEG-6000)-induced osmotic stress. Experiments were conducted under two osmotic conditions: 0% PEG (0 MPa) and 20% PEG (−0.491 MPa). A range of germination indices (SGP, GI, CVG, GV, PV, MDG, Z, MGR, MGT, U, and CVt) and seedling growth traits (root length, coleoptile length, shoot length, number of roots, fresh root weight, fresh shoot weight, and total fresh weight) were evaluated. Results showed that PEG-induced stress significantly affected all measured parameters, leading to an overall decline in germination and seedling growth. Two-way ANOVA revealed highly significant effects ($P < 0.01$) of genotype, treatment, and their interaction ($G \times \text{TPEG}$). Most germination indices decreased under stress, whereas mean germination time and uniformity-related parameters increased. Similarly, seedling growth traits were reduced, while the number of roots increased under stress conditions. Principal component analysis (PCA) indicated that drought tolerance indices MP, GMP, HM, STI, and YI were strongly and positively correlated with each other and with genotype performance, suggesting their reliability as selection criteria for drought tolerance. PCA and sum of ranks (SR) analyses identified genotypes G39, G11, G34, G18, and G33 as the most drought-tolerant. These genotypes show strong potential for the development of drought-tolerant varieties adapted to semi-arid environments, thereby contributing to improved wheat production under water-limited conditions.

Key words: *Triticum aestivum*, PEG-6000, drought stress, germination, seedling growth, tolerance.

Partial biochemical characterization of tyrosinase from Algerian dates

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Abstract

While a long shelf life for fruit products is highly desired, enzymatic browning is the main cause of quality loss in fruits and is therefore a main problem for the food industry. In this study polyphenol oxidase (PPO) was extracted and purified from Algerian DegletNoor date (*Phoenix dactylifera* L.) by a procedure that included (NH₄)₂SO₄ precipitation followed by dialysis, QSepharose bb ion-exchange chromatography and Sephadex S-200 gel filtration chromatography and some of its biochemical characteristics were studied. These procedures led to 8-fold purification with 14.72% recovery. Three isoenzymes of the date PPO were detected by polyacrylamide gel electrophoresis. Date PPO showed activity with dihydroxyphenols and trihydroxyphenols, but not with monohydroxyphenols. The Deglet-Noor date PPO had maximum activity at pH 4.6 and 8, 3.6-5.6 and 5.6 with pyrogallol, 4-methylcatechol and pyrocatechol substrates, respectively. The kinetics of PPO catalyzed oxidation obeyed Michaelis–Menten model with three substrates. 4- Methylcatechol was the most suitable substrate, due to the lowest K_m and the biggest V_{max}/K_m values, followed by pyrocatechol and pyrogallol. Of the inhibitors tested, the most potent were ascorbic acid and sodium metabisulfite, followed by oxalic acid.

Key words: Deglet-Noor date, polyphenol oxidase, purification, biochemical characteristics.

Evaluation of the physicochemical, nutritional, and antioxidant activities of acorn from *Quercus* spp.: A comparative study between Algerian and Tunisian varieties

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Abstract

The Mediterranean basin's abundance of oak trees yields a considerable quantity of acorns in the woodlands each year. This study evaluates and compares the physicochemical, nutritional, and antioxidant activities of acorns from four *Quercus* species: two Algerian varieties, *Quercus suber* and *Quercus ilex* (QSA, QIA), and two Tunisian varieties, *Quercus suber* and *Quercus ilex* (QST, QIT). For the Algerian varieties the physicochemical compositions, phytochemical compositions, and antioxidant capacity are as follows: total sugars (76.01–52.78%), proteins (7.70–6.72%), fat (13.95–4.15%), total phenolic (516.36–397.79 mg GAE/g DM), condensed tannins (4.64–6.05 mg CE/g DM), (DPPH IC₅₀ = 0.01–0.015 mg/mL, ABTS IC₅₀ = 0.008–0.02 mg/mL, FRAP = 798.5–123.3 mmol Fe(II)/mL DM, and TAC = 38.1–21.8 mmol AAE/mL DM), respectively in *Quercus suber* and *Quercus ilex* species. However, corresponding values the Tunisian varieties were as follows: total sugars (59.62–64.22%), proteins (5.01–7.58%), fat (8.05–5.23%), total phenolic (287.23–460.91 mg GAE/g DM), condensed tannins (5.34–6.78 mg CE/g DM), (DPPH IC₅₀ = 0.013–0.02 mg/mL, ABTS IC₅₀ = 0.016–0.014 mg/mL, FRAP = 68.4–133.3 mmol Fe(II)/mL DM, and TAC = 13.7–22.3 mmol AAE/mL DM), respectively in *Quercus suber* and *Quercus ilex* species. According to Principal Component Analysis, the *Quercus Suber* Algerian (QSA) displays distinct characteristics compared to other *Quercus* species. These findings suggest that an excellent source of naturally occurring physicochemical and bioactive compounds is the acorn oak tree. This study makes a significant contribution to acorn valorization. New uses for these acorn extracts, such as in the nutraceutical or food industries, may be explored.

Key words: *Quercus* spp, nutritional parameters, phytochemicals, antioxidant activities, principal component analysis.

Grain yield stability and adaptability of bread wheat genotypes in rainfed environments: A GGE biplot analysis

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Abstract

Improving grain yield stability of bread wheat (*Triticum aestivum* L.) across diverse rainfed environments is a fundamental objective in wheat breeding programs, particularly under the increasing unpredictability of rainfall patterns and growing conditions. Identifying genotypes that combine high yield potential with broad adaptability remains a persistent challenge due to the complex nature of genotype-by-environment interactions (GEI). This study evaluated 34 bread wheat genotypes, comprising 30 advanced breeding lines and four check varieties, tested across five growing seasons at the same rainfed location, to assess grain yield stability and adaptability. Combined analysis of variance revealed significant ($p < 0.05$) effects for genotype (G), environment (E), and G×E interaction for grain yield. The two-dimensional GGE biplot, which explained 89.69% of the total GGE variation (PC1 = 72.45%; PC2 = 17.24%), was employed to visualize GEI patterns and evaluate genotypic stability, adaptability, and environmental discriminating power. The which-won-where analysis revealed that the five growing seasons did not constitute a uniform selection environment, as crossover GEI was detected and different genotypes excelled under different seasonal conditions. E5 was the most discriminating but least representative season, E3 showed moderate representativeness with limited discriminating ability, while E4 was the most representative environment despite its low discriminating power, making it the most suitable site for broad genotype selection. Based on proximity to the ideal genotype — defined by the highest yield combined with the greatest stability — L29 and T4 emerged as superior candidates with broad adaptability across seasons, and are recommended for further evaluation or potential release. Conversely, L1 exhibited the lowest yield potential and greatest instability, while T1, despite winning in specific seasons (E1 and E2), showed considerable overall instability. These findings underscore the importance of multi-season evaluation in rainfed wheat breeding and provide a sound basis for selecting stable, high-yielding genotypes suited to the temporal variability of rainfed production conditions.

Key words: genotype-by-environment interaction, grain yield stability, selection, semi-arid conditions, *Triticum aestivum*.

The toxic effects of pesticides on honeybees (*Hymenoptera apidae*) in Northeastern Algeria: Acetylcholinesterase activity and glutathione S-transferase activity

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Abstract

In Algeria, the widespread use of various pesticides in agriculture is causing ecological disruption to both flora and fauna, as these products threaten biodiversity. Bees are the ultimate bioindicators; in recent years, we have observed an increase in mortality and a decline in bee populations due to various factors: diseases (viruses), pollution from pesticide use, etc. The aim of this study is to assess the impact of these products on bees. To this end, we will conduct a biochemical study. A biochemical test was performed on a biomarker of environmental stress, namely acetylcholinesterase (AChE) (a neurotoxic biomarker), and the detoxification biomarker glutathione-S-transferase (GST); The study involved domestic worker bees from three sites (ElTahir, El-Ancer, and Ziama) in northeastern Algeria (Jijel Province), with the aim of assessing the impact of pesticides used during the summer of 2015 in this region. Statistical analyses of specific AChE activity indicate a highly significant effect for the months of March, April, and May (2015) ($P \leq 0.001$). A comparison of the three months shows no significant difference, similar to the findings for GST. The results obtained demonstrate the toxic effect of pesticides on bees.

Key words: biodiversity, bee, acetylcholinesterase, Jijel, Glutathione S-transferase.

The microbiological characteristics and viability of probiotic lactic starters during production and storage in Algerian yoghurt

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Abstract

Yogurt is a fermented dairy product obtained through the activity of thermophilic starter cultures, mainly *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. In Algeria, industrial yogurt is produced entirely or partially from powdered milk, whereas traditional yogurt is manufactured at small scale without controlled starter addition and is often marketed without strict hygienic control. This raises concerns regarding the viability of lactic acid bacteria (LAB) and the stability of physicochemical properties during storage, which may affect product quality, safety, and sensory characteristics. This study aimed to evaluate and compare the microbiological quality and physicochemical stability of industrial and traditional yogurts marketed in Northern Algeria. A total of 12 samples (6 industrial and 6 traditional) were collected from local markets and analyzed. Microbiological quality was assessed by enumerating contamination indicators, including Coliforms, Enterococci, Endospores, *Escherichia coli*, *Salmonella spp.*, and *Bacillus spp.* Viable LAB (*Lactobacillus spp.* and *Streptococcus thermophilus*) were also quantified. Physicochemical parameters, including pH, titratable acidity (°D), and viscosity (Pa/s), were measured using standard methods. The results showed that both yogurt types exhibited comparable physicochemical characteristics, with pH values ranging from 3.97 to 4.13, titratable acidity between 87 and 122 °D, and viscosity ≥ 2.7 Pa.s. However, traditional yogurts presented significantly lower counts of viable LAB and the presence of contaminating microflora, suggesting inadequate hygienic conditions and lack of fermentation control. In contrast, industrial yogurts contained high levels of viable starters (*Lactobacillus* $\geq 10^8$ CFU; *Streptococcus thermophilus* $\geq 10^7$ CFU) and showed no detectable contamination. These findings indicate that, although physicochemical properties were broadly similar, microbiological quality and starter viability differed markedly between the two yogurt types. The low LAB viability and presence of contaminants in traditional yogurts may compromise both safety and functional properties, while the higher LAB counts in industrial products support their probiotic potential and contribute to improved stability and sensory quality. In conclusion, industrial yogurts demonstrated superior microbiological quality, safety, and functional value compared to traditional yogurts. Improving hygienic practices and implementing controlled starter cultures in traditional production could enhance product quality while preserving its artisanal characteristics.

Key words: starter culture, microbial quality, stability, viability, yogurt.

Genetic variability and performance of bread wheat genotypes under semi-arid rainfed conditions

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Abstract

Bread wheat (*Triticum aestivum* L.) production in semi-arid regions is highly affected by environmental variability, particularly under rainfed conditions, which limits yield performance and stability. The present study aimed to evaluate the agro-morphological variability of bread wheat genotypes across contrasting environments. Our study was conducted on 50 bread wheat genotypes, mainly advanced breeding lines, along with five check varieties. Field trials were carried out at three locations: the National Institute of Agronomic Research of Algeria (INRAA) in El Khroub (south of Constantine), the Debbah farm in Didouche Mourad (north of Constantine), and INRAA Sétif, over two consecutive growing seasons (2021-2022 and 2022-2023) under rainfed conditions using an augmented experimental design. The following traits were measured: plant height, spike length, flag leaf area, spike density, number of kernels per square meter, thousand-kernel weight, grain yield, and aboveground biomass. The combined analysis of variance (ANOVA) of the 55 bread wheat genotypes evaluated across six environments showed highly significant effects ($P < 0.01$) of both environment (Env.) and genotype (Gen.) for all eight traits. This indicates pronounced environmental variability and substantial genetic diversity within the studied material. These results are consistent with previous studies highlighting the strong sensitivity of wheat traits to environmental variation under rainfed semi-arid conditions. Overall, the results confirm the importance of multi-environment evaluation for assessing genotype performance and highlight the potential of the studied germplasm for selection in semi-arid conditions.

Key words: agro-morphological traits, genetic variability, genotype $\times$ environment interaction, grain yield, rainfed conditions.

Session 3 : Plant and animal health

Plenary Session

Adapting new perennial grains: A step toward climate resilience in Mediterranean region

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Abstract

Perennial crops have generated considerable interest for their ability to deliver a number of ecosystem services particularly in relation to adapting to- and mitigating the- effects of climatic changes. The transfer of perenniality into cultivated wheat has generated a number of genotypes with various expressions of the trait. In this study, four perennial genotypes, previously selected for quality traits, were evaluated for a number of agronomic traits including the post-harvest regrowth during three years in four sites located in four Mediterranean countries, Italy, Morocco, Algeria and Tunisia. The results showed both good performance and variability both between sites and between genotypes, which were, in general, characterized by tall plants, with more tillers, longer spikes and smaller kernels than the modern wheat variety used as control, and for some of them good grain yield and good post-harvest regrowth. Future utilization of this material includes testing on larger plots in contrasting agricultural environments and used in breeding programs to further improve their performance.

Key words: perennial wheat, agroecology, regenerative agriculture, climate change, resilience.

Oral Session

From research to field: Automated plant disease detection, Farmy, and the AgrI challenge

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Abstract

Plant diseases are responsible for 20–40% of yearly crop losses, causing around US\$220 billion in global economic damage annually. Although visual inspection is the most common diagnostic method, it relies heavily on limited expert knowledge and is often too slow to support timely action, especially for smallholder farmers in rural regions. This talk follows a three-part journey. First, we explore how automated image-based systems can accurately identify plant diseases across 38 classes and 14 crops, and how generating visual explanations that highlight affected regions in leaves proved crucial for gaining agronomists' trust and enabling real-world adoption. Second, we introduce Farmy, a mobile application that lets farmers capture an image of a diseased leaf and instantly receive a diagnosis, a visual explanation, and treatment advice. Built using field data collected with Algerian tomato growers, Farmy has reached over 7,000 users and processed more than 2,000 diagnostic requests. Third, we present the AgrI Challenge, a competition organized with the National School of Agronomy and the Botanical Garden of Hamma, where interdisciplinary teams worked to address the lack of locally relevant Algerian plant disease datasets. The key takeaway is straightforward: the impact of automated plant disease detection is realized only when it helps farmers make better decisions. Achieving this requires treating real-world data constraints, interpretability, and deployment in the field as core research challenges.

Key words: plant disease detection, image-based diagnosis, Farmy, precision agriculture, AgrI Challenge, food security.

The alarming decline in date palm genetic biodiversity caused by *Fusarium oxysporum* f.sp. *albedinis*, a causal agent of Bayoud disease in the Tidikelt region (Adrar)

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Abstract

The date palm is a xerophilous plant, constituting the main cash crop for the Saharan regions. It is perfectly the fruit tree of the Saharan desert, where it plays both an economic and an ecological role since it confers a particular structure to oases. In Algeria, this species has an extremely rich genetic heritage with more than 1000 varieties. Nevertheless, the development of this tree is subject to several constraints, the main ones being: drought, water salinity, diminishing water resources, the extension of the urban fabric, silting, desertification, locust invasions, genetic erosion, aging, and diseases, particularly Bayoud disease, which is undoubtedly the most dangerous scourge caused by a soil-borne fungus called *Fusarium oxysporum* f.sp. *albedinis* (Bayoud-disease). This disease has caused the decline of at least 3 million trees in Algeria, and unfortunately continues to ravage our phoenicilic heritage. This is indeed an ecological disaster, whose economic and social consequences could have a negative impact on our country, without underestimating the important income in currency that date earns for our country. In this context, we conducted an exhaustive study in the palm groves of the Tidikelt region, a buffer zone between the department of Adrar and In-Salah, in order to carry out an inventory and estimate the damage caused by this devastating disease as well as the degree of morbidity recorded per variety. Very worrying levels of attack on the Tegaza and Tazerzait varieties have been reported, while the town of Aoulef Laareb remains the most affected region with about 60% of the attacks for all varieties combined. Therefore, it is imperative to raise the alarm bell in order to preserve this valuable genetic biodiversity, which is undergoing a dizzying degradation and contributes intimately to the fixation of rural people.

Key words: date palm, *Fusarium oxysporum* f.sp. *albedinis*, genetic resources, palm grove, varieties.

Response of durum wheat (*Triticum durum* Desf.) genotypes to water stress: assessment through vegetation indices under semi-arid conditions

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Abstract

The sustainability of cereal production systems in semi-arid areas depends on the identification of stress-tolerant genotypes, particularly those tolerant to water stress. This study aims to analyze the relationship between grain yield and its components with the main vegetation indices used as assessment tools for water stress response in nine promising durum wheat (*Triticum durum* Desf.) genotypes. The experiment was carried out during the 2022/2023 growing season at the ITGC experimental station in Sétif. The results reveal significant genotypic variability across all measured parameters. Leaf area at the heading stage ranged from 9.08 cm² (G08) to 32.76 cm² (G01), while chlorophyll content measured by SPAD varied between 46.9 (G03) and 61.4 (G07). In terms of grain yield, genotype G08 stood out with 48.17 q/ha, followed by G01 (44.83 q/ha), whereas G02 recorded the lowest yield (17.08 q/ha). The highest spike density was observed in G01, G09, and G06 (640, 635, and 615 spikes/m², respectively), and thousand-kernel weight ranged from 39.28 g (G06) to 50.12 g (G05). These findings suggest that vegetation indices represent relevant discriminating tools for the early selection of water stress-tolerant genotypes.

Key words: durum wheat, genotypes, water stress, vegetation indices, semi-arid, NDVI.

Epidemiological dynamic of two animal diseases in Tiaret region (Northwest of Algeria): Blue tongue and Epizootic hemorrhagic

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Abstract

Bluetongue disease (BTV) and Epizootic Hemorrhagic Disease (EHD) are two major arboviral diseases affecting sheep and cattle respectively, transmitted by hematophagous dipteran insects of the genus *Culicoides*. They cause considerable losses to the national economy. In Algeria, these diseases are endemic, with periodic epidemic resurgences. The Tiaret region in northwestern Algeria is an agropastoral area characterized by its eco climatic conditions and the importance of its livestock population. The objective of this study is to analyze the spatio-temporal dynamics of BTV and EHD since their emergence in 2006. A retrospective descriptive study was conducted using official epidemiological data recorded between 2006 and 2019. The results highlight a marked emergence phase in 2006, with 352 cases of BTV and 222 cases of EHD, followed by a second peak in 2009 (349 cases of BTV and 228 cases of EHD). A significant decline was observed in 2011, with only one outbreak recorded (7 ovine cases), followed by an absence of reported cases between 2011 and 2018. In 2019, the emergence of BTV was observed in the form of sporadic outbreaks (4 outbreaks, 17 cases), associated with 6 cases of EHD. In addition, a clear seasonal distribution of cases was identified, with a predominance during late summer and autumn (September to November), linked to increased vector activity. BTV and EHD exhibit a cyclical epidemiological dynamic in the Tiaret region, characterized by phases of emergence, latency, and re-emergence. The observed seasonality confirms the key role of *Culicoides* in transmission. Strengthening surveillance systems, together with integrated vaccination strategies and vector control measures, remains essential for the sustainable control of these arboviral diseases.

Key words: animal health, epidemiology, bluetongue disease, arboviroses, transmission, Tiaret.

Poster Session

Major bioagressors of cereal crops in Algeria: Impacts and integrated management strategies

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Abstract

Cereal crops in Algeria play a strategic role in food security; however, they are highly exposed to various bioagressors, including insect pests, fungal diseases, and weeds. These biological constraints lead to significant yield losses and deterioration in grain quality. This study aims to identify the main bioagressors affecting cereal crops, assess their impacts, and analyze the management strategies adopted by farmers. The methodology is based on a field survey conducted among 300 farmers. Data were collected using a structured questionnaire and complemented by information obtained from agricultural technical services, including the Direction des Services Agricoles (DSA), the Institut National de la Protection des Végétaux (INPV), the Chambre d'Agriculture de Wilaya (CAW), and the Institut Technique des Grandes Cultures (ITGC). The results indicate that aphids, fungal diseases (particularly rusts and fusarium), and weeds such as brome and wild oats are the most prevalent bioagressors affecting cereal crops in Algeria. Approximately 72% of surveyed farmers reported yield losses related to bioagressors during recent agricultural seasons. According to investigations conducted in Algerian cereal-growing regions, rust diseases may cause estimated yield losses ranging from 20% to 40% under climatic conditions favorable to pathogen development. Farmers mainly rely on chemical control methods, whereas integrated pest management practices remain insufficiently adopted. In conclusion, this study highlights the need to strengthen integrated pest management through better coordination among institutions (DSA, INPV, CAW, ITGC), enhanced agricultural extension services, and farmer training, in order to sustainably improve cereal production and contribute to food security.

Key words: cereal crops, Algeria, aphids, fungal diseases, integrated pest management, food security.

High prevalence of hepatic *Escherichia coli* contamination in broiler chickens with suspected colibacillosis in Biskra, Algeria

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Abstract

Avian colibacillosis, caused by pathogenic strains of *Escherichia coli*, represents one of the most important bacterial diseases affecting broiler chickens worldwide, leading to significant economic losses due to increased mortality, reduced growth performance, and carcass condemnation. The disease is frequently associated with systemic infections, including lesions in internal organs such as the liver. The objective of the present study was to evaluate the prevalence of hepatic contamination by *E. coli* in broiler chickens showing clinical signs suggestive of colibacillosis in Biskra, Algeria. A targeted sampling was conducted on 26 broiler chickens aged between 2 and 4 weeks, reared in a poultry house in Biskra, Algeria. Aseptic liver samples were collected during post-mortem examinations from birds presenting characteristic lesions. The isolation and identification of *E. coli* strains were performed using standard bacteriological methods, including culture on selective media and biochemical identification techniques. The results revealed that 22 out of 26 liver samples were positive for *E. coli*, corresponding to a high prevalence of 84.6%. This elevated rate confirms the major implication of *E. coli* in hepatic lesions observed in broiler chickens at this stage of production in Biskra. These findings may be associated with inadequate biosecurity measures, environmental contamination, and management-related stress factors that favor bacterial dissemination. In conclusion, this study highlights a high prevalence of hepatic *E. coli* in Biskra, emphasizing the urgent need to strengthen biosecurity practices, improve hygiene conditions, and control stress factors in poultry farming. Further studies are recommended to investigate the antimicrobial resistance patterns and virulence profiles of the isolated strains.

Key words: *Escherichia coli*, colibacillosis, broiler chicken, liver, prevalence, Biskra.

Clinical and pathological characterization of a natural peste des petits ruminants (PPR) outbreak in a goat herd in Bordj Bou Arréridj

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Abstract

Peste des Petits Ruminants (PPR) is a highly contagious and devastating viral disease of small ruminants, caused by a Morbillivirus within the Paramyxoviridae family. Recognized as a major threat to the livelihoods of rural populations, PPR is characterized by severe respiratory and gastrointestinal distress, particularly in highly susceptible goat populations. Since its first description in West Africa in the 1940s, the disease has expanded significantly, with Algeria reporting its first major outbreak in 2011. Despite international eradication efforts, the disease continues to persist in various regions, necessitating detailed pathological investigations. This study aims to characterize the clinical manifestations and tissue lesions resulting from a natural PPR infection within a herd of 130 goats in the province of Bordj Bou Arréridj, utilizing systematic necropsy and histopathological examinations to evaluate the impact of the virus on host morphology. Among the affected herd, a significant mortality rate of 45.16% was recorded. Clinical examinations revealed pathognomonic signs of PPR, including severe hyperthermia (41°C), anorexia, erosive stomatitis, profuse diarrhea, and intermittent coughing. Post-mortem macroscopic evaluation of twelve necropsied goats showed extensive ulcerative and necrotic stomatitis, fibrinous bronchopneumonia, hemorrhagic lymphadenitis, and congestive gastroenteritis. Histopathological analysis further characterized the lesions, revealing multifocal ulcerations of the lingual and hard palate mucosa associated with hydropic necrosis of epithelial cells. Additionally, pulmonary sections exhibited interstitial pneumonia with a marked infiltration of lymphoplasmacytic cells, confirming the systemic nature of the viral infection. To effectively preserve animal health and ensure the sustainability of the livestock sector, it is imperative to implement integrated control strategies. These should include mass vaccination, strict movement controls, and enhanced epidemiological surveillance to mitigate the impact of the disease on regional animal welfare.

Key words: Peste des Petits Ruminants (PPR), goats, necropsy, clinical signs, histopathology.

Study of Staphylococcal Otitis in domestic carnivores in the Batna region

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Abstract

External otitis is a common inflammatory condition in domestic carnivores, often linked to fungal and bacterial pathogens. This study aims to assess the prevalence, etiological agents involved, and risk factors associated with staphylococcal otitis in dogs and cats in the Batna region of Algeria. A total of 43 ear swabs were collected from 33 animals (18 dogs and 15 cats) between January and May 2025, accompanied by epidemiological questionnaires completed by practicing veterinarians. The results reveal a staphylococcal infection rate of 20.93% of cases, predominantly coagulase-positive strains (77.78%). Fungal-bacterial co-infection was observed in 16.28% of samples. Statistical analysis showed a significant association ($P < 0.05$) between mixed infections and both animal species and clinical signs. Antibigram testing demonstrated complete resistance to β -lactams (penicillin, ampicillin), but good sensitivity to cefoxitin, oxacillin, gentamicin, and amoxicillin-clavulanic acid. This study highlights the diversity of pathogens responsible for otitis and underscores the importance of systematic microbiological diagnosis to guide veterinary treatments. It also provides novel epidemiological data for Algeria, contributing to a better understanding of the potential zoonotic risk.

Key words: Otitis, Staphylococcus, antibiogram, cats and dogs, risk factors.

Prevalence and diversity of intestinal parasites in turkeys (*Meleagris gallopavo*) across different localities in Djelfa, Algeria

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Abstract

Intestinal parasitism remains a significant threat to turkey production, causing substantial economic losses through reduced growth rates and impaired feed conversion. In the semi-arid region of Djelfa, Algeria, data regarding the epidemiological status of these parasites in local turkey flocks are limited. This study aimed to evaluate the prevalence and diversity of intestinal parasites in turkeys across nine distinct localities in Djelfa to provide a baseline for targeted sanitary interventions. A total of 397 turkeys were sampled from Bahrara, Dabdaba, Djelfa, Ksar Zaira, Maalba, Messaad, Moudjbara, Oued Sdeur, and Rjagno. Parasitological analysis was conducted using the flotation technique to identify oocysts, eggs, and cysts. Statistical analyses, including Chi-square tests and diversity indices (Shannon, Simpson, and Pielou), were performed to assess spatial variations. The overall prevalence was 62.97%, with *Eimeria* spp. being the most dominant parasite (55.67%). Significant spatial variation in prevalence was observed ($p < 0.001$), ranging from 39.47% in Messaad to 100% in Ksar Zaira. Diversity indices revealed complex parasitic communities in Oued Sdeur and Djelfa, while polyparasitism was recorded in 18.13% of the birds. The high prevalence and significant diversity of intestinal parasites highlight an urgent need for integrated control strategies. This research contributes to the regional veterinary database and supports the development of localized prevention programs to enhance avian health and food security in Algeria.

Key words: turkey, intestinal parasites, prevalence, diversity, Djelfa.

Study of the antagonism of a fungal strain towards the causal agent of olive verticillium wilt

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Abstract

The objective of our study is the isolation of the pathogen which causes verticillium wilt (*Verticillium dahliae*) in the olive tree from the organs which present characteristic symptoms of the disease on olive trees cultivated in three regions of Bouira (Dirah, Sour El Ghoulane and El Esnam). The results obtained allowed us to macroscopically and microscopically identify the fungal genus; *Verticillium* sp, isolated from samples taken. The identification of fungal genera is based on morphological characters which typically correspond to those described by Chabasse et al., (2002). The evaluation of the phenomenon of antagonism of the strain *Penicillium* sp against the fungal strain isolated from diseased olive plants can be studied by different techniques., a direct confrontation between the pathogen *Verticillium* sp and the antagonist *Penicillium* sp was carried out. The principle of the direct confrontation technique consists of placing two disks of each fungal strain of 08 mm in diameter taken from a pre-culture in boxes petri dish then placed using a sterile cookie cutter on a petri dish containing the PDA environment. 5 repetitions for each mushroom. The control consists of a box containing an isolated mushroom pellet measuring 08 mm diameter. The boxes are incubated at 25°C for 7 days. Reading the results consists of measuring the distance traveled by the *Verticillium dahlia* mushroom in the direction of the antagonist *Penicillium* sp. The evaluation of the inhibition exerted by *Penicillium* sp is estimated by calculating the percentage of inhibition of mycelial growth. The latter showed the effectiveness of the fungal strain *Penicillium* sp against the pathogen *Verticillium* sp; the pathogen had a lower growth rate compared to the control (an antagonism rate of approximately 34%). This technique confirmed the sensitivity of the pathogen to the inhibitory effect of *Penicillium* sp. The increase in inhibition rates over time shows that the antifungal activity is proportional to the incubation period of the culture. This can be explained by the exposure prolonged to the secondary metabolites produced and released into the environment by the strain tested, responsible for its antagonistic power.

Key words: olive tree, *Verticillium* wilt, *Verticillium* sp, antagonism, *Penicillium* sp.

Isolation and characterization of *Botrytis cinerea* strains from vineyards in the Bejaia region

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Abstract

Gray mold, caused by *Botrytis cinerea*, is one of the most important fungal diseases affecting grapevine worldwide. In the present study, *B. cinerea* was selected as a model pathogen within the framework of research on grapevine biological aggressors in the Bejaïa region (Amizour, Algeria). The main objective of this work was to evaluate the phenotypic variability and aggressiveness of *B. cinerea* isolates collected from vineyards. A total of 170 isolates were obtained from 200 grapevine samples collected from different vine organs. Phenotypic characterization revealed considerable variability among the isolates. Two morphotypes were identified: the mycelial morphotype, which was predominant with 136 isolates, and the sclerotial morphotype represented by 34 isolates. The aggressiveness study was carried out by evaluating disease development using the Area Under Disease Progress Curve (AUDPC). The results showed marked heterogeneity among the tested isolates. Isolates BCV20, BCV10, and BCV2 were the most aggressive, with mean AUDPC values of 489, 389, and 352, respectively. In contrast, isolate BCV8 exhibited the lowest aggressiveness, with an average AUDPC value of 157. Furthermore, the distribution of aggressiveness according to morphotype indicated that the sclerotial morphotype was generally more aggressive than the mycelial morphotype, with respective average AUDPC values of 682.24 and 483.66.

Key words: *Botrytis cinerea*, vine, morphotype, aggressiveness, variability.

Ectoparasites diversity and distribution in Wild Rabbit and Cape Hare collected from the High Plateaus of Algeria

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Abstract

The Cape hare *Lepus capensis* and the wild rabbit *Oryctolagus cuniculus* rank among the most prevalent game species in Algeria; however, their populations have declined in recent years. These wild lagomorphs serve as important hosts for diverse ectoparasites, including ticks and fleas. This study was carried out in the High Plateaus of Algeria over the course of the 2023–2024 hunting seasons. A total of 47 wild lagomorphs were collected from 20 different geographic sites in Bordj Bou Arreridj and M'sila province and examined for ectoparasites. Among the 44 hares sampled, 25 were infested, whereas none of the examined wild rabbits harbored ectoparasites. A total of 175 ectoparasites were collected and identified using taxonomic identification keys while 165 ticks were identified, with *Rhipicephalus sanguineus* predominating (89.14%), followed by *Ixodes hexagonus* (5.14%) and 10 fleas with three species: *Ctenocephalides felis* (4%), *Leptopsylla segnis* (1.14%), and *Xenopsylla cheopis* (0.57%). The detection of ectoparasites in lagomorphs, which act as vectors for various pathogens including zoonotic agents particularly with the predominance of *Rhipicephalus sanguineus* highlights the need for more comprehensive investigations to better understand the role of lagomorphs, especially hares, in the dynamics of these ectoparasites and their role in the transmission of vector borne pathogens.

Key words: cape hare, wild rabbit, ectoparasites, Algeria.

Diversity of ectoparasites infesting the Mallard (Aves: Anseriformes) at a Ramsar site in north-east Algeria

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Abstract

Algeria has the most Ramsar sites of international importance in Africa with 55 sites. Each year these sites attract a variety of aquatic birds to migrate, winter and breed. Feather mites and chewing lice are permanent, obligate parasites, mostly on bird species. Little is known about the ectoparasites associated with aquatic birds in Algeria. This study aimed to document the ectoparasite fauna of Mallards (*Anas platyrhynchos*) at Birds Lake (Lac des Oiseaux), a Ramsar site in north-east Algeria. External examinations were conducted on 26 ducks from August 2024 to February 2026 (approximately 1–2 individuals per month during the main activity periods, with higher effort in wintering months). Ectoparasites were collected by visual inspection and feather ruffling, then preserved in 70% ethanol. A total of 359 specimens were obtained (11 Phthiraptera and 348 Acari). Specimens were cleared, mounted on permanent slides, and identified morphologically under a compound microscope using standard taxonomic keys for Phthiraptera and feather mites. Two louse species and one mite genus were identified: *Trinoton querquedulae* (Linnaeus, 1758) (Amblycera: Menoponidae), *Anaticola crassicornis* (Scopoli, 1763) (Ischnocera: Philopteridae), and *Freyana* sp. (*Freyana* sp. (Astigmata: Freyanidae: Pterolichoidea)). This represents one of the few studies on bird ectoparasites in Algeria and contributes significantly to local parasitic biodiversity knowledge. These results are consistent with available regional and international data on waterfowl. Similar records of the chewing lice *Trinoton querquedulae* and *Anaticola crassicornis* have been reported from mallards in Turkey and from other Anatidae hosts. Feather mites of the genus *Freyana* are commonly associated with Anatidae in Europe and North America. The ectoparasite composition observed in this study, characterized by low louse abundance and high mite density, is typical of wild Anatidae populations. and a higher mite density, typical of wild Anatidae, and emphasize the presence of host-specific parasite communities shaped by migratory patterns and habitat conditions. Further studies are needed to evaluate seasonal dynamics and impacts on avian health and overall biodiversity conservation within Algerian Ramsar sites.

Key words: mallard, birds lake, Anatidae, ectoparasites, feather mites, chewing lice.

Assessment of environmental and anthropogenic constraints on the long-term survival of the endemic *Pinus nigra* subsp. *mauretanica*

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Abstract

Objectives/problems: The black pine (*Pinus nigra* subsp. *mauretanica* (Maire & Peverimh) Heywood) is an endangered endemic subspecies restricted to Djurdjura National Park, where its population is alarmingly limited to fewer than 500 individuals. This unique genetic heritage faces a high risk of extinction due to a prolonged absence of natural regeneration recorded over the last decades. This study aims to synthesize existing research to evaluate the main ecological and anthropogenic factors threatening its long-term survival. **Materials and methods:** A comprehensive bibliographic review was conducted, covering data from the 1980s to the present to encompass the historical onset of the regeneration crisis. Selection criteria strictly focused on studies addressing the ecological challenges of Algerian black pine, specifically the lack of natural regeneration. The review integrates quantitative data such as population size, tree age distribution, and seed production. **Results:** The synthesis reveals that the taxon's regeneration is severely compromised by a synergy of intense environmental constraints and anthropogenic pressures, notably climate change and recurrent wildfires. Quantitative data highlight a critical decline in the regeneration dynamics of black pine trees, with no more than 12% of the population aged 20 years or younger, coupled with an extremely low viable seed production estimated at 10.36%. Furthermore, current conservation strategies and reforestation programs are being applied to protect this species from extinction. **Conclusion:** This critical situation underscores the extreme urgency of implementing targeted, science-based conservation measures. Integrating quantitative demographic monitoring with enhanced seed protection and strategic reforestation is vital to prevent the irreversible loss of this unique endemic resource.

Key words: black pine, Djurdjura national park, regeneration, conservation.

Investigation of avian coccidiosis in chickens and turkeys: from detection to natural therapeutic strategy

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Abstract

Coccidiosis is a major parasitic disease in poultry caused by *Eimeria* spp., leading to significant economic losses worldwide. Chickens are mainly affected by species such as *E. tenella*, *E. acervulina*, and *E. maxima*, while turkeys are more susceptible to *E. adenoeides* and *E. meleagrimitis*. The disease is characterized by enteric damage, poor feed conversion, and increased mortality, particularly in young birds. This study aims to highlight key diagnostic methods, epidemiological features, and practical control strategies for coccidiosis in chickens and turkeys. Diagnosis relies on clinical observation (diarrhea, reduced growth), post-mortem lesion scoring, and laboratory techniques. Fecal flotation is used to detect oocysts, typically ranging from 15-30 µm depending on species. Lesion scoring systems (Johnson and Reid scale from 0 to 4) help identify species based on intestinal localization. Epidemiological data were collected from intensive and semi-intensive poultry systems, focusing on environmental and management factors. The prevalence of coccidiosis reached 50-80% in poorly managed flocks. Sporulation of oocysts was optimal at 25-30°C and humidity above 60%, with damp litter being a significant risk factor. The parasite *E. tenella* caused severe hemorrhagic lesions in the cecum, with mortality rates reaching 30% in acute outbreaks. Subclinical infections, particularly by *E. acervulina* and *E. maxima*, significantly reduced weight gain (up to 20%) and decreased feed efficiency. Diagnosis combining lesion assessment with oocyte identification improved diagnostic accuracy. Preventive strategies, including litter management, anticoccidial drugs, and especially natural additives (oregano, garlic, wormwood, and turmeric), showed varying degrees of effectiveness depending on farm conditions. Effective control of coccidiosis requires integrated approaches combining accurate diagnosis, environmental management, and preventive strategies. Future perspectives include the development of vaccines, improved biosecurity, and increased use of natural alternatives to reduce drug resistance and ensure sustainable poultry production.

Key words: coccidiosis, *Eimeria*, poultry, diagnosis, anticoccidial, natural additives.

Impact of black soldier fly larvae meal as a sustainable protein source on broiler performance: evidence from a preliminary meta-analysis

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Abstract

Black soldier fly (BSF) larvae meal has emerged as a promising sustainable alternative to conventional protein sources such as soybean meal in broiler nutrition due to its high protein and lipid content. Therefore, this meta-analysis aimed to evaluate the effects of BSF larvae meal inclusion on broiler growth performance. A systematic literature search based on the PICO strategy was conducted using major scientific databases, including Google Scholar, and study selection followed PRISMA guidelines. Eligible studies were screened according to predefined inclusion criteria, and data on inclusion level, sample size, experimental duration, and means $\pm$ SD/SEM were extracted. Statistical analyses were performed in R version 4.3.1 using a random-effects meta-analysis model, while heterogeneity among studies was assessed using the I^2 statistic. In total, 14 studies representing 80 observations were included. The evaluated zootechnical parameters were feed conversion ratio (FCR), daily feed intake (DFI), body weight gain (BWG), and live weight (LW). The results showed that BSF larvae meal inclusion significantly reduced daily feed intake (mean difference = -1.92 g/day; $p = 0.039$). No significant effects were observed during the starter phase; however, during the grower phase, reduced feed intake was associated with a significant decrease in body weight gain (mean difference = -79.61 g; $p = 0.006$). Feed conversion ratio was not significantly affected, indicating comparable feed efficiency to conventional diets. High heterogeneity ($I^2 > 90\%$) was observed among studies, likely due to differences in experimental conditions, inclusion levels, and processing methods. Overall, BSF larvae meal can be considered a viable and sustainable protein source for broiler production, although its effects remain dependent on dietary inclusion rate and processing conditions.

Key words: black soldier fly larvae, zootechnical performance, sustainable protein source, broiler chicken, meta-analysis.

First study to evaluate the microbiological and physico-chemical quality of certain animal feeds in dairy cow farms in the Biskra region

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Abstract

Feed represents the major production cost in dairy farming and directly conditions the quality of animal-derived products. This study aims to evaluate the physicochemical quality (pH, dry matter, total sugars) and the microbiological contamination level of feed (compound concentrates and fresh forage) sampled from two dairy farms. Faecal coliform and fungal flora counts were performed on VRBL and OGA media, respectively, while physicochemical analyses included pH measurement and total sugar determination using the phenol-sulfuric acid method. The results revealed a faecal coliform contamination rate of (2.4×10^2 CFU/g). Furthermore, 32 mold strains were isolated, showing a predominance of the genera *Aspergillus* and *Penicillium* in the concentrate feed, and *Fusarium* in the green grass. Physiochemically, the feed samples displayed a slightly acidic pH (5.91 to 6.65) and a significantly higher total sugar content in the grass (16.09%) compared to the concentrate (6.95%). In conclusion, this study confirms the presence of a diverse fungal microflora, including potentially toxin-producing genera. Given that the regional climatic conditions favor their growth, these findings underscore the urgent need for in-depth analyses to assess mycotoxin risks in the dairy supply chain.

Key words: dairy farming, concentrate feed, *Aspergillus*, mycotoxins.

Trophic data of the lesser mouse-tailed bat (*Rhinopoma cystops*) in the arid ecosystems (Bousaada, Algeria)

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Abstract

Due to its vast area in Africa and worldwide, Algeria is one of the countries rich in flora and fauna, which is reflected in its diverse ecosystems. Chiropterans hold a valued position among vertebrates due to their ecological importance and implications for public health. They are represented by 27 species belonging to seven families; these mammals remain poorly known, having been the subject of very few studies, and are also underrepresented in the work of naturalists. The study of the various chiropteran species was conducted in the Bousaada region of Algeria (Arid ecosystem) between June 2021 and June 2024. Two inventory methods were employed: capture and direct observation in their habitats. The data collected to date appear to confirm the rarity of certain species and, in particular, our study model: the Lesser mouse-tailed bat (*Rhinopoma cystops*), which is listed on the IUCN Red List as a species of Least Concern. This insectivorous bat species provides special ecosystem services by preying on insects that are pests to agriculture, arid ecosystems, and public health. The investigation of dietary patterns represents the first reported data on chiropteran fauna in the Bousaada region (Arid ecosystem), based on guano sample analysis. The 35 *Rhinopoma cystops* guano samples analyzed contained 1561 prey fragments. The results indicate that this species consumes prey belonging to three arthropod groups in the study area: Insecta (frequency: 97.22%), Chilopoda (1.08%), and Araneae (1.70%).

Key words: Chiroptera, biodiversity, Algeria, diet, *Rhinopoma cystops*, arid ecosystem.

Early detection of animal lameness: Design of a low-cost intelligent system

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Abstract

Lameness in livestock is a major issue that affects both animal welfare and productivity, as well as overall zootechnical performance. It can lead to reduced production (milk or meat), decreased fertility, and increased veterinary costs. However, early detection remains challenging, as it is typically based on visual observation by farmers or technicians—a method that is both subjective and often delayed, identifying the problem only when symptoms become clearly visible. In this context, this work proposes the development of an intelligent lameness detection system based on an embedded platform using an Arduino Uno. The device relies on pressure sensors placed under the animal's limbs to measure weight distribution, along with an accelerometer to analyze gait dynamics. The collected data are processed to identify characteristic anomalies, such as uneven weight distribution between limbs or irregular movement patterns. Experimental results demonstrate that the system is capable of effectively detecting locomotor abnormalities with satisfactory sensitivity. In cases of suspected lameness, a visual alert is triggered using an LED, enabling prompt intervention. This system offers several advantages, including simplicity of implementation, low cost, and adaptability to different types of livestock farming. It therefore represents a promising solution for improving animal health monitoring and enabling early detection of locomotor disorders.

Key words: lameness detection, livestock monitoring, embedded system pressure sensors gait analysis.

Toxic impact of clodinafop-propargyl herbicide in adult male rabbits

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Abstract

Herbicide exposure is known to induce systemic toxicity through mechanisms involving oxidative stress, inflammation, and organ damage, especially in non-target species. Clodinafop-propargyl, the active ingredient in TOPIK80EC, is widely used in agriculture, yet its sub-chronic toxic effects in mammals remain underexplored. The aim of this study was to evaluate the toxicological impact of oral exposure to TOPIK80EC in domestic rabbits, focusing on physiological, hematological, and morphometrical changes, on reproductive function and testicular structure. Adult male rabbits (5–6 months old) were randomly assigned to four groups (n = 6 each). Three experimental groups received increasing oral doses of Clodinafop-Propargyl (1, 4, and 20 mg/kg/day) for four weeks, while the fourth group served as control. Body weight was recorded daily. Hematological and hormonal analyses were performed, and morphometric measurements of target organs (testes, liver, kidneys, spleen) were assessed. Sperm analysis and histological examinations of testicular and epididymal tissues were conducted to evaluate reproductive function and structural integrity. Data were analyzed using one-way ANOVA and post hoc Tukey's test. Results showed early alterations in feeding behavior, leading to reduced body weight gain and average daily gain in treated groups. Hematological findings revealed leukocytosis at 1 and 4 mg/kg, whereas leukopenia was observed at 20 mg/kg. Significant decreases in red blood cells, hemoglobin, hematocrit, and platelet counts were detected at 4 and 20 mg/kg. A significant reduction ($P < 0.05$) in testicular weight and morphometric parameters was recorded, particularly at the highest dose. In contrast, liver, kidney, and spleen weights increased. A marked decline in serum testosterone levels indicated disruption of the hypothalamic–pituitary–gonadal axis, especially in the high-dose group. Sperm concentration, motility, and viability were significantly reduced. Histological analysis revealed seminiferous tubule degeneration, epithelial disorganization, germ cell depletion, and tubular atrophy. In conclusion, Clodinafop-Propargyl induces dose-dependent systemic and reproductive toxicity in male rabbits, causing profound structural and functional testicular damage that may compromise fertility.

Key words: Clodinafop-Propargyl, reproductive toxicity, testosterone, rabbit, sperm analysis, histology.

Prevalence of the main infectious diseases affecting domestic animal species in Sétif veterinary clinics

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Abstract

This research focuses on the study of microbial diseases in animals, conducted in the province of Sétif during the period between 2024 and 2025 in veterinary clinics, emphasizing the diversity of affected species, the analysis of the prevalence of these diseases, as well as the role of veterinarians in diagnosis and monitoring. Our methodology was structured around two complementary steps: Data Collection with a paper questionnaire was developed specifically for this survey and Data Analysis. The responses collected allowed us to calculate the prevalence rates of each disease, The results revealed significant variation in infection rates depending on the animal species. Among chickens, colibacillosis showed the highest rate at 75.98%. In birds, Newcastle disease accounted for 22%. In cattle, *Escherichia coli* infections were recorded at 24%. Among sheep, bacterial pneumonia was predominant at 30.35%, while corynebacteriosis accounted for 11,38% in goats. In dogs, hemorrhagic gastroenteritis was the most frequent disease (13.55%), whereas in cats, ringworm was recorded at 15.50%. In horses, equine influenza was the most reported disease at 23.64%.

Key words: bacterial pneumonia, colibacillosis, ringworm, *Escherichia coli*, Newcastle disease, equine influenza.

Acute toxicity of *Thymus willdenowii* essential oil on *Apis mellifera* and its chemical characterization by HSPME

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Abstract

This study aims to evaluate the acute toxicity of the essential oil of *Thymus willdenowii* on the honeybee *Apis mellifera*, as well as to characterize its chemical composition using HSPME. Biological assays were conducted in accordance with OECD Guideline 95, testing several doses through two exposure routes: contact and ingest ion, with three replicates per treatment. Mortality was recorded after 24 h, 48 h, 72 h, and 96 h. The results revealed significant toxicity, dependent on both dose and exposure time. By contact, the essential oil induced rapid and high mortality, reaching very high levels at higher concentrations within 72 96 h. By ingestion, the toxic effect was less pronounced but remained notable, with a gradual increase in mortality over time. The control group showed low mortality, confirming that the observed effects were attributable to the essential oil. Chemical analysis by HSPME showed that the essential oil of *Thymus willdenowii* is dominated by oxygenated monoterpenes (61.8%) and monoterpene hydrocarbons (31.5%). The main identified compounds were 1.8 cineole (17.3%), camphor (16.9%), α pinene (16.6%), borneol (8.2%), and camphene (7.3%). Other compounds such as β pinene, limonene, and linalool were present in lower proportions. The observed toxicity in *Apis mellifera* may be related to the high content of bioactive monoterpenes, known for their insecticidal and neurotoxic effects, particularly through disruption of the insect nervous system. In conclusion, the essential oil of *Thymus willdenowii* shows promising insecticidal potential but also poses a risk to pollinators. Its use in crop protection should therefore be carefully managed and regulated to minimize its impact on honeybees.

Key words: *Thymus willdenowii*, *Apis mellifera*, acute toxicity, OECD Guideline 95, HSPME, monoterpenes, pollinators.

Impact of multi-species grazing on sheep health and performance in steppe areas (case of Djelfa)

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Abstract

In Algerian steppe areas, sheep farming systems mainly rely on natural rangelands characterized by variable floristic diversity. The objective of this study is to evaluate the impact of multi-species grazing on sheep health, nutritional status, and zootechnical performance in the Djelfa region. Monitoring was carried out on a flock managed under extensive conditions, with periodic observations during grazing. The studied parameters include average daily gain (ADG), body condition score (BCS), and overall animal health status. The rangeland vegetation is dominated by pastoral species such as *Atriplex halimus*, *Artemisia herba-alba*, and *Stipa tenacissima*. The results show that plant diversity improves feed intake and contributes to better stability of body condition while reducing nutritional imbalances. Data analysis using One-way ANOVA followed by Tukey's post-hoc test revealed that plant diversity significantly improves feed intake ($p < 0.05$). Specifically, sheep on multi-species rangelands exhibited a significantly higher Average Daily Gain ($ADG = 145 \pm 12$ g/day) compared to those on degraded pastures ($ADG = 95 \pm 10$ g/day; $p < 0.01$). Furthermore, Pearson correlation showed a strong positive relationship ($r = 0.82$) between the availability of *Atriplex halimus* and the stability of the Body Condition Score (BCS), which remained at an optimal average of 3.2 ± 0.3 during the monitoring period. Multi-species grazing thus appears to be an effective approach to optimize sheep health and productivity in semi-arid environments. This study highlights the importance of rational rangeland management based on floristic diversity to sustainably improve animal performance.

Key words: multi-species grazing, sheep, animal health, ADG, steppe area.

Session 4. Ecology, environment and sustainable
management of natural resources

Plenary Session

The use of behavioural economics dimensions in resources preservation within the context of sustainable development

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Abstract

Behavioural economics highlights through its key dimensions (bounded rationality, loss aversion, anchoring, and the use of nudges to shape choice environments), that cognitive biases, social norms, and emotional, nonlinear processing drive behaviour. It combines both psychology and economics to study why people make irrational decisions, challenging traditional rational-economics approaches. Accordingly, this study as a descriptive study aims to explore the integrating of behavioural economics dimensions in resources prevention within the context of sustainable development. It focuses, through several examples, the use of behavioural dimensions in encouraging the environmentally conscious behaviours to promote the prevention of resources and supports environmentally friendly choices. The study concluded that resources can be conserved within the context of sustainable development by combining rational economics tools (pricing and taxation), as a mandatory framework, with behavioural economics tools (voluntary compliance) to make sustainable behaviour automatic and socially acceptable. In this context, this communication offers recommendations for policy design and implementation, and contributes to theoretical discussions in this field.

Key words: Behavioural economics, rational economics, bounded rationality, loss aversion, anchoring, nudges.

Oral Session

Activated carbon production from palm residues for efficient removal of dyes from wastewater

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Abstract

The intensive use of dyes in various industries is a major source of wastewater pollution, posing a significant environmental threat. At the same time, date palm cultivation produces large quantities of agricultural waste, particularly in the form of trunks and leaves. This study aims to valorize these residues by using thermally treated (carbonized) palm trunks and leaves as adsorbents for treating dye-contaminated water, specifically targeting the removal of the BB41 dye. The influence of key operational parameters on adsorption efficiency was investigated, including pH, biomass concentration, contact time, temperature, and dye concentration. This approach seeks to develop an environmentally friendly and cost-effective solution for reducing industrial textile pollution, while simultaneously giving added value to agricultural waste derived from date palm cultivation.

Key words: Valorization, dyes, palm, trunks, leaves, wastewater.

Morphophysiological and biochemical characterization of the toxicity of a mixture of the insecticides acetamiprid and tefluthrin on the snail *Helix aspersa*

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Abstract

Natural products constitute an important source of bioactive molecules with therapeutic properties. The production of chemicals is increasing worldwide and a large proportion of these chemicals is used in the formulation of plant protection products. But many of these products are toxic and have poor biodegradability. Their excessive use can be dangerous and sometimes cause adverse effects on all elements of the environment. We studied the effect of a combination of two insecticides (Acetamiprid : a neonicotinoid and Tefluthrin: a pyrethroid) on the *Helix aspersa* snail which is a bioaccumulator and bioindicator of environmental pollution. The toxicity of the insecticides was determined in *Helix aspersa* snails by a laboratory bioassay on animals exposed to concentrations of (Acet = 20 mg/L, Tefl = 10 mg/L) and a group treated with a mixture of these two insecticides for 21 days. The results indicate physiological disturbances in the weight and shell diameter of the treated snails. Moreover, induction of catalase and GST enzyme activities and inhibition of AChE activity were observed during the treatment period.

Key words: Insecticides, *Helix aspersa*, toxicity, physiological parameters, catalase, GST, AChE.

Seasonal changes of plasma adrenal Activity in desert rodent Libyan Jird (*Meriones libycus*) by LC-MS/MS method

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Abstract

Animals exposed to extreme environmental conditions modulate their physiology based on the availability of food and water. The Libyan jird (*Meriones libycus*), a desert rodent living in the Algerian Sahara Desert, exhibits strong seasonal changes in endocrine functions. Our study investigates adrenal activity using the LC-MS/MS method. We aimed to assess seasonal changes of adrenal activity by evaluating plasma Cortisol, Androstenedione, Corticosterone, and 11-Deoxycortisol. Our results showed that plasma cortisol followed high levels during the breeding season, and varied from (34.73 ± 5.735 ng/mL) during the breeding season to (14.36 ± 2.875 ng/mL) during the resting season. The difference between the two seasons is statistically very highly significant ($p < 0.0046$). Plasma level of Androstenedione was significantly higher during the breeding season (0.5834 ± 0.1855 ng/mL) than during the resting season (0.1500 ± 0.008 ng/mL), ($p < 0.0295$). Plasma 11-Desoxycortisol followed high levels during the breeding season, and varied from (17.48 ± 3.33 ng/mL) during the breeding season to (4.302 ± 0.61 ng/mL) during the resting season. The difference between the two seasons is statistically very highly significant ($p < 0.0046$). Plasma level of Corticosterone was significantly higher during the breeding season (1.570 ± 0.2677 ng/mL) than during the resting season (0.5840 ± 0.24 ng/mL), ($p < 0.01$). These results allow us to better understand the relationship between environmental stress in arid regions and its influence on reproductive success in desert rodents.

Key words: *Meriones libycus*- Adrenal androgens-LC-MS/MS- Seasonal variation Cortisol-Saharan desert.

Olive-based agroforestry as a pathway to sustainable agriculture in sub-humid zones: A critical literature review

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Abstract

In the sub-humid zones of northeastern Algeria, olive groves are more than just orchards —they are living witnesses to centuries of agricultural tradition. Yet today, most of these groves are still managed as monocultures, disconnected from the ecological potential that the olive tree naturally carries. What happens when we stop treating it as a solitary crop and start thinking of it as the anchor of a diversified agroecological system? This is the question at the heart of our reflection. Olive-based agroforestry — integrating annual crops beneath tree canopies — offers a scientifically grounded pathway toward more resilient and sustainable farming. Its potential in the Algerian sub-humid context, however, remains largely unexplored. To investigate what current science tells us about this approach, we conducted a structured bibliographic review of studies published between 2020 and 2026, sourced from Scopus, Web of Science, and Google Scholar, selected on the basis of thematic relevance and methodological rigor, using the following Key words: agroforestry, olive tree, intercropping, legumes, soil fertility, Mediterranean zones. What the literature reveals is both clear and encouraging. In Mediterranean olive groves, intercropping increases topsoil organic carbon by 28 to 41%, depending on the associated species, while supporting long-term carbon storage (Torrús-Castillo et al., 2023). The olive–legume association — particularly with faba bean — harnesses biological nitrogen fixation, reducing dependence on synthetic nitrogen inputs while enriching the soil (Amassaghrou et al., 2023). When agroecological practices are combined — composted olive-mill waste, pruning residue recycling, and cover crops — soil organic matter reaches 4.33% compared to just 1.65% in conventional plots, with a 65% increase in soil nitrate content (Hrameche et al., 2024). At the system level, the Land Equivalent Ratio of olive agroforestry ranges from 1.57 to 2.07, meaning overall productivity is 57 to 107% higher than monoculture (Temani et al., 2021). The evidence no longer leaves room for doubt: olive-based agroforestry works. The real challenge now is understanding how to adapt these systems to the specific soil and climate conditions of the Algerian sub-humid zones — and that is precisely where this doctoral research begins.

Key words: agroforestry, olive tree, intercropping, legumes, soil fertility, sub-humid zones, agroecology.

Development of a low-cost bio-adsorbent from palm waste for organic dye removal: Towards sustainable environmental management

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Abstract

This study addresses the challenge of treating industrial wastewater, which often contains complex and hazardous chemical compounds. It focuses on developing an environmentally sustainable and cost-effective solution by producing activated carbon (AC) from date palm fibers through chemical activation with phosphoric acid (H₃PO₄). Different impregnation ratios (30%, 60%, 100%, and 150%) were investigated, with the optimal ratio identified at 150%. The resulting material, AC150%, demonstrated high efficiency as an adsorbent for removing methylene blue (MB) dye. The prepared materials (activated carbons) were characterized physicochemically using advanced techniques such as N₂ adsorption-desorption at 77 K, Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM) using a microscope, coupled with an energy dispersive spectrometer (EDS), X-ray diffraction analysis (XRD) and thermogravimetric analysis (TGA) as well as with other methods such as pH, the point of zero charge (pHPZC) and methylene blue index. To optimize the adsorption process, the Box-Behnken Design (BBD) methodology was employed to evaluate the key parameters such as pH, dye concentration, temperature, and contact time. Twenty-nine experiments were conducted, and the quadratic model was identified as the best fit for the data, with a coefficient of determination R² of 0.9954. Kinetic and equilibrium studies show that CA150% follows the pseudo-second-order model and the Langmuir isotherm, with a maximum adsorption capacity of 763.35 mg·g⁻¹. These results confirm its efficiency for the removal of cationic dyes, making CA150% a highly effective and sustainable adsorbent for industrial wastewater treatment. The adsorption process is endothermic and disordered ($\Delta H^\circ > 0$, $\Delta S^\circ > 0$), while the negative ΔG° values confirm its spontaneity at different studied temperatures. CA150% exhibits significantly higher adsorption capacities than CAC for the B, R, and J dyes. This study highlights the potential of utilizing agricultural waste, particularly date palm fibers, to produce high-performance activated carbon. This approach not only contributes to the valorization of natural resources but also enhances environmental sustainability and improves practices in wastewater management.

Key words: date palm, activated carbons, surface chemistry, cationic dyes, Box-Behnken design.

Morphological variability and climate resilience in selected durum wheat genotypes

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Abstract

Climate change represents a major constraint on agricultural productivity, particularly in Mediterranean regions where temperature increases and declining precipitation intensify abiotic stresses. In North Africa, and especially in Algeria, warming trends exceed the global average, accompanied by a marked reduction in rainfall, leading to shortened growing seasons and reduced cereal yields. Durum wheat (*Triticum durum* Desf.), a staple crop occupying a substantial proportion of cultivated land, is particularly vulnerable to these conditions. Its development is influenced by complex interactions between water availability, temperature, and other environmental factors, which affect phenology, biomass accumulation, and yield. Understanding the adaptive mechanisms of durum wheat genotypes to climatic variability is therefore essential. The analysis of 29 durum wheat genotypes grown across three experimental sites (Tiffech, Sidi Fredj, and Montpellier) revealed significant genotype $\times$ environment interactions. Morphological parameters, including average stem height, flag leaf–spike distance, spike length, and awn length, varied considerably depending on climatic conditions. A consistent positive correlation was observed between stem height and flag leaf–spike distance across all sites. However, spike length and awn length exhibited site-specific responses. Notably, in Sidi Fredj, climatic conditions promoted enhanced awn development in the majority of genotypes compared to the other locations. Differences in plant behavior were evident at maturity, reflecting the contrasting impacts of hydric stress in Montpellier and thermal stress in Sidi Fredj. Despite this variability, certain genotypes demonstrated relative stability across environments. The findings highlight the critical role of environmental conditions in shaping the morphological expression and adaptive responses of durum wheat genotypes. Enhanced awn development under stress conditions may represent an adaptive mechanism to heat and water stress. Identifying stable and resilient genotypes remains essential for future breeding programs and the use of mixed varieties could further improve stress tolerance, biomass production, and yield stability under changing climatic conditions.

Key words: adaptation, environment, stress, *Triticum durum*.

Biodiversity of fruit fly communities (Diptera: Tephritidae) and population dynamics of *Ceratitis capitata* (Wiedemann, 1824) in Khenchela, Eastern Algeria

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Abstract

Fruit flies (Diptera, Tephritidae) are among the insect pests with the greatest economic impact in many regions of the world, particularly in Africa. They constitute a major concern in North African countries, a region commonly comprising Morocco, Algeria, Tunisia, Libya, Mauritania, and Egypt. These pests cause substantial damage to fruit crops, leading to yield losses and imposing phytosanitary constraints on national and international trade. This study investigated the diversity of fruit fly species and monitored the population dynamics of *Ceratitiscapitata* on different fruit tree species, including fig, olive, and apricot, in the Khenchela region. The study was conducted over a one-year period, from November 2023 to November 2024. A trapping technique targeting adult fruit flies was applied in a mixed orchard in order to monitor population fluctuations throughout the study period. The results of adult monitoring indicated that trap captures increased with the appearance of receptive fruits in the orchard. Population levels decreased toward the end of the fruiting season, coinciding with the absence of other host fruit species within the study orchard and in relation to prevailing climatic conditions. Differences were observed between male and female captures, reflecting variations in activity patterns and responses to trapping methods. These findings demonstrate a close association between host fruit availability, environmental factors, and fruit fly population dynamics. Overall, this study provides valuable baseline information on the ecology of *Ceratitiscapitata* and contributes to a better understanding of fruit fly behavior, which may support the development of effective management strategies in the Khenchela region.

Key words: fruits flies, Tephritidae, Diptera, Algeria, Khenchela.

Honeybees facing the challenges of environmental change in Algeria

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Abstract

Honeybee colonies (*Apis mellifera*) are highly sensitive to environmental disturbances that affect colony development, productivity, and survival. In Algeria, recurrent droughts, climate variability, vegetation degradation, and pesticide use are increasingly reported as major constraints for beekeeping. This study aimed to assess the impact of environmental changes on colony performance and honey production across different ecological regions of Algeria. A comparative observational study was conducted between 2021 and 2024 in three ecological zones of Algeria: northern humid/sub-humid regions, steppe semi-arid areas, and Saharan regions. Data were collected from field observations and surveys of 85 beekeepers, including colony strength, annual honey yield, winter mortality, and floral resource availability. Descriptive statistics and one-way ANOVA were used to compare production parameters among regions ($p < 0.05$). Results showed significant regional differences in colony performance. Average honey production was highest in northern regions (13.4 ± 3.2 kg/colony/year), compared with steppe (8.7 ± 2.8 kg) and Saharan regions (6.3 ± 2.1 kg) ($p < 0.05$). Winter colony losses reached 28% in steppe areas, compared with 12% in northern regions. Reduced floral availability during prolonged drought periods was associated with lower colony strength and increased susceptibility to *Varroa destructor* infestation, observed in 41% of weakened colonies. Strong annual fluctuations in productivity were linked to irregular rainfall patterns and shortened flowering periods. Environmental degradation significantly affects honeybee health and productivity in Algeria, particularly in semi-arid and arid ecosystems. Adaptation measures such as transhumant beekeeping, introduction of drought-tolerant melliferous plants, and reduced pesticide use are essential to improve colony resilience and support agricultural sustainability.

Key words: *Apis mellifera*, environmental change, honey production, nutritional stress, Algeria.

The utilisation of agricultural by-products as a driver of sustainable agriculture: an integrated management approach in sub-humid areas

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Abstract

Every season, farms in Algeria's sub-humid regions generate considerable quantities of crop residues — straw, pomace, manure and harvest waste — which are usually burned or left to rot. Yet these same residues could play a central role in regenerating depleted soils and in building a truly sustainable agricultural system (Ferreira et al., 2022). It is this paradox that forms the basis of our reflection: why do we continue to treat as waste what nature recognises as resources?. To answer this question, we conducted a structured literature review of a selection of scientific studies published between 2020 and 2026, sourced from Scopus, Web of Science and Google Scholar. The selection was made using a combination of thematic keywords — valorisation, agricultural by-products, composting, biochar, biomethanisation, soil fertility, sub-humid zones. The literature review reveals consistent and quantifiable results. Optimised composting improves above-ground biomass and plant height by 19–43% (Han et al., 2026). Biochar, applied in combination with organic amendments, increases rice yield by 10–17% and rapeseed yield by 20–25%, whilst raising soil organic carbon by 57–90% (Zhang et al., 2024); its application also improves soil pH, total nitrogen and nitrogen use efficiency by 6–43% respectively (Abrha et al., 2025). As for biomethanisation, its digestate acts as an effective biofertilizer that stimulates microbial biomass and nitrogen mineralisation, thereby reducing dependence on synthetic chemical fertilisers (Zapata-Morales & Moreno-Andrade, 2025). These results also confirm that the partial replacement of chemical fertilisers with organic amendments maintains yields whilst sustainably improving soil quality (Chen et al., 2025; Wang et al., 2025; Pandey et al., 2024).

Ultimately, the question is no longer whether these approaches work — the data confirms they do. The question is why their adoption is taking so long, and how to support Algerian farmers in moving towards local value chains that are suited to their soil and climate conditions.

Key words: sustainable agriculture, by-product utilization, sub-humid zones, circular economy, soil fertility, agricultural resilience.

Potential of yeast as a feed for *Artemia*

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Abstract

Brine shrimp *Artemia* is an essential live feed for the successful larval rearing of many crustacean and fish species, owing to its adaptability and ability to utilize a wide range of food sources. The present study was carried out at the CNRDPA laboratory. The cysts strain collected from El Bahira Lake (Setif Province). They were purified using separation based on density and size. The cysts were then incubated for hatching in 1 L bottles at a temperature of 28 °C, with continuous aeration and constant illumination. After hatching, the nauplii were collected by siphoning and light attraction, then transferred into 10 L aquarium for culture under standard stocking density and physicochemical conditions to conduct the experiment where *Artemia* were fed with yeast. The nauplii developed into adults within 15 days of culture, reaching an average total length of 7.2 mm. The growth performance of *Artemia* was notably high, particularly during the juvenile and adult stages, with growth rates of 1.9 mm/day and 0.3 mm/day, respectively. The final survival rate of individuals fed with yeast was recorded at 45%. This study is necessary because yeast represents a cost-effective, readily available, and nutritionally valuable feed source, rich in proteins, vitamins, and bioactive compounds. Understanding how *Artemia* utilizes yeast at the laboratory scale helps optimize enrichment protocols, improve the nutritional quality of *Artemia* for larval feeding, and support more sustainable and efficient aquaculture practice.

Key words: Crustacean, fish, cysts, hatching.

Poster Session

Removal of the synthetic dye E110 by in situ chemical oxidation (ISCO) via thermal activation of persulfate

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Abstract

Persulfate-based decontamination is a key component of in situ chemical oxidation (ISCO) technology, which relies on oxidizing agents such as permanganate, hydrogen peroxide, and ozone to promote the degradation of organic and inorganic contaminants. The persulfate ion, activated through radical mechanisms or direct electron transfer, is recognized as a highly effective oxidant capable of targeting a wide range of pollutants. These pollutants include halogenated organic compounds, BTEX (benzene, toluene, ethylbenzene, and xylenes), perfluorinated substances, phenols, pharmaceuticals, inorganic compounds, and various pesticides. In this context, the food industry is identified as a major source of environmental pollution associated with synthetic dyes. Moreover, several studies have demonstrated that certain food colorants may exhibit toxicity and cause long-term health effects. In this study, the degradation of the synthetic dye E110 by thermally activated persulfate was investigated. Batch experiments were conducted under controlled conditions. The effects of operational parameters, including initial persulfate concentration (0.184–7.4 mM), dye concentration (150–900 mg/L), temperature (40–70 °C), and pH (2–9), were systematically evaluated. The presence of heavy metals (Ag^+ , Fe^{2+} , Cu^{2+}) and metal oxides (ZnO, NiO, TiO) was also examined. Dye degradation was monitored using UV–Vis spectrophotometry. The results showed that adopting optimal conditions significantly enhanced the degradation efficiency. At a persulfate concentration of 3.7 mM, a temperature of 60 °C, and an acidic medium of pH = 3, a degradation efficiency of approximately 99.09% was achieved within 360 minutes. Moreover, the presence of certain metal ions, such as silver ions, increased the degradation rate, reflecting their catalytic role. These findings highlight the effectiveness of thermally activated persulfate as a promising method for the removal of synthetic dyes from contaminated water.

Key words: decontamination, ISCO, persulfate, synthetic dye, degradation.

Study of the impact of soil degradation on agriculture in the province of Bordj bou Arreridj

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Abstract

Soil degradation is a major environmental challenge that directly threatens agricultural productivity and food security, particularly in semi-arid regions such as Bordj BouArréridj (Algeria). This study aims to assess the impact of soil degradation on agricultural performance and to highlight the main degradation processes affecting the region. The study is based on a combination of field observations, analysis of existing soil data, and interpretation of previous research conducted in the region. Key indicators such as soil erosion, organic matter content, and salinity levels were considered to evaluate soil quality. A qualitative and semi-quantitative approach was used to estimate the extent of degradation and its effects on crop yields. The results indicate that soil degradation in the study area is mainly driven by water erosion, loss of organic matter, and unsustainable agricultural practices. These factors contribute to a decline in soil fertility and structure, leading to reduced agricultural productivity. Estimated trends suggest a significant decrease in crop yields in degraded areas, along with increased vulnerability of soils to further degradation processes. Soil degradation poses a serious threat to sustainable agriculture in Bordj Bou Arréridj. Effective soil management strategies, including conservation practices, organic amendments, and better land-use planning, are essential to mitigate degradation and restore soil productivity. This study highlights the urgent need for integrated approaches to ensure long-term agricultural sustainability in the region.

Key words: soil degradation, agriculture, erosion, soil fertility, sustainable management, Bordj Bou Arréridj.

Governance of natural resources and ecological transition in selected municipalities of M'sila province (Msif, El Khebbana and El Houamed)

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Abstract

The municipalities of Msif, El Khebbana, and El Houamed, located in M'sila Province and characterized by an arid to semi-arid climate, are highly vulnerable to the impacts of climate change, particularly declining rainfall, rising temperatures, and progressive soil degradation. These environmental pressures directly affect local agricultural systems and the living conditions of rural populations, thereby threatening food security and socio-economic stability. In this context, the sustainable management of natural resources represents a major challenge at the local level, requiring effective governance mechanisms adapted to field realities. This study aims to analyze environmental impacts in these three municipalities while highlighting natural resource management practices and the role of farmers in the ecological transition. The methodology is based on a mixed approach combining quantitative and qualitative data. Field surveys were conducted with a sample of 46 farmers across the three municipalities using structured questionnaires and semi-structured interviews. The study was carried out during the period 2024–2025. In addition, climatic data (rainfall and temperature) were collected from local meteorological services and analyzed to identify recent trends. Direct observations of agricultural practices were also undertaken. The results indicate that the active involvement of farmers, combined with participatory approaches, promotes the adoption of agroecological practices such as water-saving techniques, crop diversification, and soil conservation. Furthermore, the integration of local knowledge with public policies appears to be a key lever for enhancing the resilience of agroecosystems in these municipalities. This study emphasizes the importance of strengthening inclusive territorial governance and promoting context-specific strategies to ensure a sustainable ecological transition in M'sila Province.

Key words: sustainable management, local governance, ecological transition, M'sila, agroecology.

Assessment of irrigation water quality for tomato (*Solanum lycopersicum*) in the Biskra region (Algeria)

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Abstract

Faced with the increasing scarcity of freshwater resources, particularly in arid and semi-arid regions, this study aims to assess the quality and comparative impact of irrigation using treated wastewater (TWW) and groundwater on tomato (*Solanum lycopersicum*) cultivation, in terms of agronomic performance, fruit nutritional quality, sanitary safety, and environmental sustainability. The experiment was conducted under natural conditions in an arid environment. Two irrigation treatments were compared: groundwater (control) and treated wastewater. The studied parameters were grouped into three categories: (1) agronomic (vegetative growth and yield), (2) nutritional (vitamin content, sugars, and acidity), and (3) sanitary and environmental (presence of contaminants and impact on soil properties). The results showed that irrigation with TWW makes it possible to obtain yields comparable to, or even higher than, those obtained with groundwater, without altering the nutritional quality of the fruits. No significant sanitary contamination was detected in the fruits or in the soils irrigated with properly treated TWW. Furthermore, this practice helps reduce pressure on groundwater resources, while maintaining soil fertility through the nutrient input from wastewater. Thus, the use of treated wastewater for tomato irrigation in arid environments appears to be a viable, sustainable, and safe alternative. It makes it possible to reconcile agricultural productivity, preservation of water resources, and adaptation to climate change, provided that treatment and usage standards are strictly respected.

Key words: irrigation, water quality, tomato, arid environment, sustainability.

Physicochemical and bacteriological analyses of well water in Bordj Bou Arreridj

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Abstract

Wells and boreholes are very important sources of water supply for populations, however the quality of well water can be affected by various physicochemical and bacteriological factors. This study aims to evaluate the physicochemical and bacteriological quality of ten samples collected from different localities in Bordj Bou Arreridj region in order to link the relationship between the quality of the water analyzed, its location and its relationship with water-borne diseases. According to the results obtained, most of the wells and boreholes are of acceptable physical and chemical quality for human consumption and comply with Algerian and World Health Organization standards, while we have recorded that the microbiological quality was not good for human consumption (except for some samples) because they contain undesirable germs: FTAM, total coliforms and fecal coliforms. This poses a health risk to the water consumers of these wells studied.

Key words: water, wells, boreholes, physicochemical quality of water, bacteriological quality, water-borne diseases, water of Bordj Bou Arreridj.

A study of the diversity and dynamics of *Oedipoda caerulescens sulfurescens* at the Sidi Abdoun station (Theniet El Had National Park)

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Abstract

As part of this study, we conducted a survey of Orthoptera communities over three consecutive months (June, July and August) in the Theniet El Had National Park region, specifically at the Sidi Abdoun station, located on the southern slope of the park. The survey was carried out using the quadrat counting method. The sampled species were identified in the laboratory using dichotomous keys, notably those by Chopard. A total of 180 orthopteran individuals were recorded during the study period, including 31 individuals belonging to the species *Oedipoda caerulescens sulfurescens*. The relative abundance of this species varies considerably over the summer, with a very low value in June (1.72%), followed by a significant increase in July (24.67%), then a slight decrease in August (24.44%). This variation reflects the influence of climatic factors and vegetation structure on the species' dynamics. This study highlights the ecological importance of *Oedipoda caerulescens sulfurescens* as a biological indicator and contributes to a better understanding of entomological biodiversity in Theniet El Had National Park.

Key words: Orthoptera, *Oedipoda caerulescens sulfurescens*, species, Theniet El Had, Sidi Abdoun.

Application de la technique d’ozonation au traitement des eaux de surface : cas de l’unité de production d’Ain Zada–El Maouane

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Résumé

La technique d’ozonation, correspondant à une désinfection chimique par l’ozone, mise en place en 2024 au niveau de l’unité de production d’Ain Zada–El Maouane, est destinée au traitement de l’eau brute provenant des barrages d’Ain Zada et d’El Maouane. Malgré la dégradation de la qualité de cette eau brute durant cette période, caractérisée par une forte teneur en matières organiques, ce procédé s’est révélé efficace pour améliorer la qualité de l’eau traitée. Toutefois, bien que l’ozonation constitue un prétraitement performant, l’adoption d’un traitement complémentaire demeure nécessaire afin de garantir des niveaux optimaux de potabilité. En effet, la réduction de la charge organique reste un défi majeur pour les eaux brutes issues du barrage d’Ain Zada.

Mots-clés : ozonation, ozone, unité de production de Ain Zada–El Maouane, potabilité, traitement de l’eau.

Sand flies and biodiversity: challenges for the conservation and restoration of natural habitats in Algeria

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Abstract

Within the framework of integrated ecosystem management in Algeria, biodiversity is a key indicator of the functioning and resilience of these ecosystems. Among the taxa of interest, sandflies (Diptera: Psychodidae) has a special place due to their ecological and epidemiological importance, both as bioindicators and vectors of leishmaniasis. This study aims to investigate the diversity, spatial distribution, and seasonal population dynamics of sandflies in different habitats of northeastern Algeria. Specimens were collected using light and sticky traps in rural, peri-urban, and natural environments. Morphological identification was then carried out using Algerian taxonomic. Preliminary observations revealed variations in species composition and abundance according to habitat type and environmental conditions, suggesting a strong influence of ecological factors and anthropogenic disturbances on sandfly communities. Integrating entomological and ecological data into ecosystem management strategies can contribute to biodiversity conservation, habitat restoration assessment, and vector monitoring, thus supporting a comprehensive approach that integrates environmental sustainability with public health considerations.

Key words: Sand flies, biodiversity, sustainable management, natural resources, Algeria, leishmaniasis.

Effects of biostimulants on spike length in *Durum wheat* in a semi-arid region

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Abstract

In semi-arid regions, durum wheat (*Triticum durum* Desf.) productivity is severely limited by abiotic stress, necessitating the exploration of innovative solutions. This study evaluates the effect of "ProtaminalCéréales" and "Phos'Strat" biostimulants on spike length in two durum wheat varieties at the booting stage. The trial was conducted under natural conditions in a semi-arid climate to measure the morphological response of spikes to treatments compared to a control. Results demonstrate a significant improvement in the growth of reproductive structures under the influence of the biostimulants. "Protaminal Céréales" promoted increased spike elongation, while "Phos'Strat" optimized associated leaf architecture. This growth dynamic, observed at the booting stage, suggests better preparation of yield components in the face of environmental constraints. These biostimulants act as promising ecological levers to strengthen the resilience of cereal crops by reducing dependence on mineral fertilizers and promoting sustainable resource management. In conclusion, applying these biotechnological products constitutes an effective adaptation strategy to maximize the productive potential of durum wheat in semi-arid zones, while aligning with integrated agrosystem management.

Key words: durum wheat; biostimulants, booting stage, semi-arid zone, growth.

Study of the trophic behavior of the algerian hedgehog (*Atelerix algirus* Lereboullet, 1842) (Mammalia: Erinaceidae) in the Sidi Bel Abbès region

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Abstract

The Algerian hedgehog (*Atelerix algirus*) was investigated in terms of its trophic behavior based on the analysis of 20 fecal samples collected between August 2022 and December 2023 at the Amtar station (Sidi Bel-Abbès, Algeria). Insects represented the dominant component of the diet, accounting for 97.50% of the total prey items. Within this group, Hymenoptera was the most abundant order (545 individuals; RA = 73.55%), followed by Coleoptera (137 individuals; RA = 18.49%) and Dermaptera (37 individuals; RA = 4.99%). At the family level, Formicidae dominated the diet, with *Messor* sp. being the most frequently consumed taxon (74.22%), followed by *Pheidole pallidula* (8.84%) and *Messor* sp. 1 (3.87%). Overall, *Atelerix algirus* exhibited a generalist insectivorous feeding strategy in the Sidi Bel-Abbès region.

Key words: *Atelerix algirus*, trophic behavior, Algerian hedgehog, droppings, Sidi Bel-Abbès.

Eco-valorization of organic waste: extraction, characterization, and evaluation of the antioxidant potential of phenolic compounds within a sustainable natural resource management perspective

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Abstract

The valorization of organic waste represents a major environmental and scientific challenge. These effluents, often neglected, contain a significant richness of bioactive compounds of pharmaceutical, cosmetic, agrifood and environment interest. This work proposes an ecological valorization through aqueous and ethanolic extraction to recover high value-added bioactive compounds. The extracts were characterized by UV-Visible and FTIR spectroscopy. This approach transforms waste into valuable natural resources, contributing to green chemistry and the sustainable bioeconomy. Results have shown that total polyphenol content was 17.91 mg GAE/mg DE for the ethanolic extract and 14.65 mg GAE/mg DE for the aqueous extract. Flavonoid quantification showed concentrations of 10.52 and 9.45 mg QE/g DE for the ethanolic and aqueous extracts, respectively. However, Tannin content, determined by the vanillin method, was 38.58 µg CE/g DE for the ethanolic extract and 26.92 µg CE/g DE for the aqueous extract. Evaluation of antioxidant activity by the DPPH method showed IC₅₀ values of 0.473 mg/mL for the ethanolic extract and 0.554 mg/mL for the aqueous extract. The FRAP method gave EC₅₀ values of 1.07 mg/mL for the ethanolic extract and 1.09 mg/mL for the aqueous extract. These values were compared with IC₅₀ values of about 3.855 µg/mL for BHA and 17.766 µg/mL for BHT used as standards. UV-Vis and FTIR spectra confirmed the presence of polyphenols, flavonoids, and tannins, highlighting the interest of these organic wastes as a natural source of antioxidants. These results open promising perspectives for their valorization in various industrial fields.

Key words: extraction, total polyphenols, flavonoids, tannins, antioxidant activity, characterization.

Assessment of the impact of environmental pollution on a phytoremediating plant: *Typha latifolia*

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Abstract

Water resources are exposed to various forms of pollution from multiple sources. This issue has raised global awareness and prompted researchers to assess the toxicity of discharges and the quality of aquatic environments. Consequently, several monitoring methods have been developed and are now widely used. Among these, biomonitoring is a relevant, simple, and cost-effective approach that allows the detection of environmental pollutants through their effects on living organisms. In this context, the present study aims to evaluate the water quality of wadis in the Bordj BouArreridj region and to assess the impact of water pollution on the macrophyte *Typha latifolia*. Plant samples were collected from three sites with different levels and sources of pollution: “Maali Forest” in El Hammadia (control site), and the wadis “El K’sob” and “Bousselam,” which are heavily polluted due to various human activities, including domestic, agricultural, and industrial discharges. The results revealed significant alterations at the biometric, physiological, biochemical, and enzymatic levels in plants from polluted sites compared to those from the control site. Notably, enhanced root development, reduced photosynthetic activity, increased protein content, and elevated catalase activity were observed, reflecting a response to environmental stress.

Key words: *Typha latifolia*, macrophyte, biomonitoring, pollution, wastewater.

Waste valorization in alkali-treated alfa fiber–recycled rubber composites

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Abstract

Researchers are increasingly interested in plant fiber–reinforced composites due to their eco-friendly nature, low density, low cost, and good mechanical properties. However, their application is limited by weak interfacial adhesion between the polymer matrix and plant fibers, which reduces their mechanical performance. In this study, Alfa fibers were chemically treated using a 3 wt% NaOH solution for different durations (1, 3, 5, and 24 h) in order to improve fiber–matrix adhesion. After treatment, the fibers were washed, dried, and incorporated into the polymer matrix. Recycled rubber from end-of-life tires was also added as a sustainable filler to enhance environmental performance and promote waste valorization. The composite materials were then prepared using a conventional mixing and molding process. The prepared composites were characterized by Fourier Transform Infrared Spectroscopy (FTIR), Thermogravimetric Analysis (TGA), and tensile testing to evaluate their structural, thermal, and mechanical properties. The results showed that alkali treatment significantly improved the properties of Alfa fibers, with a crystallinity index increase of 36.26% for fibers treated for 5 h compared to untreated ones. Moreover, composites reinforced with treated fibers and modified with recycled rubber exhibited better mechanical performance. These findings demonstrate that the combination of chemically treated Alfa fibers and recycled rubber is an effective strategy for developing sustainable composite materials with enhanced properties, offering an eco-friendly and cost-effective alternative to synthetic fiber–reinforced composites.

Key words: composite, luffa fiber, adhesion, tensile strength, alkaline treatment.

Valorization of olive mill wastewater from traditional oil mills in El Milia region

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Abstract

Behind olive oil production lies a secret: olive mill wastewater. This liquid residue, generated at a rate of 8.4 million cubic meters per year worldwide, poses a major environmental challenge. In Algeria, annual production reaches approximately 200,000 tons. The direct discharge of olive mill wastewater into the environment by oil mills poses significant risks to ecosystems. In this study, a physicochemical, phytochemical, and biological characterization of olive mill wastewater was carried out with the aim of transforming this effluent into high-value-added natural products. To this end, the antioxidant, anti-inflammatory, cytotoxic, and antifungal effects of extracts obtained using different solvents of varying polarities were evaluated. The results showed a high water content with moderate to low levels of proteins, lipids, and minerals. A high sulfate content necessitates a pretreatment phase of the olive mill wastewater before its use. A high content of total phenols and flavonoids was found in the organic extracts, particularly ethyl acetate with a value of 373.2 µg GAE/gm. Ethyl acetate is clearly the most suitable solvent for extracting polyphenols from olive mill wastewater. It is essential to continue this research and explore the various possibilities for transforming these by-products into valuable resources for agriculture and society.

Key words: olive mill wastewater, organic waste, physicochemical parameters, polyphenols.

Physiological response of pepper (*Capsicum annuum* L.) to irrigation water salinity in a semi-arid agroecosystem

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Abstract

Irrigation water salinity is one of the major constraints affecting crop productivity in semi-arid agroecosystems. Pepper (*Capsicum annuum* L.) is considered sensitive to salt stress, but it can develop physiological responses to reduce osmotic and ionic damage. Among these responses, proline accumulation is widely recognized as an important indicator of plant adaptation to salinity stress. This study aimed to evaluate the physiological response of pepper to irrigation water salinity using the Sodium Adsorption Ratio (SAR) and proline accumulation. The study was conducted in agricultural lands located in the Yabous region, Khenchela, northeastern Algeria. Irrigation water samples were collected to determine the ionic parameters required for SAR calculation. Pepper leaf samples were also collected from the same agricultural lands to quantify proline content using a colorimetric method based on the ninhydrin reaction and spectrophotometric reading at 520 nm. The proline/SAR ratio was calculated to assess the efficiency of proline accumulation under salinity stress. SAR values ranged from 2.93 to 4.14, indicating variability in irrigation water salinity among the studied lands. Proline concentrations showed a wide variation, ranging from 4.87 to 233.37 µg/mL. The highest proline/SAR ratios were observed in some agricultural lands, particularly lands 12, 13, 14, and 15, suggesting a stronger physiological adaptation to salt stress. In contrast, low ratios indicated a weaker proline response. The results show that irrigation water salinity influences proline accumulation in pepper plants. The proline/SAR ratio may be considered a useful physiological indicator for assessing pepper response to salt stress and improving irrigation management in semi-arid agricultural areas.

Key words: pepper, proline, sar, salinity stress, irrigation water, semi-arid agroecosystem.

Spatial assessment of soil organic carbon stocks in surface horizons (0–5 and 5–15 cm) in the semi-arid region of eastern Algeria: the case of Bordj Bou Arreridj

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Abstract

Soil organic carbon (SOC) is a key indicator of soil quality, ecosystem functioning, and terrestrial carbon storage capacity. In semi-arid region such as the Algerian High Plains, accurate spatial quantification of SOC stocks in surface horizons is critical for evaluating land degradation risks and supporting sustainable soil management strategies. This study assessed the spatial distribution of SOC stocks in the surface horizons (0–5 cm and 5–15 cm) of the Bordj Bou Arreridj region in the Algerian High Plains using a georeference dataset of 2,498 grid points. Descriptive statistics and correlation analysis were applied to evaluate variability and vertical coherence between layers. Mean SOC stock was 17.7 ± 8.4 tC/ha for the 0–5 cm layer (CV = 48%) and 20.0 ± 7.6 tC/ha for the 5–15 cm layer (CV = 38%). Combined, these two horizons account for approximately 22% of the total 0–200 cm SOC stock (37.6 tC/ha on average). A pronounced north-south gradient was identified in the 0–5 cm layer, with values ranging from 8.3 tC/ha in the southernmost zone (35.5°–35.7°N) to 28.1 tC/ha in the northernmost zone (36.3°–36.5°N), representing a 3.4-fold difference. Both layers exhibited a strong spatial correlation ($r = 0.969$; $p < 0.0001$), reflecting a coherent vertical distribution pattern across the study area. This study reveals marked spatial heterogeneity in surface SOC stocks across Bordj Bou Arreridj wilaya, with a significant depletion in the semi-arid southern fringe. These findings provide a spatial reference baseline for designing targeted organic amendment strategies, carbon sequestration programs, and land restoration policies in the cereal-dominated High Plains of eastern Algeria.

Key words: soil organic carbon, Bordj Bou Arreridj, spatial variability, north-south gradient, sustainable soil management, semi-arid zones.

Multiscale investigation of seasonal effects on alfa fibers: linking structural properties to environmental sustainability and food security

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Abstract

Alfa (*Stipa tenacissima* L.) is a strategic lignocellulosic resource in semi-arid ecosystems, whose structural and functional properties are strongly influenced by seasonal variations, with direct implications for plant health and its valorization potential in sustainability and food-related applications. This study aims to investigate the effect of seasonal variability (spring, autumn, winter, and summer) on the physicochemical, structural, thermal, and mechanical properties of Alfa fibers through a multiscale approach. The methodology combined chemical composition analysis (cellulose, hemicellulose, and lignin) with FTIR, XRD, and TGA techniques, as well as tensile testing and scanning electron microscopy (SEM). The results revealed marked seasonal variability, with fibers harvested during, (spring and autumn) exhibiting higher cellulose content and crystallinity, leading to significant improvements in tensile strength and stiffness. In contrast, fibres collected during dormancy periods (winter and summer) showed increased lignin content, lower crystallinity, and reduced mechanical performance, but enhanced thermal stability. Morphological analysis further confirmed seasonal differences in surface structure and fiber integrity. These findings highlight the critical role of seasonal factors in governing the multiscale behavior of Alfa fibers, emphasizing the importance of optimizing harvesting periods to maximize their valorization efficiency. This work supports sustainable management strategies for Alfa resources and underscores their potential in eco-friendly materials and food-related applications, contributing to environmental sustainability and food security.

Key words: *Stipa tenacissima* L., seasonal variations, alfa fibers, growth periods, sustainability and food.

Characterization and valorization of carbide lime waste from acetylene manufacture for heavy metal removal from waste water

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Abstract

Every year increasing amounts of industrial waste are generated worldwide. Depending on their characteristics, wastes can represent an important source of secondary raw materials in order to replace natural resources. The growing amount of carbide lime waste (CLW), a by-product of acetylene production, has resulted in environmental problems. In the present study, the potential use of CLW for waste water treatment was investigated. The main characteristics of the CLW were determined. Chemical and X-ray diffraction analyses indicated that CLW was similar in chemical and mineralogical compositions to industrial lime, except for the presence of carbon in the waste. Morphological and elemental chemical analyses by scanning electron microscopy and energy dispersive X-ray spectrometry revealed that CLW particles differ from industrial lime by the presence of carbon formations. The precipitation of heavy metals with CLW has been shown to be successful in reducing the level of soluble heavy metals in aqueous solution. The removal of heavy metals was enhanced at pH ranges 10-11 for zinc, 9.2-11.6 for lead, 4-11.8 for iron and 7-11.8 for copper. The results revealed that CLW can be effectively used in waste water treatment.

Key words: valorization, carbide lime waste, acetylene production, waste water treatment, heavy metal precipitation.

Lithological, sedimentological study and paleoclimatic evolution of Oued El Hai, Batna region (Northeastern Algeria)

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Abstract

Lithological, sedimentological, and geochemical analyses of the Quaternary alluvium of Oued El Hai, located in the Batna region, aim to identify and characterize the sedimentary body. They also seek to reconstruct the transport paleo environment, the different depositional phases, and the paleoclimatic conditions that prevailed in the study area. From a lithostratigraphic perspective, the region is characterized by a complete sedimentary sequence ranging from the Triassic to the Quaternary, with significant variations. The main tectogenetic phase is attributed to the Middle Eocene, corresponding to the Atlasic phase. Geological maps reveal the presence of recent Quaternary alluvial accumulations. Lithological analysis highlights two repetitive depositional sequences, characterized by alternating clayey-gravelly facies showing textural variations. The hydrographic network of the region is dominated by the Oued El Hai, Oued El Gourzi, Oued Abdi, and Oued Labiod. The Quaternary alluvial formations, developed along both banks of Oued El Hai, occur as nested alluvial terraces. These formations are characterized by various sedimentary structures, including anastomosing channels, bedded stratifications, as well as erosion and collapse features. Morphoscopic analysis shows that quartz grains display a wide range of shapes. Unworn and shiny subrounded grains alternate with a notable presence of well-rounded matrix grains within the sediments of Oued El Hai. The reconstruction of the paleoenvironment and paleoclimate, based on lithostratigraphic, sedimentological, micromorphological, and geochemical analyses, indicates predominantly fluvial transport and depositional dynamics. It also reveals an arid to semi-arid paleoclimate, marked by episodes of flooding and high discharge.

Key words: Batna, quaternary, Oued El Hai, alluvium, geochemistry, paleoclimate.

Assessment of physicochemical and bacteriological quality of well and borehole water in Bordj Bou Arréridj, Algeria: Implications for public health

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Abstract

Well water is an essential resource for many communities, particularly in rural areas. However, it is particularly vulnerable to contamination from both natural and human sources, which can pose a risk to public health. This study aims to assess the physico-chemical and bacteriological quality of water from wells and boreholes in the BBA province, which is used as drinking water or for domestic purposes by the local population. Samples were collected in accordance with a standard protocol and then analysed in the laboratory. The physico-chemical parameters measured included temperature, pH, electrical conductivity (EC), turbidity, total hardness, calcium (Ca^{2+}), magnesium (Mg^{2+}), chlorides (Cl^-), nitrites (NO_2^-), nitrates (NO_3^-), suspended solids (SS), . The bacteriological analysis focused primarily on the detection of total coliforms, faecal coliforms, faecal streptococci, sulphite-reducing Clostridium and Salmonella. The results obtained highlight significant physicochemical and bacteriological contamination at the majority of the monitoring points studied. The concentrations measured for several parameters exceed the thresholds set by current national and international standards. Furthermore, high levels of indicator bacteria of faecal contamination, combined with significant nitrite levels in the water, pose a significant health risk to exposed populations. In conclusion, this study highlights the need for regular and rigorous monitoring of the quality of water from wells and boreholes. It also emphasises the importance of implementing preventive measures, including protecting water infrastructure from sources of contamination and stepping up public awareness campaigns. These measures are essential to reducing the health risks associated with the consumption of these water resources.

Key words: Bacteriological quality, BBA, boreholes, health risk, physico-chemical quality, wells.

A data-driven framework for assessing agri-food reverse logistics and waste valorization performance in Algeria

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Abstract

Agri-food losses exert increasing pressure on Algerian water, soil and energy resources, while expired, deteriorated or damaged products generate avoidable greenhouse-gas emissions when land filled. Reverse logistics, redirecting returned flows toward reuse, composting, biogas production or recycling, is a key lever for natural resource conservation and climate mitigation. However, system level quantitative tools to evaluate agri-food reverse logistics performance remain scarce in Algeria, limiting evidence-based decisions on valorisation strategies. A reproducible Python framework generates a synthetic dataset of 500 agri-food return records covering six categories: fruits and vegetables, cereals and grains, medicinal plants, phytosanitary products, agricultural packaging and animal by-products. Domain rules link each category and product condition to feasible valorization options (reuse, composting, biogas production, recycling or disposal). Key performance indicators are computed, including overall valorization rate, recovered mass by route, net CO₂ balance by category, average processing cost and processing time, and monthly return volumes, and are synthesized into six analytical figures. The framework yields a high overall valorization rate of 87.8%, with composting as the dominant route (about 17.9 tonnes, nearly 60% of recovered mass). Five of the six categories exhibit a positive net CO₂ balance, led by fruits and vegetables (about 9.7 tonnes CO₂-equivalent avoided), while medicinal plants emerge as the only net-negative category. Reuse is the cheapest option (around 788 DZD on average), compared with more than 4000 DZD for disposal and recycling. Deteriorated, expired and damaged products are the main drivers of return flows by mass. This reproducible framework provides a transparent tool to assess agri-food reverse logistics performance in terms of resource conservation and climate benefits. Composting and reuse emerge as priority routes for Algerian agri-food systems, whereas medicinal-plant flows and upstream deterioration or expiry appears as critical intervention levers. Future work will integrate multi-criteria decision methods and spatial optimization to support sustainable management of natural resources.

Key words: reverse logistics, agri-food waste valorization, sustainable natural resource management.

The impact of invasive ants on urban biodiversity: the case of the Botanical Garden of Hamma (Algiers, Algeria)

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Abstract

Ants are highly social insects of the order Hymenoptera, belonging to the family Formicidae. They are characterized by high ecological plasticity, high reproductive capacity, and competitive behaviour, which significantly impacts terrestrial ecosystems. This study examines the presence and impact of invasive ants within the botanical garden of Hamma, a site of both historical and ecological significance located in Algiers, rich in tropical species and possessing a distinctive microclimate. Various sampling methods were employed, such as bait traps, pitfall traps, and hand sampling. Three invasive species were identified, representing three genera and three subfamilies: Dolichoderinae (*Linepithemahumile*), Myrmicinae (*Tetramoriumlanuginosum*), and Formicinae (*Nylanderiajaegerskioeldi*). With over 9,000 specimens collected, the ant communities were analyzed for abundance and spatial distribution. These species exhibit a highly competitive capacity, often leading to the decline or even exclusion of native species. Furthermore, the presence of exotic plants appears to favour the establishment and dispersal of these ants.

Key words: Formicidae, Hymenoptera, biodiversity, invasive species, native species, Hamma experimental garden, Algiers.

Agrometeorological assessment of the vulnerability of olive cultivation under current and future climatic conditions: case of the Wilaya of Bordj Bou Arreridj

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Abstract

Climate change is expected to intensify water scarcity in Mediterranean regions, posing a major challenge for the ecology, environment and sustainable management of natural resources. In semi-arid areas such as Bordj Bou Arreridj (Algeria), rain fed olive cultivation is highly dependent on the balance between precipitation and temperature, making it particularly vulnerable to increasing aridity. Understanding these dynamics is essential for preserving agro ecosystem stability and ensuring sustainable resource use. This study assesses the evolution of aridity and its implications for olive growing using the De Mar tonne index, based on climate projections from the MPI-ESM1-2-LR model (CMIP6). The analysis compares a historical period (1980–2014) with a future horizon (2070–2099) under the high-emission SSP8.5 scenario. Results indicate a marked increase in aridity, with a shift from semi-arid to arid conditions, as the annual index decreases from 14.8 to 9.7. Seasonal analysis shows that spring, a key period for olive development, is significantly affected, while summer becomes extremely dry, prolonging water stress. These findings highlight a growing vulnerability of rain fed olive systems and raise concerns about the sustainability of water and soil resources. They underline the need to adopt adaptive strategies—such as improved water management, soil conservation practices and drought-tolerant varieties—to support resilient agro ecosystems and promote the sustainable management of natural resources in the face of climate change.

Key words: De Mar tonne aridity index, olive growing, SSP8.5, climate projection, Bordj Bou Arreridj, vulnerability.

***Streptomyces coeruleorubidus* SALG1 derived seashore plastic bottle for plastic polymer degradation potential**

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Abstract

Plastic pollution has become a significant environmental concern due to the persistence and extensive use of polyethylene (PE). In this study, soil samples from a public landfill and plastic bottles collected along the Sidi Ali Lebher shoreline in Bejaia were investigated for the presence of PE-degrading microorganisms. Nine actinobacteria strains were isolated using PE as the sole carbon source. Among them, strain SALG1, obtained from plastic bottles, and exhibited the highest degradation potential. It was identified as *Streptomyces coeruleorubidus* with 98.28% similarity to *Streptomyces coeruleorubidus* type strain ISP 5145 T based on the 16S rRNA gene sequence analysis. Biodegradation assays conducted over periods of 2 and 6 months showed that SALG1 was capable of degrading both colourless and black PE, with weight loss rates of 9.18% and 4.54%, respectively. It also demonstrated limited degradation of polystyrene (0.25%) and polyethylene terephthalate (0.42%). The addition of Twenty 80 enhanced degradation efficiency, particularly in submerged cultures, suggesting its role as a bio stimulant. Furthermore, polymer surface characterization using X-ray diffraction (XRD) and attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FTIR) confirmed structural and chemical changes, supporting the occurrence of biodegradation.

Key words: biodegradation, bioremediation, polyethylene degradation, actinobacteria, *Streptomyces coeruleorubidus*.

Ethnobotanical knowledge and valorization of medicinal plants in Algeria

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Abstract

Algerian traditional medicine is a constitutive element of community identity, ancestral knowledge Whose underestimation and loss would constitute an irreparable loss of both cultural heritage and potential scientific discovery. This challenge has incited us to conduct an ethno botanical study in Algeria aiming to document the associated knowledge and identify priority species to valorise. To do this, an electronic questionnaire survey was distributed on social networks; the qualitative testimonies collected were then transformed into exploitable scientific data through the calculation of four ethnobotanical indices: Use Value (UV), Informant Consensus Factor (ICF), Fidelity Level (FL), and Relative Frequency of Citation (RFC). This approach, based on online data collection, paves the way for field investigations intended to confirm and deepen this knowledge. The first results reveal dominance of the Lamiaceae, Asteraceae, and Apiaceous families among 29 families cited in total, while digestive and respiratory ailments constitute the main therapeutic indications cited; furthermore, leaves are the most used parts and maceration is the most frequent preparation method. Traditional medicine practices are largely transmitted orally and intergeneration all within families, and their conservation and valorisation is a priority.

Key words: Ethno botany, medicinal plants, exploration, Algeria, valorization.

Dynamics of chromosomal evolution: a comparative analysis of two populations of *Lotus ornithopodioides* L in Algeria

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Abstract

In Algeria, the genus *Lotus* holds a significant place in the Constantine region, harbouring several Endemic or relict taxa. The morphological and genetic variability within this genus complicates its classification, making the use of integrated analytical methods essential to clarify taxonomic boundaries. Our study focuses on the cytogenetic analysis of intraspecific variability in two populations of *L. ornithopodioides* L. Three metaphase plates per population were stained with aceto-orcein. Chromosomes were observed using a Leica DM4000 B LED optical microscope (100x magnification), photographed, and then analyzed (karyotype establishment and index calculation) using Karyo Measure software, revealing a notable diversity in their chromosomal organization reflecting distinct evolutionary dynamics. A comparative study of the two *L. ornithopodioides* populations reveals marked similarities alongside subtle differences in their chromosomal organization. Both populations exhibit a generally symmetrical karyotypic architecture, as evidenced by their Stebbins indices (1A for both) and low intrachromosomal asymmetry values ($A_1=0.28$ for the first population and $A_1=0.35$ for the second). However, the total haploid length shows a slight variation, with $19.89\ \mu\text{m}$ for Population 1 versus $22.35\ \mu\text{m}$ for Population 2, suggesting minor differences in overall DNA content. The main distinction lies in the chromosomal composition: while Population 2 consists exclusively of met centric chromosomes, Population 1 includes two submetacentric chromosomes (1 and 3). This difference is reflected in the mean centromeric index values ($X_{ci}=0.39$ for Population 1 vs. 0.41 for Population 2) and in the arm ratios (maximum AR of 1.87 for Population 1 vs. 1.64 for Population 2). Global asymmetry indices ($AI=0.63$ for Population 1 vs. 0.88 for Population 2) indicate that Population 2 exhibits slightly more pronounced symmetry, though both values remain within the range of balanced karyotypes. Comparative analysis demonstrates that both *L. ornithopodioides* populations share a fundamentally stable and symmetrical karyotypic organization, characteristic of species with low evolutionary divergence. However, the observed variations in centromere position (presence of submetacentric chromosomes in Population 1) and asymmetry parameters suggest the existence of genomic micro differentiations between populations. Subtle chromosomal differences may reflect local adaptation and evolutionary divergence. Cytogenetic analysis is essential for understanding plant diversity and supporting conservation and breeding efforts.

Key words: *Lotus ornithopodioides* L., cytogenetic, intraspecific variability, chromosomal evolution, biodiversity conservation.

Phenotypic divergence and mitochondrial DNA introgression in hybridizing sparrow populations (*Passer domesticus* and *Passer hispaniolensis*) in the Saharan Atlas

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Abstract

Hybridization between the House Sparrow (*Passer domesticus*) and the Spanish Sparrow (*Passer hispaniolensis*) in North Africa represents a significant model for studying evolutionary dynamics and genomic introgression. This study investigates the phenotypic characterization and mitochondrial DNA (mtDNA) variation among these species and their hybrids in the Algerian regions of Djelfa and Hassi El-Euch. Morphometric and phenotypic analyses were conducted on 311 male individuals using Principal Component Analysis (PCA) across 15 morphological traits, while genetic diversity was assessed via PCR-based haplotype networking of a 707 bp fragment of the mitochondrial ND2 gene in 185 samples. Results indicate a complex mosaic of phenotypes: while 26.4% and 18.3% of individuals were identified as pure *P. domesticus* and *P. hispaniolensis* respectively, over 50% exhibited varying degrees of hybridization. Notably, genetic analysis revealed that all sampled males in the Djelfa urban population were hybrids, characterized by a high frequency of *P. domesticus* mitochondrial haplotypes, suggesting asymmetric introgression. This research contributes to the field by providing empirical evidence of ongoing, contemporary hybridization processes rather than purely historical events. The findings highlight the role of urban environments in facilitating mitochondrial introgression and underscore the importance of integrating morphological and molecular data to understand the stability of avian hybrid zones. These results are significant for future studies on the genomic architecture of speciation and the impact of anthropogenic landscapes on biodiversity.

Key words: *Passer domesticus*, *Passer hispaniolensis*, hybridization, mitochondrial DNA, phenotypic characterization, Saharan Atlas.

Quantification of water stress in durum wheat (*Triticum durum* Desf.) under semi-arid mediterranean conditions: phenological analysis, water balance and yield impact

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Abstract

Water stress is a primary constraint on cereal production in semi-arid Mediterranean regions, where erratic rainfall and high inter annual variability severely limit durum wheat yield. Accurate quantification of crop water deficit across phonological stages is essential to identify drought-tolerant ideotypes and guide breeding strategies. Four contrasting genotypes *Bousselem*, *Altar 84*, *Mexicali 75*, and the local landrace *Oued Zenati* were monitored over five rain fed growing seasons (2010–2016). Water stress was quantified at each of three phonological phases (sowing–till ring, till ring–heading, heading–maturity) using the stress coefficient $K_s = AET/PET$ derived from daily water balance simulations. Pearson correlations were computed between K_s values and yield components. Stress intensity increased progressively through the crop cycle: mean K_s was 0.45 at sowing–till ring, 0.20 at till ring–heading, and 0.66 at heading–maturity, with the latter reaching 0.97 during the 2015–2016 drought season. Over the full cycle, early-maturing genotypes *Altar 84* and *Bousselem* exhibited lower mean stress ($K_s = 0.43$) compared to the late-maturing *Oued Zenati* ($K_s = 0.47$). Water stress was significantly and negatively correlated with grain yield ($r = 0.95$), number of grains per m² ($r = 0.94$), and spike number per m² ($r = 0.78$). These results demonstrate that water balance simulation effectively discriminates genotypic drought responses in durum wheat. Earliness at heading emerges as a key drought-escape mechanism under semi-arid conditions, supporting the selection of short-cycle varieties for yield stability and guiding breeding programmes toward water-efficient, drought-resilient ideotypes.

Key words: water stress, durum wheat, evapo transpiration, water balance, grain yield, Mediterranean environment.

Effect of sowing date and seeding density on the performance of two durum wheat (*Triticum durum* Desf.) varieties under semi-arid conditions

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Abstract

Determining date and density of sowing is a very sensitive component in cultivation practices of durum wheat. This work was carried out in the Technical Institute of Field Cultures (ITGC) in the semi-arid area of Setif, during the agricultural season 2021/2022, whose objective is to evaluate the effect of the date and density of sowing on the performance of two cultivars of durum wheat (*Triticum Durum* Desf.) Namely: Oued Elbared and Boussellam. The results obtained indicate that early sowing improve various phenol morphological parameters such as the number of plants emerged / m², the height of the plants and the aerial biomass. As well as the components of the yield; the number of spike / m², the number of seeds/spike, however, the weight of a thousand seeds were negatively affected by early sowing. The final yield per hectare and the harvest index responded positively to the early sowing. The highest density (400 seed / m²) gave the highest agronomic performance. The cultivar Oued Elbared gave higher yields than the Boussellam variety, whatever the date and density of sowing, with a significant reduction when it is sown late, at the contrary the cultivar Boussellam which shows certain stability by delaying the date of sowing. Other earlier sowing dates, and other higher sowing densities must be tested to find out the productive potential of these two varieties.

Key words: durum wheat, sowing date, sowing density, yield, semi-arid.

The effect of different salinity levels on the early growth of common vetch (*Vicia sativa*) and Narbonne vetch (*Vicia narbonensis*) in the semi arid region of Setif

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Abstract

Soil salinization is common in Mediterranean environments due to naturally saline soils or irrigation with saline water. Plant growth in saline soils is mainly affected by reduced water availability due to high osmotic pressure. Salinity has numerous disruptive effects on seeds, including disruption of the plasma membrane, cellular organelles, respiration, photosynthesis, and protein synthesis. Salt-stressed plants are typically stunted, with dark green leaves that, in some cases, are thicker and more succulent than normal. Elevated salinity in agricultural soils or irrigation water adversely affects nearly all stages of plant development. From germination onward, high salt concentrations impair osmotic balance and ion homeostasis, thereby limiting water and essential nutrient uptake. This physiological stress inhibits vegetative growth, restricts root system development, and disrupts reproductive processes such as flowering and fruit set. Consequently, these effects lead to reduced crop yield and overall agricultural productivity. This study aimed to assess the effect of different salinity levels (0 g/l, 5 g/l, 10 g/l, 15g/l) on the early growth of common vetch (*Vicia sativa*) and Narbonne vetch (*Vicia narbonensis*) in the semi-arid region of Setif. The results indicated that increasing salinity significantly reduced growth parameters, including root and shoot length as well as fresh and dry biomass, with marked differences between the two species. Narbonne vetch showed greater salinity tolerance than common vetch. These findings highlight the importance of species selection for improving crop performance under saline conditions.

Key words: soil salinity, *Vicia sativa*, *Vicia narbonensis*, salt tolerance, early growth, semi-arid environment.

Regional climate analysis of rainfall in Northwestern Algeria (1950–2014): toward sustainable management of water resources

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Abstract

Precipitation is a key driver of ecosystem functioning, water availability, and agricultural productivity in Algeria. In the context of climate change, understanding its regional variability is essential for ecological sustainability and the sustainable management of natural resources. This study analyzes CNRM-simulated rainfall in Aïn Defla and Sidi Bel Abbès over 1950–2014. Monthly simulated precipitation was analyzed using basic statistics, seasonal characterization, and a simple trend assessment. Aïn Defla exhibits higher rainfall than Sidi Bel Abbès, confirming a west–east gradient. Both regions show Mediterranean regime with wet winters and dry summers. Inter annual variability is higher in Sidi Bel Abbès (CV = 20.1%) than in Aïn Defla (CV = 15.9%), and a slight, non-significant decreasing trend is observed. These findings highlight the relevance of climate-based analyses for understanding regional water dynamics and supporting ecosystem resilience. Although trends remain non-significant, the results provide useful insights for the sustainable management of water resources and for anticipating climate change impacts on ecological systems and agriculture in Algeria.

Key words: climate variability, precipitation, north western Algeria, water resources management, CNRM climate model.

Assessment of the quality indices of soils irrigated with wastewater and groundwater in a semi-arid environment under climate change conditions case study: Ziban region (Biskra)

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Abstract

In semi-arid regions such as the Ziban area of northeastern Algeria, increasing water scarcity has led to a growing dependence on both wastewater and groundwater for agricultural irrigation, each presenting distinct risks to soil integrity. Ongoing climate change—characterized by rising temperatures (+0.3 °C decade⁻¹), declining precipitation (−8 mm decade⁻¹), and increased evapo transpiration—further exacerbates soil degradation processes, including salinisation, sodification, and the accumulation of contaminants. This study aims to assess and spatially map soil quality under contrasting irrigation regimes using an integrated approach that combines physical, chemical, biological, and microbiological indicators. A composite Soil Quality Index (SQI) is developed through multivariate statistical analysis and evaluated using Geographic Information Systems (GIS) and remote sensing data derived from Sentinel-2, Land sat, and unmanned aerial vehicle (UAV) imagery. Environmental risks are assessed in accordance with USEPA and WHO guidelines. Preliminary results suggest that soils irrigated with untreated wastewater exhibit significantly lower SQI values (< 0.40), associated with high pathogen loads and increased contamination risks. In contrast, groundwater-irrigated soils show progressive secondary salinisation ($EC_e > 8 \text{ dS m}^{-1}$) and sodification ($ESP > 15\%$). Geo-accumulation indices for cadmium (Cd) and lead (Pb) indicate moderate to heavy contamination in peri-urban areas ($I_{geo} > 2$; $EF > 5$). Additionally, CROPWAT simulations under the RCP 8.5 scenario project a 20–30% increase in irrigation water demand by 2060, placing further pressure on groundwater resources and wastewater reuse systems. The findings provide a spatially explicit framework to support sustainable water management and soil conservation strategies tailored to Saharan agro ecosystems.

Key words: Ziban region, soil quality index, climate change, wastewater irrigation groundwater, GIS – remote sensing.

Climate warming and resource sustainability in a semi-arid region: a multi-model study under RCP 4.5

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Abstract

Climate change is a key driver of environmental transformations, particularly in semi-arid regions where rising temperatures strongly influence water resources, ecosystem balance, and agricultural productivity (IPCC, 2021). Understanding regional climate variability is therefore essential to support sustainable management strategies reduce future vulnerabilities. This study presents a comparative analysis of two climate models over Bordj Bou Arreridj, focusing on near-surface air temperature under the RCP 4.5 scenario. This scenario assumes intermediate stabilisation of greenhouse gas emissions and is widely used for regional climate assessments. The objective is to evaluate project temperature changes and assess inter-model consistency between present and future conditions. The results indicate a clear warming trend in both models. The first model projects an increase of approximately +2.74°C, while the second suggests a stronger warming of about +4.34. despite differences in magnitude, both models show consistent warming signals, in agreement with global climate projections (IPCC, 2021). Such temperature increases may significantly affect water availability, intensify thermal stress, and alter ecosystem dynamics in the study region. These findings highlight the importance of integrating climate projections into environmental planning and resource management strategies to enhance regional resilience (WMO, 2022).

Key words: temperature, water availability, regional assessment, Bordj Bou Arreridj, ecosystem dynamics.

Climate change and precipitation variability: implications for sustainable olive production in western Algeria

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Abstract

Climate change, marked by rising temperatures and variability in rainfall, is putting increasing pressure on ecosystems and the sustainable management of natural resources in North Africa. From this ecological perspective, this study analyses climate variability and its impacts on olive production in the arid region of Sidi Bel Abbes (western Algeria). Climate data (1980–2009) were processed using the Mann–Kendall and Sen Tests, as well as linear regression to assess the relationship between climate variables and olive oil yield. The results show that there is no significant trend in precipitation, but there is a marked warming, especially in spring and summer, as well as a decrease in relative humidity. Olive yield appears to be highly dependent on rainfall ($R^2 = 0.86$), underlining the central role of water in the stability of agro-ecological systems. These results highlight the vulnerability of agricultural systems to climate variability and the importance of sustainable water resources management to strengthen ecosystem resilience.

Key words: climate, ecology, rainfall variability, climate change, water management, olive yield, western Algeria.

Response of the genus *Pochonia* to tillage systems and interannual variability in the roots of *Triticum durum* and *Lens culinaris* under semi-arid conditions in Algeria

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Abstract

Conventional tillage, widely practiced in semi-arid regions, is a major driver of soil degradation, particularly affecting soil biological properties. In this context, the adoption of conservation agriculture practices, especially no-tillage systems, appears as a promising strategy for improving the sustainability of cereal-based agroecosystems. The present study aimed to analyze variations in the abundance of the fungal genus *Pochonia* in the roots of *Triticum durum* and *Lens culinaris* cultivated under crop rotation, by assessing the effects of tillage practices conventional tillage (CT) and no-tillage (NT) as well as interannual variability during the 2017–2018 and 2018–2019 cropping seasons. The study was conducted at the experimental station of the I.T.G.C. located in the Bordj Bou Arréridj region within the semi-arid bioclimatic zone of Algeria. The experiment was established using a split-plot design comparing CT and NT systems, with random root sampling carried out in March 2018 and March 2019. The results revealed significant variations in the abundance of *Pochonia* according to tillage system, crop type, and year, with a significant interaction among these factors ($p < 0.05$). In 2018, *Pochonia* was dominant in wheat roots under conventional tillage, reaching an abundance of 17.73%, compared with 5.67% under no-tillage. In lentil roots, lower abundances were recorded, with 0.75% under CT and 1.67% under NT. In 2019, *Pochonia* was completely absent from wheat roots under both tillage systems and from lentil roots under CT, whereas a low abundance (1.91%) persisted only in lentil roots under NT. These findings suggest a strong sensitivity of *Pochonia* to interannual variability, probably related to water availability, while also highlighting a greater persistence of this fungal genus in the no-tillage system associated with lentil cultivation.

Key words: endophytes, no-tillage, wheat, lentil, *Pochonia*, Algeria.

Metal–organic frameworks: A next-generation nanomaterial for water treatment

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Abstract

Water is one of the most important resources available on Earth; unfortunately, its quality is deteriorating because of increasing pollution, waste of water, and climate change. Thus, it is necessary to raise awareness among the population about the need to protect it, as well as increase the number of effective methods of cleaning water. One of them is the creation and development of new technologies based on metal–organic frameworks (MOFs) to purify water. The latter are considered promising materials to solve problems related to water contamination, scarcity, and water quality. They are formed from metal ions (clusters) and organic ligands molecules. These materials have high adsorption capacity and fast kinetic processes to capture various contaminants (such as heavy metal ions, organic micropollutants, drugs, dyes, nutrients, and pathogens). They allow us to create unique materials through specific functionalization (-NH₂, -SO₃H, -SH, -COOH) of organic linkers or metal ions for selective purification of particular pollutants while preserving material stability in certain conditions. Despite the positive results that have been achieved in laboratories regarding the effectiveness of MOFs in water purification, there are a number of technical issues related to scaling up the use of MOFs. One such problem is the issue of long-term stability of the material when exposed to different environments in the field, such as pH changes, ionic concentration, presence of organic materials, and biological contamination, among others. The economic feasibility of utilizing MOFs, especially when looking at their production, their possible reutilization and regenerability, and how they can fit into already existing infrastructures, is another important consideration. Finally, assessing the full life-cycle environmental impacts of MOFs is essential to avoid unintended trade-offs in the broader circular-water and circular-economy context.

Key words: MOFs, water purification, adsorption, contaminant removal, circular economy.

Sustainable valorization of olivepomace via natural co-composting

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Abstract

Olive pomace represents up to 35–40% of the total olive weight processed and poses significant environmental challenges due to its high organic load and phenolic content (2–5 g/kg). This study evaluates the efficiency of natural composting of olive pomace mixed with cow manure and green waste under aerobic conditions over 90 days. Three mixtures were tested: pomace alone (M1), pomace + manure (70:30, M2), and pomace + manure + green waste (50:30:20, M3). Results showed that M3 reached thermophilic temperatures of 55–60°C within the first 10 days, while M1 did not exceed 35°C. The C/N ratio decreased significantly from 32 to 14 in M3, indicating advanced compost maturity. Organic matter degradation reached 52% in M3 compared to only 25% in M1. Total phenolic content was reduced by 65–75%, confirming detoxification. The germination index increased from 38% (raw pomace) to 90% in the final compost, indicating the absence of phytotoxicity. Moisture content was maintained at 55%, and pH stabilized around 7.2. These findings demonstrate that co-composting significantly enhances biodegradation efficiency and produces a stable, nutrient-rich organic fertilizer suitable for agricultural applications

Key words: Olive, pomace, compost, organic, fertilizer.

Remote sensing and GIS-based monitoring of urban expansion and agricultural land consumption in semi-arid environments

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Abstract

Urban expansion represents one of the major forms of land transformation affecting agricultural areas in regions experiencing rapid demographic growth. In the wilaya of Aïn Defla, this process exerts increasing pressure on fertile agricultural lands and contributes to significant landscape and environmental changes. This study investigates the spatio-temporal dynamics of urban expansion and its impact on agricultural land in the municipalities of Ain Defla and Khemis Miliana over the 1985–2024 period. The methodological framework is based on the analysis of multi-temporal satellite imagery subjected to atmospheric correction and integrated within a GIS environment. Several remote sensing indices, including NDVI, SAVI, and NDBI, were employed to identify land use changes, assess vegetation cover dynamics, and detect urbanized areas. The findings reveal a continuous expansion of urban areas at the expense of agricultural land, with noticeable spatial differences between the two municipalities. Khemis Miliana exhibits a more pronounced urban growth pattern and a higher rate of agricultural land conversion compared with Aïn Defla. The study highlights the effectiveness of remote sensing and GIS techniques for monitoring territorial transformations and emphasizes their potential contribution to sustainable spatial planning and agricultural land conservation in regions subjected to increasing anthropogenic pressure.

Key words: spectral indices, sustainable planning, multitemporal analysis, Aïn Defla, Khemis Miliana.

Physicochemical assessment of Oued El Ksob water quality (Algeria)

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Abstract

This study focuses on the assessment of the physicochemical quality of the waters of Oued El Ksob, located in the Bordj Bou Arreridj region, an essential water resource for agricultural, domestic, and industrial uses. However, this watercourse has been experiencing significant degradation due to the uncontrolled discharge of waste along its banks. The methodological approach is based on water sampling carried out at four representative stations (wastewater treatment area, urban area, agricultural area, and industrial area). The analyses covered several physicochemical parameters, including pH, electrical conductivity, turbidity, suspended solids, alkalinity, hardness, as well as concentrations of chlorides, nitrates, nitrites, and phosphates. The results reveal significant pollution of the oued, characterized by high values of electrical conductivity, suspended solids, and phosphates, along with high water hardness. The urban and industrial areas show the highest levels of contamination, mainly due to wastewater discharges and solid waste dumping. In contrast, nitrate and nitrite concentrations remain relatively low. This deterioration in water quality makes its use problematic, particularly for irrigation, and poses risks to ecosystems and public health. The study highlights the need to strengthen management and protection measures for this resource, as well as to conduct further investigations, particularly on emerging pollutants such as heavy metals.

Key words: Oued El Ksob, water quality, physicochemical parameters, pollution, Bordj Bou Arreridj.

Aphid parasitoid communities associated with fruit trees in northeastern Algeria

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Abstract

Aphid parasitoids play a key ecological role in regulating aphid populations in agroecosystems. This study provides a descriptive assessment of parasitoid diversity and their associations with aphid hosts in fruit orchards of northeastern Algeria. Sampling was conducted weekly over a single growing season across multiple fruit tree species. A total of eight primary parasitoid species belonging to the subfamily Aphidiinae (Braconidae) were recorded across five genera (*Aphidius*, *Lysiphlebus*, *Binodoxys*, *Diaeretiella*, and *Ephedrus*), with *Lysiphlebus testaceipes* being the most frequently recorded species (45.55% of primary parasitoids), primarily associated with apple and pomegranate trees. *Binodoxys angelicae* was observed exclusively on pear trees. In addition, four hyperparasitoid taxa from four families (*Asaphes* sp., *Pachyneuron aphidis*, *Alloxysta victrix*, *Dendrocercus* sp., and *Syrphophagus aphidivorus*) were recorded, with *Pachyneuron aphidis* being the most abundant. Hyperparasitoids comprised 52.93% of parasitoids recovered from aphid mummies, highlighting the multitrophic complexity of parasitoid–aphid interactions. Parasitoid assemblages varied among host plants, with some species showing broad host associations while others appeared more restricted. These observations provide quantitative baseline data on parasitoid diversity, host associations, and multitrophic interactions in Mediterranean fruit orchards. Although parasitism rates were not directly measured, the findings contribute to a better understanding of parasitoid communities and may support future research on sustainable pest management strategies.

Key words: parasitoids, aphids, Aphidiinae, fruit orchards, biodiversity, Mediterranean agroecosystems.

Oral Session

Nutritional value of the pods of several Algerian annual alfalfa varieties

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Abstract

New varieties of legumes with self-regenerating properties, particularly *Medicago*, must be made available to livestock farmers in livestock rearing regions in order to improve forage production. Analysis of variance reveals highly significant differences for the parameters studied, mineral matter (5.75%), total nitrogen (17.55%) and crude fiber (40.4%). A positive correlation is observed between total nitrogen (TN) and dry matter (DM), whilst a very high negative correlation is recorded between crude fiber (CF) and TN. Principal component analysis (PCA) highlights four distinct groups: the first comprises digestibility, TNM and DM (populations 31, 32, 23, 19, 10 and 9); the second comprises the HC, NDF, LN and BC parameters (populations 21, 22, 17, 20, ...); the third combines true cellulose (TC) and DM (populations 6, 7 and 8); finally, the fourth group corresponds to parameters not studied (populations 28, 11 and 27). Furthermore, PCA analysis based on chemical parameters distinguishes two main groups: the first, characterized by DM and CB, comprises populations S7, S5, S3, Tr407, Tr201, Tr238, I11 and I755; the second, characterized by MAT and MM, includes the remaining populations (Tr55, Tr27, Tr221, C58, C52, C204, C2, I253, I756, Aus106, Poly205, Poly27, Poly218 and Poly236). The assessment of in vitro digestibility reveals considerable variability among species and populations of the genus *Medicago*. Dry matter digestibility is highly dependent on genotype. Among the species studied, *Medicago ciliaris* (population S7) exhibits the highest forage potential, significantly outperforming the other species. These results confirm the decisive influence of genetic material as well as soil and climatic conditions, particularly in coastal areas at altitudes below 600–700 m. In steppe regions, further in situ trials are required.

Key words: forage legumes, populations, pods, nutritional value.

Chitosan–keratin composite films for sustainable food packaging

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Abstract

Introduction: Growing environmental and health concerns associated with non-biodegradable petrochemical plastics have intensified the search for sustainable alternatives. Chitosan and keratin are promising biopolymers for food packaging due to their biodegradability, edibility, and film-forming abilities. However, the high hydrophilicity of chitosan limits its practical applications. This study aims to enhance its properties through the development of a chitosan–keratin composite film. **Methods:** Chitosan and keratin were extracted from red shrimp shells and chicken feathers, respectively, with yields of 17.33% and 15.05%. The composite film was prepared and compared with control films, including chitosan (CHF), chitosan–glycerol (CHGF), and keratin (FKF). The films were evaluated based on visual appearance, mechanical properties, and microstructure using light microscopy. **Results:** The chitosan–keratin composite film exhibited a homogeneous structure, light brown color, and absence of defects such as pores or bubbles. Mechanical properties, including flexibility, toughness, and smoothness, showed noticeable improvement compared to the control films, although transparency decreased. Microscopic observations revealed a compact and continuous structure with some crystalline features. Additionally, the composite film showed reduced water content compared to CHGF, indicating improved barrier properties. **Conclusion:** The incorporation of keratin significantly enhances the physical and functional properties of chitosan-based films. These findings suggest that chitosan–keratin composite films have strong potential as eco-friendly materials for sustainable food packaging applications.

Key words: chitosane, feather keratin, edible films, food packaging.

Physicochemical characterization and enhanced antimicrobial efficacy of *Satureja battandieri* essential oil nanoemulsion for food preservation applications

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Abstract

The food industry is shifting toward innovative preservation methods by exploiting bioactive molecules from essential oils (EO) coupled with emerging technologies. This study evaluates the optimization of *Satureja battandieri* essential oil properties through the formulation of nanoemulsions (SbHE-NE) and its synergistic application with cold plasma. GC-MS analysis revealed a predominance of thymol (45%) and carvacrol (30%), while the nanoemulsions (2% Tween 80) exhibited optimal colloidal stability (PDI < 0.3). Compared to pure EO, SbHE-NE demonstrated superior efficacy, including increased inhibition of *Fusarium oxysporum* spore germination (delayed by 64,2 h à 1,3mg/mL), lower MICs against *E. coli* and *L. monocytogenes*, and a 64% reduction in in vivo ear edema without acute toxicity.

Key words: *Satureja battandieri*, nanoemulsion, PDI, antimicrobial synergy, toxicity.

Impact of ultrasonic pretreatment on microwave drying kinetics, specific energy consumption, and bioactive compound preservation in *Mentha spicata* stems

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Abstract

The application of pre-treatment methods prior to drying offers an innovative approach to improve food quality while reducing energy requirements. This study investigated the impact of ultrasonic (US) pretreatment at 32 kHz on the microwave (MW) drying kinetics of spearmint stems (*Mentha spicata* L.) at 300 W. Samples were subjected to ultrasonic pretreatment for 0, 10, 20, and 30 min before microwave drying. Seven thin-layer mathematical models were evaluated; the Midilli et al. (2002) model provided the best fit with R^2 values ranging from 0.9955 to 0.9978. Effective moisture diffusivity ($Deff$) increased by 84.5%, from 3.42×10^{-10} to 6.31×10^{-10} m²/s. Increasing US pretreatment time from 0 to 30 min reduced total drying time by 42.5% and specific energy consumption (SEC) by 35.3%, from 4.31 to 2.79 kJ/kg of evaporated water. Combined US–MW drying significantly enhanced total polyphenol content (TPC) by 54.9% (from 12.34 to 19.12 mg GAE/g DM) and improved DPPH and ABTS radical scavenging activities compared to fresh and conventionally dried samples. These findings demonstrate that US–MW drying is an effective, energy-efficient technology for the industrial dehydration of aromatic herbs, simultaneously improving drying efficiency and nutritional quality.

Key words: ultrasound pretreatment, microwave drying, *Mentha spicata* stems, drying kinetics, mathematical modelling.

The effect of flavoring with mandarin fruit exocarps & myrtle leaves on the olive oil quality

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Abstract

Flavoring olive oil is a traditional practice in the Mediterranean region, and it has recently become a trend due to its low cost, ease of use, and potential benefits. In this study, two local waste products were used as flavoring agents to evaluate their influence on olive oil quality. Three samples were compared: non-flavored olive oil, olive oil flavored with mandarin exocarps, and olive oil flavored with myrtle leaves. A maceration process using 5% of dried plant material was applied for 10 days. Subsequently, free fatty acids (FFA), peroxide value (PV), chlorophyll pigments, carotenoid pigments, total phenolic content (TPC), and antioxidant activity (DPPH%) were evaluated. The results showed that FFA did not differ significantly between flavored and non-flavored oils ($p > 0.05$). However, PV differed significantly among all samples, with the highest value observed in the non-flavored oil and the lowest in oil flavored with myrtle leaves (20.30 vs. 18.30 meq O₂/kg). In addition, carotenoid and chlorophyll pigment contents showed significant differences among the three samples. In particular, the highest carotenoid content was observed in oil flavored with mandarin exocarps (2.45 mg/kg oil), while the highest chlorophyll content was found in oil flavored with myrtle leaves (3.06 mg/kg oil), compared to lower values in the non-flavored oil. Regarding total phenolic content, higher values were observed in oils flavored with mandarin exocarps and myrtle leaves compared to the non-flavored oil. Furthermore, antioxidant activity (DPPH%) did not show significant differences among the samples ($p > 0.05$). Pearson correlation analysis revealed a positive correlation between total phenolic content and carotenoid pigments, while a negative correlation was observed between peroxide value and chlorophyll pigments. In conclusion, flavoring olive oil with local waste products (mandarin exocarps and myrtle leaves) can enhance its quality and represents a promising approach aligned with the principles of the circular economy.

Key words: olive oil quality, mandarin fruit exocarps, myrtle leaves, flavoring oil, oil pigments.

Poster Session

Food safety knowledge, attitudes, hygienic practices of poultry slaughterhouse workers in Algeria: a cross-sectional study

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Abstract

Food handlers can play a vital role in reducing foodborne diseases by adopting appropriate food handling and sanitation practices in working plants. This study aims to assess the level of knowledge, attitudes, and practices (KAPs) of 89 workers in 11 operational poultry slaughterhouses in the Bordj Bou Arreridj province (Algeria). A cross-sectional study was conducted between February and May 2024. Data were collected through in-person interviews using a structured questionnaire. The questionnaire consisted of four parts; socio-demographic characteristics, assessments of food safety knowledge, food safety attitudes, and food safety practices. Spearman's correlation coefficient was used to identify the factors associated with food safety knowledge, attitudes and practices, as well as the relationships among various components of KAP. The results indicated that all respondents (100%) were male and had no formal food safety training, with over one-third (35.9%) having attained a high level of education. Furthermore, the findings revealed that a majority of participants (78.7%) exhibited insufficient knowledge, particularly concerning foodborne pathogens (21.6%) and foodborne diseases (26.1%). While 78.7% of workers demonstrated positive attitudes, 71.9% displayed poor practices related to personal hygiene and the wearing of appropriate protective clothing. The level of education was significantly correlated with knowledge, attitudes, and practices ($r_s = 0.564$, $r_s = 0.220$, and $r_s = 0.566$, respectively). Additionally, a significant positive correlation was found between knowledge and attitudes ($r_s = 0.563$), as well as between knowledge and practices ($r_s = 0.389$). The findings suggest that regular practical training is essential for enhancing the knowledge, attitudes, and practices (KAPs) of meat handlers concerning meat safety, as well as for preventing meat-borne diseases in the study area.

Key words: food-handlers, food safety, KAP, meat, poultry, slaughterhouses.

Correlative assessment of the relationships between vegetative growth, qualitative characteristics of olive oil, and sensory attributes in a collection of Algerian and European cultivars of *Olea europaea* L.

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Abstract

The olive tree cultivation occupies a central role in Algerian agriculture, where it holds major economic and socio-cultural importance. Several production factors strongly influence olive oil quality. Vegetative growth of the olive tree represents a key determinant of fruit and oil quality by influencing photosynthetic capacity, assimilate partitioning, and physiological processes involved in fruit filling. These physiological mechanisms directly affect oil content, as well as fatty acid composition and phenolic compounds, and consequently sensory characteristics such as bitterness and pungency. This study investigates the quantitative relationships between vegetative growth, chemical parameters, and interactions among sensory attributes, which remain insufficiently understood, using seven representative olive cultivars: local varieties (Chemlal, Bouchouk Lafayette, Blanquette de Guelma, Sigoise, and Limli) and European varieties (Frantoio and Belgentéroise). Vegetative growth was assessed through average shoot length; oil content was expressed as a percentage of dry matter; and fatty acid composition was analysed by gas chromatography after derivatisation. Total phenolic content was determined by spectrophotometry and expressed as concentration, while oxidative stability was measured using the Rancimat method. Sensory analysis was performed by a trained panel in accordance with international standards. The results revealed substantial positive correlations between vegetative growth parameters, oil content, olive oil composition, and sensory attributes associated with phenolic compounds across all studied varieties. This functional coherence suggests that the improvement of one parameter is generally associated with the improvement of others. These preliminary findings indicate that optimization of oil quality is closely linked to the physiological and biochemical performance of the olive tree, thereby confirming the relevance of a systemic approach in cultivar selection and management and food security strategies.

Key words: shoot growth, olive oil content, content, quality oil, polyphenols, bitterness.

The indirect contribution of perovskites to food security through energy and sensing technologies

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Abstract

Food security is one of the most important global challenges today. It aims to ensure that all people have continuous access to sufficient, safe, and nutritious food. It is based on four main pillars: food availability, food accessibility, proper utilization, and stability of food supply over time. In this context, food sciences and technologies play a crucial role in improving agricultural production systems, enhancing food processing, developing preservation techniques, and strengthening food quality and safety control. These advances also contribute to reducing post-harvest losses and improving the efficiency of food supply chains. The objective of this work is to explore how emerging materials such as perovskites can indirectly contribute to food security through renewable energy and advanced sensing applications. On the other hand, advanced materials such as perovskites have emerged in modern scientific fields, particularly in renewable energy and optoelectronic technologies. Although they are not directly used in food applications, their impact on food security is indirect but significant. Perovskite-based solar cells represent a promising technology in the field of renewable energy, as they can provide low-cost and efficient electricity. Based on recent literature, this energy can be used in rural and remote areas to power irrigation systems, food refrigeration units, and food processing facilities. As a result, they help reduce post-harvest losses and improve the stability of food supply chains. In addition, perovskite materials are being investigated for their potential use in advanced sensing systems, which can detect gases related to food spoilage or monitor storage conditions such as temperature and humidity. They may also contribute to environmental monitoring systems, which are essential for sustainable agricultural production. This prospective analysis demonstrates that, despite current challenges in stability and scalability, perovskites offer a viable pathway for off-grid food preservation and smart sensing in low-resource settings. Further experimental validation and life-cycle assessments are needed to confirm these potential benefits.

Key words: food security, renewable energy, perovskites, food refrigeration, post-harvest losses, gas sensing.

Microbiological quality assessment and investigation of physical-chemical stability of processed soft cheese preparations marketed in Algeria- preliminary study

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Abstract

Background: Cheese, a safe source of human nutrition. Stabilizing cheese technology used for acidification, maturation, thermophilic mixte lactic starter. However, product stability during storage and marketing is a controversial subject. Aim: This Study aims to evaluate the microbiological and physicochemical stability of processed soft cheese preparations, collected from several locations in North-Eastern Bordj Bou Arreridj Algerian province. Material and methods: Between February and March 2026, twenty-four (24) samples from various processed cheese brands were collected. Half of the samples (12 samples) were analyzed in the laboratory following visual inspection, while the other half was kept at 4°C for three weeks. At the beginning and end of the storage period, identical physicochemical and microbiological tests were carried out. The outcomes were contrasted with Algerian norms. Results: Physico-chemical tests, before storage at 4°C gave the average values: pH: (5.54- 5.62), Titratable acidity: (16.72D- 18.18°D), Conductivity: (4.41ms/cm-4.53ms/cm), Total Dry Extract: (53.66%- 55.6%), Relative Humidity: (46.4%- 44.46%) respectively. Microbiological analyses, by colony-forming unit (CFU) counting, revealed the stability and conformity of the product to Algerian standards during the first day of storage at 4°C. However, an increase in eukaryotic flora (yeasts+molds), total mesophilic flora, endospores and *Bacillus* spp, were found in 27% of samples, which suggests that the hygienic quality is much below expectations. Conclusion: At the start and finish of storage at 4°C, all samples had steady physicochemical properties. By the end of the third week of storage, there was an increase in endospores, mesophilic aerobic flora, and eukaryotic flora. A more representative sampling strategy and more thorough physicochemical, bacteriological studies are necessary to further investigate this ongoing study.

Keywords: analysis, cheese, microbiological, physicochemical, stability, storage.

Date and carob powder: An innovative alternative to sugar for tahini halva

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Abstract

It is necessary to valorise certain low-value carob and date harvests, which are considered important sources of sugars (over 55 Brix) and other essential compounds. This study, after the physico-chemical characterisation, used dried carob and dates as the main ingredients in the production of tahini halva. Five different percentages (100%, 70% + 30%, 50% + 50%, 70% + 30%, 100%) were used successively to evaluate the different physical and sensory qualities. The formulation with a high date content exhibited high brightness (L^*) and yellowing index (b^*). Texture profile analysis revealed a significant difference ($p = 0.05$) in hardness and stickiness for the formulation with a high carob content. However, the oil separation test revealed no variation among the five formulations. Furthermore, the sensory study, which examined 13 attributes, revealed that most panelists perceived a significant difference in 8 attributes (appearance, colour, colour intensity, texture, aroma, sweetness, flavour persistence, and overall appreciation) and no difference in 5 attributes (firmness, sandy texture, bitterness, glossiness, and oil release). The Friedman ranking test showed that formulations with a high date content were the most highly rated, with decreasing percentages. This study justifies further research to improve the physical and sensory qualities and fully utilize these two undervalued raw materials. The production and development of a similar product would not only offer functional and nutritional benefits but would also enable local communities to improve their economic and social situation.

Key words: Carob, Dates, Valorisation, Characterization, Texture, Sensory Analysis.

Early-stage salinity tolerance and adaptive mechanisms in Algerian wheat landraces

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Abstract

Soil salinization represents a major edaphic constraint limiting wheat productivity in arid and semi arid regions of Algeria. The present study aimed to characterize the early morphological, energetic and biochemical responses of four Algerian wheat genotypes subjected to increasing NaCl concentrations under semi controlled conditions. Two genotypes of *Triticum durum* (VT, VB) and two *Triticum aestivum* (VH, VM) were evaluated. Salinity stress reduced total dry biomass, leaf area index and chlorophyll pigment content, biochemical analyses revealed accumulation of some osmoticums, particularly sugars soluble and proline, suggesting activation of osmotic adjustment mechanisms. In contrast, Total protein content declined under high salinity levels, possibly indicating protein degradation or inhibition of protein synthesis due to ionic toxicity. The differential responses observed among genotypes highlight variability in osmotic regulation efficiency. These findings emphasize the potential of Algerian wheat landraces as a promising source of genetic variability for breeding programs aimed at enhancing salinity tolerance and stabilizing wheat yield under salt affected agroecosystems.

Key words: salinity stress, wheat landraces, morphological and biochemical responses.

Impact of black cumin seed meal and whey on the physicochemical properties of gluten-free bread

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Abstract

This study aimed to optimize gluten-free bread formulations fortified with black cumin seed meal and whey to enhance their physicochemical characteristics. Employing a central composite design under response surface methodology. Forty formulations were developed and benchmarked against a rice-based control. Physicochemical evaluations included baking loss (weight loss), specific volume, pH, crumb cellular architecture and water activity and chromatic properties (color) were also assessed. The results for specific volume across the two optimized gluten-free bread formulations show no statistically significant differences ($p > 0.05$). Weight loss during baking is mainly attributed to the evaporation of water. The consistency across all samples ($p = 0.43$) indicates that the water-binding capacity of the ingredients used in both the control and the enriched versions is comparable. Concerning pH measurements, there are highly significant differences ($p < 0.0001$) between samples. The control groups have higher pH levels than the enriched breads. Regarding water activity, no significant difference was observed ($p = 0.94$), with all samples hovering around 0.84 to 0.85. This indicates that the enrichment did not affect the free water available, which is crucial for microbial stability. The color analysis shows high significance ($p < 0.0001$) across all parameters for both crust and crumb. The inclusion of functional ingredients significantly changed the chromatic profiles of the bread samples. The crumb structure parameters generally show less statistical variation than the color, but some key trends emerge. Parameters like Number of cells/mm² ($p = 0.1$) and Average cell size ($p = 0.6$) show no significant differences. Significant differences were found in perimeter ($p = 0.02$) and circularity ($p = 0.04$). These findings suggest that the strategic integration of agro-industrial by-products can effectively mitigate the structural and physicochemical characteristics of gluten-free bread.

Key words: black cumin seed meal, physicochemical properties, bread, gluten-free, whey.

Assessment of *Escherichia coli* O157:H7 contamination in the beef supply chain: A literature review and implications for carcass safety

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Abstract

In order to enhance carcass safety and safeguard public health, this literature study attempts to determine the frequency and degree of *Escherichia coli* O157:H7 contamination in beef. From 2015 to 2025, a review of the literature was carried out. Four of the sixteen papers that were found were chosen because they were relevant to the investigation of *Escherichia coli* O157:H7 in beef carcasses. Important information on prevalence, detection techniques, and public health consequences was taken out and combined. Four of the chosen studies showed that pathogenic *E. coli* was present in beef: *E. coli* O157 was present in 9.7% (29/300) of the corpses; *E. coli* O157:H7 was confirmed in 7.4% (30/406); 81.2% (85/104) of the samples were positive for STEC, including 12 O157:H7 cases; *E. coli* O157:H7 was detected in 8.75% (7/80) of the samples. Conclusion: According to the four investigations, beef carcasses are significantly contaminated with *Escherichia coli* O157:H7 ($\approx 7-10\%$), frequently in conjunction with other pathogenic STEC. Stronger cleanliness and control procedures are needed at slaughterhouses because this presence poses a serious risk to the safety of meat.

Key words: STEC (Shiga toxin-producing *E. coli*), PCR, beef carcasses, contamination, and *Escherichia coli* O157:H7.

Impact of climate change on food security in the M'sila region: An agronomic approach

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Abstract

Climate change represents a major challenge to food security, particularly in arid and semi-arid regions such as the M'sila area. This study adopts an agronomic approach to assess the impact of climate variability, especially decreasing rainfall and rising temperatures, on agricultural production systems. The analysis is based on examining the relationship between climatic parameters and the yields of major cereal crops. The results reveal a significant correlation between rainfall variability and the decline in agricultural yields, highlighting the high vulnerability of local farming systems to climatic hazards. These disturbances directly threaten food security in the region. Therefore, the adoption of adaptation strategies is essential, including improving irrigation techniques, using drought-tolerant crop varieties, and implementing sustainable natural resource management practices.

Key words: climate change, food security, M'sila, agriculture, rainfall, agricultural yield, semi-arid regions, agronomic adaptation.

Extraction of the date-pulp aqueous extract from the "*Mech-Degla*" cultivar using conventional and eco-friendly water extraction methods

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Abstract

The extraction of soluble components from the pulp of *Phoenix dactylifera* L. remains a major technological hurdle hindering their industrial utilization. Conventional aqueous methods, although widely used, have significant limitations in terms of yield and extraction recovery. This study therefore aims to improve process efficiency by comparing three approaches: conventional water-bath extraction, microwave-assisted extraction, and ultrasonic extraction. Using a one-factor experiment, preliminary essays through «one-factor» tests consist of evaluating the influence of each parameter on extraction recovery (ER) individually, while simultaneously maintaining the other two parameters constant, for the three extraction methods. The objective is to maximise the overall yield of total soluble matter and to propose a more effective solution for industrial use. Three extraction techniques were investigated. Water-bath extraction (WAE) was performed on mixtures of 40 g of date pulp powder and distilled water, varying the water volume, temperature, and duration under controlled agitation (150 cycles/min). Microwave-assisted extraction (MAE) was applied using the same solid-to-liquid ratios, by adjusting the power and irradiation time in a cyclic mode (10 s ON/5 s OFF) to limit heating. Finally, ultrasonic-assisted extraction (UAE) was conducted by varying the sonication intensity and duration in a pulsed mode (10 s ON/10 s OFF), with thermal control via an ice bath to prevent overheating. The results show that extraction yield depends heavily on the method and operating parameters. Water-in-water extraction (WAE) remains limited, with little influence from the S/L ratio and time, and a thermal optimum around 75 °C. Microwave-assisted extraction (MAE) offers the highest yields (~79%), thanks to rapid volumetric heating that induces effective cell rupture, although it is sensitive to power and time. Ultrasonic extraction (UAE) yields lower yields (~30 - 33%), due to cavitation attenuated by the viscosity of the matrix. Overall, MAE appears to be the most effective technique.

Key words: date-pulp, extraction, recovery, water-bath, microwave, ultrasound.

Assessing drought-adaptive traits in Canola (*Brassica napus L.*) as a strategy for stabilizing oilseed raw material supply in semi-arid zones

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Abstract

The sustainability of the vegetable oil industry is inherently linked to the climate resilience of oilseed crops. In semi-arid regions, water stress poses a direct threat to the quantity and quality of *Brassica napus L.* yield, thereby challenging food security. This research aims to identify robust genotypes capable of maintaining biological and chemical stability under drought conditions. A comparative field study was conducted in the semi-arid climate of Bordj Bou Arreridj on two varieties: 'Jura' and 'Es Hydromel'. The evaluation focused on physiological markers critical for crop survival and productivity, including cellular integrity, relative water content (RWC), and the biosynthesis of protective solutes (proline and soluble sugars). The findings reveal that 'Es Hydromel' possesses a superior adaptive toolkit, characterized by significantly higher chlorophyll retention and increased soluble sugar accumulation. These biochemical traits facilitated better osmotic regulation and membrane protection compared to 'Jura'. From a food technology perspective, the stability shown by 'Es Hydromel' suggests its potential to provide a more consistent supply of raw materials for oil extraction in water-scarce environments. The study concludes that integrating such drought-tolerant varieties into the agricultural value chain is a vital technological intervention to mitigate the risks of food supply chain disruptions caused by climate change.

Key words: Oilseed sustainability, food supply chain, *Brassica napus L.*, drought tolerance.

Antimicrobial resistance in foodborne bacteria: A one health perspective

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Abstract

Antimicrobial resistance (AMR) has become one of the most pressing global challenges in public health, threatening the effectiveness of antimicrobial treatments and food security worldwide. This study aims to examine the emergence and spread of antimicrobial resistance in foodborne bacteria and its implications for public health globally and in Algeria in particular, within the framework of the ‘One Health’ approach. A comprehensive literature review was conducted based on scientific publications issued between 2020 and 2025, drawn from major databases, including PubMed, Scopus, and Web of Science. The analysis focused on antibiotic-resistant bacteria isolated from food. The studies examined revealed an increasing prevalence of multidrug-resistant bacteria and their diversity across the study regions, particularly *Escherichia coli*, *Klebsiella pneumoniae*, *Enterococcus faecium*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*. It also highlighted critically important antibiotics such as colistin, carbapenems and vancomycin; this resistance was associated with resistance genes, particularly *mcr*, *bla_{NDM}*, *bla_{KPC}*, *bla_{OXA-48}* and *vanA*. The main resistance mechanisms included enzymatic inactivation, target modification, reduced membrane permeability, active efflux pumps, biofilm formation, and horizontal gene transfer. Furthermore, environmental compartments such as wastewater, agricultural soils, and animal manure were identified as important reservoirs facilitating the dissemination of antimicrobial resistance genes. These findings highlight the interconnected roles of humans, animals, food systems, and the environment in the evolution and spread of antimicrobial resistance. Consequently, integrated surveillance programs, antimicrobial stewardship, enhanced biosecurity measures, and international cooperation are essential to mitigate the burden of AMR. The One Health approach provides a comprehensive strategy for controlling antimicrobial resistance and preserving the efficacy of antibiotics for future generations.

Key words: antimicrobial resistance, foodborne bacteria, one health, food safety, antibiotics.

Biosynthesized nanomaterials: A green chemistry approach for innovative and sustainable food packaging

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Abstract

Over the past decades, the development of nanotechnologies has led to the emergence of numerous methods for synthesizing nanomaterials, particularly conventional physical and chemical approaches. However, these processes often present major drawbacks, such as the use of toxic solvents, high-energy consumption, and the generation of harmful by-products. In this context, green chemistry has emerged as a promising alternative by offering more sustainable, environmentally friendly, and economically viable synthesis routes. The biosynthesis of nanoparticles, based on the use of plant extracts, microorganisms, or biomolecules, has recently attracted increasing interest due to its ecological advantages and ease of implementation. These biosynthesized nanoparticles exhibit interesting physicochemical properties, including enhanced antimicrobial activity, improved stability, and compatibility with biological matrices, making them particularly suitable for applications in food packaging. Several scientific studies have highlighted the importance of nanomaterials in food packaging systems. The study *“Food Packaging Based on Nanomaterials”* (2019) demonstrated that the incorporation of nanoparticles significantly improves the mechanical and barrier properties of packaging materials. Furthermore, the review *“Nanomaterials for Food Packaging Applications”* (2020) emphasized their role in enhancing antimicrobial properties and extending the shelf life of food products. Jafarzadeh et al. (2024) emphasized the growing role of biosynthesized nanomaterials in the development of smart packaging systems. Among them, bacterial cellulose-based nanocomposites have gained significant attention due to their biodegradable and sustainable nature. The incorporation of nanomaterials such as AgNPs, TiO₂, nanocellulose, chitosan, and ϵ -polylysine enhances their antimicrobial, mechanical, and thermal properties. These materials contribute to improved food preservation and contamination control. Therefore, they represent a promising approach for the development of active and intelligent packaging in the agri-food sector.

Key words: Nanomaterials, biosynthesis, green chemistry, antimicrobial activity, sustainability, food safety.

Fermentation: From ancestral practice to food biotechnology: Toward the improvement of natural preservation strategy

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Abstract

Fermentation can be applied to almost all foods and has historically been adopted for its preservative qualities, as well as for its ability to enhance sensory properties. Fermented foods have been consumed for nearly 9000 years, making fermentation one of the oldest and most reliable forms of food bio-preservation. In the context of global food security, fermentation offers sustainable and accessible solutions that are particularly suitable for developing countries, in accordance with the growing populations and a changing climate. Fermentation helps to extend shelf life, valorise local raw materials and reduce food losses. This work aims to highlight the attributes of fermentation to secure, safe and sustainable agri-food production systems, by referring to the implicated compounds and mechanisms. The literature research was conducted using PubMed, Scopus, ScienceDirect, and Springer databases. The research strategy included the following terms: fermentation, fermented foods, lactic acid bacteria, bioactive compounds, antimicrobials, conservation, and bio-preservation. Only peer-reviewed articles published between 2020 and 2025 were considered. Overall, the data revealed that fermentation extended the shelf life significantly (until 10 days) and increased the safety of foods, resulting from the antagonistic action exerted by different lactic acid bacteria (LAB) strains used. LAB prevent at 99% the development of foodborne pathogens and spoilage microorganisms by producing various metabolites like organic acids, hydrogen peroxide, and bacteriocins. Additionally, some LAB have demonstrated the ability to neutralise contaminants such as mycotoxins and degrade anti-nutritional compounds such as phytic acid. The adoption of fermentation technology is expanding rapidly, due to increasing consumer demand for clean-label foods, reduced reliance on chemical preservatives, and locally safe and qualitative products. In Western countries, numerous start-ups are innovating by combining traditional fermentation practices with modern food science to fully exploit fermentation's preservative potential.

Key words: Fermentation, Fermented Food, Antimicrobials, Food Preservation, Food Safety.

Nutritional value of dried leaves of *Moringa oleifera*: traditional preparation of couscous

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Abstract

This work focuses on the nutritional valorization of dried leaves of *Moringa oleifera*, a tropical plant recognized for its exceptional richness in essential nutrients. The main objective of this study was to propose a local, sustainable nutritional solution adapted to the Algerian context, in the face of persistent malnutrition problems. To do this, the leaves of *Moringa oleifera* were dried, reduced to powder, then subjected to various physicochemical and nutritional analyses. The results reveal a high protein content (20.24%), a low proportion of lipids (1.54%), and ash (5.99%), as well as a significant richness in bioactive compounds such as polyphenols; flavonoids, carotenoids and tannins, known for their antioxidant properties. Two solvents of extraction (ethanol and acetone) were tested, with the acetone extract showing slightly higher efficiency in the extraction of total phenolic compounds, tannins and antioxidant activity. In order to evaluate the possibility of integrating this powder into a traditional food, a couscous was formulated with different incorporation rates of *Moringa oleifera* powder (1%, 5% and 10%). A sensory evaluation was carried out with panels of tasters. The results showed that couscous enriched with 1% *Moringa oleifera* powder retained appreciable organoleptic characteristics (taste, odor, texture, color), while the 5% and 10% formulations were considered less pleasant. This work thus highlights the potential of *Moringa oleifera* as a functional and natural enrichment in traditional foods.

Key words: *Moringa oleifera*, polyphenols, flavonoids, condensed tannins, antioxidant activity, couscous.

Exploring bioactive extracts of green tea (*Camellia sinensis* L.) as natural preservatives in orange juice for food security

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Abstract

Food security has increased interest in natural alternatives to synthetic preservatives. This study evaluated the preservative potential of bioactive compounds from *Camellia sinensis* L. extracts in unpasteurized orange juice stored at 4 °C for 28 days. Extracts were obtained by methanol–water maceration and fractionated into chloroform, ethyl acetate, and n-butanol fractions. Bioactive compounds were quantified by spectrophotometric assays (total phenolics, flavonoids, condensed tannins) and characterized by GC–MS. Orange juice quality was evaluated through physicochemical analyses (pH, titratable acidity, total soluble solids, vitamin C, browning index, and cloud value), fungal counts on PDA medium (CFU/mL), and sensory evaluation by 21 trained panelists using a 9-point hedonic scale. GC–MS identified caffeine as the major compound in chloroform (54.09%) and n-butanol (8.72%) fractions, while ethyl acetate was rich in 1,2,3-benzenetriol (45.90%) and the aqueous fraction in quinic acid (14.13%). The n-butanol fraction showed the highest bioactive content: total phenolics (696.25 ± 1.01 µg GAE/mg), flavonoids (559.42 ± 1.03 µg QE/mg), and condensed tannins (191.29 ± 0.99 µg CE/mg). Treated juice maintained stable pH (3.7–4.0) and acidity (0.65–0.72%), retained more vitamin C (5.99–3.2 vs. 5.47–2.01 mg/100 mL in control), reduced browning (0.160–0.274 vs. 0.169–0.713), and decreased fungal counts from 1×10^1 – 900×10^1 to 0.05×10^1 – 7×10^1 CFU/mL, while sensory scores increased from 3.8–4.9 to 7.0–8.0. Overall, *Camellia sinensis* L. extracts improved orange juice stability, safety, sensory quality, and shelf life.

Key words: bioactive extracts, *Camellia sinensis* L., natural preservatives, orange juice, food security.

Corn silk (*Zea mays* L.) as a source of bioactive compounds for food safety and quality: microwave-assisted extraction and RSM-oriented phytochemical characterization

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Abstract

Corn silk (*Zea mays* L.), a renewable agricultural by-product that has traditionally been used to manage diabetes, hypertension, and urinary tract disorders, is increasingly recognized as a promising source of bioactive compounds that can enhance food safety and quality. In this study, a green, energy-efficient microwave-assisted extraction (MAE) technique was employed to obtain a polyphenol-rich hydroethanolic corn silk extract and generate analytical data for the future optimization of the process using response surface methodology (RSM). Corn silk powder was extracted at 400 W and 60 °C for 15 minutes using a solid to solvent ratio of 1:20 (w/v) in 70% aqueous ethanol. The extract exhibited a total polyphenol content of 72.43 ± 0.06 mg gallic acid equivalents (GAE)/g of dry extract ($A_{765} = 0.617$, Folin–Ciocalteu method) and a total flavonoid content of 19 mg quercetin equivalents (QE)/g of dry extract ($A_{510} = 0.288$). This confirms the significant presence of flavonoids in the phenolic fraction. Condensed tannins, quantified by the acid vanillin method, were present in high concentrations ($A_{500} = 0.455$), while total antioxidant capacity, as measured by the phosphomolybdate assay, reached an absorbance of 0.676 at 695 nm. This indicates substantial electron-donating and radical-scavenging potential. Total carotenoids extracted in hexane gave an absorbance of 0.217 at 450 nm, indicating the presence of a complementary lipophilic antioxidant fraction. Qualitative phytochemical screening revealed the presence of free quinones, flavonoids, steroids and gallic/catechic tannins, and the absence of saponins, resins, and mucilages. This is in line with the selective polarity of the 70% hydroethanolic solvent under microwave irradiation. Phytosterols, which were detected using the Liebermann–Burchard reaction, are of particular interest due to their reported inhibitory effects on α -glucosidase and α -amylase. Compared with conventional maceration (24–48 hours), the microwave-assisted extraction (MAE) protocol reduced extraction time to 15 minutes and limited solvent consumption, all the while maintaining high levels of phenolic compounds and flavonoids. These findings support the use of microwave-assisted extraction as a rapid, environmentally sustainable strategy for the valorization of corn silk, providing a quantitative basis for subsequent response surface methodology (RSM)-based optimization and application as a functional ingredient in natural food protective systems.

Key words: corn silk, microwave-assisted extraction, phenolic compounds, antioxidant activity, food safety.

Closing Plenary

Life and nature and the valorization of natural resources in the light of modern scientific theories.

Part 2: The emergence of life on earth and the relationship of living beings to nature

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Abstract

When a person sets out to calculate their age, they typically start from the moment of their birth and extend to the present, deriving a temporal difference bounded by two fixed points. However, this temporal conception remains inherently relative and limited. For if we were to trace the origin of the particles constituting our bodies, we would find that experts unanimously agree they originated from the very soil of this Earth. Does this mean, then, that the age of our particles dates back to the formation of the planet, approximately 4.54 billion years? No; in fact, they are far older. For the Earth itself had a prior phase, and indeed the entire universe did, a stage in which hydrogen and helium gases were dispersed in the form of a cosmic nebula. Its particles coalesced under the force of gravity, giving rise to the cosmos with all its stars, galaxies, black holes, and dark matter, among which our Earth took its place. Yet this does not answer the fundamental question: when exactly did the particles of our bodies come into existence? This is a profound and intricate question that remained unanswered until Albert Einstein formulated his General Theory of Relativity in 1915, which was experimentally confirmed in 1919, thereby establishing itself as one of the most powerful and robust scientific theories ever conceived. Thanks to this theory, scientists were able to reconstruct the genesis of the universe through the Big Bang—a moment when the cosmos existed as an infinitesimally small point of infinite mass, heat, and energy. It then began its continuous expansion; within the first three minutes, primordial particles formed, and by the twentieth minute, primordial nucleosynthesis commenced, producing the nuclei of helium and hydrogen, along with a trace of lithium, thus constituting the universe's primordial matter. Based on this, no less than 10% of a human being's mass can be traced back to that immeasurably distant epoch—that is, to the origin of the cosmos, 13.8 billion years ago. Following a series of cosmic interactions, galaxies began to take shape, with our solar system emerging only in the third generation of such formations. At that time, Earth was a blazing inferno, utterly inhospitable to life. It took approximately one hundred million years of chemical reactions for water to form, followed by the atmosphere. During this period, the oceans were acidic, yet under uniquely favorable conditions, they witnessed a remarkable molecular affinity and precise arrangement that culminated in the formation of amino acids. This was succeeded by a chain of reactions leading to the emergence of the living cell—the fundamental building block of organic matter—marking the advent of life on Earth. Nevertheless, modern science remains unable to fully explain that bewildering qualitative leap from the amino acid to the RNA molecule, and then to the living cell. For a living cell cannot maintain its integrity or perform its functions without passing through four essential stages: the self-assembly of atoms, their self-catalysis, the capacity for division and reproduction, and finally, the formation of a membrane that preserves its

energy and protects its contents. Thus, single-celled organisms appeared first, later evolving into multicellular organisms, an event rooted approximately 3.8 billion years in the past.

Billions of years later, the animal kingdom began to emerge, starting with fish in the ocean depths. Driven by the necessities of life and survival challenges, fish gradually moved toward the shores, giving rise to amphibians, then to terrestrial creatures. Consciousness began its gradual evolution until it reached its peak, and it was destiny that humanity would become the bearer of that supreme consciousness on Earth. Yet, despite its advanced consciousness, humanity remains inextricably linked to the entire cosmos; any disruption occurring at the farthest reaches of the universe would gradually propagate, impacting our galaxy, the Milky Way, then our Sun, and ultimately reaching the plants and all life on Earth. This confirms the unity of the cosmic fabric and the interconnectedness of its parts within a coherent system that knows no isolation.

Keywords: age of man, age of the body's particles, origin of the universe, emergence of water on Earth, living cell, living matter, emergence of life, animal kingdom, consciousness, relationship of man to nature.