ATSB
Association Tunisienne
des Sciences Biologiques

35th International Congress of Biological Sciences and Biotechnology

ABSTRACT BOOK

25-28 June 2026 | Hotel El Mouradi, Hammamet, Tunisia

TOPICS

- Biochemistry & Molecular Biology
- Animal Biology, Physiology & Ecology
- Plant Biology, Physiology & Ecology
- Biotechnology
- Environment
- Genetics & Immunology
- Microbiology & Virology
- Pharmacology & Toxicology

AVANT - PROPOS

Chers collègues, chers participants,

C'est avec un grand plaisir et un profond honneur que nous vous accueillons à l'occasion du **35e Congrès international des Sciences Biologiques et des Biotechnologies**. Nous souhaitons la bienvenue à l'ensemble des chercheurs, enseignants-chercheurs, doctorants et professionnels venus de Tunisie, d'Algérie, du Maroc, d'Europe et d'ailleurs pour prendre part à cette rencontre scientifique, devenue au fil des années un rendez-vous incontournable de la communauté des sciences du vivant.

Cette édition témoigne une nouvelle fois de la vitalité et du dynamisme de la recherche dans nos disciplines. Le comité d'organisation a reçu un nombre particulièrement important de propositions de communications orales et affichées, reflétant la richesse des thématiques abordées, la qualité des travaux réalisés et l'engagement constant des chercheurs dans la production et le partage des connaissances scientifiques.

Le programme scientifique a été conçu pour favoriser les échanges et les collaborations autour de questions de recherche actuelles et porteuses d'avenir. Les sessions plénières accueilleront des conférences de haut niveau présentées par des experts de renommée internationale, qui partageront leurs avancées les plus récentes et leurs visions des défis scientifiques et technologiques à venir. Un workshop de Bio-informatique vient renforcer le programme.

L'Association Tunisienne des Sciences Biologiques (ATSB) poursuit activement le développement de partenariats internationaux au bénéfice de ses adhérents. Ces collaborations offrent de nouvelles opportunités de formation, de mobilité, de financement et de visibilité scientifique, notamment à travers l'organisation d'ateliers internationaux, l'accès à des programmes de bourses et la participation de chercheurs tunisiens aux différentes activités de la FEBS.

Nous souhaitons également consacrer une pensée particulière à la mémoire de notre regretté collègue et ami, **le Professeur Abderraouf KENANI,** Professeur de Biochimie à la Faculté de Médecine de Monastir, membre du Bureau exécutif de l'ATSB, dont la disparition a profondément attristé notre communauté. Scientifique respecté, enseignant dévoué et acteur engagé de la vie associative, il a contribué avec générosité et passion au développement de notre association et à la promotion des sciences biologiques en Tunisie. Son professionnalisme, son sens du partage et ses qualités humaines demeureront une source d'inspiration pour tous ceux qui ont eu le privilège de travailler à ses côtés. Nous lui rendons aujourd'hui un hommage sincère et reconnaissant.

Nous invitons tous les participants à prendre part activement aux différentes activités du congrès afin de faire de cette rencontre un espace privilégié d'échanges scientifiques, de réflexion collective et de création de nouvelles collaborations. La participation de chacun contribue au rayonnement de notre association et au renforcement de son rôle dans la promotion de la recherche scientifique aux échelles nationale et internationale.

Nous adressons nos plus vifs remerciements à la direction et à l'ensemble du personnel de l'Hôtel El Mouradi Hammamet pour leur accueil chaleureux, leur disponibilité et leur professionnalisme, qui ont permis de réunir les meilleures conditions pour la tenue de cette manifestation.

Nous remercions également tous les membres des comités d'organisation et scientifique, les conférenciers invités, les partenaires et les participants pour leur confiance et leur contribution à la réussite de cet événement.

Nous vous souhaitons un congrès riche en découvertes, en discussions stimulantes et en rencontres fructueuses, ainsi qu'un agréable séjour à Hammamet.

Le Bureau exécutif et le Comité d'organisation de l'ATSB

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Programme

Scientific Program of the 35th International Congress of the Tunisian Association of Biological Sciences (ATSB) June 25-28, 2026, Hammamet - Tunisia

Thursday, 25 June 2026

10h00 -16h00	**Registration** ***Lunch*** *12h-13h30*	
16h00 -16h45	**ATSB Ordinary General Assembly** ***No registrations,*** *they will resume after*	
16h45 -17h00	**Opening Ceremony of the ATSB Congress 2026** **Welcome address; ATSB Activities** Pr. Issam Smaali, ATSB & Congress Chair	
17h00 -17h15	**Tribute to Professor Abderraouf Kenani** ***No registrations,*** *they will resume after*	
17h15-18h00	**Plenary Conference 1**	
	Moderators	**Pr. Issam Smaali & Pr. Nejib Marzouki**
	Presented by	**Pr. BACIOU LAURA**, *CNRS Université Paris-Saclay, Orsay*
	Title	**The NADPH oxidase: why so much interest?**
18h00 -19h45	**Plenary Mini-Conferences**	
	Moderators	**Pr. Faiza Fakhfakh, & Pr. Laura Baciau & Pr. Sofiane Bezzine**
	18h00	**Mini-Conference 1:** **Presented by Dr. Aymen Ezzine,** Institut National des Sciences Appliquées et de Technologie **Title:** Enzymes in Post-Harvest Fruit Treatment as Green Solutions for Sustainable Food Production: Challenges and opportunities.
	18h20	**Mini-Conference 2:** **Presented by Dr. Issam Nouairi**, Centre de Biotechnologie de Borj Cedria **Title:** Green nanotechnology for sustainable agriculture: Plant-derived metallic nanoparticles as tools for crop protection and enhanced productivity
	18h40	**Mini-Conference 3:** **Presented by Dr. Bouchra BenMansour**, Faculté des Sciences de Bizerte **Title:** Do parasites induce the expression of biochemical markers in the golden grey mullet *Chelon auratus* (RISSO, 1810)?
	19h00	**Mini-Conference 4:** **Presented by Dr. Yacine Chtourou**, Faculté des Sciences de Sfax (UR11ES70) **Title:** Naringin, Quercetin and Chlorogenic acid mixture and Diabetes: Focusing on the therapeutic strategies
	19h20	**Discussion**
19h45	**Dinner**	

Scientific Program of the 35th International Congress of the Tunisian Association of Biological Sciences (ATSB) June 25-28, 2026, Hammamet - Tunisia

Friday, 26 June 2026

8h30 -10h30	**3 Sessions of Oral Communications**		
	Room 1:	**Room 2:**	**Room 3:**
	Biotechnology 1	**Plant Physiology & Biology 1**	**Biochemistry & MB 1**
	Moderators: Pr. Hanem Makni Pr. Bassam Jaouadi Pr. Med Ali Borgi	**Moderators:** Pr. Zouhaier Abbes Pr. Wahbi Djebali Pr. Haythem Mhadhbi	**Moderators:** Pr. Sofiane Bezzine Pr. Tania bizouarn Pr. Aymen Ezzine
	Comm N° 63-71	**Comm N° 37-40 , 42-46**	**Comm N° 1-4 , 6-10**
10h30-10h45	**Coffee Break** *Free service at the bar (all-in)*		
10h45-11h30	**Plenary Conference 2**		
	Moderators	**Pr. Hatem Fakhfakh & Pr. Mohamed Makni**	
	Presented by	**Pr. Ben Field**, *CNRS Bioscience and Biotechnology Institute Aix-Marseille*	
	Title	**Chloroplast signaling in stress responses and growth control: from TOR to ppGpp and beyond.**	
11h30-13h00	**3 Sessions of Oral Communications**		
	Room 1:	**Room 2:**	**Room 3:**
	Biochemistry & MB 2	**Pharmaco-Toxicology**	**Animal Physiology & Biology 1**
	Moderators: Pr. Mohamed Makni Pr. Hatem Fakhfakh Pr. Ben Fields	**Moderators:** Pr. Ferid Abidi Pr. Riadh Ksouri Pr. Raouf Ben Salah	**Moderators:** Pr. Khémais Rhouma Pr. Nabil Attia Pr. Najla Hfaiedh
	Comm N° 11-17	**Comm N° 125-127 , 129-132**	**Comm N° 21-28**
13h00 - 14h30	**Lunch**		
14h30 - 16h30	**Poster Session A:**	**Poster N° 1 – 95,** ***except One day***	
	Moderators: Pr. Abdelilah Chaoui, Pr. Riadh Ben Salah, Pr. Hafedh Belguith, Dr. Nadia Khelifi, Dr. Emna Harigua, Dr. Nawrez Ktari, Dr. Nizar Chaira, Dr. Issam Saidi, Dr. Badi Gaalich, Dr. Wassim Azri, Dr. Lamia Sakouhi		
16h30 –16h45	**Coffee Break** *Free service at the bar (all-in)*		
16h45-17h30	**Plenary Conference 3**		
	Moderators	**Pr. Riadh Ben Salah & Zouhaier Abbes**	
	Presented by	**Pr. Mourad AROUS**, *Faculty of Sciences of Sfax*	
	Title	**Nanocomposites and Encapsulation Technologies: Toward Multifunctional Systems for Biomedical, Environmental, and Antibacterial Applications.**	
17h30 - 19h15	**3 Sessions of Oral Communications**		
	Room 1:	**Room 2:**	**Room 3:**
	Biotechnology 2	**Microbio/Genetic**	**Environment 1**
	Moderators: Pr. Bassem Jaouadi Pr. Hafedh Belguith Pr. .Riadh Ben Salah	**Moderators:** Pr. Faten Gorsane Pr. Salwa Zehdi Pr. Neila Farah Trifi	**Moderators:** Pr. Hassib Bouallagui Pr. Anis Ben Hsouna Pr. Bouchra Ben Mansour
	Comm N° 72-79	**Comm N° 115-123**	**Comm N° 94-98 , 100-102**
19h15	**Dinner**		

Scientific Program of the 35th International Congress of the Tunisian Association of Biological Sciences (ATSB) June 25-28, 2026, Hammamet - Tunisia

Saturday, 27 June 2026

8h30 -10h30	**2 Sessions of Oral Communications & Workshop**		
	Room 1:	**Room 2:**	**Room 3: Workshop**
	Biotechnology 3	**Plant Physiology & Biology 2**	**Bioinformatics**
	Moderators: Pr. Karima Belguith Pr. Souad Rouis Pr. Moufida Tounsi	**Moderators:** Pr. Abdelilah Chaoui Pr. Issam Nouairi Pr. Arafet Manaa	**8h30 – 12h** **Trainers:** Pr. Emna Harigua Pr. Houcemeddine Othmane
	Comm N°80-83,85,86,88,89,91	**Comm N° 47-55**	
10h30-10h45	**Coffee Break** *Free service at the bar (all-in)*		
10h45-11h30	**Plenary Conference 4**		
	Moderators	**Pr. Chokri Messaoud & Pr. Abdelilah Chaoui**	
	Presented by	**Pr. Nabil ATTIA**, *National Institute of Nutrition and Food Technology, LR 12SP05, SURVEN-Tunisie, Lipidology, Nutrition and Metabolic Syndrome Team, Tunis, Tunisia.*	
	Title	**Role of PCSK9 and ABCA1 in Reverse Cholesterol Transport in Coronary Artery Disease and Type 2 Diabetes.**	
11h30-13h00	**3 Sessions of Oral Communications (+ One day)**		
	Room S1:	**Room S2:**	**Room S3:**
	Environment 2	**Active Biomolecules**	**Biochem/Biotech**
	Moderators: Pr. Manel Ben Mhadheb Pr. Slah Ouerhani Pr. Karim Kadri	**Moderators:** Pr. Nabil Ben Youssef Pr. Leila Rezig Pr. Nawrez Ktari	**Moderators:** Pr. Faiza Fakhfakh Pr. Sami Ben Haj Ahmed Pr. Emna Harigua
	Comm N° 41, 99, 103-105, 111	**Comm N°20, 124, 128, 133-135**	**Comm N°5, 18, 19, 84, 90, 92, 93**
13h00 - 14h30	**Lunch**		
14h30 - 16h30	**Poster Session B:**	**Poster N° 96 - 190, One day: 2,23,25,26,37,39,73,92,102,161,176**	
	Moderators: Pr. Abdelilah Chaoui Pr. Riadh Ben Salah, Pr. Wahbi Djebali, Dr. Wael Bahia Dr. Faouzi Horchani, Dr. Nesrine Ben Yahmed, Dr. Hafedh Hajlaoui, Dr. Nadia Smirani, Dr. Anouar Feriani, Dr. Ali Lafi, Thouraya Majoul,		
16h30 –16h45	**Coffee Break** *Free service at the bar (all-in)*		
16h45-17h00	**Distribution of Best Posters Awards**		
17h00-17h45	**Plenary Conference 5**		
	Moderators	**Pr. Slah Ouerhani & Pr. Mohamed Chemkha**	
	Presented by	**Pr. Bassem Jaouadi**, *Center of Biotechnology of Sfax*	
	Title: **From Environmental DNA to Industrial Biocatalysts: NGS-Driven Discovery of Extremozymes from Tunisian Extreme Ecosystems for a Circular Bioeconomy.**		
17h45 - 19h30	**3 Sessions of Oral Communications**		
	Room S1:	**Room S2:**	**Room S3:**
	Animal Physiology & Biology 2	**Plant Physiology & Biology 3**	**Environment 3**
	Moderators: Pr. Hichem Sebai Pr. Allagui MS Pr. Ilyes Zhioua	**Moderators:** Pr. Chokri Messoud Pr. Abdelmajid Krouma Pr. Mourad Jridi	**Moderators:** Pr. Moktar Hamdi Pr. Mohamed Naifer Pr. Imen Khouni
	Comm N° 29-36	**Comm N° 56-62**	**Comm N° 106-110 , 112-114**
19h30	**Dinner**		

Scientific Program of the 35th International Congress of the Tunisian Association of Biological Sciences (ATSB) June 25-28, 2026, Hammamet - Tunisia

Sunday, 28 June 2026

09h00 -09h30	**Plenary Conferences 6**	
	Moderators	**Pr. Manel Ben Mhadheb & Pr. Moktar Hamdi**
	Presented by	**Pr. Ilyes Zhioua** *Pasteur Institute of Tunis*
	Title	**How to write a successful grant application: case of the'USNIH.**
09h30 -09h45	Discussion	
09h45-10h00	**Coffee Break** *Free service at the bar (all-in)*	
	Plenary Mini-Conferences **Pr. Wahbi Djebali, Pr. Khémais Ben Rhouma, Pr. Hasna Mohammadi**	
10h00-10h20	**Mini-Conference 5:** **Presented by Dr. Ahmed Othmani, CRRAO Deguech** **Title:** Triploid and tetraploid induction in date palm (*Phoenix dactylifera* L.): a platform for genetic improvement	
10h20-10h40	**Mini-Conference 6:** **Presented by Dr. Oussama Souiai, IPT** **Title:** Génomique et métagenomique pour la surveillance des pathologies et maladies infectieuses	
10h40-11h00	**Mini-Conference 7:** **Presented by Dr. Sami Mnif, CBS** Title: Innovative Approaches to Biofilm Eradication and Resistance Management	
11h00-11h15	**Discussion**	
11h15 - 11h30	**Closing Ceremony & Departure**	

CONFERENCES

CONFERENCE N°: 1.

THE NADPH OXIDASE: WHY SO MUCH INTEREST?

BIZOUARN TANIA[1], AND BACIOU LAURA[1]

[1] *Institut de Chimie Physique, UMR8000 CNRS Université Paris-Saclay, Orsay*

Abstract:

The NADPH oxidases, whose members are all characterized by a membrane-bound flavocytochrome.Their sole function is to generate, in a highly controlled manner, reactive oxygen species (ROS), which, depending on their level of production, play various physiological roles (immune system, hormone synthesis, cell signaling, etc.). We are focused in particular on NADPH oxidase in phagocytes, whose activity is essential for the innate immune system to fight infections and destroy pathogens. The goal is to understand its highly refined regulation, which is controlled by multiple protein-protein and lipid-protein interactions triggered by cellular signaling and to explain how NADPH oxidase activation adapts to the cell needs. Given that this is a potential pharmaceutical target, this information is essential for developing pharmacological modulators. To understand the complexity of these NADPH oxidase assembly and activation processes and identify effective strategies for controlling its function, we are conducting functional and structural studies of the NADPH oxidase complex.

KEYWORDS: NADPH oxidase, membrane protein, innate immunity, redox enzyme, Reactive oxygen species, protein complex assembly

CONFERENCE N°: 2.

CHLOROPLAST SIGNALLING IN STRESS RESPONSES AND GROWTH CONTROL: FROM TOR TO PPGPP AND BEYOND

BEN FIELD,
DR CNRS, Bioscience and Biotechnology Institute of Aix-Marseille (BIAM), Marseille

Plants and algae must constantly balance growth with their response to environmental stress, and the chloroplast sits at the heart of this trade-off. As the site of photosynthesis, it produces the energy and carbon that fuel growth, but it is also highly sensitive to environmental fluctuations and a major source of stress signals. Two evolutionarily ancient signalling systems- the eukaryotic Target of Rapamycin (TOR) kinase pathway and the bacterial alarmone guanosine tetraphosphate (ppGpp)- have emerged as key regulators at this interface. TOR integrates nutrient and energy status to promote growth, while ppGpp, inherited from the prokaryotic ancestors of the chloroplast, throttles plastid gene expression and photosynthetic activity under stress. I will introduce our earlier work establishing the role of ppGpp in chloroplast regulation and plant immunity, our recent published findings on TOR-mediated control of the chloroplast through ppGpp signalling, and unpublished results revealing unexpected new layers of regulation. Together, these studies highlight the chloroplast as an active hub of signalling that coordinates growth and stress responses across photosynthetic organisms.

CONFERENCE N°: 3.

NANOCOMPOSITES AND ENCAPSULATION TECHNOLOGIES: TOWARD MULTIFUNCTIONAL SYSTEMS FOR BIOMEDICAL, ENVIRONMENTAL, AND ANTIBACTERIAL APPLICATIONS

MOURAD AROUS[1*], SIRINE MHIRI[1], YOSRA HADJ KACEM[1], RATIBA WALI[1], RIADH BEN SALAH[2], RAMZI MAALEJ[1]

[1] *Laboratory of Ceramics, Composites and Polymer Materials (LaMaCoP), Faculty of Sciences of Sfax, University of Sfax, Sfax, Tunisia. * mourad.arous@fss.usf.tn*

[2] *Laboratory of Microbial and Enzymatic Biotechnology and Biomolecules (LBMEB), Centre of Biotechnology of Sfax, University of Sfax, Sfax, Tunisia*

Abstract : The encapsulation of active molecules currently represents a promising strategy to improve the stability, bioavailability, and controlled release of compounds of biological interest, such as drugs, antioxidants, or antimicrobial agents. In this context, the growing emergence of antibiotic resistance poses a major challenge to both public and veterinary health, highlighting the urgent need to develop novel and effective antibacterial alternatives. Nanocomposites and hybrid nanostructures represent a new generation of material capable of delivering superior performance through the synergistic combination of specific matrices and surface-tunable nano-reinforcements. This conference provides an overview of recent advances in this field, focusing on the development of hybrid core–shell nanostructures based on metal oxide nanoparticles ZnO, MgO et Fe_3O_4 coated with natural amino acids (notably L-methionine). In this approach, the inorganic core provides intrinsic antimicrobial properties and tunable surface reactivity, while the organic shell improves colloidal stability and dispersion, and enhances interactions with microbial cell membranes to increase antibacterial efficiency. The synthesized nanomaterials were characterized by X-ray diffraction, electron microscopy, and vibrational spectroscopy, confirming the successful formation of stable core–shell architectures with good crystallinity and homogeneous morphology. The functionalization mechanisms, preparation methods, and evaluation of antibacterial activities against different microbial strains will be discussed. Finally, scientific challenges related to biocompatibility, biodegradability, and process reproducibility will be addressed, highlighting the significant potential of these multifunctional bioactive systems for developing innovative solutions that meet the requirements of healthcare and sustainable development.

KEYWORDS: Nanocomposites, Encapsulation, Amino acid coating, Core–shell nanostructures, Antibacterial activity, Multifunctional systems.

CONFERENCE N°: 4.

ROLE OF PCSK9 AND ABCA1 IN REVERSE CHOLESTEROL TRANSPORT IN CORONARY ARTERY DISEASE AND TYPE 2 DIABETES

NEBIL ATTIA

National Institute of Nutrition and Food Technology, Studies and Planning Department and Research Laboratory LR 12SP05, SURVEN-Tunisie, Lipidology, Nutrition and Metabolic Syndrome Team, Tunis, Tunisia.

Reverse cholesterol transport (RCT) is a critical atheroprotective mechanism that removes excess cholesterol from peripheral tissues and macrophage foam cells and delivers it to the liver for excretion. Among the molecular regulators of RCT, ATP-binding cassette transporter A1 (ABCA1) and proprotein convertase subtilisin/kexin type 9 (PCSK9) play central and often opposing roles. ABCA1 promotes cholesterol efflux and nascent high-density lipoprotein (HDL) formation, whereas PCSK9 contributes to dyslipidemia and atherosclerosis through effects on LDL receptor metabolism and inflammatory pathways.

The transfer of intracellular cholesterol and phospholipids to apolipoprotein A-I is mediated by ABCA1, leading to the formation of nascent HDL particles and initiation of RCT. Reduced ABCA1 expression impairs cholesterol efflux, promotes foam-cell formation, and accelerates atherosclerosis. In CAD patients, impaired ABCA1-mediated cholesterol efflux capacity has been linked to increased plaque burden and adverse cardiovascular outcomes. Furthermore, hyperglycemia, oxidative stress, and chronic inflammation associated with T2DM suppress ABCA1 expression and HDL functionality, thereby compromising RCT efficiency.

One of major plasma LDL-cholesterol regulatory is PCSK9 by promoting lysosomal degradation of LDL receptors. Increased PCSK9 activity reduces hepatic LDL clearance and elevates circulating LDL levels, thereby contributing to atherogenesis. Elevated plasma PCSK9 concentrations have been reported in both CAD and T2DM and are associated with enhanced cardiovascular risk, endothelial dysfunction, vascular inflammation, and plaque instability.

In summary, ABCA1 and PCSK9 represent two major regulators of cholesterol homeostasis and cardiovascular disease. While ABCA1 promotes cholesterol efflux and HDL biogenesis, PCSK9 contributes to dyslipidemia and atherosclerotic progression. In CAD and T2DM, impaired ABCA1 function and increased PCSK9 activity synergistically disrupt RCT, leading to cholesterol accumulation and vascular injury. Combined therapeutic strategies targeting both pathways may offer enhanced cardiometabolic protection in the future.

CONFERENCE N°: 5.

FROM ENVIRONMENTAL DNA TO INDUSTRIAL BIOCATALYSTS: NGS-DRIVEN DISCOVERY OF EXTREMOZYMES FROM TUNISIAN EXTREME ECOSYSTEMS FOR A CIRCULAR BIOECONOMY

BASSEM JAOUADI[1*], SONDES MECHRI[1,2,3], SÉVERINE CROZE[2], ALEXANDRE NOIRIEL[3], MARILIZE LE ROES-HILL[4], ABDELKARIM ABOUSALHAM[3], SLIM TOUNSI[5], JOEL LACHUER[2]

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[5] *Laboratory of Biopesticides, Centre of Biotechnology of Sfax, University of Sfax, Sfax, Tunisia*

Abstract: This study was conducted within the framework of the Horizon Europe Twinning Project NGS-4-ECOPROD (Grant Agreement No. 101079425), which aims to address critical gaps in next-generation sequencing (NGS) datasets for the development of eco-friendly biotechnological products and sustainable bioprocesses using genomic and metagenomic approaches. Sampling campaigns covered a wide range of Tunisian extreme environments and microbiota communities, including geothermal hot springs, forest soil ecosystems, high-altitude mountain peaks, sediments from the Sahara Desert and saline lakes, crude oil field sites, as well as marine surface and deep-sea water zones. These microorganisms were subjected to genomic and metagenomic exploration using advanced NGS platforms, including the Illumina NextSeq™ 500 system for short-read sequencing and Oxford Nanopore technologies (PromethION™ 2 Solo and MinION Mk1C) for long-read sequencing. Whole-genome sequencing (WGS) of selected strains provided high-resolution insights into microbial diversity, adaptation mechanisms, and functional potential. A total of 52 microbial species were isolated from Tunisian extreme environments, including fungi (35 isolates), yeasts (6), bacteria (9), and archaea (2). In parallel, environmental DNA (eDNA) analyses included 23 whole-metagenome shotgun datasets and 34 amplicon-based metagenomic datasets targeting the 16S rRNA, 18S rRNA, and ITS regions were investigated. Comprehensive bioinformatic analyses enabled the identification and annotation of genes encoding industrially relevant extremozymes, including lipases, phospholipases, proteases, chitinases, cellulases, and oxidoreductases. Several promising enzyme candidates were subsequently cloned, synthesized, and heterologously expressed in *Escherichia coli* BL21 (DE3) and *Pichia pastoris* X-33, followed by purification and biochemical characterization. The characterized extremozymes exhibited remarkable catalytic efficiency and stability under harsh operational conditions, including high temperatures, alkaline pH, elevated salinity, and the presence of organic solvents. These properties highlight their strong potential for applications in major industrial sectors such as detergents, leather processing, textiles, bioremediation, waste valorization, and green chemistry. The implementation of enzyme-based eco-friendly processes may contribute significantly to reducing chemical pollution, lowering energy consumption, and preserving ecosystem integrity. Furthermore, the integration of these robust biocatalysts into circular bioeconomy strategies supports the valorization of industrial and agro-industrial by-products into high-value biomolecules, thereby improving resource efficiency and environmental sustainability. Overall, this study underscores the considerable biotechnological potential of Tunisian extreme biotopes as sources of novel extremozymes and highlights the pivotal role of NGS-driven bioprospecting in promoting sustainable industrial innovation.

KEYWORDS: extremozymes; next-generation sequencing; environmental DNA; whole-genome sequencing; industrial biocatalysis; circular bioeconomy; sustainable biotechnology.

CONFERENCE N°: 6.

HOW TO WRITE A SUCCESSFUL GRANT PROPOSAL TO THE US NATIONAL INSTITUTES OF HEALTH

ELYES ZHIOUA [1,2]

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2. **International Center of Research and Training,** Sidi Bouzid, Tunisia.

Abstract: *Grant funding is essential for sustaining a career in research, but the process of writing grant can be labor intensive and overwhelming. To write an effective grant proposal, it is important to have a thorough understanding of fundamental grant-writing principles and best practices.*

The US National Institutes of Health (NIH) represent one of the largest sources of biomedical research funding in the world with an annual budget exceeding $45 billion. It is of major importance to point out that the US National Institute of Allergy and Infectious Diseases (NIAID) a component of the US NIH is the only institution in the world that allow scientists from low and mid income countries (LMIC) to submit their grant proposal either as principal investigator (PI) or co-principal investigator (Co-PI) for funding.

Preparing an NIH grant proposal is a rigorous, multi-step process that typically takes 6 to 12 months. It requires finding the right Funding Opportunity Announcement (FOA), assembling a team, drafting a clear Research Strategy, and securing institutional eRA Commons and SAM registrations. Below, we have outlined the typical core sections, along with resources to support effective writing for each.

Sections:

- *Specific Aims*
- *Approach*
- *Significance & Innovation*
- *Abstract & Narrative*

KEYWORDS: *Grant writing, US National Institutes of Health*

MINI CONFERENCES

MINI CONFERENCE N° 1:

ENZYMES IN POST-HARVEST FRUIT TREATMENT AS GREEN SOLUTIONS FOR SUSTAINABLE FOOD PRODUCTION: CHALLENGES AND OPPORTUNITIES

AYMEN EZZINE [1, 2], SAFA BEN HADJ MOHAMED [1], YOSRA AOUDI [1], LAURA BACIOU [3], ISSAM SMAALI [1], MOHAMED NAJIB MARZOUKI [1]

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Abstract: Phytopathogenic fungi pose a considerable threat to the agricultural industry by causing substantial economic losses through severe plant diseases. The excessive use of synthetic fungicides to combat phytopathogens has raised environmental and human health concerns. Consequently, there is an increasing demand for safe and environmentally friendly biopesticides to align with consumer preferences for uncontaminated food. A particularly promising alternative to synthetic fungicides involves the utilization of pivotal hydrolytic enzymes like glucanases, chitinases, and proteases. These enzymes effectively manage fungal phytopathogens while concurrently fostering sustainable plant protection. They function by disrupting the cell wall, proteins, and DNA of phytopathogens, thereby establishing a reliable method of biocontrol. The primary functions, contributions to plant and fruit protection, and mechanisms of action of a case studied enzymes will be explored.

KEYWORDS: Biological control, Glucanase, Chitinase, Phytopathogenic fungi

MINI CONFERENCE N° 2 :

GREEN NANOTECHNOLOGY FOR SUSTAINABLE AGRICULTURE: PLANT-DERIVED METALLIC NANOPARTICLES AS TOOLS FOR CROP PROTECTION AND ENHANCED PRODUCTIVITY

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Abstract: In the face of climate change and the growing demand for food, sustainable agricultural innovations are urgently required to ensure global food security. Among emerging technologies, biogenic nanoparticles, synthesized using biological resources such as plants, microorganisms, and their metabolites, have attracted considerable attention owing to their eco-friendly, cost-effective, and sustainable nature. These nanoparticles integrate the benefits of nanotechnology with the principles of green chemistry, providing a promising alternative to conventional agricultural inputs. Characterized by their nanoscale dimensions (1–100 nm), high surface-area-to-volume ratio, and unique physicochemical properties, biogenic nanoparticles exhibit enhanced reactivity and functionality compared with their bulk counterparts. These attributes enable improved nutrient delivery, increased fertilizer and pesticide efficiency, and reduced agrochemical losses. Furthermore, biogenic nanoparticles can serve as effective carriers for the targeted and controlled release of agrochemicals, thereby enhancing crop protection while minimizing environmental contamination. Through their application in the precise management of agricultural inputs, biogenic nanoparticles hold substantial potential to enhance crop productivity, strengthen resilience to environmental stresses, and promote the sustainability of modern agroecosystems. In this presentation, we will highlight recent scientific and technological advances in the field of biogenic nanoparticles, with a particular focus on research conducted at the Laboratory of Legumes and Sustainable Agrosystems (L_2AD), within the Center of Biotechnology of Borj Cedria (CBBC), as well as studies carried out under the framework of the Nanoferty project (P_2ES-D_4P_2). Special attention will be given to the development and application of biogenic nanomaterials aimed at enhancing plant productivity, improving tolerance to biotic and abiotic stresses, and supporting the transition toward more sustainable and resilient agricultural systems.

KEYWORD:, Green synthesis, Nanoparticles, Nanofertilizer, Nanopesticide, Sustainable agriculture

MINI CONFERENCE N°3 :

DO PARASITES INDUCE THE EXPRESSION OF BIOCHECHEMICAL MARKERS IN THE GOLDEN GREY MULLET *CHELON AURATUS* (RISSO, 1810)?

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Abstract : The Mullet (*Chelon auratus*) is a eurythermal and euryhaline fish, with high protein content in muscles and eggs. In the current investigations, 40 individuals were examined for the prevalence of parasites. Approximately half of the investigated individuals were infested with three parasites, comprising two copepods, (*Lernanthropus mugilis,* prevalence P=25%, mean intensity M.I.=1.4 and abundance A=0.7 and *Parabrachiella mugilis* P=17.5%, M.I.=1.95 and A=0.7) and one species of Myxosporidia *Myxobolus exiguus* (P=15%, M.I.=1.83 and A=0.55) respectively. All the parasite species encountered in the current study were satellite species, whose prevalence did not exceed 50%.

The effect of parasitism was followed by the modulation of antioxidant defense in infested fish and confirmed the allergenic effect of parasites on antioxidant metabolism following the mobilization of nonenzymatic scavengers and afterward of catalase (CAT), gluthathione S-transferase (GST), acetylcholinesterase (AChE), and malondialdehyde (MDA) to trap the excess of ROS, respectively. The body of mullet involves important biochemical responses through the activation of several detoxification mechanisms at all the organs considered (gills, liver and muscles) to fight, survive and acclimate to stressful conditions. However, it could be concluded that the parasite *L. mugilis* was more virulent compared to *P. mugilis* and *M. exiguus,* since the gills had the highest biomarker changes. The results of the current pilot study could be extended in the future for the study of biomarkers, by integrating the entire enzymatic chain involved in antioxidant defense and the dosage of ROS and also to extend the efforts toward other fish species to further identify the deleterious effect induced by the parasites on their hosts with the aid of biomarkers.

KEYWORDS: Chelon auratus, parasites, biomarkers, oxidative stress

MINI CONFERENCE N° 4:

NARINGIN, QUERCETIN AND CHLOROGENIC ACID MIXTURE AND DIABETES: FOCUSING ON THE THERAPEUTIC STRATEGIES

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ABSTRACT:
Despite their broad spectrum of antioxidant, anti-inflammatory, anticancer, and antidiabetic activities. The therapeutic effects of phenolic compounds, particularly flavonoids, are significantly reduced by their low bioavailability in reaching the bloodstream, due to their size and solubility. Among these flavonoids and phenolic acids are naringin (N), quercetin (Q), and chlorogenic acid (C), which are considered powerful therapeutic agents for diabetes mellitus. Clinical, *in vitro*, and *in vivo* studies have shown that these molecules, when administered alone, improve insulin sensitivity, glucose metabolism, and insulin resistance. They also have antioxidant and anti-inflammatory effects through the regulation of multiple signaling pathways. Our results highlight the supplementation for ten consecutive weeks of the natural compound mixture namely NCQ mixture mitigated diabetic renal fibrosis and inflammation induced by STZ via purinergic signaling and myocardial hypertrophy by the regulation of apoptosis and necroptosis in diabetic aged rats.

Keywords: phenolic acids mixture, Diabetes, therapeutic mechanism

MINI CONFERENCE N° 5:

TRIPLOID AND TETRAPLOID INDUCTION IN DATE PALM (*PHOENIX DACTYLIFERA* L.): A PLATFORM FOR GENETIC IMPROVEMENT

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Abstract

The date palm is the key foundational plant in desert regions, providing economic resource and favorable microclimate that supports the entire oasis agricultural system. However, its long juvenile phase and dioecious nature make sexual multiplication and conventional intra-varietal breeding inefficient for generating new elite genotypes susceptible to resist to major contemporaneous biotic and abiotic stresses. In this study, a naturally occurring 2n/4n ploïdy chimera of date palm was identified. The tetraploïd sector was successfully propagated through in vitro culture and subsequently used as the female parent in a cross with diploid male palms. Four confirmed triploids with distinct phenotypes, including a sterile bisexual palm, a sterile male, and two fertile females producing high-quality fruits with very small seeds were produced. Furthermore, tetraploid males were produced by treating embryogenic callus with oryzalin. Surely, this genotype opens new breeding perspectives, as crosses with diploid, triploid, or tetraploid females can generate novel genomic combinations inaccessible through conventional and even modern methods. In date palm, polyploids may also enhance fiber quality for construction and papermaking, increase secondary metabolite production, and improve tolerance to major environmental stresses, as well as landscape value and potential resistance to pests and diseases, notably the red palm weevil, due to the robustness of their organs. These results highlight polyploidization as a powerful tool for future genetic improvement and functional research in date palm.

MINI CONFERENCE N° 6:

FROM GENOMES TO ACTION: GENOMIC SURVEILLANCE AT THE ONE HEALTH INTERFACE OF AGRICULTURE, WILDLIFE, AND HUMAN HEALTH

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Agriculture faces increasing threats from both emerging and re-emerging pathogens that impact livestock, wildlife, and crop production systems. The rapid evolution and dissemination of infectious agents, driven by globalization, environmental change, and intensified human-animal interactions, underscore the urgent need for effective genomic surveillance strategies. Recent advancements in high-throughput sequencing technologies have transformed our capacity to detect, characterize, and monitor pathogens in near real time. This presentation will provide an overview of our genomic surveillance approaches applied to pathogens of agricultural importance, focusing particularly on viral, bacterial, and zoonotic agents that circulate at the human-animal-environment interface. These genomic surveillance and analysis approaches are implemented within the 'ZOO-TRACK' (Integrated Metagenomic, Metaproteomic, and Serological Surveillance of Zoonotic Viruses in Livestock and Rodents for Early Detection and Risk Assessment) and 'FIELD-LIGHT' (Field Deployable Leishmania Identification Genotyping for Health Tracking) projects. Drawing on experiences from pathogen genomics research and surveillance initiatives, the talk will illustrate how sequencing technologies, including portable long-read platforms, can support outbreak investigation, facilitate pathogen discovery, enhance molecular epidemiology, and identify genetic markers associated with virulence, host adaptation, and antimicrobial resistance.

MINI CONFERENCE N° 7:

INNOVATIVE APPROACHES TO BIOFILM ERADICATION AND RESISTANCE MANAGEMENT

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Abstract: Biofilms are structured microbial communities embedded in a self-produced extracellular matrix that make infections especially persistent and difficult to treat. By protecting bacteria from antibiotics and host defenses, biofilms play a major role in chronic and recurrent infections, particularly those caused by pathogens such as *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. Their resistance is further strengthened by the exchange and acquisition of resistance genes, which contributes to multidrug-resistant phenotypes and worsens clinical outcomes. In addition to this physical protection, biofilm-forming bacteria rely on quorum sensing, a cell-to-cell communication system that coordinates biofilm development, virulence factor expression, and collective resistance. Because these signaling networks are highly complex, they remain difficult to fully understand and target effectively.

Given the global burden of biofilm-associated infections, there is a growing need for new strategies that can overcome microbial resistance. Current research in our team is therefore focusing on combination therapies, novel antimicrobial agents, and compounds that interfere with biofilm formation, maintenance, or communication pathways. Natural bioactive molecules are particularly promising because of their ability to inhibit biofilm development and quorum sensing–dependent virulence. In parallel, nanotechnology is emerging as a powerful approach for controlling resilient biofilms and may offer effective alternatives to conventional antibiotics and biocides.

KEYWORDS: Biofilm, Quorum sensing, Bioactive molecules, Nanotechnology

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ORAL COMMUNICATIONS

BIOCHEMISTRY AND MOLECULAR BIOLOGY

ORAL COM N°: 1.

EXTRACTION, CHARACTERIZATION AND HYPOCHOLESTEROLEMIC POTENTIAL OF POLYSACCHARIDES FROM THE GUM OF COLUMNAR PINE (ARAUCARIA COLUMNARIS)

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Natural ecosystems are a rich source of bioactive compounds, and polysaccharides have gained growing interest due to their structural diversity and broad biological activities. Despite its remarkable phytochemical potential, the gum of the columnar pine (*Araucaria columnaris*) remains poorly explored. This study investigates the extraction, characterization, and hypocholesterolemic property of polysaccharides isolated from *A. columnaris* gum. Extraction was performed using hot water, followed by purification steps including ethanol precipitation, deproteinization, and dialysis. Structural characterization was carried out using FTIR, XRD, GC-FID, and GC-MS analyses. GC-FID enabled monosaccharide composition identification, while GC-MS was used to investigate glycosidic linkages within the polysaccharide chains. Biological evaluation revealed notable hypocholesterolemic potential, demonstrated by the inhibition of cholesterol absorption, modulation of lipid metabolism, bile acid binding, and reduction of micellar cholesterol solubility, suggesting a promising role in cardiovascular risk management.

Keywords : *Araucaria columnaris*; structural characterization; hypocholesterolemic activity

ORAL COM N°: 2.

HEPATOPROTECTIVE EFFECTS OF *CLEOME ARABICA* FRUIT EXTRACT IN WISTAR RATS INTOXICATED WITH BISPHENOL A : GC-MS AND *IN SILICO* ANALYSIS.

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Abstract

We aimed to investigate the antioxidant and therapeutic effects of *Cleome arabica* fruit (CA) extract using a combination of in vitro, in vivo, and in silico approaches. Thirteen metabolites were identified within the aqueous extract through GC-MS profiling. In vivo, the findings indicated that CA had a hepatoprotective effect by attenuating the metabolic and structural changes induced by BPA. CA normalized liver injury markers (ALT, AST, and ALP) to a desirable state. CA pretreatment also significantly precluded the negative effects of BPA exposure on liver oxidative stress markers (MDA, SOD, GPx, and GSH). Histopathological findings also confirmed the hepatoprotective properties of CA by revealing improvements in BPA-induced ultrastructural changes. For *in silico* docking simulations, our results indicated that the abundantly found compounds from Cleome arabica showed high-affinity interaction with candidate antioxidant regeneration complexes such as glutathione reductase. **Conclusion**: The present study suggested that CA has a strong hepatoprotective activity probably because of its rich phytochemicals profile.

Keywords: *Cleome arabica*, GC-MS/MS analysis, Hepatoprotective effect, Bisphenol A.

ORAL COM N° : 3.

PHYSICOCHEMICAL CHARACTERIZATION AND NUTRACEUTICAL POTENTIAL OF SEED OILS EXTRACTED FROM THREE *PHOENIX DACTYLIFERA* L. VARIETIES OF KÉBILI OASES

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Abstract: The present study examines the phytochemical composition and biological properties of seed oils derived from three date palm varieties (*Phoenix dactylifera* L.) Arechti, Deglet Ennour, and Ghars Souf harvested from the oases of Kébili (Errabta). Oils obtained by cold maceration and mechanical pressing yielded extraction rates ranging from 5.3 ± 0.2% to 8.43 ± 0.31%, with physicochemical parameters conforming to Codex Alimentarius standards, indicative of high nutritional quality. GC-MS fatty acid profiling identified lauric acid as the dominant saturated fatty acid (12.51–55.49%) and oleic acid as the principal unsaturated fatty acid (12.37–39.82%).

Quantification of phenolic metabolites revealed significant inter-varietal and inter-method variability ($p \leq 0.05$). Hexane extraction yielded the highest polyphenol (0.37 ± 0.04 mg GAE/g oil) and flavonoid (0.16 ± 0.02 mg CE/g oil) concentrations in Deglet Ennour, which consistently exhibited the greatest phenolic content across all extraction procedures. Mechanical pressing proved more effective for polyphenol recovery in Arechti (0.10 ± 0.01 mg GAE/g).

Antioxidant activity, assessed by DPPH and FRAP assays, showed moderate efficacy across all samples, with IC_{50} values of 4.7–14.5 mg/mL and 14.7–45.5 mg/mL, respectively substantially higher than those of BHT (0.0107 mg/mL). Mechanically pressed Arechti oil demonstrated the most favorable antioxidant performance (IC_{50} = 6.5 mg/mL, DPPH; 14.7 mg/mL, FRAP), though all samples remained less potent than the synthetic reference.

Furthermore, the seed oils exhibited notable inhibitory activity against α-amylase and pancreatic lipase, supporting potential antidiabetic and anti-obesity applications, albeit with lower potency relative to the reference compounds acarbose and orlistat. These findings collectively highlight the functional food and nutraceutical potential of *P. dactylifera* seed oils as natural bioactive ingredients.

KEYWORDS: Phoenix dactylifera L., seed oil, fatty acids, GC-MS, polyphenols, antioxidant activity, antidiabetic activity, anti-obesity activity.

ORAL COM N° : 4.

RESISTANCE-BREAKING STRAINS OF TOMATO SPOTTED WILT VIRUS SUPPRESS IMMUNITY IN SW-5–CARRYING TOMATOES VIA HORMONAL SIGNALING MANIPULATION AND ARF TRANSCRIPTIONAL DYSREGULATION

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Abstract:

Tomato spotted wilt virus (TSWV) causes severe yield losses in tomato (*Solanum lycopersicum*), with emerging resistance-breaking strains undermining the effectiveness of the commercially deployed *Sw-5b* resistance gene. Here, we demonstrate that the Rib1TL1 TSWV strain overcomes *Sw-5b*-mediated resistance through manipulation of hormonal signaling pathways. Infected HEINZ *Sw-5b* plants displayed severe systemic symptoms, stunting, and growth suppression, accompanied by progressive viral accumulation throughout infection at 7,14 and 28 dpi. Physiological analyses revealed dramatic reductions in chlorophyll content declined by 70% and soluble sugars by 78% indicating severe impairment of primary metabolism.Thus TSWV infection triggered excessive reactive oxygen species accumulation, evidenced by elevated H_2O_2 (0.43 fold) and lipid peroxidation marked by increase of MDA (0.5-fold), which lead to the activation of antioxidant defense enzymes activities including GPx (0.43 fold), CAT (0.33-fold), and SOD (0.23 fold). This ROS imbalance disrupted photosynthetic electron transport, reducing both PSI and PSII efficiency. Hormonal profiling revealed increased abscisic acid (ABA) and salicylic acid (SA) coupled with substantial auxin depletion. Gene expression analysis showed selective repression of ARF genes involved in auxin (IAA) signaling including *SlARF2A/B, SlARF4, SlARF7A/B, SlARF8A/B* while *SlARF17* and *SlARF24* were induced, with enrichment of ABA-responsive elements (ABRE) in their promoters. Our results indicate that TSWV exploits ABA-responsive signaling to disrupt IAA–SA crosstalk, thereby suppressing defense responses and promoting host susceptibility in *Sw-5b* tomatoes. These findings provide mechanistic insights into virus-mediated resistance-breaking and identify potential targets for developing durable resistance strategies.

Keywords : Tomato spotted wilt Virus,Tomato, Phytohomone,Auxin response factors , Cis Regulatory Elements

ORAL COM N° : 5.

MICROENCAPSULATION MODULATES FATTY ACID RELEASE AND IN VITRO DIGESTIBILITY OF ALLIUM CEPA SEED OIL

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Abstract :
This study focused into how microencapsulation impacted the digestibility and fatty acid release of onion seed oil (Allium cepa L.), which is abundant in unsaturated fatty acids but easily oxidized. Their study investigated the combined effects of two emulsification procedures, rotor-stator homogenization (RSH) and cross-flow membrane emulsification (CFME), as well as two drying methods, spray drying and freeze drying. The results revealed that RSH created smaller droplets, but CFME produced more uniform droplets and had a greater encapsulation efficiency. Spray-dried powders had a decreased moisture content and improved physical stability, but freeze-dried powders formed a more porous structure. Fatty acid research revealed that onion seed oil was mostly made up of unsaturated fatty acids, including linoleic and oleic acids, which were better kept in freeze-dried samples. In vitro digestion experiments using the standardized INFOGEST procedure demonstrated that freeze-dried microcapsules were much more lipid digestible than spray-dried ones. Furthermore, freeze-dried formulations increased the release of unsaturated fatty acids, indicating better bioaccessibility. The findings show that the structural features of microcapsules, which are influenced by the emulsification and drying procedures used, have an important effect in lipid stability, digestibility, and nutritional function. Overall, the study demonstrates microencapsulation's promise as a viable technique for developing personalized lipid delivery systems for functional foods and nutraceutical applications.
KEYWORDS: *rotor-stator homogenization ;cross-flow membrane emulsification, lipid digestibility.*

ORAL COM N° : 6.

IKZF1 RS4132601 VARIANT AND Δ4–7 SOMATIC DELETION IN ACUTE LYMPHOBLASTIC LEUKEMIA: A BIOINFORMATICS AND CASE-CONTROL STUDY

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Abstract
IKZF1 is a key regulator of lymphocyte differentiation, and its alterations are associated with increased susceptibility and poor prognosis in acute lymphoblastic leukemia (ALL). This study investigates the association of the *IKZF1* rs4132601 polymorphism and Δ4–7 somatic deletion with ALL risk, while also exploring their molecular effects using bioinformatics approaches. A case-control study was conducted including 58 pediatric ALL patients and 150 healthy controls. Genotyping of the rs4132601 variant was performed by PCR followed by sequencing, while Δ4–7 deletions were detected using multiplex PCR. Bioinformatics analyses estimated differences in free energy of hybridization between wild-type and variant alleles and assessed potential alterations in miRNA-binding sites within the *IKZF1* 3′UTR, as well as changes in RNA secondary structure.
The rs4132601 G allele was significantly associated with a reduced risk of ALL [OR (95% CI):
0.36 (0.19–0.69)]. A strong association was also observed between the variant and the Δ4–7 deletion [RR (95% CI): 8.33 (1.57–10.69)]. In silico analysis indicated that this polymorphism disrupts binding sites for miR-1261, miR-524-3p, and miR-525-3p, potentially affecting post-transcriptional regulation of *IKZF1*. It may also increase RNA secondary structure stability, which could impair normal regulation and contribute to leukemogenesis.
Overall, these findings show a significant association between rs4132601, Δ4–7 deletion, and pediatric ALL susceptibility, suggesting a role for altered miRNA-mediated regulation and RNA structure in disease development.
KEY WORDS: ACUTE LYMPHOBLASTIC LEUKEMIA · BIOINFORMATICS · IKZF1 · Δ4–7 DELETION · MIRNA REGULATION

ORAL COM N° :7.

BIOCONVERSION OF OLIVE MILL WASTEWATER INTO RHAMNOLIPIDS WITH BIOSTIMULANT POTENTIAL

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Background: Olive mill wastewater (OMW) is a major by-product of the olive oil industry, rich in organic matter and phenolic compounds, making it a serious environmental pollutant. Traditional disposal methods are unsustainable, prompting the need for eco-friendly solutions. Bioconversion of OMW into valuable products like rhamnolipids offers a sustainable alternative. Rhamnolipids are microbial biosurfactants with surface-active and plant biostimulant properties. They can enhance plant growth, improve stress tolerance, and serve as natural agricultural inputs. Using OMW as a substrate for rhamnolipid production not only addresses waste management issues but also supports the circular bioeconomy. This study explores the microbial conversion of OMW into rhamnolipids and evaluates their potential as biostimulants in agriculture.
Materials/Methods: *Pseudomonas aeruginosa* was cultured in olive mill wastewater (OMW) for 7 days at 30 °C, 130 rpm. Biosurfactants were extracted from the supernatant via acid precipitation and chloroform: methanol (2:1) extraction, then dried at 40 °C. Antimicrobial activity of rhamnolipids (1–3 g/L) was tested against *E. coli*, *S. aureus*, and *S. typhimurium* using the disc diffusion method. For biostimulant evaluation, *Trigonella foenum-graecum* and *Zea mays* seeds were treated with rhamnolipids (0.25–0.75 g/L), and germination and root growth were assessed after 5 days.
Results: *Pseudomonas aeruginosa* grown on olive mill wastewater (OMW) under optimized conditions (pH 7, 30 °C, 120 rpm) reached a high cell density (OD = 13.51 ± 0.48). Rhamnolipid production was confirmed by a reduction in surface tension (42.0 mN/m), a strong emulsification index (72.22%), and effective oil displacement. The final yield was 6 g/L. Antimicrobial assays showed no inhibitory activity against *E. coli*, *S. aureus*, or *S. typhimurium* at concentrations up to 3 g/L, indicating low toxicity. In contrast, seed germination assays demonstrated significant biostimulant effects, with germination indices of 151.71% for *Trigonella foenum-graecum* (0.5 g/L) and 176.83% for *Zea mays* (0.75 g/L). These findings highlight the potential of rhamnolipids as eco-friendly biostimulants and support the valorization of agro-industrial waste streams.
Conclusion: This study demonstrates the potential of olive mill wastewater as a sustainable and cost-effective substrate for rhamnolipid production by *Pseudomonas aeruginosa*. The successful synthesis of rhamnolipids, validated through key surface activity indicators, illustrates the feasibility of converting agro-industrial waste into valuable biosurfactants. Despite the absence of antibacterial effects, the non-toxic nature of the produced rhamnolipids supports their suitability for diverse applications, including agriculture, cosmetics, and environmental remediation. Most notably, their ability to significantly enhance seed germination in *Trigonella foenum-graecum* and *Zea mays* underscores their promise as biostimulants in sustainable crop production. These findings align with green chemistry principles, offering an eco-friendly approach to transform agro-industrial waste into high value bioproducts.

ORAL COM N° : 8.

EVALUATING THE IMPACT OF PD-L1 AND PD-1 GENE POLYMORPHISMS ON BREAST CANCER SUSCEPTIBILITY: A CASE-CONTROL STUDY IN TUNISIA.

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Abstract:

The PD-1/PD-L1 pathway plays a crucial role in mediating tumor immune escape. Although genetic variations in these checkpoints have been linked to cancer susceptibility, data regarding North African populations remain limited. This study investigated the associations of *CD274* (PD-L1 rs2890658) and *PDCD1* (PD-1 rs2227981, rs11568821) polymorphisms with breast cancer (BC) risk and clinicopathological features in Tunisia. A case-control study was conducted involving 176 BC patients and 166 healthy controls from Monastir. Genotyping was performed using PCR-RFLP. Data were analyzed using Chi-square and Fisher's exact tests, and SNPstats software was utilized to evaluate genetic inheritance models. The *CD274* rs2890658 C/A genotype was found to significantly increase BC susceptibility, particularly within the 50–59 age group, following an overdominant model. In contrast, *PDCD1* rs2227981 showed no significant association with BC risk, and rs11568821 was found to be monomorphic in the studied population. This study identifies *CD274* rs2890658 as a novel etiological risk factor for breast cancer in Tunisian women, particularly those aged 50–59. These findings provide critical, pioneer insights into the genetic landscape of immune checkpoints in North Africa. Ultimately, this work suggests that this polymorphism could serve as a potential genetic biomarker for breast cancer risk assessment in this population.

***KEYWORDS*:** PD-L1 (rs2890658), PD-1, genetic polymorphism, breast cancer, susceptibility, Tunisian population.

ORAL COM N°: 9.

Hexadecanoic acid, found on the eggs of *Phlebotomus papatasi* from Central Tunisia, attracts gravid females and stimulates oviposition

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Abstract: *Phlebotomus papatasi* is a vector of *Leishmania major*, the etiologic agent of zoonotic cutaneous leishmaniasis, a disfiguring and debilitating disease. In this study, we identified fatty acids found on the exterior of eggs laid by female *P. papatasi* that could be potential oviposition pheromones. We tested the effect of different treatments on 1) the number of eggs laid and 2) the spatial distribution of eggs laid. The treatments included three quantities of eggs (80, 160 and 320), hexane extracts of 160 eggs, 160 eggs after being washed with hexane to remove any pheromones, and three concentrations (1ng, 10ng and 100ng) of synthetic versions of three fatty acids that we identified as being present on egg exteriors. The saturated fatty acids dodecanoic (C12) and tetradecanoic (C14) acid, identified by GC/MS analysis, were abundant in hexane extracts of both eggs and gravid females but were present in only trace amounts in males. Hexadecanoic and hexadecenoic (C16) acids were abundant on eggs, gravid females and males. A negative binomial GLM found that significantly more eggs were oviposited by gravid females in response to 80 eggs (P=0.0255), 160 eggs (P<0.001), 320 eggs (P<0.001) and the hexane extract of 160 eggs (P<0.001). Eggs washed in hexane were not more attractive than a control (P=0.591). The number of eggs laid was increased by all three concentrations of hexadecanoic acid (P<0.001), 10ng and 100ng of tetradecanoic acid (P<0.001), and 1ng and 10ng of dodecanoic acid (P<0.001). The spatial response of oviposition (the proportion of eggs laid on the test vs. control side of the oviposition pot) was weaker than the response of total eggs laid. A beta GLM found that gravid females laid a significantly higher proportion of eggs near 160 eggs (P=0.004) and significantly lower proportion of eggs near 100ng of dodecanoic acid (P=0.016). Bootstrapping and permutation tests also suggested significant attractive effects of 320 eggs, egg extract, and 1ng and 10 ng of hexadecenoic acid. These results suggest that hexadecanoic acid is the oviposition pheromone, of *P. papatasi* from Tunisia because its presence increases both the number of eggs laid and attracts oviposition over the small spatial scales of the assay. In this study, dodecanoic acid increased the number of eggs laid but either did not change their spatial distribution or was repulsive at the highest concentration. The observed difference may be related to the different geographical origins of the sand flies used in this study.
KEYWORDS: *Sand fly; Phlebotomus papatasi; oviposition pheromone; eggs; tetradecanoic acid; hexadecanoic acid; dodecanoic acid; attractant; stimulant*

ORAL COM N°: 10.

LACTOCOCCUS LACTIS FERMENTATION ENHANCES PROBIOTIC STABILITY AND ANTIOXIDANT BIOAVAILABILITY IN ORANGE JUICE

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Orange juice fermented by *Lactococcus lactis* represents an innovative strategy for developing a non-dairy functional beverage. *L. lactis* population increased from 7.39 to 8.50 log cfu/mL within 48 h and remained at 8.30 log cfu/mL after 3 weeks at 4°C, exceeding the minimum probiotic threshold.
Growth induced rapid acidification and increased titratable acidity through strictly homofermentative metabolism converting glucose to lactic acid. Intense proteolytic activity enriched the juice with essential and hydrophobic free amino acids: arginine, threonine, leucine/isoleucine, lysine/glutamine, and phenylalanine.
Total phenolic compound content increased through enzymatic hydrolysis, releasing highly bioavailable molecules such as ferulic acid, protocatechuic acid, and flavonoid aglycones. These enzymatic bioconversions elevated DPPH radical scavenging from 56.30% to 69.43% and ABTS scavenging from 45.34% to 61.03%.

Keywords: *Lactococcus lactis,* orange juice, probiotics, proteolysis, phenolic bioconversion, functional beverage

ORAL COM N° : 11.

PENNISETUM GLAUCUM (L.) ORAL SUPPLEMENTATION MITIGATES MULTI-ORGANIC DYSFUNCTION ASSOCIATED WITH CARCINOGENESIS IN HPV16-TRANSGENIC MICE

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Abstract: Cancers induced by human papillomavirus are often associated with systemic inflammation and cachexia. This study aimed to determine the interference of Pennisetum glaucum oral supplementation over multi-organic dysfunction in HPV16-transgenic mice. The experimental groups included (1) wildtype (WT) mice with standard diet, (2) WT mice with 36% Pennisetum, (3) transgenic mice with standard diet, (4) transgenic mice with 29% Pennisetum, and (5) transgenic mice with 36% Pennisetum. During the 4-week experimental protocol, body weight, food and water intake, and humane endpoints were recorded. At sacrifice, blood and tissue samples were collected for analysis. Oral supplementation with millet was shown to be safe and well tolerated by both WT and transgenic mice, with no adverse effects on behavior, food or water intake, or general animal welfare. In HPV16- transgenic animals, millet supplementation was associated with an improved health status, reduced serum glucose levels, enhanced antioxidant responses, and a notable reduction in the severity of HPV-induced skin and organ lesions. Overall, *Pennisetum glaucum* was safe under these experimental conditions and is a promising functional food for patients suffering from systemic paraneoplastic syndromes. Longer exposure periods and doses should be evaluated experimentally before proceeding to clinical trials of Pennisetum containing diets.

KEYWORDS: *cancer;* HPV16-transgenic mice*; Pennisetum glaucum*

ORAL COM N° : 12.

CHANGES IN ANTIOXIDANT, ANTIBACTERIAL AND ANTIBIOFILM ACTIVITIES OF FENUGREEK AT DIFFERENT STAGES OF MATURITY

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Abstract: The total phenolic and total flavonoids contents decreased during fenugreek seed development. The highest phenolic and flavonoid contents was observed in immature stage, with values of 29.80±0.18 and 23.00±0.08 mg g^{-1} DW, respectively. This suggests that the seeds of immature stage may be a better source of nutritious food products than the premature and mature seeds. Immature seeds exhibited a higher DPPH scavenging activity than the others stages, which may imply that phenolic extracts might contain some highly reactive antioxidative substances. The antioxidant activity determined also by reducing power assay (ferricyanide method) decreased by 50%, from 0.45±0.01 mg/mL at immature stage to 0.65±0.10 mg/mL at premature stage. The full mature seed extracts showed the largest inhibition zones overall, particularly against *S. aureus* (18.5 mm) and *E. faecalis* (18.5 mm). The antibiofilm activity assessed by crystal violet test demonstrated significant antibiofilm activity against the bacterial strains (*S. aureus* ATCC 25923 and *E. faecalis* ATCC 19433). Based on our results, it is suggested that fenugreek seeds have a higher nutritional value at immature stage.

KEYWORDS*: flavonoids, fenugreek, antibiofilm, S. aureus, maturity*

ORAL COM N° :13.

FROM ENVIRONMENTAL DNA TO INDUSTRIAL BIOCATALYSTS: NGS-DRIVEN DISCOVERY OF EXTREMOZYMES FROM TUNISIAN EXTREME ECOSYSTEMS FOR A CIRCULAR BIOECONOMY

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Abstract: This study was conducted within the framework of the Horizon Europe Twinning Project NGS-4-ECOPROD (Grant Agreement No. 101079425), which aims to address critical gaps in next-generation sequencing (NGS) datasets for the development of eco-friendly biotechnological products and sustainable bioprocesses using genomic and metagenomic approaches. Sampling campaigns covered a wide range of Tunisian extreme environments and microbiota communities, including geothermal hot springs, forest soil ecosystems, high-altitude mountain peaks, sediments from the Sahara Desert and saline lakes, crude oil field sites, as well as marine surface and deep-sea water zones. These microorganisms were subjected to genomic and metagenomic exploration using advanced NGS platforms, including the Illumina NextSeq™ 500 system for short-read sequencing and Oxford Nanopore technologies (PromethION™ 2 Solo and MinION Mk1C) for long-read sequencing. Whole-genome sequencing (WGS) of selected strains provided high-resolution insights into microbial diversity, adaptation mechanisms, and functional potential. A total of 52 microbial species were isolated from Tunisian extreme environments, including fungi (35 isolates), yeasts (6), bacteria (9), and archaea (2). In parallel, environmental DNA (eDNA) analyses included 23 whole-metagenome shotgun datasets and 34 amplicon-based metagenomic datasets targeting the 16S rRNA, 18S rRNA, and ITS regions were investigated. Comprehensive bioinformatic analyses enabled the identification and annotation of genes encoding industrially relevant extremozymes, including lipases, phospholipases, proteases, chitinases, cellulases, and oxidoreductases. Several promising enzyme candidates were subsequently cloned, synthesized, and heterologously expressed in *Escherichia coli* BL21 (DE3) and *Pichia pastoris* X-33, followed by purification and biochemical characterization. The characterized extremozymes exhibited remarkable catalytic efficiency and stability under harsh operational conditions, including high temperatures, alkaline pH, elevated salinity, and the presence of organic solvents. These properties highlight their strong potential for applications in major industrial sectors such as detergents, leather processing, textiles, bioremediation, waste valorization, and green chemistry. The implementation of enzyme-based eco-friendly processes may contribute significantly to reducing chemical pollution, lowering energy consumption, and preserving ecosystem integrity. Furthermore, the integration of these robust biocatalysts into circular bioeconomy strategies supports the valorization of industrial and agro-industrial by-products into high-value biomolecules, thereby improving resource efficiency and environmental sustainability. Overall, this study underscores the considerable biotechnological potential of Tunisian extreme biotopes as sources of novel extremozymes and highlights the pivotal role of NGS-driven bioprospecting in promoting sustainable industrial innovation.

KEYWORDS: *extremozymes; next-generation sequencing; environmental DNA; whole-genome sequencing; industrial biocatalysis; circular bioeconomy; sustainable biotechnology.*

ORAL COM N° : 14.

EXTRACTION, STRUCTURAL CHARACTERIZATION, AND REGIOSELECTIVE OVERSULFATION OF A DISTINCTIVE DERMATAN SULFATE FROM *CARANX CRYSOS* BONES

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Abstract

Marine fishery by-products represent a promising and sustainable source of high-value biomolecules, including glycosaminoglycans (GAGs). In this study, GAGs were extracted from the bones of *Caranx crysos* through enzymatic hydrolysis, followed by CPC precipitation and anion-exchange chromatography. Structural characterization by 2D-NMR spectroscopy (^{1}H,^{13}C-DEPT-HSQC, COSY, TOCSY, and 1D-DOSY) revealed a mixed chondroitin sulfate/dermatan sulfate composition with a CS:DS ratio of 34:66, with dermatan sulfate domains predominantly enriched in α-L-IdoA2S residues and exclusive C6 sulfation of GalNAc within dermatan units. A regioselectively oversulfated derivative was subsequently prepared via TBA-salt formation, selective pivaloylation, and homogeneous sulfation, resulting in near-complete conversion of free C6 hydroxyl groups to sulfate esters and the emergence of doubly sulfated GalNAc4,6S residues. These findings establish *C. crysos* bones as a viable and largely untapped source of dermatan sulfate with a distinctive sulfation profile, while the successful chemical oversulfation opens additional perspectives for biomedical applications.

Keywords: Caranx Crysos, glycosaminoglycans, 2D-NMR, chemical oversulfation

ORAL COM N° : 15.

MICROPLASTIC EXPOSURE PATHWAYS IN *SCYLIORHINUS CANICULA*: A COMPARATIVE STUDY OF INGESTION AND BRANCHIAL UPTAKE IN NORTHERN TUNISIA (GHAR EL MELH AND CAP ZEBIB)

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Abstract: Plastic pollution is rapidly increasing worldwide and poses significant risks to marine organisms. This study investigates microplastics (MPs) exposure pathways in the small-spotted catshark (*Scyliorhinus canicula*) from the northern Tunisian coast (Ghar El Melh and Cap Zebib). MPs were characterized for the first time in both gills and stomachs of demersal individuals, using Laser Direct Infrared (LDIR) and FTIR-ATR spectroscopy for 100% chemical identification. MPs were detected in 60% of specimens, with a total of 95 particles recovered from 20 individuals. Fibres dominated (96.8%), while fragments (3.2%) were observed at a single site. Most particles were <1000 µm (71.6%), and polyethylene terephthalate (PET) and polyamide (PA) were the predominant polymers. These findings demonstrate simultaneous trophic and branchial uptake of MPs in *S. canicula* and reveal significant contamination in this understudied region of the northern Tunisian coast. This study provides a baseline for MPs contamination in the southern Mediterranean Sea and supports the use of demersal elasmobranchs as bioindicators of marine litter.

KEYWORDS: *Synthetic fibres, microplastics, Elasmobranchs, northern Tunisia, Mediterranean Sea*

ORAL COM N° : 16.

ADVANCES IN NUCLEIC ACID BIOSENSORS FOR RAPID TESTING

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Abstract

Rapid tests have become essential in bioanalysis for various applications, including diagnostics, environmental monitoring, and food safety. These tests offer cost-effectiveness, user-friendliness, and quick results. This abstract focuses on advancements in rapid tests utilizing Nucleic acid biosensors.

This work highlights recent advances in DNA-based biosensors for on-site rapid analysis, which have emerged as highly sensitive and selective platforms for the detection of a wide range of target analytes. Owing to their precise molecular recognition capabilities, particularly through DNA probes and aptamers, these biosensors enable the accurate detection of pathogens, disease biomarkers, toxins, and emerging contaminants, even at very low concentrations.

Our recent efforts have focused on integrating nanomaterials with nucleic acid-based signal amplification strategies to significantly enhance analytical performance. In parallel, an in silico study is currently underway to optimize probe design, predict molecular interactions, and further improve the sensitivity and specificity of the developed biosensing systems.

Moreover, the integration of DNA biosensors with smartphone-assisted detection platforms has opened new avenues for decentralized, user-friendly diagnostics. These portable systems enable real-time analysis, thereby expanding their applicability in field-based and point-of-care settings.

Overall, emerging DNA biosensors represent a versatile and promising approach for rapid, on-site detection, with strong potential to advance public health surveillance, environmental monitoring, and food safety control.

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KEYWORDS: Biosensors, DNA, Rapid Testing, smartphone-assisted detection platforms

ORAL COM N° : 17.

EFFECTS OF ORGANIC AMENDMENTS ON SOIL QUALITY AND PHYSIOLOGICAL PERFORMANCE OF BERSEEM (*TRIFOLIUM ALEXANDRINUM* L.) IRRIGATED WITH TREATED WASTEWATER

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Abstract: Bersim (*Trifolium alexandrinum* L.) is a forage legume of considerable agronomic interest, valued for its high nutritional quality and its sensitivity to environmental constraints, making it a relevant model for studying soil–plant interactions under stress conditions. This study evaluated the effects of different organic amendments on soil quality and on the physiological and metabolic responses of bersim irrigated with treated wastewater. Four treatments were applied: a control without amendment, compost, biochar, and a combined treatment of compost + biochar. The results revealed a significant improvement in the biological and chemical properties of the soil in the amended treatments compared with the control. Soil enzyme analysis showed increased enzymatic activity, indicating stimulation of microbial activity. Among the treatments investigated, the combination of compost + biochar produced the most pronounced effects, suggesting a positive interaction between the two organic amendments. From an agronomic perspective, compost- and biochar-based treatments improved the growth and yield of bersim compared with the control. The results indicated that the compost + biochar combination achieved agronomic performance very close to that obtained with compost alone, particularly in terms of plant height and several growth-related parameters. The study of physiological and biochemical responses also demonstrated that organic amendments help alleviate oxidative stress induced by irrigation with treated wastewater. Analyses of proline, soluble sugars, malondialdehyde (MDA), and hydrogen peroxide (H_2O_2), used as indicators of cellular stress, showed that MDA and H_2O_2 levels were relatively low in the amended treatments, indicating reduced oxidative stress and limited cellular damage in bersim. Real-time PCR analysis showed differential expression of candidate genes such as NRT1, NRT2, AMT, KT, and PHT, which are involved in N, K, and P metabolism in bersim leaves and roots. This suggests that these genes may perform various functions and regulate the uptake, transport, reduction, assimilation, and translocation of nitrate, ammonium, potassium, and phosphorus in the vegetative organs of bersim. These findings suggest that compost + biochar plays a major role in enhancing the vegetative development of bersim, resulting in improved soil functionality, reduced oxidative stress, and more efficient nutrient uptake and assimilation under treated wastewater irrigation conditions.

KEYWORDS: *Trifolium alexandrinum, Treated wastewater irrigation, Soil enzyme activity, Physiological responses, Nutrient transport genes*

ORAL COM N° : 18.

HELMINTH–MICROBIOTA INTERACTIONS RESHAPE THE GUT MICROBIOME OF THE ATLANTIC CHUB MACKEREL SCOMBER COLIAS

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Abstract: Interactions between gastrointestinal helminths and host-associated microbiota are increasingly recognized as important determinants of host health, yet they remain poorly explored in marine fish. This study provides the first next-generation sequencing (NGS)-based characterization of the intestinal microbiota of Scomber colias and its modulation by the acanthocephalan parasite Rhadinorhynchus spp.. The parasite exhibited a prevalence of 54.83% and a mean intensity of 1.56. In uninfected fish, the gut microbiota was dominated by Pseudomonadota (71.87%), Actinomycetota (22.09%), and Bacillota (5.05%), with beneficial taxa such as Microbacterium (19.68%) and Bradyrhizobiaceae (11.77%). In contrast, infected individuals showed enrichment of taxa frequently associated with dysbiosis and disease states, including established fish pathogens such as Photobacterium (12.65%) and Vibrionaceae (7.08%), alongside opportunistic genera such as Weissella (10.06%) and Ralstonia (7.81%). The parasite microbiome was overwhelmingly dominated by Pseudomonadota (97.38%), particularly Vibrio (65.42%) and Photobacterium (17.21%). Alpha diversity analysis revealed the highest species richness in uninfected fish (ACE: 576.64), with an approximate 40% decline in infected samples. Although beta-diversity differences were not statistically significant (PERMANOVA, $p = 0.712$), 14.3% of operational taxonomic units (OTUs) were unique to infected fish, whereas no OTUs were uniquely shared between infected fish and parasites, suggesting microbial amplification rather than direct microbial introduction. Collectively, these findings identify Rhadinorhynchus spp. as a potential microbial disruptor capable of destabilizing protective gut communities and promoting opportunistic taxa, underscoring the ecological significance of helminth–microbiota interactions in marine fish health and disease dynamics.

KEYWORDS: *Scomber colias, Rhadinorhynchus, gut microbiota, dysbiosis, helminth–microbiota interactions, marine fish health.*

ORAL COM N° : 19.

GENOME-WIDE VARIANT ANALYSIS OF THE TUNISIAN DATE PALM CULTIVAR DEGLET NOUR (*PHOENIX DACTYLIFERA* L.): CANDIDATE GENES FOR FRUIT QUALITY TRAITS

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Abstract: Despite the socioeconomic importance of the date palm in North Africa, genomic resources for Tunisian cultivars remain scarce. This study presents the first draft genome assembly of the elite cultivar Deglet Nour, generated by Illumina paired-end sequencing and scaffolded against the Barhee BC4 reference genome, yielding a 431 Mb assembly with high BUSCO completeness. Genome-wide variant calling identified over one million SNPs and thousands of INDELs distributed across a large number of genes, many of which carry multiple mutations with diverse functional consequences. Functional annotation with SnpEff highlighted candidate genes in three fruit quality categories, several harboring high-impact variants. To further characterize the most critical mutations, protein structure modelling and molecular docking were performed to compare the structural and functional consequences of variants between the Barhee BC4 reference genome and the Deglet Nour genome. In sucrose and starch metabolism, disruptive mutations were identified in cytosolic glucose-6-phosphate isomerase (GPI), chloroplastic phosphoglucomutase (PGM), and furostanol glycoside 26-O-beta-glucosidase-like / beta-D-fucosidase (F26G). For fruit size and weight, high-impact variants were found in the cell number regulator fw2.2. Regarding fruit firmness, severely deleterious mutations were detected in the ripening regulator MADS-box RIN. Structural modelling and docking analyses confirmed that these variants induce significant conformational changes and alter ligand-binding properties compared to the reference. These findings establish a comprehensive allelic catalog for Deglet Nour and provide a molecular basis for understanding its distinctive agronomic traits, with direct applications in marker-assisted breeding for improved fruit sweetness, size, texture, and shelf life.

KEYWORDS: *Phoenix dactylifera, Deglet Nour, SNP annotation, fruit quality, sugar metabolism, fruit firmness, molecular docking, genomic variants*

ANIMAL PHYSIOLOGY
BIOLOGY AND ECOLOGY

ORAL COM N° : 20.

LC–MS CHARACTERIZATION OF PHENOLIC AND FLAVONOID COMPOUNDS IN EOBANIA VERMICULATA MUCUS AND THEIR CONTRIBUTION TO WOUND HEALING.

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Abstract: This investigation assessed the biological efficacy of the mucus derived from Eobania vermiculata snails in terms of its antioxidant and wound healing properties. Through LC-MS analysis, a total of 24 distinct molecules were identified, which were categorized into phenolic acids, flavonoids, and anthocyanins. The antioxidant activity of the mucus was found to be moderate, effectively scavenging DPPH free radicals and demonstrating reducing power. The efficacy of wound healing was evaluated through a combination of macroscopic, histological, and biochemical analyses. Rats treated with snail mucus exhibited a significantly greater rate of wound closure. Additionally, histopathological and biochemical assessments indicated complete regeneration of the epidermis, along with enhancements in epidermal thickness and collagen density. Molecular docking studies suggested potential interactions between the constituents of the mucus and the binding sites of collagenase and fibroblasts. These results underscore the potential of Eobania vermiculata mucus as a valuable natural resource for applications in antioxidant and wound healing applications.

KEYWORDS: *Snail mucus, Polyphenols, Wound healing, antioxidant activity.*

ORAL COM N° : 21.

ÉVALUATION DES RÉPONSES COMPORTEMENTALE, IMMUNOLOGIQUE ET PHYSIOLOGIQUE CHEZ LA PALOURDE (RUDITAPES DECUSSATUS) DE LA LAGUNE DE BIZERTE EXPOSÉE À LA CAFÉINE : ESSAI DE BIOREMÉDIATION

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Des palourdes (*Ruditapes decussatus)*, collectés dans la lagune de Bizerte, ont été exposés pendant 7 jours à la caféine, un composé largement consommé et actuellement considéré comme un contaminant émergent des milieux aquatiques.
Les spécimens ont été exposés en microcosmes, sous conditions contrôlées, à 03 concentrations de caféine : C1 (0,5 $\mu g \cdot L^{-1}$), C2 (2 $\mu g \cdot L^{-1}$) et C3 (8 $\mu g \cdot L^{-1}$).
Afin d'évaluer un éventuel effet protecteur, le chitosane (1 $mg \cdot L^{-1}$), un biopolymère naturel dérivé de la chitine et connu pour ses propriétés antioxydantes et adsorbantes, a été utilisé dans cette étude.
Les réponses comportementales (capacité de filtration), immunologiques ainsi que les dommages oxydatifs et neurotoxiques ont été étudiés afin d'évaluer l'état de santé des palourdes. Cinq biomarqueurs ont été mesurés dans les branchies et la glande digestive : trois biomarqueurs de défense antioxydante (CAT, GST et SOD), un biomarqueur de dommage cellulaire (MDA) et un biomarqueur de neurotoxicité (AChE).
Les résultats montrent une diminution significative de la capacité de filtration chez les palourdes exposées à la caféine par rapport au groupe témoin. Toutefois, l'ajout de chitosane entraîne une amélioration remarquable, particulièrement aux faibles concentrations de caféine. Les activités des enzymes antioxydantes (CAT, GST et SOD) montrent une augmentation hautement significative suite à l'exposition à la caféine. De même, les niveaux de MDA révèlent des réponses dépendantes de la concentration ainsi que de l'organe étudié. Au contraire, l'activité de l'AChE présente une inhibition dose-dépendante hautement significative. Par ailleurs, l'exposition au chitosane a entraîné une amélioration des réponses biochimiques, marquée par une modulation des activités des enzymes antioxydantes (SOD, CAT et GST), une réduction de la peroxydation lipidique (MDA) et une restauration de l'activité de l'AChE, indiquant un effet protecteur potentiel du chitosane contre les effets toxiques de la caféine.
Quant à la réponse immunologique, le nombre d'hémocytes diminue après exposition à la caféine, mais reste plus élevé en présence de chitosane, suggérant un effet modérateur de ce biopolymère sur les tissus. Ces résultats indiquent que la caféine peut induire des perturbations physiologiques, oxydatives et immunologiques chez *Ruditapes decussatus*, tandis que le chitosane pourrait atténuer partiellement ses effets toxiques.

Mots-clés : *Ruditapes decussatus*, Caféine, Biomarqueurs, Immunologie, Chitosane.

ORAL COM N° : 22.

DO PARASITES INDUCE THE EXPRESSION OF BIOCHEMICAL MARKERS IN THE GOLDEN GREY MULLET *CHELON AURATUS* (RISSO, 1810)?

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ABSTRACT:
The Mullet (*Chelon auratus*) is a eurythermal and euryhaline fish, with high protein content in muscles and eggs. In the current investigations, 40 individuals were examined for the prevalence of parasites. Approximately half of the investigated individuals were infested with three parasites, comprising two copepods, (*Lernanthropus mugilis*, prevalence P=25%, mean intensity M.I.=1.4 and abundance A=0.7 and *Parabrachiella mugilis* P=17.5%, M.I.=1.95 and A=0.7) and one species of Myxosporidia *Myxobolus exiguus* (P=15%, M.I.=1.83 and A=0.55) respectively. All the parasite species encountered in the current study were satellite species, whose prevalence did not exceed 50%.
The effect of parasitism was followed by the modulation of antioxidant defense in infested fish and confirmed the allergenic effect of parasites on antioxidant metabolism following the mobilization of non enzymatic scavengers and afterward of catalase (CAT), gluthathione S-transferase (GST), acetylcholinesterase (AChE), and malondialdehyde (MDA) to trap the excess of ROS, respectively. The body of mullet involves important biochemical responses through the activation of several detoxification mechanisms at all the organs considered (gills, liver and muscles) to fight, survive and acclimate to stressful conditions. However, it could be concluded that the parasite *L. mugilis* was more virulent compared to *P. mugilis* and *M. exiguus*, since the gills had the highest biomarker changes. The results of the current pilot study could be extended in the future for the study of biomarkers, by integrating the entire enzymatic chain involved in antioxidant defense and the dosage of ROS and also to extend the efforts toward other fish species to further identify the deleterious effect induced by the parasites on their hosts with the aid of biomarkers.
KEYWORDS : *Chelon auratus, parasites, biomarkers, oxidative stress.*

ORAL COM N° : 23.

COMPARATIVE ANALYSIS OF INSECT COMMUNITIES IN PESTICIDE-TREATED VS UNTREATED APPLE ORCHARDS ON THE ALGERIAN-TUNISIAN BORDER

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Abstract: Insect biodiversity plays a major role in agroecosystem functioning and biological pest control, and it may be affected by pesticide use. This study aims to examine and compare insect order biodiversity, abundance, and species richness in pesticide-treated and untreated apple orchards located on both sides of the Algerian-Tunisian border. Sampling was conducted between January and September 2025 using Malaise traps. A total of 65 field trips were carried out, resulting in 34236 individuals captured, representing 15 insect orders.
Preliminary results revealed the dominance of Diptera and Hymenoptera across all sites. Taxonomic richness varied between 10 and 13 insect orders depending on Orchard management practices. Untreated sites appeared to present higher taxonomic richness and a more balanced distribution of insect orders. Seasonal fluctuations in abundance were also observed, particularly during spring and early summer periods.
These observations suggest a potential influence of agricultural practices on insect community structure in border agroecosystems
KEYWORDS: *Insects biodiversity, Agroecosystems, Apple orchards, Pesticide management*

ORAL COM N° : 24.

PRENATAL DELTAMETHRIN EXPOSURE DISRUPTS LIPID METABOLISM AND INDUCES CARDIAC DYSFUNCTION IN OFFSPRING RATS: INTEGRATION OF IN VIVO AND COMPUTATIONAL MODELING

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Abstract: Deltamethrin (DLM), a common pyrethroid insecticide used in agriculture and public health, has well-documented acute toxicity affecting heart function and lipid metabolism. However, the long-term effects on cardiovascular and lipid health following prenatal exposure are not well understood. This study investigates cardiac and lipid changes in adult male offspring after in utero exposure to deltamethrin. Wistar rats were divided into four groups: a control group and three treatment groups receiving daily gavage doses of deltamethrin (1.28, 2.56, and 5.12 mg/kg) from the 6th day of gestation until birth. At 8 weeks postnatal, the male offspring were sacrificed. Results showed a dose-dependent rise in malondialdehyde (MDA) levels and a decrease in antioxidant enzymes SOD, CAT, and GSH, indicating oxidative stress. Deltamethrin also impaired cardiac function, evidenced by reduced heart weight, altered lipid profiles (higher TC, TG, LDL-C; lower HDL-C), increased cardiac biomarkers (troponin, CK-MB, LDH, AST), and structural heart changes such as myofibrillar disorganization, hypertrophy, inflammation, and focal necrosis. Computational analysis revealed gene dysregulation affecting lipid metabolism (PPARα, PPARγ, HMGCR, LDLR, APOA1), antioxidant defenses (Nrf2, SOD1, CAT), and inflammation (NF-κB), leading to irreversible cardiac damage. Combining experimental data with AI predictions and molecular docking, the study outlines a mechanistic pathway from placental transfer and oxidative stress to persistent cardiac and lipid abnormalities driven by molecular and tissue-level damage. Overall, the findings highlight that prenatal deltamethrin exposure results in lasting cardiac pathology, emphasizing the vulnerability of the developing heart to environmental toxins and the importance of stricter regulation during pregnancy to minimize prenatal exposure.

KEYWORDS: Deltamethrin; prenatal exposure; cardiotoxicity; Computational modeling; oxidative stress; dysregulation of genes.

ORAL COM N° : 25.

INTEGRATION OF PHYTOCHEMICAL PROFILING AND PHARMACOLOGICAL ASSESSMENT OF EUCALYPTUS SALUBRIS SEEDS: A PROMISING NATURAL ANTI-INFLAMMATORY AGENT

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Abstract

In this work, *Eucalyptus salubris* seeds extract (ESS) was characterized using liquid chromatography (LC) coupled to mass spectrometry (MS), and its *in vitro* and *in vivo* anti-inflammatory properties were evaluated. Through LC–MS and MS2 analysis, flavanonols and monounsaturated fatty acids were found to be the most abundant components, while unreported galloylated flavanonols were profiled. ESS attenuated the denaturation of Bovine Serum Albumin (BSA), significantly stabilized rats Red Blood Cells (RBC) membranes, and inhibited both Cyclooxygenase-1 (COX-1) and Cyclooxygenase-2 (COX-2) enzymes, indicating its ability to reduce inflammation. The *in vivo* study showed that ESS significantly reduced the carrageenan-induced paw edema in rats and normalized the inflammatory cytokines Tumor Necrosis Factor-alpha (TNF-α) and Interleukin-6 (IL-6) levels. In addition, ESS alleviated formaldehyde-induced arthritis symptoms through a remarkable reduction in oxidative stress biomarkers (evidenced by decreased Malondialdehyde (MDA), Glutathione (GSH), and Nitric Oxide (NO) levels, along with increased Superoxide Dismutase (SOD) and Catalase (CAT) activities), as well as the restoration of the hematological profile (reduction in white blood cell (WBC) count and erythrocyte sedimentation rate (ESR), accompanied by an increase in red blood cell (RBC) count and hemoglobin (Hb) levels). These effects are largely attributable to the richness of ESS in phenolic compounds, flavonoids, and other bioactive secondary metabolites. Collectively, these findings supported the therapeutic potential of *E. salubris* extract as a natural source of anti-inflammatory and antioxidant agents, warranting further investigation for potential pharmaceutical or nutraceutical applications.

Key words: Antioxidant · Arthritis · Eucalyptus salubris · Anti-inflammatory · Haematological

ORAL COM N° : 26.

ECOPHYSIOLOGICAL AND PRODUCTIVE RESPONSES OF GOATS TO *PANICUM MAXIMUM* SUPPLEMENTATION GROWTH PERFORMANCE MILK YIELD AND MILK COMPOSITION

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Abstract: This study evaluated the effect of *Panicum maximum* supplementation on feed intake, milk production, and milk composition in dairy goats raised under semi-arid conditions. The experiment involved two dietary treatments: a control group receiving a conventional diet and a treated group supplemented with *Panicum*. Feed intake, milk yield, and milk quality parameters were monitored, and data were analyzed using a general linear model.

The results showed that dry matter intake was slightly higher in goats fed *Panicum maximum* (1.124 ± 0.138 kg/day) compared to the control group (1.076 ± 0.108 kg/day), although the difference was not statistically significant ($P = 0.457$). In contrast, milk production was significantly improved in the supplemented group (398.37 ± 93.78 g/day) compared to the control group (289.12 ± 72.33 g/day) ($P < 0.0001$).

Milk composition was also positively affected by the dietary treatment. Milk fat content was higher in the *Panicum* group (7.83 ± 0.65%) than in the control group (7.42 ± 0.44%) ($P = 0.016$). Similarly, protein content increased significantly (4.63 ± 1.43% vs 3.83 ± 1.15%; $P < 0.0001$). Lactose levels were also higher in the supplemented group (3.71 ± 0.39% vs 3.55 ± 0.22%; $P = 0.003$), while pH showed a slight but significant difference (6.51 ± 0.15 vs 6.52 ± 0.17; $P < 0.0001$).

Overall, *Panicum maximum* supplementation improved milk yield and enhanced key quality traits without significantly affecting feed intake. These findings highlight the potential of *Panicum maximum* as a valuable forage resource to improve dairy goat productivity in semi-arid environments.

KEYWORDS: *Panicum maximum*, dairy goats, milk production, milk composition, arid conditions.

ORAL COM N° : 27.

WEST NILE VIRUS ANTIBODY PREVALENCE IN HORSES DURING THE 2023 OUTBREAK IN TUNISIA, NORTH AFRICA

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Abstract: During the 2023 West Nile Virus (WNV) outbreak in Tunisia, which resulted in 183 human cases and 45 suspected equine cases, a serological study was conducted on 20 horses at the Pasteur Institute of Tunis. These horses, used for antiscorpion venom production, were tested using both ELISA and the virus microneutralization test (MNT). ELISA screening indicated a seroprevalence of 25% (5/20), but the more specific MNT performed for the first time using a local Tunisian strain (M8.TUN2014) confirmed a seroprevalence of 10% (2/20). Although all horses remained asymptomatic and tested negative for viral RNA via RT-PCR and Q-RT PCR, the MNT results provide clear evidence of WNV circulation. The results of this study conclude that equid surveillance is a vital tool for early detection of WNV outbreak.

KEYWORDS: *West Nile virus, outbreak, equid, ELISA, virus microneutralization test, antibody prevalence, Tunisia*

ORAL COM N° : 28.

EXTRAITS DE *ZIZIPHUS SPINA-CHRISTI* : ANTIOXYDANTS PUISSANTS ET PROTECTEURS CONTRE STRESS OXYDANT ET INFLAMMATION ENTÉRIQUE IN VITRO

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Abstract: Ziziphus spina-christi (L.) Desf., une plante médicinale largement utilisée en médecine traditionnelle pour les troubles gastro-intestinaux, a été étudiée pour son potentiel à combattre l'inflammation et le stress oxydant impliqués dans les maladies inflammatoires intestinales comme la colite ulcéreuse. Ces pathologies résultent d'une production excessive d'espèces réactives de l'oxygène (ROS) et de réponses pro-inflammatoires déclenchées par des stimuli comme le lipopolysaccharide (LPS), entraînant des dommages aux entérocytes. L'objectif de cette étude était d'évaluer l'efficacité d'extraction, la teneur en phytochimiques, la capacité antioxydante et les effets cytoprotecteurs in vitro des extraits de feuilles de Z. spina-christi sur des cellules enterocytes humaines, en vue d'identifier des agents naturels prometteurs pour des applications nutraceutiques.
Les feuilles de Z. spina-christi ont été collectées, séchées et broyées en poudre. Les extractions ont été réalisées par macération (24 h à température ambiante) suivie de sonication (40 kHz, 30 min) avec de l'eau pure, de l'éthanol (96 %) ou du méthanol (99,8 %) comme solvants (ratio 1:10 p/v). Les rendements ont été déterminés gravimétriquement, le contenu phénolique total (CPT) par la méthode de Folin-Ciocalteu (équivalents acide gallique, EAG), et les flavonoïdes totaux (FT) par la méthode $AlCl_3$ (équivalents quercétine, EQ). L'activité antioxydante a été évaluée par les essais ABTS et DPPH (valeurs EC_{50}). Les études in vitro ont utilisé des cellules NCM460 (entérocytes humains, ATCC). La cytotoxicité a été évaluée par Alamar Blue (24 h, 10-100 µg/mL). Les effets anti-inflammatoires ont été testés contre LPS (10 µg/mL, 24 h), et la cytoprotection contre le stress oxydatif induit par H_2O_2 (1 mM, 24 h) par NBT (anion superoxyde) et Alamar Blue. Tous les expériences en triplicata ; données analysées par ANOVA ($p < 0,05$).
Les rendements d'extraction étaient de 17,043 ± 0,31 % (ZSCAQ), 20,574 ± 1,01 % (ZSCEtOH) et 21,26 ± 3,79 % (ZSCMeOH, le plus élevé). Le CPT était maximal pour ZSCMeOH (667,55 ± 4,01 mg EAG/g), tandis que les FT culminaient pour ZSCAQ (168,2 ± 6,3 mg EQ/g). Pour ABTS, les EC_{50} étaient de 12,3 µg/mL (ZSCAQ), 10,8 µg/mL (ZSCEtOH) et 9,2 µg/mL (ZSCMeOH). Pour DPPH, EC_{50} = 58 µg/mL (ZSCAQ), 22 µg/mL (ZSCEtOH) et 18 µg/mL (ZSCMeOH), l'extrait méthanolique étant le plus puissant. Sur cellules NCM460, tous les extraits étaient non cytotoxiques (>98 % viabilité à 100 µg/mL). Contre l'inflammation induite par LPS, ZSCEtOH a restauré la viabilité à 85 % vs contrôle LPS ($p < 0,001$ à 50 µg/mL). Pour le stress H_2O_2, ZSCMeOH a réduit le superoxyde de 52 % (NBT, $p < 0,01$) et augmenté la viabilité de 48 % (Alamar Blue, $p < 0,001$ à 50 µg/mL).
Les extraits de feuilles de Z. spina-christi, particulièrement éthanolique et méthanolique, présentent des rendements élevés, une richesse en phénols/flavonoïdes et une puissante activité antioxydante. Leur non-toxicité et leurs effets protecteurs doubles contre l'inflammation LPS-médiée et le stress oxydatif H_2O_2-induit sur entérocytes soulignent leur potentiel thérapeutique pour les troubles gastro-intestinaux oxydatifs/inflammatoires comme la colite ulcéreuse. Ces résultats justifient une validation in vivo et un développement nutraceutique.
KEYWORDS: *Ziziphus spina-christi; activité antioxydante; cellules NCM460; inflammation LPS; stress oxydant*

ORAL COM N° : 29.

$CUFE_2O_4$ SPINEL FERRITE NANOPARTICLES MITIGATE ETHANOL-INDUCED OVARIAN DYSFUNCTION VIA OXIDATIVE STRESS MODULATION IN FEMALE WISTAR RATS

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Abstract: This study investigated the preventive potential of copper ferrite nanoparticles NPs ($CuFe_2O_4$ NPs), a class of spinel ferrite NPs, against ethanol (EtOH)-induced ovarian toxicity in a rat model. These superparamagnetic NPs were synthesized via an eco-friendly green synthesis route, combining the hydrothermal method with a natural bioligand derived from *Ficus Carica*. Physiochemical characterization revealed a homogeneous cubic crystallographic structure with a spherical morphology, moderate agglomeration and an average particle size ranging from 20 to 30 nm. The subchronic intraperitoneal administration of $CuFe_2O_4$ NPs at two doses (5 and 10 mg/kg b.w) over 20 days, conferred significant ovarian protection against EtOH induced oxidative damage in female Wistar rat. This preventive effect was evidenced by a marked reduction in mondialdehyde (MDA) levels alongside a significant restoration of superoxide dismutase (SOD) activity. Histological analysis further supported these findings, demonstrating that both treatment concentrations successfully restored the distribution of follicular developmental stages within the ovarian cortex, which has been disrupted by EtOH intoxication.
KEYWORDS: *green-synthesis nanoparticles, copper ferrites, ethanol, ovary, oxidative stress.*

ORAL COM N° : 30.

RÉPONSE PHYSIOLOGIQUE DES TÊTARDS DES GRENOUILLES (*DISCOGLOSSUS PICTUS*) À L'EFFET D'EFFLUENTS D'EAUX USÉES DE L'OUED GUENNICHE DANS UN CONTEXTE DE CHANGEMENT CLIMATIQUE

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Abstract: Des têtards de grenouilles *Discoglossus pictus*, prélevés dans l'oued El-Hila, ont été exposés pendant 3 et 7 jours aux effluents d'eaux usées de l'oued Guenniche (Tributaire de la lagune de Bizerte, Nord tunisien). Cette exposition a eu lieu in situ (à 18 °C) et au laboratoire (à 23 °C).

Dans cette étude, la réponse physiologique des têtards a été analysée concernant essentiellement le stress oxydatif par le suivi de trois biomarqueurs (catalase : CAT, glutathion S-transférase : GST, malondialdéhyde : MDA) et un biomarqueur de neurotoxicité : l'acétylcholinestérase (AChE).

Les résultats montrent que l'exposition des têtards aux effluents de l'oued Guenniche in situ entraine une augmentation significative de l'activité de la CAT et de la GST ainsi que du taux de MDA par rapport aux témoins. En revanche, on note une diminution significative de l'activité de l'acétylcholinestérase (AChE).

L'exposition, au laboratoire, de ces têtards à une température plus élevée (23° C) entraine une accentuation significative des réponses au stress oxydatif (CAT, GST), de peroxydation lipidique (MDA) et de neurotoxicité (AChE).

Ces résultats indiquent que les changements climatiques matérialisés essentiellement par l'augmentation de la température entrainent une modulation de la toxicité des effluents d'eaux usées chez *Discoglossus pictus*, d'où la nécessité de prévoir des mesures de conservation de cette espèce clé dans ces écosystèmes de plus en plus vulnérables.

KEYWORDS: *Discoglossus pictus, Eaux usées, Température, Biomarqueurs.*

ORAL COM N° : 31.

LC–MS CHARACTERIZATION AND BIOLOGICAL EVALUATION OF *AJUGA IVA* EXTRACT AS A NATURAL PROTECTOR AGAINST ACRYLAMIDE TOXICITY

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Abstract

This study investigated the protective effects of the aqueous extract of *Ajuga iva* (AEAI) against acrylamide (AA)-induced hepatorenal toxicity in rats through integrated *in vitro*, *in vivo*, and *in silico* approaches. Phytochemical characterization using liquid chromatography–mass spectrometry (LC–MS) revealed the presence of nine major phenolic constituents, namely naringenin, naringin, apigenin, rosmarinic acid, apigenin-7-O-glucoside, luteolin-7-O-glucoside, trans-ferulic acid, gallic acid, and quinic acid.

The *in vivo* results demonstrated that acrylamide exposure caused marked hepatic and renal impairments, as reflected by significant increases in serum urea (+60%), creatinine (+50%), alanine aminotransferase (ALT, +30%), and aspartate aminotransferase (AST, +25%) levels. Treatment with AEAI significantly attenuated these biochemical disturbances. In addition, AEAI markedly alleviated oxidative stress by reducing lipid peroxidation levels (−33%) and strengthening antioxidant defenses through enhanced activities of superoxide dismutase (SOD, +63%), catalase (CAT, +173%), and glutathione peroxidase (GPx, +50%). Histopathological analyses further supported these findings, showing preservation of hepatic and renal tissue architecture together with a reduction in inflammatory lesions.

Molecular docking studies indicated that naringenin, followed by myricetin, displayed the highest binding affinities toward key pro-inflammatory target proteins, highlighting their probable contribution to the observed biological activities. Furthermore, both naringin and its aglycone naringenin have been widely recognized for their ability to protect cells against oxidative and inflammatory damage through reactive oxygen species (ROS) scavenging and inhibition of lipid peroxidation.

Collectively, these findings suggest that AEAI constitutes a valuable natural source of bioactive phenolic compounds possessing strong antioxidant, anti-inflammatory, nephroprotective, and hepatoprotective activities. The present study provides both experimental and theoretical evidence supporting the potential use of *Ajuga iva* as a promising therapeutic strategy for the prevention and management of acrylamide-induced hepatorenal toxicity.

Keywords: Hepatotoxicity; Nephrotoxicity; *In vivo* study; Oxidative stress; Acrylamide; Molecular docking (Keap1, COX-2); Biochemical analysis; Histopathology; *Ajuga iva*.

ORAL COM N° : 32.

AMOXICILLIN/CLAVULANATE-INDUCED MICROBIOTA DYSBIOSIS DISRUPTS SEXUAL BEHAVIOR IN RATS THROUGH TESTOSTERONE SUPPRESSION AND SPERM DETERIORATION

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Abstract:

Antibiotic-induced gut microbiota dysbiosis is increasingly recognized to influence reproductive health via the gut-brain-gonad axis. This study investigated whether amoxicillin/clavulanate-induced dysbiosis disrupts sexual behavior in male rats through decreased testosterone levels and impaired sperm quality indicators. Adult male Wistar rats received amoxicillin/clavulanate in drinking water for 14 days. Serum testosterone, sperm count, motility, morphology, and viability were assessed. Sexual behavior parameters including mount latency, intromission latency, and mounting frequency were recorded. Antibiotic-treated rats showed marked gut microbiota dysbiosis (reduced Lactobacillus and Bifidobacterium, increased Proteobacteria). Testosterone levels decreased significantly ($p < 0.01$) compared to controls. Sperm motility and viability were reduced by approximately 40% and 35%, respectively, while abnormal sperm morphology increased. Sexual behavior was profoundly disrupted, as evidenced by prolonged mount and intromission latencies and reduced mounting frequency. Correlation analyses linked dysbiosis severity with testosterone decline and sperm impairment. Collectively, these findings indicate that amoxicillin/clavulanate-induced gut microbiota dysbiosis disrupts male rat sexual behavior, mediated largely by testosterone suppression and deterioration of sperm quality, highlighting potential reproductive risks of prolonged antibiotic use via the microbiota-gut-brain-gonad axis.

KEYWORDS: *Gut microbiota dysbiosis, Amoxicillin/clavulanate, Testosterone, Sperm quality, Male sexual behavior.*

ORAL COM N° : 33.

ECOLOGICAL DISTRIBUTION OF *MERIONES SPP.* IN SOUTHERN TUNISIA UNDER ENVIRONMENTAL AND ANTHROPOGENIC INFLUENCES

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Abstract: The *Meriones* species complex is a widespread rodent group in arid and semi-arid ecosystems of North Africa, characterized by omnivorous feeding habits with a strong dependence on seeds, vegetation, and cultivated crops. This study was conducted in southern Tunisia, a heterogeneous landscape dominated by steppe, agricultural lands, and desert margins, where human activities strongly influence habitat structure. The objective was to identify environmental and anthropogenic variables associated with the presence and abundance of *Meriones* spp. Macrohabitat characteristics were quantified using a GIS-based approach in ArcGIS 10.8 by extracting agricultural data within circular buffers (~0.6 km²) around each sampling point. Occurrence of *Meriones* spp. was mainly influenced by environmental variables related to land use. The Stepwise AIC model indicated a significant positive association with olive groves ($P = 0.00269$), while bare soil and road length showed negative tendencies. For abundance, the Stepwise AIC model revealed that olive groves had a strong positive effect ($P < 0.0001$), along with a positive association with rangelands ($P = 0.0156$). In contrast, cultivated areas and bare soil showed significant negative effects ($P = 0.0375$ and $P = 0.0142$, respectively). These results highlight the importance of agro-ecosystems, particularly olive groves, in shaping the distribution and abundance of *Meriones* spp. in southern Tunisia.

KEYWORDS: *Macrohabitat, Arid ecosystems, Agro-ecosystems, Habitat selection*

ORAL COM N° : 34.

HABITAT SELECTION AND ECOLOGICAL ROLE OF THE ENDEMIC GUNDI (*CTENODACTYLUS GUNDI*) IN ARID ECOSYSTEMS

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Abstract: In the arid landscapes of North Africa, the gundi (*Ctenodactylus gundi*), an endemic species, represents an important component of Saharan biodiversity. This small rodent, strictly confined to rocky and semi-desert habitats of Tunisia, Algeria, and Libya, occupies environments where vegetation is sparse and stone dominates. Through its presence, it shapes local ecological dynamics, linking the structure of plant and animal communities to extreme abiotic constraints.

This study focuses on the habitat selection of *C. gundi* in relation to abiotic and biotic parameters. Data were collected from GPS records of presence and absence, complemented by systematic 50 m transects in four directions, yielding a total of 100 sampling points. Environmental variables measured included soil type, floristic composition, and the intensity of anthropogenic disturbances.

Multivariate Analysis of Variance (MANOVA) revealed a marked affinity for open and rocky environments (Wilks' $\lambda = 0.12$; $P < 0.0001$). Rocky outcrops ($P < 0.0001$), stony soils ($P < 0.0001$), and bare soils ($P = 0.01432$) emerged as major determinants. On the biotic side, the presence of the gundi was significantly associated with characteristic plant species such as *Argyrolobium uniflorum* ($P = 0.000664$), *Atractylis serratuloides* ($P = 0.003709$), and *Gymnocarpos decander* ($P = 0.04369$).

These findings highlight the adaptive strategy of a specialized mammal whose distribution depends on the synergy between microhabitats and specific vegetation. The study emphasizes the importance of considering the gundi as an ecological indicator of arid environments, providing valuable insights for the conservation and sustainable management of these fragile ecosystems.

KEYWORDS: *Atlas gundi, Microhabitat, Abiotic factors, Ecological niche*

ORAL COM N° : 35.

TROPHIC NICHE DIFFRENTIATION OF THE AFRICAN GOLDEN WOLF AND RED FOX UNDER HUMAN INFLUENCE IN SOUTHERN TUNISIA

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Abstract : Human activities increasingly reshape wildlife habitats by modifying resource availability, risk levels, and interspecific interactions. Understanding how sympatric species adjust their trophic niches under anthropogenic pressure is essential for predicting community responses to environmental change. We investigated trophic niche differentiation of the African golden wolf (*Canis anthus*) and the red fox (*Vulpes vulpes*) during the dry season across three habitat types in southern Tunisia (natural, agricultural, and urban areas), representing a gradient of human disturbance. Over a 6-month period spanning April to September, 833 fecal samples were collected and analysed using standard scat analysis methods. Sampling across all sites was conducted within the same seasonal window to minimize potential seasonal variation in prey availability. Diet composition was quantified using frequency of occurrence, relative abundance, and biomass estimates. Differences in diet composition among habitats were evaluated using non-parametric statistical analyses. Both species exhibited marked dietary plasticity across all habitats. The African golden wolf consumed primarily plant material in all habitats, with rodents dominating in agricultural areas and livestock remains occurring mainly in urban environments. In contrast, the red fox relied largely on invertebrates, rodents, birds, and plant material, with relative contributions varying among habitats. These findings indicate that anthropogenic disturbance strongly influences the trophic niche structure of sympatric canids in southern Tunisia.

KEYWORDS: *anthropogenic disturbance, arid ecosystem, dietary plasticity, prey availability, Southern Tunisia, sympatric canids.*

ORAL COM N° : 36.

THE ASIAN TIGER MOSQUITO *AEDES ALBOPICTUS* (DIPTERA: CULICIDAE) IN NORTHERN AND CENTRAL TUNISIA: SEASONAL ACTIVITY, SPATIAL DISTRIBUTION MODELING, AND DENGUE VIRUS SURVEILLANCE

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Abstract: Despite the growing public health relevance of the Asian tiger mosquito *Aedes (Stegomyia) albopictus* (Skuse), there is a significant gap in our knowledge of its ecology and the prevalence of dengue virus in Tunisia. We conducted larval and adult mosquito surveillance in nine Tunisian governorates, from each belonging to different bioclimatic areas. The phenology of *Ae. albopictus* is bimodal with a small population peak in June and a second larger one in September-October. A total of 99 field-collected *Ae. albopictus* females were pooled and examined for the presence of the four closely related viral strains of dengue virus by PCR multiplex. No dengue virus RNA was detected in the 25 pools of *Ae. albopictus* examined. Species Distribution Models were used to predict the current potential suitable habitats across Tunisia. The model predicts that the most suitable habitats for *Ae. albopictus* are located in the northern and northeastern regions of Tunisia, as well as in small patches in the eastern areas, with a continuous distribution extending along the northwestern coastal zones. According to the model, the factors contributing to the distribution of *Ae. albopictus* in Tunisia include seasonal temperature, elevation, mean temperature of wettest quarter, precipitation of warmest quarter, and minimum temperature of coldest month. Our findings provide evidence that Tunisia is at risk for *Aedes*-borne disease such as dengue fever.

KEYWORDS: *Asian tiger mosquito, Aedes albopictus, surveillance, dengue virus, modeling geographical distribution, MaxEnt, Tunisia.*

PLANT PHYSIOLOGY
BIOLOGY AND ECOLOGY

ORAL COM N° : 37.

TOWARDS SUSTAINABLE WASTEWATER REUSE IN SEMI-ARID AREAS: INTEGRATING COMPOST TO ENHANCE SOIL HEALTH AND *MEDICAGO SATIVA* PRODUCTIVITY

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Abstract: Water scarcity is a major challenge in arid and semi-arid regions and is expected to intensify due to ongoing climate change. Effective water resource management is essential for ensuring global food security and sustainable development. Currently, the irrigation of crops with treated wastewater (TWW) has emerged as a sustainable strategy to help alleviate water scarcity. In Tunisia's semi-arid regions, where water shortages are particularly severe, the use of TWW to cultivate forage crops such as *Medicago sativa* is crucial for reducing reliance on groundwater and promoting agricultural sustainability. However, if not adequately treated, TWW could represent health and environmental risks when reused in irrigation. In this context, soil management strategies that include incorporating organic amendments are widely recognized as effective for improving soil health and mitigating the negative effects of poor-quality irrigation water. The objective of this study was to evaluate the effects of compost amendment on the yield, quality, biochemical, and molecular responses of *Medicago sativa* under treated wastewater (TWW) irrigation. Additionally, the study aimed to assess how these inputs influence soil physicochemical properties, nutrient dynamics, and microbial contamination levels. The experimentation was carried out in a semi-arid region. Obtained results showed thar compost amendment significantly increased lucerne yield by 50%. In addition, compost enhanced leaf nitrogen and phosphorus content by 18% and 13%, respectively, while reducing sodium and chloride accumulation in plant tissues. Oxidative stress indicators were markedly reduced in compost-treated plants, accompanied by increased antioxidant enzyme activities, indicating improved tolerance to salinity stress induced TWW. At the molecular level, the compost siginificantly upregulate stress-responsive genes in plant leaves. Results also revealed that compost amendment reduced the abundance of pathogenic microorganisms, soil electrical conductivity (EC), Na_2O, and chloride concentrations, thereby mitigating salinity and pathogen-related risks associated with treated wastewater (TWW) irrigation. In addition, soil relative water content, organic matter and biological quality were improved. Overall, these findings highlight compost as a promising strategy to enhance the safe and sustainable reuse of treated wastewater in agricultural systems.

KEYWORDS: *Compost, Medicago sativa, soil health, treated waste water,*

ORAL COM N° : 38.

MELATONIN–CALCIUM INTERACTION EFFECTS ON SIGNALING MOLECULES IN WHEAT (*TRITICUM TURGIDUM* L.) UNDER CADMIUM STRESS

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Abstract : This study was designed to evaluate the mitigating effects of melatonin (MEL) and calcium (Ca) on wheat (*Triticum turgidum* L.) plants exposed to 200 µM cadmium (Cd). The application of MEL as a pretreatment and Ca as a cotreatment was found to activate plant defense mechanisms, thereby mitigating the adverse effects of Cd stress on plant growth. The combined MEL+Ca treatment resulted in a significant reduction in the accumulation of reactive oxygen specie. Concurrently, the activities of antioxidant enzymes, superoxide dismutase and catalase were markedly enhanced. MEL+Ca further enhanced NO biosynthesis by upregulating the two key enzymes involved in NO metabolism : nitrate reductase and nitrite reductase. Meanwhile, H_2S metabolism was also upregulated, as evidenced by a significant increase in the activities of L-cysteine desulphydrase and D-cysteine desulphydrase. In addition, the effect of MEL+Ca on proline metabolism was evaluated by measuring proline accumulation and the activities of pyrroline-5-carboxylate synthase, a key enzyme in proline biosynthesis, which decreased, and proline dehydrogenase, involved in proline degradation, which increased. This will provide an interesting direction for further research on the regulation of the complex interactions between MEL+Ca and signaling molecules in plants under heavy metal poisoning situation.

KEYWORDS: Keywords: Cadmium. Calcium. Melatonin. Proline. Signal. Wheat.

ORAL COM N° : 39.

ACCESSION-SPECIFIC SALT TOLERANCE STRATEGIES IN QUINOA UNDER SALINE FIELD CONDITIONS

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Abstract: Soil salinization poses a major threat to agricultural productivity in Mediterranean regions, particularly in Tunisia where saline groundwater is widely used for irrigation. Quinoa (*Chenopodium quinoa* Willd.) represents a promising alternative crop due to its remarkable halophytic adaptations. This study investigated genotype-specific mineral nutrient partitioning strategies in three quinoa accessions (18 GR, R-132, DE-1) grown under field conditions irrigated with 50–200 mM NaCl, representative of Tunisian saline groundwater realities.

At 200 mM NaCl, accessions exhibited contrasting physiological responses. Accession 18 GR maintained biomass production despite accumulating the highest shoot Na^+ concentrations (146% above control) and lowest K^+/Na^+ ratios, suggesting a tissue tolerance strategy based on Na^+ compartmentalization. In contrast, DE-1 preserved superior K^+ retention and K^+/Na^+ selectivity but suffered 79% biomass reduction, revealing the limitations of strict ion exclusion under severe salinity. All genotypes demonstrated tissue-specific mineral partitioning, with roots preferentially sequestering Na^+ and Fe^{2+}, while shoots concentrated K^+, Ca^{2+}, and Mg^{2+}. Positive correlations between shoot K^+ content, biomass production, and tissue osmolarity confirmed potassium's dual roles in metabolic functioning and osmotic adjustment. Principal component analysis and hierarchical clustering successfully distinguished high-salinity-tolerant genotypes (18 GR) from high-biomass but salt-sensitive types (DE-1, R-132), providing robust selection criteria for breeding programs. These findings contribute to evidence-based quinoa cultivation strategies in saline Mediterranean agroecosystems, supporting regional food security and climate adaptation goals.

KEYWORDS: *Quinoa, salt stress, ion partitioning, K^+/Na^+ ratio, halophyte, Center west of Tunisia.*

ORAL COM N° : 40.

PROTEOMIC RESPONSE OF TUNISIAN WILD GRAPEVINE *VITIS VINIFERA* SUBSP. *SYLVESTRIS* – ABIOTIC STRESS ADAPTATION (DROUGHT & SALINITY)

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Abstract: The Tunisian wild grapevine (*Vitis vinifera* ssp. *sylvestris*) is a valuable genetic reservoir, exhibiting remarkable adaptation to harsh environmental conditions, including drought and salinity. In this study, we investigated the molecular mechanisms underlying abiotic stress responses using a proteomic approach. Protein profiling was performed on two-dimensional electrophoresis (2DE), followed by the identification of differentially abundant proteins. The analysis revealed significant modulation of proteins involved in stress defense, energy metabolism, redox homeostasis, and cellular regulation. Notably, key functional categories included antioxidant enzymes, heat shock proteins (HSPs), and proteins associated with carbon metabolism and protein folding. These proteins displayed stress-specific expression patterns, highlighting their role in adaptive responses. Our findings suggest that *V. sylvestris* employs a complex and coordinated proteomic reprogramming to cope with environmental constraints. This adaptive strategy relies on integrating metabolic adjustment with protective mechanisms against oxidative damage. The identified protein markers provide valuable insights into stress tolerance mechanisms and represent promising candidates for improving resilience in cultivated grapevine (*Vitis vinifera* ssp. *sylvestris*).

KEYWORDS: *Vitis vinifera* ssp. *Sylvestris, abiotic stress; proteomics; drought; salinity; stress tolerance.*

ORAL COM N° : 41.

SCREENING OF TUNISIAN BARLEY LANDRACES FOR SALT TOLERANCE USING MULTIPLE AGRO-MORPHOLOGICAL AND TOLERANCE INDICES CRITERIA

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Abstract:

Barley (Hordeum vulgare L.) is a major cereal crop characterized by considerable genetic diversity, particularly in Tunisia. Barley landraces represent valuable genetic resources harboring novel allelic variants associated with resistance and tolerance to various climatic constraints. This study aimed to evaluate the yield performance of twenty-one Tunisian barley genotypes under salt stress in comparison with three improved varieties. The experiment wasconducted in inert sand-filled pots under threes alinity levels (0, 200, and 250 mM NaCl). Key yield components, physiological traits, and biochemical responses were assessed. Statistical analyses, including ANOVA and multivariate analysis, were performed to identify genotypes with high yield potential under salt stress and to determine potential selection markers for screening salt-tolerant barley cultivars at maturity. Significant variations were observed among the tested genotypes for all evaluated traits ($p < 0.01$). However, the degree of reduction under salinity was genotype-dependent. Phenotypic analysis identified plant height (PH) and grain number per spike (GN) as the two major traits contributing to total phenotypic variation. Under severe salinity condition, and based on the stress tolerance index (STI) of these parameters, the genotypes"Kettena", "Skhira" and "Ardhaoui" were identified as the most salt-tolerant genotypes. Hierarchical clustering classified the 21 barley landraces into three groups:tolerant, moderately- tolerant, and sensitive. Salt-tolerant genotypes exhibiting superior adaptation and yield stability may represent valuable genetic resources for future barley breeding programs targeting salinity tolerance.

KEYWORDS: *Barley; Salinity stress; Tunisian landraces; Salt tolerance; Yield components; Genetic diversity.*

ORAL COM N° : 42.

THE PHYSIOLOGICAL RESPONSE OF FABA BEAN (*VICIA FABA* L.) GENOTYPES TO THE COMBINED EFFECT OF DROUGHT STRESS AND *OROBANCHE CRENATA* FORSK. PARASITISM

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Abstract

Water deficit and broomrape (*Orobanche crenata* Forsk.) can pose a persistent threat to faba bean production and sustainability in the Mediterranean countries, especially in arid and semi-arid regions. Currently, there is no review has specifically focused on functional relationships between physiological processes and combined drought-parasitic stress. In this study, four improved and developed Tunisian faba bean varieties were selected, based on their contrasting responses to *O. crenata* and drought stress under free and infested conditions using two different watering regimes. The superior performing genotypes were selected based on the correlations between *Orobanche* infestation, physiological activity and agronomic performance. Interestingly, genotypic performance under combined stress were depended on both infestation status and water availability, as indicated by the highly significant ($p < 0.005$) G × OT × WR interactions on these variables. Significant decreases was highly pronounced especially in the sensitive Bachaar (up to 75.8% in total community dry weight and up to 90.9% in the water use efficiency).The tolerant faba bean varieties Chams and Chourouk were able to maintain moderate function of their physiological activity and exhibited the lowest reduction in the agronomic parameters. Notably, our findings revealed that drought stress accelerated the time of *Orobanche* emergence by approximately 10 days, specifically in Najeh variety, along with significant increase in *Orobanche* dry weight (ODW) in Bachaar (+35.5%) and Najeh (+69.4%) compared to well-watered conditions. No clear genotypic variability in transpiration responses was observed among all genotypes, except for the Chams variety, which maintained transpiration and delayed stomatal closure until lower soil water availability.

Key words: *Orobanche crenata* Forsk; transpiration; faba bean; combined stress; drought stress; parasitism; water use efficiency.

ORAL COM N° : 43.

COMPARATIVE ANALYSIS OF THE EFFECT OF FOUR PGPB BACTERIAL STRAINS AND SOME CONSORTIA ON FIELD-GROWN TOMATO PLANTS

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Abstract: The growing interest in reducing chemical fertilizer use has reinforced the importance of biofertilizers as sustainable agricultural alternatives. Plant Growth-Promoting Bacteria (PGPB) have emerged as promising candidates owing to their capacity to enhance plant growth, improve yield, and boost natural defense mechanisms. The tomato plant (Solanum lycopersicum), one of the world's most widely cultivated vegetable crops, was used as model to assess PGPB efficacy under real field conditions. This study aims to evaluate and compare the individual and combined effects of four PGPB strains (BMI4, A10, VBH6, and STN24) previously isolated in the laboratory on the growth and physiological performance of field-grown tomato plants.

This study aims to evaluate and compare the effect of individual bacteria and combined consortia (BMI4+VBH6 and A10+VBH6) on the growth and physiological performance of field-grown tomato plants, to identify the most effective inoculation strategy for sustainable tomato production.

These bacterial strains and consortia were used to inoculate tomato seedlings before planting under field conditions. Plants were assessed over a 13-week experimental period. Key morphological, biochemical, and reproductive parameters were evaluated and compared to those of non-inoculated control plants.

Although PGPB-treated tomato plants exhibited significantly higher fresh biomass, larger leaf area, and longer roots compared to non-inoculated controls, the bacterial effect was strain-dependent. The A10-inoculated plants showed the highest improvement rate in growth parameters, while STN24 also performed notably well. Biochemical analyses revealed higher IAA concentrations in BMI4-treated plants and elevated total chlorophyll content in A10 and VBH6 treatments, reflecting improved photosynthetic capacity. Regarding reproductive performance, A10-inoculated plants achieved the highest survival rate, and the A10+VBH6 consortium produced the greatest number of blooms per plant, outperforming all individual strains and the control.

This study showed that inoculating tomato plants with PGPB strains — particularly A10 and the A10+VBH6 consortium — significantly improved growth, biomass accumulation, photosynthetic activity, phytohormone production, and reproductive output under field conditions. The synergistic effect observed in bacterial consortia highlights the potential of combining compatible strains to maximize plant growth promotion, offering a viable and eco-friendly strategy for sustainable tomato production.

KEYWORDS: *PGPB, tomato, plant growth promotion, bacterial consortium, IAA, field.*

ORAL COM N° : 44.

COMPARATIVE PHYSIOLOGICAL AND BIOCHEMICAL RESPONSES OF TWO TALL FESCUE (FESTUCA ARUNDINACEA SCHREB.) CULTIVARS UNDER COPPER AND LEAD STRESS

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Abstract:

Tall fescue (*Festuca arundinacea* Schreb.) is a key perennial forage grass in Tunisia and across the Mediterranean region, valued for its high biomass yield and adaptability to diverse agricultural environments. Tunisian agricultural soils are increasingly affected by copper (Cu) and lead (Pb) accumulation, which is linked to agrochemical inputs and phosphate-based fertilizers from local mining, thereby threatening grassland productivity and forage quality. We compared the physiological and biochemical responses of two genetically distinct cultivars, the Tunisian 'Mornag' and the French 'Bullseye', exposed to Pb (500–1500 mg L^{-1}), Cu (250–500 mg L^{-1}), and combined Cu + Pb stress for 20 days under greenhouse conditions.

Metal stress elicited contrasting, cultivar-specific responses. In 'Mornag', net photosynthesis declined progressively under Pb (−46.0% and −49.4% at 500 and 1000 mg L^{-1}), carotenoids dropped sharply (−65.7% at 500 mg L^{-1} Pb), and osmotic adjustment relied on soluble sugar accumulation. In contrast, 'Bullseye' maintained photosynthetic performance under Pb, markedly increased chlorophyll *a* (up to +227.4%), accumulated proline under Cu stress (+469.4% at 500 mg L^{-1}), and sustained polyphenol-based antioxidant responses.

These findings demonstrate that Cu and Pb tolerance in *F. arundinacea* arises from cultivar-specific coordination of photosynthetic regulation, osmotic adjustment, and antioxidant metabolism, with direct implications for cultivar selection in metal-affected agricultural soils in Tunisia.

KEYWORDS: *Festuca arundinacea; cultivar; copper; lead; photosynthesis; osmotic adjustment; polyphenols.*

ORAL COM N° : 45.

INFLUENCE OF SEED STORAGE PERIOD ON THE GERMINATION PERFORMANCE OF PEPPER SEEDS

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Seed longevity is a critical determinant of crop performance and germplasm conservation, hovewer genotype-dependent variability remains poorly documented in pepper (Capsicum annuum L.). This study investigated the impact of a decade of storage on the germination performance of three Tunisian genotypes (Nabeul, Mahdia, and Kairouan). Seed lots harvested in 2013 and 2023 were evaluated under controlled conditions using viability, germination speed and vigor parameters. Long-term storage resulted in significant reductions in viability, germination rate, and vigor across genotypes indicated ecting pronounced physiological deterioration. Fresh seeds exhibited consistently higher germination percentage, capacity, speed index, coefficient of velocity, and germination vigor index values, together with a markedly lower mean germination time. Clear genotype-specific responses were observed : Nabeul maintained high germination and vigor regardless of storage duration, whereas Mahdia showed excellent performance when fresh but severe deterioration after 10 years; Kairouan displayed intermediate sensitivity. These findings highlight substantial genetic variation in seed aging tolerance and underscore the value of long-lived genotypes such as Nabeul for seed conservation, breeding programs, and long-term germplasm management.

Keywords : Capsicum annuum, physiological deterioration, seed conservation, viability, vigor index.

ORAL COM N° : 46.

THE ROLE OF THE ANTIOXIDANT ENZYMES OF DURUM WHEAT IN ABIOTIC STRESS TOLERANCE

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Abstract: In this study, we focused on the role of the antioxidant enzymes, ascorbate peroxidases (APX) and glutathione peroxidases (GPX) of durum wheat in abiotic stress tolerance. Firstly, the members of APX and GPX families were identified and classified using bio-informatic tools. Moreover, their genomic organization and duplication were analyzed and compared to their homologs in other plant species. Secondly, their expression profile was analyzed in leaves and roots of durum wheat exposed to various abiotic stress, such as salinity, cold and metals toxicities. Finally, the role of the durum wheat protein APX7B-2 in abiotic stress tolerance was evaluated in transgenic *Arabidopsis* plants. Indeed, the homozygous lines were transferred with the non-transformed plants (Wt) to medium containing various abiotic stresses. Subsequently, different physiological, biochemical and molecular parameters were analyzed like the determination of proline contents and the analysis of the expression of various stress-related genes to understand the mechanism involved during abiotic stress tolerance.

KEYWORDS: *Peroxidases, durum wheat, abiotic stress, bio-informatic tools, Arabidopsis.*

ORAL COM N° : 47.

EFFECTS OF PRUNING INTENSITY ON VEGETATIVE GROWTH, FRUIT QUALITY, AND YIELD STABILITY OF FIG (*FICUS CARICA* L.) UNDER RAINFED CONDITIONS

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Abstract: This study investigated the effects of pruning intensity on vegetative growth, yield performance, fruit quality, and yield stability of the 'Zidi' fig cultivar over three consecutive seasons (2023–2025) under Mediterranean rainfed conditions in northeastern Tunisia. The experiment was conducted in a fig orchard located at the Agricultural Experimentation Unit of INRA-Tunisia using a randomized complete block design with three pruning intensities: light pruning (T1, <15% biomass removal), moderate pruning (T2, 30–40% biomass removal), and severe pruning (T3, ≥50% canopy reduction). Vegetative growth parameters, yield components, fruit quality traits, and interannual yield variability were evaluated.

Pruning intensity significantly affected all measured traits. Severe pruning stimulated vigorous vegetative regrowth, resulting in the highest shoot length (67.8 cm), shoot diameter, and leaf area index (LAI = 3.8), indicating strong compensatory growth following extensive canopy removal. In contrast, light pruning limited canopy renewal and vegetative development, whereas moderate pruning maintained a more balanced vegetative–reproductive equilibrium. Moderate pruning also achieved the best agronomic performance, producing the highest mean yield (17.0 kg tree^{-1}), the largest fruit weight (65 g), and the greatest total soluble solids content (19.5 °Brix). In addition, trees subjected to moderate pruning exhibited the lowest interannual coefficient of variation in yield (CV = 12%), reflecting greater yield stability across seasons. Conversely, severe pruning markedly reduced yield (12.2 kg tree^{-1}) and soluble solids accumulation (17.4 °Brix), likely due to preferential assimilate allocation toward vegetative sinks at the expense of fruit development.

Overall, moderate pruning emerged as the most effective canopy management strategy for optimizing vegetative–reproductive balance, improving fruit quality, and enhancing yield stability under Mediterranean rainfed conditions. These findings provide practical insights for adapting fig orchard management to increasing climatic variability and drought stress.

KEYWORDS: *Ficus carica*, canopy management, pruning severity, drought adaptation, fruit quality, yield stability, rainfed conditions

ORAL COM N° : 48.

BIOPRIMING OF WHEAT SEEDS WITH A CHITIN BLUE CRAB AND A CHITINOLYTIC STRAIN PGPB CAN ENHANCED TOLERANCE TO SALINITY

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Seed biopriming is a pre-sowing seed enhancement technique that combines controlled seed hydration with the inoculation of beneficial microorganisms to improve plant growth, stress tolerance, and disease resistance. While traditional seed inoculation involves a simple application of microbes to the seed surface, biopriming offers a more integrated and effective approach. In another hand, environmental pollution has become increasingly severe, with large amounts of industrial waste contaminating the natural environment essential to human life over the past few decades. Pollutant discharges remain a serious problem in many countries around the world. This study is part of efforts to valorize fishery byproducts, particularly crustacean waste, with the aim of producing high-value-added products. This research focuses the technique of biopriming, by a chitinolytic strain in combination with blue crab chitin, as a healthy alternative to exploit a source of environmental pollution "crab chitin" as a biofertilizers in order to attenuate the inhibitory effects of salt on plants in general and durum wheat specifically.

Our studies showed better growth of durum wheat shoots treated with biopriming and chitin compared to the control without chitin. The explants treated with biopriming showed better growth of durum wheat shoots compared to the control. The content of reducing sugars, total sugars, and proteins was higher in the presence of the chitinolytic strain. The beneficial effect of seed biopriming was more pronounced in samples containing chitin than in those treated with osmopriming and chitin. Consequently, it can be said that the role of these strains combined with chitin in producing substances that promote plant growth and stress resistance is clear. This combination also promotes the growth and development of beneficial microorganisms to establish synergistic relationships with plants. Our results from in vitro and in vivo trials confirm that the use of crab chitin proved to be very useful and effective, particularly regarding the rooting capacity and development of durum wheat explants. Furthermore, the addition of this chitin-based biofertilizer induced the activation of several metabolic pathways in seeds treated with a chitinolytic strain prior to germination.

The use of blue crab chitin, a natural adjuvant as a biofertilizers in the presence of a chitinolytic strain, can replace the harmful effect of chemical fertilizers and remedy soils affected by abiotic factors. These bacteria can be considered as a biological adjuvant which can play an important role in inducing salinity tolerance in plants and can be used in salt sensitive crops in saline areas.

Keywords: Plant growth-promoting bacteria, Biopriming, Seed germination, Abiotic stresses, Chitinase, Blue Crab Chitin.

ORAL COM N° : 49.

PHYSIOLOGICAL DISSECTION OF THE GENOTYPIC DIFFERENCES IN RESPONSE OF DURUM WHEAT (*TRITICUM TURGIDUM SSP. DURUM* DESF.) TO SALINITY STRESS

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Abstract : Durum wheat is still the main cereal crop, both in rainfed and irrigated. However, soil and irrigation water salinity remain the main abiotic factors limiting its productivity, especially in arid and semi-arid environments driven by climate change. Understanding the mechanisms by which plants respond and adapt to salinity would enable the selection of tolerant cultivars and identify useful traits and markers of tolerance. Accordingly, a greenhouse experiment was conducted on four cultivars of durum wheat (Triticum durum Desf.) subjected to salinity stress. Physio-biochemical parameters (growth, water relations, gas exchange, chlorophyll pigments, ionic content, and endogenous phytohormones) and their interrelationships were analyzed.

Obtained results showed that salt stress affects plant growth, chlorophyll pigments, photosynthetic parameters and growth hormones, promote the accumulation of sodium at the expense of potassium, disrupts water relations, and stimulates stress hormones. These metabolic changes remain strictly cultivar-dependent, while Karim proved less vulnerable to salt stress. The relative tolerance of durum wheat to salinity stress depends closely on its ability to regulate water relations through osmotic adjustment and optimization of photosynthetic parameters. Although growth hormones have been affected, stress hormones are stimulated and appear to play a key role in stress signaling, modulation of ionic compartmentalization through promoted K uptake, and stimulation of osmolyte accumulation. These two mechanisms help preserve gas exchange and maintain net photosynthetic assimilation, leading to improved biomass production.

KEYWORDS: *Durum wheat, photosynthesis, phytohormones, salinity stress, water relations*

ORAL COM N° : 50.

ASSESSMENT OF GENETIC DIVERSITY IN SUNFLOWER GENOTYPES USING PHYSIOLOGICAL, PHOTOSYNTHETIC AND AGRO-MORPHOLOGICAL TRAITS

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Abstract:

Sunflower is one of the most important oilseed crops worldwide and the identification of genetically diverse genotypes is essential for breeding programs and crop improvement. Therefore, the objective of this study was to assess the genetic diversity among some sunflower genotypes using agro-morphological, physiological and photosynthetic traits. Analysis of variance performed for all examined variables revealed significant differences ($p \leq 0.05$) among the studied sunflower genotypes. The principal component analysis (PCA) revealed that the first two principal components explained 53.8% of the total variance, accounting for 36.8% and 17% of the variance, respectively. The first component was strongly associated with photosynthetic parameters such as PhiNPQ (regulated energy dissipation), LEF (Linear electron flow) and ECSt (Electrochromic shift total), while it was negatively correlated with Fv/Fm (maximum PSII efficiency), Phi2 (Quantum yield of PSII) and PhiNO (non-regulated energy loss). The second component was mainly related to agronomic traits, particularly seeds number and seeds weight per head . The PCA also showed that the sunflower genotypes were grouped into six distinct clusters. The correlation analysis demonstrates strong interactions between photosynthetic efficiency, physiological regulation, and agronomic performance, highlighting the coordinated mechanisms underlying plant responses under the studied conditions. Overall, the results demonstrated considerable genetic diversity among sunflower genotypes and emphasized the importance of integrating agro-morphological and physiological markers for the characterization of sunflower genetic resources and the improvement of breeding strategies.

KEYWORDS: *sunflower, genetic diversity, physiological and photosynthetic traits, multivariate analysis*

ORAL COM N° : 51.

INVOLVEMENT OF MYROSINASES IN STOMATAL CLOSURE IN ARABIDOPSIS

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Abstract: Stomatal guard cells integrate diverse environmental and defense signals to regulate aperture, yet the molecular components linking early signaling events to stomatal closure remain unclear. Myrosinase, also known as thioglucoside glucohydrolase (TGG), catalyzes the hydrolysis of glucosinolates to isothiocyanates (ITCs), a reaction central to plant defense in the Brassicaceae family. Here, we investigated the roles of the myrosinase isoforms TGG1 and TGG2 in guard cell signaling downstream of allyl isothiocyanate (AITC), a myrosinase reaction product, chitosan (CHT), a pathogen-associated elicitor, and salicylic acid (SA), a key defense hormone, in Arabidopsis thaliana wild-type and mutants. Using single (tgg1, tgg2) and double (tgg1 tgg2) mutants, we demonstrate that TGG1 and TGG2 are required for stomatal closure induced by all three signals, as closure was impaired specifically in the double mutant. Notably, early signaling events, including reactive oxygen species (ROS) and nitric oxide (NO) production, cytosolic alkalization, and cytosolic Ca^{2+} oscillations, remained intact in tgg1 tgg2 guard cells, indicating that TGG1 and TGG2 act downstream of these responses in the AITC-induced closure pathway. Investigation of reactive carbonyl species (RCS) signaling further revealed that RCS scavengers blocked CHT- and SA-induced closure in all genotypes, while exogenous application of acrolein, an RCS, failed to restore the closure in tgg1 tgg2 mutants. This suggests that TGG1 and TGG2 act downstream of ROS but upstream or at the level of RCS production, representing a novel myrosinase-dependent step in stomatal defense signaling. Collectively, these findings identify TGG1 and TGG2 as positive regulators of stomatal closure across defense pathways and underscore the need to further define their molecular roles in stomatal signaling.

***KEYWORDS*:** *Arabidopsis*, Myrosinase, stomatal closure, glucosinolates, RCS

ORAL COM N° : 52.

SELECTING HIGH-PERFORMANCE POLLINATORS FOR CLIMATE CHANGE ADAPTATION: METAXENIC IMPACT ON PRODUCTIVITY AND FRUIT QUALITY OF THE 'DEGLET NOUR' VARIETY (*PHOENIX DACTYLIFERA* L*)* IN TUNISIA.

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Abstract:
This study examines the metaxenic effect of various pollen sources on the agronomic, pomological, and biochemical parameters of the Deglet Nour date variety in Tunisia. The objective is to identify optimal pollinators to enhance fruit productivity and quality in response to climate change challenges. The methodology was based on controlled pollination conducted *in situ* within private and experimental plots. Various parameters were evaluated, including fruit set rate, parthenocarpy, maturation kinetics, and biochemical composition, such as polyphenols, flavonoids, sugars, and minerals. The results reveal highly significant variability depending on the pollen source. Pollinator P11 induced the highest fruit set rate (75.44%), directly influencing yield. Regarding maturation, a gap of up to 40 days was observed between early pollinators (P10, P Sami) and late ones (P6, P15), providing strategic options to avoid early autumn rains. Qualitatively, pollinator P15 stands out for producing dates with the highest antioxidant content, specifically polyphenols and flavonoids. For commercial optimization, P165 is recommended as it produces the heaviest fruits while maintaining minimal water activity (aw), thereby reducing the risk of microbial spoilage during storage. Conversely, sources such as ABD1 increase the risk of deterioration due to high aw levels. In conclusion, the rigorous selection of pollinators is a fundamental lever for modern palm grove management, allowing for the maximization of both nutritional value and the economic resilience of oasis systems.
Keywords: Date palm, pollen, metaxenia, cross pollination, fruit set, antioxidants, yield.

ORAL COM N° : 53.

CADMIUM-INDUCED OXIDATIVE AND METABOLIC STRESS IN *PISUM SATIVUM* SEEDLINGS AND ITS MITIGATION BY MELATONIN AND GAMMA-AMINOBUTYRIC ACID

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Abstract: Cadmium exposure in *Pisum sativum* seedlings induces severe oxidative and metabolic stress, reflected by reduced carbohydrate content and disruption of proline metabolism through the activation of delta-1-pyrroline-5-carboxylate synthase and inhibition of proline dehydrogenase, leading to a significant accumulation of proline. Cadmium also stimulates ornithine aminotransferase activity, indicating the involvement of the ornithine pathway. Polyamine metabolism is enhanced, with increased activities of arginine decarboxylase and ornithine decarboxylase, as well as diamine oxidase and polyamine oxidase, suggesting accelerated polyamine turnover. The application of melatonin and gamma-aminobutyric acid alleviates cadmium toxicity by improving carbohydrate levels, attenuating ornithine aminotransferase activity, modulating polyamine-related enzymes, and enhancing antioxidant responses.

KEYWORDS: *Cadmium, Pisum sativum, Melatonin, GABA, Polyamine.*

ORAL COM N° : 54.

ABIOTIC MODULATION OF ESSENTIAL OILS IN MEDICINAL AND AROMATIC PLANTS

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Abstract: Medicinal and aromatic plants exhibit remarkable eco-physiological plasticity, enabling them to adapt to environmental fluctuations through modifications in secondary metabolism and bioactive compound production. This work provides an overview of how abiotic factors, including salinity, seasonal variation, geographical conditions, and phenological development, influence the biosynthesis and biological properties of essential oils (EOs) in several studied Tunisian aromatic plant species. Climatic and edaphic conditions varied markedly among the studied environments. Precipitation during the dry season could drop to as low as 2 mm, reflecting strong seasonal water stress. Soil characteristics were also highly variable, with sandy-dominated textures containing up to 86.55% sand, and low proportions of clay and loam.

Marked differences in EO appearance were revealed, with coloration ranging from pale yellow to darker yellow-green tones, reflecting changes in metabolic activity and volatile composition. EO productivity was strongly affected by environmental and developmental conditions, with extraction yields showing substantial fluctuations that varied from less than 0.2% to nearly 3% according to harvest period, growth stage, and cultivation environment. These abiotic influences promoted differential accumulation of Monoterpene oxygenated and phenolic metabolites closely associated with plant defense and adaptive responses. Variations in chemical composition were further correlated with modifications in antioxidant, antimicrobial, insecticidal, and enzymatic inhibitory activities, demonstrating that environmental stress acts as an important regulator of plant bioactivity.

Overall, the findings emphasize that abiotic stimuli not only shape plant adaptation mechanisms but also determine the functional and industrial value of EOs. Understanding these interactions may contribute to sustainable cultivation strategies and to the optimization of medicinal and aromatic plants as renewable sources of bioactive compounds for pharmaceutical, food, cosmetic, and agroecological applications.

KEYWORDS: *abiotic factors, essential oils, medicinal and aromatic plants, plant adaptation*

ORAL COM N° : 55.

CHEMICAL PROFILE AND BIO-HERBICID POTENTIAL OF *EYCALYPTUS* ESSENTIAL OILS AND HYDROSOLS: *IN SILICO* AND *IN VITRO* ALLELOPATHIC ASSESSMENTS

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Abstract:
The potential hazards posed to human health and the environment by synthetic herbicides are currently a major concern. This has led to an increased interest in alternative strategies, particularly the development of biodegradable and non-toxic compounds. Essential oils (EOs) are known for their allelopathic interactions, which inhibit seed germination and plant growth, making them excellent candidates for bio-herbicide development.
The aim of this study was to characterise the chemical composition and to evaluate, through *in silico* and *in vitro* approaches, the allelopathic activity of EOs and hydrolats extracted from the dry leaves of three eucalypts (*Eucalyptus torquata*, *E. woodwardii*, and their hybrid *E. torwood*) collected in the Gabès region (Southern Tunisia). Chemical characterisation of the EOs was performed using GC-MS. Molecular docking was conducted to assess the inhibitory potential of the predominant compounds against the HPPD enzyme. *In vitro* bioassays were carried out to evaluate the impact of different EO volumes on the germination and growth of *Hordeum vulgare*, *Raphanus sativus* and *Lactuca sativa*.Chemical analysis showed that oxygenated sesquiterpenes were predominant in all species, with *E. torwood* exhibiting the highest content (61.5%). The EOs were dominated by 1,8-cineole, torquatone, α-pinene, aromadendrene, eudesmol, and globulol. Docking results indicated favorable interactions with the target receptor, with binding energies ranging from -5.8 to -8.2 kcal/mol. Aromadendrene was identified as the most active compound (-8.2 kcal/mol), showing higher potential than the reference inhibitor. *In vitro* results demonstrated a significant dose-response effect; at high doses (30 and 60 µL), *E. torquata* and *E. woodwardii* completely inhibited the germination and radicle growth of all target species. This study demonstrates that the studied *Eucalyptus* EOs, particularly from *E. torquata*, act as potent natural inhibitors of the HPPD enzyme. These findings suggest that these species represent a promising and eco-friendly "green source" for the development of new bio-herbicides.
KEYWORDS: *Eucalyptus*, Essential oils, Allelopathy, Molecular docking, HPPD, Bio-herbicides.

ORAL COM N° : 56.

COMPARATIVE PERFORMANCE OF TWO *CYTISUS* SPECIES WITHIN AN AGROFORESTRY FRAMEWORK

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Abstract : In front of intensifying climate change, characterized by more severe and prolonged summer droughts, the adaptive management of forest ecosystems has become a priority, particularly for oak stands which are increasingly vulnerable to dieback. In this context, the integration of shrub legumes is of significant interest: beyond their ability to fix atmospheric nitrogen and enhance soil fertility, they play a crucial role in the structure and forest resilience. This study compares two species of the genus Cytisus (*C. albidus* and *C. villosus*) to evaluate their suitability for supporting agroforestry systems under water stress.
We investigated the performance of these two legumes from an adaptive management perspective, assessing their development from germination to their response to summer drought. The results highlight two distinct ecological strategies : while *C. albidus* exhibits marked precocity—characterized by faster establishment, a higher germination rate, and more vigorous initial elongation—this trend reverses during the critical drought phase. Ecophysiological analysis shows that *C. villosus* maintains higher efficient photosynthesis, stomatal conductance, and transpiration rates despite the cessation of irrigation (severe water stress equivalent to –3,5 ± 0,5 MPa). This resilience is explained by optimized biomass allocation, where the development of root weight relative to shoot weight promotes enhanced long-term survival. In conclusion, although *C. albidus* is effective for immediate colonization, *C. villosus* proves to be the more robust species and better adapted to uncertain climatic scenarios, ensuring the sustainability of agroforestry systems in arid conditions.
KEYWORDS: *Cytisus, germination, growth, water stress, adaptive management.*

ORAL COM N° : 57.

COMPARATIVE PHYSIOLOGICAL AND TRANSCRIPTOMIC RESPONSES OF CONTRASTING BARLEY GENOTYPES UNDER DIFFERENT TUNISIAN BIOCLIMATIC CONDITIONS

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Abstract: Climate change represents a major threat to cereal production in Tunisia, particularly in arid and semi-arid regions. In this context, the identification of genotypes capable of maintaining their performance under unfavorable environmental conditions is essential for the sustainability of cereal production.
This study aimed to compare the physiological and transcriptomic responses of two contrasting barley genotypes: Ardhaoui, a local landrace recognized for its resilience to harsh environmental conditions, and Manel, a high-yield improved variety relatively sensitive to environmental stresses. Field experiments were conducted under two contrasting Tunisian bioclimatic conditions : Béja, a favorable cereal-growing region, and Mednine, characterized by an arid climate and saline irrigation water. An integrated approach combining physiological and transcriptomic analyses was used to characterize genotype responses to environmental constraints.
Physiological analyses revealed more pronounced reductions in growth, relative water content (RWC), and chlorophyll content in Manel cultivated in Mednine, whereas Ardhaoui maintained better physiological performance under arid conditions. RNA-seq transcriptomic analysis highlighted a strong effect of climate on gene expression patterns. Principal component analysis (PCA) and heatmap clustering clearly separated samples according to environmental conditions. Moreover, Ardhaoui exhibited a much larger transcriptional reprogramming (~9,400 DEGs) compared with Manel (~6,200 DEGs), suggesting greater transcriptomic plasticity associated with adaptation to arid environments.
Ongoing functional analyses will help identify the biological pathways and molecular mechanisms involved in environmental stress tolerance in barley.

KEYWORDS: Barley; Climate change; RNA-seq; Abiotic stress; Transcriptomic plasticity.

ORAL COM N° : 58.

MITIGATION OF SALINITY STRESS IN BAKLOUTI PEPPER (*CAPSICUM ANNUUM* L.) BY HALOTOLERANT PLANT GROWTH-PROMOTING BACTERIA

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Abstract: Soil salinity represents a major constraint to agricultural productivity by adversely affecting plant growth and physiological performance. The present study investigated the potential of two bacterial isolates, PH51 and AB58, selected through a screening process for their plant growth-promoting activity in Baklouti pepper (*Capsicum annuum L.*) under saline conditions. Plants cultivated in soil supplemented with 120mM NaCl and inoculated with strain AB58 showed significant improvements in vegetative and physiological parameters compared to uninoculated controls. Enhanced stem length, leaf number, leaf area, and plant survival were recorded under salt stress, with survival rates reaching 100%. Beneficial effects were also observed under non-saline conditions, confirming the growth-promoting ability of this isolate. Furthermore, the bacterial consortium composed of AB58 and PH51 contributed to improved plant performance and salt tolerance. These findings highlight the potential of halotolerant plant growth-promoting bacteria as an eco-friendly and sustainable strategy to mitigate the detrimental effects of salinity and improve crop productivity in salt-affected soils.

KEYWORDS: *Salinity stress; Plant growth-promoting bacteria (PGPB); Halotolerant bacteria; Capsicum annuum L.; Salt tolerance*

ORAL COM N° : 59.

SIGNALING PATHWAYS TRIGGERED BY 5-AMINOLEVULINIC ACID MEDIATE CADMIUM TOLERANCE IN CHICKPEA

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Abstract: Cadmium (Cd) toxicity severely limits plant growth by disrupting cellular redox balance and ion homeostasis. This study investigated the mechanisms underlying 5-aminolevulinic acid (5-ALA)-induced Cd tolerance in chickpea (*Cicer arietinum* L.), with a particular focus on signaling pathways.
Primed seeds with 5-ALA were exposed to 200 µM $CdCl_2$ during germination. The results revealed that Cd stress markedly inhibited seedling growth, increased hydrogen peroxide and malondialdehyde accumulation, and altered membrane integrity. In contrast, 5-ALA significantly alleviated these effects by reducing Cd accumulation and enhancing antioxidant defense systems, as reflected by increased activities of superoxide dismutase, catalase, ascorbate peroxidase, glutathione reductase, and glutathione peroxidase, along with elevated levels of reduced glutathione and ascorbic acid.
At the signaling level, 5-ALA restored Ca^{2+} homeostasis by increasing Ca^{2+} accumulation and Ca^{2+}-ATPase activity, while modulating the expression of Ca^{2+} transporters (*PMCA4* and *SERCA3*). Furthermore, 5-ALA activated Ca^{2+}-dependent signaling pathways through the upregulation of key genes, including *CaM7*, *CDPK21*, and *MAPK2*. The application of lanthanum, a Ca^{2+} channel blocker, suppressed these responses, highlighting the essential role of Ca^{2+} flux. In parallel, 5-ALA enhanced the accumulation of NO and H_2S and stimulated the activities of their biosynthetic enzymes. Pharmacological inhibition the synthesis routes of NO and H_2S abolished the protective role of 5-ALA, whereas the application of their respective donors restored stress tolerance, confirming their involvement as key signaling mediators.
Overall, these findings demonstrate that 5-ALA enhances Cd tolerance through a coordinated signaling network involving Ca^{2+}, NO and H_2S signaling, and antioxidant regulation, thereby improving plant resilience under heavy metal stress.
KEYWORDS*: Antioxidant enzymes, Calcium signaling, Calmodulin, Ca^{2+}-ATPase, Signal transduction*

ORAL COM N° : 60.

GENOTYPE-SPECIFIC ENHANCEMENT OF DROUGHT RESILIENCE AND POST-STRESS RECOVERY IN POTATO PLANTS INOCULATED WITH *BACILLUS MOJAVENSIS* I4 THROUGH ANTIOXIDANT AND HORMONAL REGULATION

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Abstract: Drought stress is a major constraint limiting potato (*Solanum tuberosum* L.) productivity by disrupting plant growth, physiological homeostasis, and tuber development. Somatic hybridization can be an alternative to produce potato varieties. In this study, we envisaged to combine somatic hybridization and Plant Growth-Promoting Bacteria (PGPB) to promote potato plant response to drought stress. Therefore, a PGPB strain *Bacillus mojavensis* I4 (BmI4) was used to inoculate potato plants, and we evaluated drought resilience and post-stress recovery of two intraspecific somatic hybrid potato lines (H506 and H101), produced in the Luke Institute, and the commercial cultivar Spunta under contrasting water regimes. Plants were subjected to three irrigation treatments: full-watered control conditions, prolonged drought stress (SH), and drought stress for 17 days followed by rehydration (SHR). Water deficit significantly reduced growth and yield across all genotypes. Under prolonged severe drought, non-inoculated control plants exhibited substantial biomass loss and high mortality, and BmI4 inoculation provided only limited protection. In contrast, inoculated plants subjected to drought stress followed by rehydration, particularly H506 and Spunta, exhibited improved growth performance and enhanced recovery capacity compared with non-inoculated plants. Drought stress induced pronounced oxidative damage, as evidenced by increased hydrogen peroxide (H_2O_2) and malondialdehyde (MDA) accumulation. BmI4 inoculation significantly reduced these stress markers, indicating improved membrane stability and more efficient detoxification of Reactive Oxygen Species (ROS). This protective effect was associated with enhanced activities of antioxidant enzymes, including superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPX). Furthermore, BmI4 improved osmotic adjustment under water-deficit conditions by promoting proline accumulation in inoculated plants. It also modulated hormonal balance through increased indole-3-acetic acid (IAA) levels, particularly in H506, which likely contributed to improved growth and post-stress recovery. Moreover, the inoculation with BmI4 significantly enhanced yield and quality of tubers produced under SHR conditions. Overall, BmI4-mediated improved somatic hybrid plant drought resilience, with the greatest benefits observed during post-stress recovery rather than under extreme drought conditions.
KEYWORDS: Potato; *Bacillus mojavensis*; Plant Growth-Promoting Bacteria; drought stress; post-stress recovery; oxidative stress; tuber quality

ORAL COM N° : 61.

ASSESSMENT OF THE ROLE OF CHLOROPHYLL FLUORESCENCE PARAMETERS IN FABA BEAN (VICIA FABA L.) TOLERANCE TO OROBANCHE PARASITISM

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Orobanche spp. are root parasitic plants that cause severe yield losses in faba bean (*Vicia faba* L.). The use of resistant varieties is a key element in an integrated control approach and has significant potential to mitigate the damaging effects of these parasitic weeds. In this study, we investigated the resistance mechanisms associated with fluorescence parameters in relation to Orobanche infestation, using a pot experiment.

Results showed that parasitism reduced active photosynthetic pigments in the susceptible variety and was accompanied by alterations in PSII and photosynthetic performance. In contrast, the tolerant varieties maintained chlorophyll (*a*, *b*, and total*)* and carotenoid content, showed a stability in PSII-related parameters, including ABS/RC, TR0/RC, ET0/RC, DI0/RC, γRC/(1−γRC), ΦPo/(1−ΦPo). This was associated with only minor reductions in PIabs and PItotal and unchanged Fv/Fm at approximately 0.8, indicating preserved photosynthetic efficiency and yielding performance similar to the control.

Key words: *Faba bean, Orobanche, Tolerance, Chlorophyll Fluorescence, MultispeQ, Handy PEA.*

ORAL COM N° : 62.

BENEFICIAL BACTERIA AS A SUSTAINABLE STRATEGY TO ALLEVIATE ANTIBIOTIC-INDUCED STRESS IN PLANTS AND SOIL MICROBIOMES

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Abstract: The widespread use of antibiotics in human medicine and agriculture has led to their continuous release into the environment, particularly through treated wastewater irrigation and agricultural amendments. This situation raises serious concerns, not only due to the persistence of antibiotic residues in soils but also because of their contribution to the selection and dissemination of antimicrobial resistance in environmental microbiomes. Of particular concern is the emergence of ciprofloxacin-resistant *Escherichia coli* and colistin-resistant *Enterobacteriaceae*, with genes conferring resistance to drugs. This is especially alarming as these antibiotics are considered "last-resort antibiotics," leaving humans with severely limited therapeutic options and highlighting a critical global health threat.Among commonly detected environmental antibiotics, tetracycline (TET) is frequently found in agricultural soils, where it can persist, disrupt plant physiological processes, and alter soil microbial communities, ultimately affecting crop productivity and ecosystem stability. In this context, we investigated the ability of a tetracycline-degrading bacterial strain S9, isolated from soil irrigated with treated wastewater and closely related to *Erwinia sp.*, to alleviate antibiotic-induced stress in pea plants (*Pisum sativum L.*). Greenhouse experiments were conducted using two TET concentrations (20 and 200 mg/L). Plant responses were evaluated through measurements of tissue elongation, root and leaf biomass, and tetracycline accumulation in soil and plant tissues.Results demonstrated that TET significantly inhibited plant growth and physiological performance. In non-inoculated plants, a strong and significant negative correlation was observed between TET concentration and dry biomass of both roots ($\rho = -0.76$, $p = 0.00025$, ρ = Spearman correlation coefficient, p = significance level) and shoots ($\rho = -0.80$, $p = 6.7 \times 10^{-5}$), indicating a marked dose-dependent reduction in growth. In contrast, inoculation with strain S9 significantly improved plant development and restored physiological parameters to levels close to the control. In inoculated plants, dry biomass remained relatively stable across increasing TET concentrations, showing weak and non-significant correlations with TET for roots ($\rho = 0.38$, $p = 0.12$) and shoots ($\rho = -0.039$, $p = 0.88$).

Tetracycline accumulation in soil and plant tissues was strongly influenced by S9 inoculation. In non-inoculated treatments, TET concentrations in irrigation solution were positively and significantly correlated with TET accumulation in soil ($\rho = 0.88$, $p = 0.00073$), roots ($\rho = 0.93$, $p = 7.6 \times 10^{-5}$), and shoots ($\rho = 0.67$, $p = 0.032$). Conversely, in S9-inoculated plants, TET levels in soil, roots, and shoots remained largely unchanged across the tested concentrations, exhibiting flat and statistically non-significant correlations (soil: $\rho = 0.10$, $p = 0.78$; roots: $\rho = 0.21$, $p = 0.56$; shoots: $\rho = 0.26$, $p = 0.47$). These effects were associated with enhanced nutrient uptake, improved stress tolerance, and the degradation of tetracycline, leading to reduced antibiotic bioavailability within the soil–plant system.Furthermore, 16S rRNA gene amplicon sequencing of rhizosphere samples revealed that strain S9 modulated the structure of the indigenous bacterial community under antibiotic stress. Overall, this study highlights the dual environmental and agricultural relevance of strain S9, demonstrating its potential as both a biofertilizer and a bioremediation agent. The application of such beneficial bacteria represents a sustainable strategy to mitigate antibiotic contamination, enhance crop resilience, and address the interconnected challenges of environmental pollution and antimicrobial resistance.

KEYWORDS: *Antibiotic contamination, Tetracycline degradation, Beneficial bacteria Plant–microbiome interaction, Bioremediation.*

BIOTECHNOLOGY

ORAL COM N° : 63.

ENHANCING PHYCOCYANIN STABILITY BY INCORPORATION INTO A BIOACTIVE FILM

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Abstract: Phycocyanin (C-PC), a blue water-soluble protein pigment extracted from cyanobacteria, has attracted increasing interest in the biomedical, food, therapeutic, and cosmetic fields due to its antioxidant, anti-inflammatory, and antibacterial properties. However, its high sensitivity to environmental factors, particularly temperature, light, and pH variations, considerably limits its practical applications.
To improve its stability and functionality, phycocyanin was incorporated into a polymeric matrix in the form of a bioactive film.
The incorporation of phycocyanin into the biofilm was carried out by the casting method according to a protocol developed in our laboratory, using natural ingredients and different concentrations of phycocyanin. Spectral analyses (optical density, fluorescence, and transmittance) and physicochemical analyses (scanning electron microscopy, FTIR, and zeta potential) confirmed the successful integration of C-PC within the biofilm matrix. The stabilization efficiency was evaluated by measuring the antibacterial activity and antioxidant capacity of the phycocyanin incorporated into the bioactive film.

KEYWORDS: *Phycocyanin, bioactive film, stability, biofilm matrix*

ORAL COM N° : 64.

SUSTAINABLE BIODIESEL PRODUCTION FROM GREEN NON-OILSEED BIOMASS VIA *IN-SITU* BIOCONVERSION

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Abstract:
The development trends of non-consumable biodiesel feedstocks as sustainable alternative fuels have recently gained significant attention in the advancement of next-generation biofuels. Nowadays, major research efforts are dedicated to developing alternative lipid sources, such as lipid-rich agricultural and industrial wastes, which provide a variety of potential raw materials for biodiesel production. This study presents an innovative approach for sustainable biodiesel generation from leaves through in-situ bioconversion of membrane galactolipids using *Talaromyces thermophilus* galactolipase. Galactolipids, mainly monogalactosyldiglycerides (MGDG) and digalactosyldiglycerides (DGDG), are the major constituents of plant membranes, especially those involved in the photosynthetic machinery, accounting for 77% of the thylakoid membranes in plants and green algae. They are estimated to be the most abundant acylglycerolipids on Earth, representing the largest reservoir of fatty acids (FA), comprising up to 80% of total biomass FA. The exploitation of galactolipids contained in plant biomass or green waste would thus be an attractive alternative source for fatty acid conversion. We demonstrated that TTL exhibits high galactolipase activity capable of hydrolyzing and fully converting these natural galactolipids into FA and fatty methyl esters (FAME). By optimizing *in-situ* transesterification conditions on the entire green biomass, a one-pot process was developed, yielding 121 mg of biodiesel after 12 hours, composed of 66% FAME and 33% alkanes (C16-C24). The recovery of FAME from galactolipid FA reached 89%, highlighting its potential for co-refining within existing petroleum refineries and avoiding competition with vegetable oils. Therefore, the outcome of this study can potentially improve the *in-situ* harvest of fatty acids without extraction, enabling the recovery and valorization of fatty acids esterified from the most abundant membrane lipids. In the context of competition for vegetable oils, these findings open the door to the recovery of fatty acids dispersed in green biomass for sustainable biodiesel generation from agricultural waste. Additionally, the methanolic extract of leaves exhibited antioxidant properties that could enhance the stability of the produced biofuel. These findings underscore the potential of green biomass galactolipids as a sustainable and innovative raw material for biodiesel production.

KEYWORDS*: In-situ transesterification, Non-oilseed green biomass, Galactolipids, Galactolipase, Sustainable biodiesel*

ORAL COM N° : 65.

QUINOA FOOD VALUE CHAIN INTELLIGENCE AND INTEGRATIVE DESIGN FOR THE DEVELOPMENT AND IMPLEMENTATION OF INNOVATIVE FOOD PACKAGING ACCORDING TO BIOECONOMIC SUSTAINABILITY CRITERIA (QUIPACK)

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Abstract: Prompted by the need to reduce losses and increase sustainability and safety along the food value chain, and guided by strategies and action plans at international, European, and national level, QuiPack is going to create a holistic, integrative design approach for the development and implementation of functional food packaging solutions, that will (1) valorise waste and side streams from quinoa and aquacultural food production, (2) introduce biointelligent coatings and packaging materials that meet customer and market requirements in Europe and the Maghreb region, (3) be linked to AI/IoT-assisted Food Value Chain Intelligence & Decision Support Systems optimized with regard to food safety, traceability, environmental effects, sustainability, and cost-effectiveness in Mediterranean settings, and (4) be accompanied by tailored communication, training, dissemination, and consumer studies to support market launch, penetration and diffusion. A novel and sustainable packaging solution is being developed, consisting of a primary edible biofilm bag incorporating bioactive substances and a secondary cardboard packaging. This system is designed to enhance microbial stability and preserve the organoleptic properties of food products under storage conditions. Two approaches for packaging functionalization have been developed: (i) saponin extracts obtained from quinoa husks, representing the valorization of an agricultural waste stream, and (ii) a blend of essential oils derived from forest side stream. These formulations were previously assessed for their antibacterial and antioxidant properties. The resulting packaging solutions, designed for dry staple agrifood products, particularly couscous and bulgur, will be further evaluated through specific experiments to assess their antimicrobial and antioxidant properties, as well as their conformity as sustainable packaging prototypes.

KEYWORDS: *Functional food packaging, IoT/AI, agricultural waste stream, Quinoa saponin extracts, essential oils, antimicrobial properties*

ORAL COM N° : 66.

EFFICIENT HYDROLYSIS OF NATIVE WHEAT STARCH USING A NOVEL RAW STARCH-DIGESTING A-AMYLASE

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Abstract: Conventional starch processing industries rely heavily on high-temperature gelatinization steps, which require substantial energy input and contribute to increased operational costs and environmental impact. Raw starch-digesting amylases provide a sustainable alternative by directly hydrolyzing raw starch at temperatures below its gelatinization point. A novel raw starch-digesting α-amylase, designated AmyH1, was purified from Bacillus spH1 strain and evaluated for its ability to hydrolyze raw wheat starch. The hydrolysis conditions were optimized using Response Surface Methodology (RSM) in order to maximize reducing sugar production. The effects of key reaction parameters, including temperature, substrate concentration, and hydrolysis time, were investigated and optimized. Under the optimal conditions of 5% native wheat starch, 60 °C, and 3 h of incubation, AmyH1 produced 52.14% reducing sugars directly from raw starch without any prior gelatinization treatment.
These findings demonstrate that AmyH1 is a potent catalyst for efficient hydrolysis of raw starch, positioning it as a promising and sustainable biocatalyst with strong potential for application in starch bioconversion industries.

KEYWORDS: *Bacillus, Amylase, Response surface methodology, Raw starch hydrolysis*

ORAL COM N° : 67.

IMPACT OF GAMMA IRRADIATION ON STRUCTURAL INTEGRITY AND BIOACTIVE PROPERTIES OF PHYCOCYANIN FROM *SPIRULINA PLATENSIS*.

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Abstract: Phycocyanin, a valuable natural blue pigment and nutraceutical compound extracted from *Spirulina platensis*, is highly sensitive to thermal and oxidative degradation. Gamma irradiation has emerged as an effective non-thermal technology for phycocyanin preservation, offering microbial decontamination while maintaining its bioactivity. In this study, phycocyanin solution was lyophilized prior to γ-irradiation at doses ranging from 1 to 5 kGy. The effects of irradiation were evaluated in terms of microbial decontamination, structural stability, and bioactivity. A dose of 5 kGy achieved a significant microbial reduction, with a 2.0 $\log_{10}$ decrease in total aerobic counts and a 1.0 $\log_{10}$ decrease in yeasts, along with complete inactivation of molds. FTIR spectroscopy indicated dose-dependent conformational changes in the protein structure. UV–Vis spectroscopy and HPLC analyses confirmed excellent preservation of the native structure of phycocyanin at doses below 3 kGy. Notably, γ-irradiation at 3 kGy significantly enhanced the nutraceutical properties, increasing total phenolic content by 32.7%, flavonoid concentration by 18.4%, and antioxidant capacity as measured by DPPH radical scavenging (24.1%), FRAP (19.8%), and ABTS (22.3%) assays. These findings demonstrate that gamma irradiation is a dual-function technology capable of ensuring microbial safety while improving the functional properties of phycocyanin. This approach offers a sustainable and effective solution for the stabilization of phycocyanin in functional food and pharmaceutical applications.

KEYWORDS: *Phycocyanin, Gamma Irradiation, Stability.*

ORAL COM N° : 68.

RHIZOBIA-MEDIATED ENHANCEMENT OF RESISTANCE IN FABA BEAN (VICIA FABA L.) AGAINST ASCOCHYTA FABAE

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Abstract: Faba bean (*Vicia faba L.*), is a major grain legume crop with high agronomic and nutritional importance due to its contribution to food security and soil fertility through biological nitrogen fixation. However, its production is severely constrained by *Ascochyta* blight caused by *Ascochyta fabae*, a destructive fungal pathogen responsible for considerable yield losses. Enhancing host plant resistance through sustainable biological approaches is therefore an important objective for integrated disease management. In this context, rhizobia have attracted increasing attention not only for their symbiotic nitrogen-fixing capacity but also for their potential role in inducing plant defense responses against pathogens. This study evaluated the effect of rhizobial inoculation on the resistance of two contrasting faba bean genotypes to *A. fabae* infection. Plant growth performance, membrane stability, and biochemical markers associated with oxidative stress were analyzed under control, pathogen-infected, and rhizobia + pathogen treatments. The results showed that *A. fabae* infection significantly reduced shoot dry weight by nearly 50% compared to the non-infected control, indicating severe growth inhibition. Infection also caused substantial membrane damages as reflected by increased electrolyte leakage, which increased from 21% to 44% in the resistant genotype. In contrast, rhizobia + *A. fabae* treatment reduced electrolyte leakage by 22.7% and 24.1% in the resistant and sensitive varieties, respectively, compared with infected non-inoculated plants. Biochemical analyses revealed that pathogen infection induced oxidative stress through increased accumulations of proline and malondialdehyde, with genotype dependent variations. Rhizobial inoculation significantly decreased the accumulations of these stress-related metabolites, suggesting reduced lipide peroxidation and improved cellular protection mechanisms. The resistant genotype exhibited a more efficient physiological and biochemical response following rhizobial inoculation, indicating a positive interaction between host genotype and rhizobia symbiosis in the activation of defense mechanisms. These results highlight the potential of rhizobia as an eco-friendly component of integrated strategies for the biological management of *Ascochyta* blight in faba bean cultivation.

KEYWORDS: *Vicia faba*; *Ascochyta fabae*; Ascochyta blight; rhizobia; plant resistance; oxidative stress; biocontrol.

ORAL COM N° : 69.

OPTIMIZATION OF CHITOSAN EXTRACTION FROM CRAB AND ITS APPLICATION IN THE PREPARATION OF ADVANCED ACTIVE NANOFIBRES

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Abstract: A Chitin extraction from crab residues was studied and optimized aiming to obtain chitosan with highest deacetylation degree and specific molecular mass. Operating conditions of demineralization and deacetylation were optimized using RSM methodology. The optimization results lead to a chitosan with high deacetylation (98.95%) degree and low molar mass. Chitosan was characterized physiochemically using FTIR and electronic microscopy. On this basis, chitosan was mixed with biopolymers to create a novel electrospun nanofiber membrane. Then nanofibres were enriched with phytoextracts obtained from aromatic and medicinal plants with prominent biological activities. The antibacterial and antioxidant properties, and biocompatibility of the nanofiber membranes were finally evaluated.

KEYWORDS: *Chitosan extraction optimization, nanofibres, electrospinning, biological activities*

ORAL COM N° : 70.

IMPROVEMENT OF *BACILLUS THURINGIENSIS* DELTA-ENDOTOXIN PRODUCTION BY APPLICATION OF STRESS CONDITIONS AND ADJUSTING THE C/N RATIO

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Abstract:

This study aimed to increase δ-endotoxin production yield through adaptation of *Bacillus thuringiensis* (*Bt*1) cells to heat shock and osmotic stress (NaCl), alongside carbon-to-nitrogen (C/N) ratio adjustment. The food industrial wastewater (M1) fortified with 40 dry matter (DM) of the primary sludge (B1) was used as an alternative medium. Growing *Bt*1 cells exposed to heat treatments at different temperatures and various incubation times showed no enhancement of δ-endotoxin production. However, the addition of 7 g L^{-1} NaCl at the begining of incubation time yielded the highest improvement, increasing δ-endotoxin production by 85%, whereas the combined stressors showed no significant effect. Furthermore, the influence of the C/N ratio was evaluated using various organic, inorganic, and waste-derived nitrogen sources. Among these, fish meal emerged as the most effective nitrogen source, enhancing δ-endotoxin production by 107% at an optimized C/N ratio of 7.4. Heatmap analysis of the tested strategies showed that the C/N ratio adjustement exhibit the most critical influence on δ-endotoxin synthesis. Bioassays carried out against *Ephestia kuehniella* and *Ectomyelois ceratoniae* demonstrated higher insecticidal activity for *Bt*1 cultures grown under the optimized C/N ratio, achieving 100% larval mortality for both species. These findings highlight the importance of nutrient balance over abiotic stress in maximizing *Bt*1 bioinsecticide efficacy.

KEYWORDS: *Bacillus thuringiensis*, bioinsecticide, C/N ratio, abiotic stress

ORAL COM N° : 71.

ANTIFUNGAL ACTIVITY AND IN SILICO MOLECULAR DOCKING STUDY OF SYZYGIUM AROMATICUM ESSENTIAL OIL AGAINST *ASPERGILLUS FLAVUS* ISOLATED FROM DATES

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Abstract : The increasing incidence of fungal contamination and aflatoxin production by *Aspergillus flavus* represents a major challenge for food safety and agricultural preservation. In this context, the present study investigated the antifungal potential of *Syzygium aromaticum* essential oil and explored the molecular mechanisms underlying its biological activity through a combined experimental and *in silico* approach.

The essential oil was extracted by hydrodistillation using a Clevenger apparatus and subsequently characterized by GC–MS analysis. Antifungal activity was evaluated using the PDA contact method against *A. flavus* O22.3, isolated from dates, at varying concentrations. Fungal growth inhibition was assessed by measuring radial growth and growth rate. Microscopic observations were further conducted to examine the morphological alterations induced by the treatment. In addition, the cytotoxicity of the essential oil was evaluated on human erythrocytes by means of a hemolytic assay. To elucidate the molecular basis of the observed antifungal activity, an *in silico* molecular docking study was carried out targeting the Omt-A protein model from *A. flavus*. Two complementary docking platforms based on distinct computational algorithms were employed: MOE (Molecular Operating Environment), using the Triangle Matcher placement method in conjunction with London dG and GBVI/WSA dG scoring functions, and DockThor, which relies on a flexible docking strategy combining a genetic algorithm with empirical scoring functions to predict ligand–protein interactions.

GC–MS analysis revealed that the essential oil of *Syzygium aromaticum* was predominantly composed of eugenol (83.876%), followed by acetyleugenol (10.642%) and caryophyllene (4.591%). The essential oil exhibited a marked concentration-dependent antifungal activity against *A. flavus*. At 300 µg/mL, fungal growth inhibition reached 54.8%, whereas complete inhibition was observed at 500 µg/mL, which corresponds to the minimum fungicidal concentration. Microscopic examination revealed severe morphological alterations in treated fungal cultures, including suppression of sporulation, deformation of conidiophores, and disruption of hyphal organization. The hemolytic assay confirmed the low cytotoxicity of the essential oil toward human erythrocytes, with hemolysis percentages consistently remaining below 20% even at the highest tested concentrations. Regarding the *in silico* results, eugenol exhibited a strong binding affinity toward the biological target, with a binding free energy (ΔG) of −8.336 kcal/mol as determined by DockThor and a docking score of −5.790 kcal/mol as obtained with MOE. Molecular interaction analysis revealed interactions with several key active-site residues, most notably Gly195, identified as the principal residue responsible for ligand stabilization within the catalytic pocket and directly implicated in blocking enzymatic activity.

Taken together, these findings suggest that *Syzygium aromaticum* essential oil, owing to its high eugenol content, represents a promising source of natural antifungal biomolecules. Furthermore, the integrated use of biological assays and molecular docking proves to be an effective strategy for elucidating the mechanisms of action of bioactive compounds and for supporting the rational development of eco-friendly antifungal agents.

Keywords : *Syzygium aromaticum; Aspergillus flavus; essential oil; antifungal activity; molecular docking; MOE ; DockThor.*

ORAL COM N° : 72.

PRESENTATION OF EUCALYPTUS SPECIES FROM THE ARBORETUM OF JEBEL MANSOUR AND EVALUATION OF THE IMPACT OF GAMMA IRRADIATION ON THEIR BIOLOGICAL ACTIVITIES

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This study investigates the diversity of Eucalyptus species and the influence of bioclimatic and pedological factors, as well as the effect of gamma irradiation on the biological activities of methanolic leaf extracts obtained from three species: Eucalyptus loxophleba, Eucalyptus woollsiana, and Eucalyptus intertexta. The extracts were evaluated before irradiation and after exposure to gamma doses of 10 and 30 kGy to assess changes in their antioxidant, antimicrobial, and antifungal activities.

Extraction yields were higher in aqueous extracts (2.55–3.40%) than in methanolic extracts (0.60–2.15%). However, methanolic extracts contained greater amounts of total polyphenols, flavonoids, and tannins, reaching 858 mg GAE/g DM in non-irradiated *E. intertexta*. Gamma irradiation at 10 kGy enhanced the phenolic content, increasing it to 900 mg GAE/g DM, while a decrease was observed at 30 kGy.Antioxidant activity, evaluated by DPPH and ABTS assays, was stronger in methanolic extracts, with DPPH IC50 values ranging from 0.21 to 44.75 mg/mL. Antifungal activity against *Fusarium* spp. also showed better performance in methanolic extracts, with IC50 values between 5.8 and 28.4 mg/mL. Moderate irradiation improved antifungal activity, particularly for *E. intertexta* extracts at 10 kGy (IC50 = 10.1 mg/mL).

In addition, all extracts exhibited dose-dependent herbicidal effects by significantly inhibiting the germination of radish, mustard, and clover seeds at 10 mg/mL. Overall, the results demonstrate that moderate gamma irradiation enhances the bioactive potential of *Eucalyptus* extracts, especially their antioxidant and antifungal properties, highlighting their potential applications in agriculture and natural bioactive products.

Keywords : *Eucalyptus intertexta, Eucalyptus wollsiana, Eucalyptus loxophleba, crude extracts, antioxidants, antimicrobials, polyphenols, herbicidal activity, gamma irradiation*

ORAL COM N° : 73.

ENHANCEMENT OF EXOPOLYSACCHARIDE PRODUCTION BY *PERSINEMA* SP. UNDER STRESS CONDITIONS AND EVALUATION OF THEIR STRUCTURAL, FUNCTIONAL, AND BIOLOGICAL PROPERTIES

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Abstract: Cyanobacterial exopolysaccharides (EPSs) are extracellular biopolymers secreted by cyanobacteria primarily as a protective mechanism against adverse environmental conditions. In recent years, these biomolecules have attracted considerable attention due to their unique structural features, functional properties, and broad industrial applications. The present study developed a two-step strategy to enhance EPS production by the cyanobacterium *Persinema* sp. for potential biotechnological valorization. In the first step, *Persinema* sp. was cultivated in a 40 L raceway system under controlled conditions. In the second step, biomass harvested during the exponential growth phase was subjected to different stress conditions, including thermal stress (50 °C), carbon enrichment (16 g L^{-1} $NaHCO_3$), and salinity stress (40 g L^{-1} NaCl), to stimulate EPS overproduction. Among the tested conditions, carbon stress yielded the highest biomass productivity (0.038 g DW L^{-1} day^{-1}) and EPS production (0.2103 g DW L^{-1}), after 6 days of cultivation. Biochemical characterization showed that the EPSs were mainly composed of polysaccharides (70%) and proteins (20%). Monosaccharide analysis revealed that EPS composition varied depending on the applied stress conditions, indicating a heteropolysaccharidic nature under thermal and carbon stress, whereas salinity stress resulted in a homopolysaccharidic profile. FTIR analysis confirmed the presence of key functional groups, including primary amine and sulfated groups. Bioactivity evaluation demonstrated that EPSs exhibited antibacterial activity against *Bacillus cereus*, *Escherichia coli*, *Salmonella* spp., and *Staphylococcus aureus*, with minimum inhibitory concentrations (MICs) $\leq 1 \pm 0.01$ mg mL^{-1}. Antioxidant activity was assessed using DPPH radical scavenging and FRAP assays. Furthermore, the EPSs showed promising emulsifying properties, highlighting their potential as multifunctional biopolymers for applications in food, pharmaceutical, cosmetic, and biotechnological industries.

KEYWORDS: *Cyanobacteria, Persinema sp., Exopolysaccharides (EPSs), stress conditions, Raceway cultivation, Antibacterial activity, Antioxidant activity, Emulsifying properties.*

ORAL COM N° : 74.

EVALUATION OF THE PROBIOTIC POTENTIAL OF BACILLUS STRAINS ISOLATED FROM CHICKENS AS AN ALTERNATIVE TO ANTIBIOTICS IN POULTRY

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Abstract: The rapid growth and intensification of aviculture have increased the occurrence of infectious diseases and microbial imbalance in poultry farms. High stocking density and environmental stress often predispose birds to gastrointestinal infections and reduced productivity. Traditionally, antibiotics and chemotherapeutic agents have been used to manage these health problems. However, their extensive use has raised concerns regarding antimicrobial resistance, residue accumulation in poultry products, and risks to consumer safety. As a sustainable alternative, probiotics have emerged as promising microbial supplements capable of improving gut health, enhancing the immune system, and inhibiting the growth of pathogenic bacteria. The aim of this study is to evaluate *in vitro* the probiotic potential of selected bacterial strains for possible application in aviculture.

Method: The selection is based essentially on several criteria such as the potential for inhibition of pathogens, tolerance to acid pH and bile salts, extracellular enzyme activity, antibiotic resistance and adhesion to epithelial cells.

Results: Ten strains were isolated from chicken intestines. Among them, four strains showed strong antibacterial activity against several pathogenic strains, including *Salmonella enterica*, *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. The selected strains tolerated acidic conditions and high bile concentrations. They were also sensitive to antibiotics and showed high adhesion to epithelial cells. The tested strains showed great heterogeneity regarding their safety and antibiotic susceptibility profiles and were taxonomically identified as bacillus by MALDI-TOF MS and partial 16S rDNA gene sequencing.

Conclusion: Given the good pH and bile tolerances, the high adhesion and the ability to suppress pathogen growth under *in vitro* conditions, will be further studied in challenge experiments in poultry to observe their potential probiotic effects in situations directly related to aviculture conditions.

KEYWORDS: *Probiotic, Aviculture, Antibiotics, Pathogen, Sustainable alternative.*

ORAL COM N° : 75.

DEVELOPMENT OF BIOACTIVE GELATIN–CHITOSAN PACKAGING ENRICHED WITH ESSENTIAL OILS FROM MEDICINAL PLANTS AND ORANGE PEELS BY-PRODUCTS FOR AGRIFOOD PRESERVATION

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Abstract: The growing demand for sustainable and natural food preservation systems has stimulated the development of active biodegradable packaging based on bioactive plant extracts and agro-industrial by-products. This study aimed to valorize essential oils and natural extracts from *Thymus vulgaris*, *Thymus capitatus* and orange peels for the formulation of an active gelatin–chitosan edible bio-packaging intended to preserve the quality of agrifood during storage. Phytochemical characterization of the extracts was performed to identify their major bioactive compounds and evaluate their antioxidant potential using DPPH, ABTS, hydroxyl radical scavenging, and TBARS assays. A mixture design methodology was applied to investigate the interactions among the extracts and optimize the formulation of the bioactive blend. The optimized mixture was incorporated into a gelatin–chitosan matrix to produce an edible film, which was subsequently characterized for antioxidant activity, total polyphenol content, UV-barrier capacity, opacity, water permeability, and swelling behavior, as well as its effectiveness in preserving meat quality. Results revealed synergistic antioxidant interactions among the extracts, despite variations in their individual activities. *Thyme* exhibited the strongest DPPH radical scavenging activity, whereas orange peel extract contributed to a more balanced antioxidant profile. The optimized model demonstrated high predictive performance with significant ANOVA results and determination coefficients exceeding 0.90. The developed biofilm exhibited enhanced antioxidant activity (>80%), elevated phenolic content (>130 µg GAE/50 mg), improved opacity and UV-blocking properties, and reduced water sensitivity compared with control films. Furthermore, application of the bioactive film to freeze-dried chicken meat effectively delayed lipid oxidation and inhibited microbial growth during storage. These findings demonstrate that gelatin–chitosan bio-packaging enriched with essential oils from medicinal plants and citrus by-products represents a promising natural and eco-friendly strategy for extending food shelf life while promoting the valorization of agro-industrial residues.

KEYWORDS: *Active edible packaging; Gelatin–chitosan biofilm; Essential oils; Thymus vulgaris; Thymus capitatus; Orange peel by-products; Antimicrobial activity.*

ORAL COM N° : 76.

FOLIAR AND NUTRIENT APPLICATIONS OF SALICYLIC ACID AND POTASSIUM NITROPRUSSIDE ENHANCE GROWTH, NUTRIENT STATUS, AND SECONDARY METABOLITES IN SALT-STRESSED QUINOA

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Abstract: Salinity is one of the most detrimental abiotic stresses limiting agricultural productivity worldwide, particularly in arid and semi-arid regions. Quinoa (*Chenopodium quinoa* Willd.) which is recognized for its remarkable tolerance to extreme environments, has been widely used as model crop for understanding salt tolerance mechanisms in halophytes, nonetheless it suffers significant physiological and biochemical impairments under high salt conditions. This study investigated the effects of exogenous application of salicylic acid (SA, 0.2 mM) and potassium nitroprusside (SNP, 0.2 mM) on quinoa plants subjected to salt stress (NaCl, 300 mM) using a hydroponic system. Treatments were applied in three ways: foliar spraying, direct application to the nutrient solution, and combined application. Salt treatment induced a significant reduction in plant growth, with approximately a 48% decrease in total DW compared to the control. However, exogenous application of SA via foliar spray mitigated this detrimental effect, enhancing plant growth by approximately 114% relative to salt-treated plants. This growth-promoting effect was even more pronounced (150%) when SA was applied both as a foliar spray and directly in the nutrient solution. Salt stress also led to a 50% reduction in leaf protein content, which was alleviated by all biostimulant treatments, regardless of the application method. In contrast, leaf sugar content significantly decreased under combined treatments of (SA+NaCl) and (SA+SNP+NaCl). Regarding secondary metabolite accumulation, saponin content increased following exogenous application of SA, both as a foliar spray and when applied in the nutrient solution, compared to NaCl treatment alone. A similar enhancement was observed with SNP foliar application, resulting in an increase of approximately 117%. In addition, the decrease in total phenolic content (50%) under salt was mitigated following leaf spraying with SNP alone or in combination with SA. Under saline conditions, flavonoid and tannin contents increased in all treatments compared to NaCl alone, with the highest enhancement observed when SA was applied both as a foliar spray and added to the nutrient solution. Our findings provide new insights into the complementary roles of SA and SNP in mitigating salinity-induced damage and highlight their potential to promote the production of secondary metabolites with antioxidant properties for various applications.

Keywords: *Quinoa, salinity, biostimulant, salicylic acid, potassium nitroprusside, nutritional properties, secondary metabolites*

ORAL COM N° : 77.

EFFECT OF IRRIGATION REGIMES ON THE PHYSICOCHEMICAL PROFILE OF SEED OIL AND BIOACTIVE PROPERTIES OF LEAF AND PETAL EXTRACTS OF *CARTHAMUS TINCTORIUS* L.

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Abstract: *Carthamus tinctorius* L. represents a strategic crop for arid and semi-arid agrosystems, owing to its tolerance to water deficit and its abundance of secondary metabolites with high nutraceutical value. This study investigates the effect of three irrigation regimes ; T1 (100% ETc), T2 (75% ETc) and T3 (50% ETc) on the physicochemical profile of the seed oil, the phenolic composition, and the biological activities of leaf and petal extracts.

Physicochemical analysis of mechanically extracted oil revealed optimal oil yield under moderate water stress (T2), with enhanced oxidative stability as evidenced by acid value, peroxide index, and density measurements. GC-MS characterization identified 14 fatty acids, with four predominant constituents: linoleic acid (78.50–85.13%), oleic acid (10.13–12.10%), palmitic acid (6.28–6.93%), and stearic acid (2.21–2.38%). Under T2, the unsaturated fatty acid fraction reached 95.63% (UFA/SFA ratio = 12.04), whereas T3 induced a relative increase in saturated fatty acids, thereby reducing the overall nutritional quality of the oil.

Quantification of phenolic metabolites demonstrated higher accumulation in leaves than in petals. T2 significantly upregulated the biosynthesis of leaf polyphenols and flavonoids (up to 75 mg GAE/g DW), while T3 promoted their accumulation in petals, reflecting an adaptive biochemical response to severe water stress.

Biological activities including antioxidant capacity (DPPH and FRAP assays), α-glucosidase inhibition, and pancreatic lipase inhibition, were significantly enhanced under T2. Ethanolic leaf extracts exhibited a markedly reduced IC_{50} from 35 to 11 µg/mL, while petal extracts under T2 demonstrated superior antioxidant activity compared to BHT (IC_{50} = 7 µg/mL).

Collectively, these findings establish *C. tinctorius* as a promising phytochemical resource for nutraceutical, food, and cosmetic applications in water-limited environments.

KEYWORDS: *Carthamus tinctorius L., water deficit, fatty acids, polyphenols, flavonoids, antioxidant activity, α-glucosidase inhibition, lipase inhibition.*

ORAL COM N° : 78.

CHEMOTYPE-DRIVEN PHYTOTOXICITY OF MEDITERRANEAN ESSENTIAL OILS: MULTIVARIATE LINKING OF TERPENOID ARCHITECTURE TO DIFFERENTIAL INHIBITION OF GRASS WEED GERMINATION

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Abstract: Plant-derived essential oils (EOs) offer bioherbicidal alternatives to synthetic herbicides. This study examined four Mediterranean essential oils (*Origanum onites*, *Thymus capitatus*, *Laurus nobilis*, and *Mentha pulegium)* against two grass weeds, *Lolium rigidum* and *Phalaris* sp. Gas chromatography-mass spectrometry (GC-MS) revealed chemotypes dominated by oxygenated monoterpenes. *O. onites* (56.63% carvacrol) and *T. capitatus* (62.73% carvacrol) were phenolic chemotypes, *L. nobilis* had a cineole-phenylpropanoid profile (15% 1,8-cineole; 10.21% methyl eugenol), while *M. pulegium* was ketone-rich with iso-menthone (66.20%) and pulegone (8.56%). Bioassays showed strong dose-dependent inhibition of germination and seedling growth in both weeds. Phenolic oils (*Origanum* and *Thymus*) caused complete germination inhibition at 1-2 µl ml^{-1}, while *Laurus* and *Mentha* oils produced gradual inhibition to complete arrest at higher doses. Root elongation was more sensitive than shoot growth. Principal component analysis separated oils by chemotype and linked phenolic monoterpenes with higher phytotoxicity. These findings demonstrate that EO chemotype is a key determinant of phytotoxic potency and highlight the strong potential of carvacrol-rich oils as bioherbicides for sustainable weed management..

KEYWORDS: phytotoxicity, dose-response, bioherbicide, integrated weed management

ORAL COM N° : 79.

ISOLATION AND FUNCTIONAL ANALYSIS OF DATE PALM RHIZOBACTERIA IG3 STRAIN ENHANCING ABIOTIC STRESS TOLERANCE IN FINGER MILLET SEEDS

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Abstract: Abiotic stresses, including drought, extreme temperatures, heavy metal contamination, and soil salinity intensified by climate change and anthropogenic activities, represent major threats to agricultural productivity, highlighting the necessity for sustainable strategies that improve crop tolerance to adverse environments. Among these strategies, plant growth-promoting rhizobacteria (PGPR) have emerged as an eco-friendly solution because of their ability to enhance plant growth and reduce the detrimental effects of stress. In this study, a rhizobacterial isolate designated IG3 was obtained from the rhizosphere of date palm (*Phoenix dactylifera*) and evaluated for its capacity to mitigate osmotic stress in finger millet (*Eleusine coracana L.*). Morphological and molecular characterization revealed that the IG3 is a Gram-positive, rod-shaped bacterium. Whole-genome sequencing identified the strain as *Priestia filamentosa* (previously known as *Bacillus filamentosus*). Genomic analysis combined with validation assays *in vitro*, demonstrated that strain IG3 present considerable tolerance to abiotic stresses, including high temperatures, acidic and alkaline pH conditions, and saline environments. In addition, the strain exhibited several plant growth-promoting traits, including siderophore biosynthesis, phosphate solubilization, and indole-3-acetic acid (IAA) production. These functional attributes are associated with enhanced nutrient acquisition and phytohormone-mediated root development, thereby contributing to improved plant adaptation under stress conditions. To evaluate its efficacy, finger millet seeds were inoculated with strain IG3 and subjected to abiotic stresses *in vitro*. Compared to unprimed seedlings, IG3-inoculated seedlings exhibited significant improvements in shoot growth, root elongation, and secondary root hair formation.

KEYWORDS: *Plant growth-promoting rhizobacteria (PGPR), Priestia filamentosa, abiotic stress, rhizosphere, seed priming, Eleusine coracana. L.*

ORAL COM N° : 80.

ISOLATION AND CHARACTERIZATION OF A NOVEL SINORHIZOBIUM *SPECIES FROM* ACACIA KAROO *NODULES AT A CONTAMINATED SITE WITH PHYTOREMEDIATION POTENTIAL*

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Abstract : Heavy metal pollution degrades soils and impairs plant growth. *Acacia karoo*, a legume adapted to stressful environments, holds potential for bioremediation through symbiotic microorganisms, yet little is known about its rhizobia in contaminated soils. At the contaminated site of Borj Cedria, nodulation of *A. karoo* was abundant, confirming native rhizobial populations. Seven isolated strains (AK56, AK2, AK12, AK17, AK16, AK4, AK55) tolerated up to 800 µM of Pb, Zn, and Cu (but not Cd), tolerated 1% NaCl, produced siderophores, and exhibited phosphate-solubilizing activity. MLSA and genomic analyses (ANI, dDDH) identified these strains as a novel species within *Sinorhizobium*. These PGPR candidates show strong potential for rehabilitating polluted soils. This study highlights the ecological importance of *A. karoo*-associated rhizobia in metal-contaminated environments and their promise for sustainable phytoremediation and soil restoration strategies.

KEYWORDS: *Heavy metal pollution, Acacia karoo, Rhizobia, Sinorhizobium, Bioremediation, Phytoremediation*

ORAL COM N° : 81.

PLANT-MEDIATED SYNTHESIS OF DOLEROPHANITE/CUO NANOPARTICLES AND EVALUATION OF THEIR ANTIBACTERIAL AND CYTOTOXIC ACTIVITIES

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Abstract: Cu-based nanoparticles were synthesized using extracts from *Punica granatum*, *Teucrium marum*, and *Teucrium polium*. The synthesized nanomaterials were characterized using physicochemical techniques and evaluated for their antibacterial, antibiofilm, and anticancer activities. The results revealed that *P. granatum* extract produced phase-pure CuO nanoparticles, while *T. marum* and *T. polium* extracts promoted the formation of a CuO/dolerophanite composite. Notably, this work reports for the first time the green synthesis of dolerophanite-containing nanoparticles. Biological assays demonstrated that *T. polium*-mediated nanoparticles exhibited the strongest antibacterial and antibiofilm activities against pathogenic bacteria. In contrast, nanoparticles synthesized using *T. marum* showed the highest cytotoxic activity against *MCF-7* breast cancer cells. Comparative analysis indicated that the phytochemical composition of plant extracts significantly influenced nanoparticle structure, crystallite size, and biological performance. These findings highlight the biomedical potential of Cu-based nanomaterials for applications in antimicrobial coatings, wound dressings, implant protection, and targeted drug delivery systems.
KEYWORDS: *Green synthesis NPs1, CuONPs2, Dolerophanite3, Anti-Biofilm4, Anti-cancer5.*

ORAL COM N° : 82.

OPTIMIZATION OF BIOPESTICIDE PRODUCTION (BTK/WHEAT BRAN) FOR INTEGRATED PEST MANAGEMENT AGAINST CROP PESTS

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Abstract: Bt-based biopesticides provide a sustainable alternative to chemical pesticides in integrated pest management (IPM), offering selective efficacy against crop pests, minimal impact on non-target organisms, and reduced dependence on synthetic pesticides. In this context, this work aims to optimize the production of biopesticides from the Bt BLB1 strain cultivated on a Tunisian wheat bran-based medium (TWB).
TWB was sieved using an electromagnetic sieve, generating four fractions of different particle sizes. Physico-chemical characterization of fractions F2, F3, and F4 revealed no significant differences in water content, ash, total/organic nitrogen, protein, total organic carbon, and fat. However, F2 presented the highest water retention capacity (WRC: 641%) and F4 the highest starch content (0.353±0.08g/gdm). Single or mixture of two fractions (w/w) were evaluated for BLB1 production in 1L Erlenmeyer flasks. Comparing to semi-synthetic medium (SSM), the production of toxins by BLB1 strain using fractioned TWB was significantly higher by almost 2.3–2.9 times, with the mixture F2+F3 (w/w) yielding the highest protein concentration (1.38±0.14mg/mL), which was selected for scale-up of Bt production to 3L and 100L fermenters. The resulting fermentation broths were subjected to downstream bioprocessing including filtration, microfiltration, additive incorporation, and drying to produce wettable powder (WP) formulations. Quality analysis for the WP formulations confirmed compliance with CIPAC standards for particle size distribution, suspensibility (>90%), photostability, pH (5–8), and humidity (<12%). In addition, laboratory bioassays demonstrated high efficacy against key lepidopteran pests as *Ectomyeloïs ceratoniae*, *Ephestia kuehniella*, *Prays oleae*, *Spodoptera frugiperda*, and *Phyllocnistis citrella*.
The results demonstrate the significant potential of TWB as an agro‑industrial byproduct for the production of Bt biopesticide, supporting the development of formulations conforming to international quality standards.

KEYWORDS: *Bacillus thuringiensis, Tunisian wheat bran, bioproduction, biopesticides, scale-up, Powder formulation, Quality analysis, bioassays.*

ORAL COM N° : 83.

COMPARATIVE EVALUATION OF SOLID-STATE FERMENTATION AND SUBMERGED FERMENTATION PROCESSES FOR ENHANCED BIOPESTICIDE PRODUCTION USING THE SAME MEDIA

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Abstract: Biopesticides derived from *Bacillus thuringiensis* (Bt) are the most well-known biological agents for selective control of pest insects. This entomopathogenic bacterium is typically produced by submerged fermentation (SmF) or solid-state fermentation (SSF), two different bioprocesses that influence its growth, sporulation, and toxin production depending on the process conditions. The aim of this study is to compare and optimize *Bt kurstaki (Btk*) cultivation under SmF and SSF processes using the same waste. Optimization of culture conditions for both processes was achieved by applying the experimental design methodology. A first screening step for the most influencing factors using the Plackett-Burman (PB) design, showed that delta-endotoxin yield is greatly affected by temperature, humidity, and pH in SSF, while pH and substrate concentration influenced SmF. The optimization of these selected culture parameters by using the Central Composite Design (CCD) showed that the optimum operating conditions for Btk production by SSF were as follows: Temperature =28°C; Humidity = 71% and pH= 9 giving a delta-endotoxin yield of 21.73 mg/g. In contrast, optimal production yield in SmF reached 37.62 mg/g under a substrate concentration of 37.5 g and a pH of 6.5. In the two studied cases, characterization of the toxin profile via SDS-PAGE resolved two major bands at approximately 130 kDa and 70 kDa corresponding to Cry1 and Cry2 toxins, respectively. These findings were supported by evaluation of insecticidal activity against *Ephestia kuehniella* larvae, showing high mortality rates under both conditions, confirming the biological activity of the produced δ-endotoxins. Overall, while SmF resulted in higher toxin yield, SSF offers a sustainable, cost-effective option for large-scale application.

Keywords*: Biopesticides, Bacillus thuringiensis, Solid-state fermentation, Submerged fermentation.*

ORAL COM N° : 84.

PROBIOTIC POTENTIAL OF RIBOFLAVIN-PRODUCING LACTIC ACID BACTERIA STRAINS

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Abstract

Lactic acid bacteria (LAB) are widely recognized for their probiotic properties, although only a limited number of strains are capable of producing riboflavin. The present study aimed to evaluate the probiotic potential of ten riboflavin-producing LAB strains through several in vitro assays, including acid and bile tolerance, antimicrobial activity, adhesion, and aggregation capacity. The strains were tested for their resistance to acidic conditions and in the presence of 0.5% bile salts. Antibacterial activity against pathogenic bacteria was also investigated using both bacterial cells and cell-free supernatants (CFSs).

All tested strains exhibited complete tolerance to 0.5% bile, indicating that this concentration did not affect bacterial viability. Among them, strains SO, Y1, R3, FC, M1, M3, M2, Y11, and Y44 showed bile tolerance levels exceeding 50% and maintained survival at pH 4, suggesting their ability to withstand gastrointestinal conditions. Auto-aggregation capacity varied among strains after 18 h of incubation, with strain M1 showing the highest aggregation level (approximately 51%) and strain R3 the lowest (approximately 3.7%). Most riboflavin-producing strains demonstrated aggregation values above 10%.

The antibacterial assay revealed strong inhibitory activity against several pathogenic bacteria, including *Listeria monocytogenes ATCC 19114*, *Listeria innocua*, *Escherichia coli*, *Staphylococcus aureus*, and *Salmonella Typhimurium ATCC 14026*. Strain SO exhibited the broadest and strongest antimicrobial activity through both bacterial cells and CFSs. Strains Y1 and Y3 showed pronounced inhibition against S. *aureus ATCC 29213*, while strain FC inhibited all tested pathogens except *L. innocua.* In *a*ddition, strains Y1, Y2, and Y3 demonstrated similar inhibitory effects against *Salmonella*, whereas Y2, R2, and R3 were active against *L. monocytogenes*.

These findings demonstrate the promising probiotic and antimicrobial potential of riboflavin-producing LAB strains and support their possible application as functional cultures in fermented foods and probiotic formulations.

Keywords: lactic acid bacteria, probiotics, riboflavin, antimicrobial activity, bile tolerance, auto-aggregation.

ORAL COM N° : 85.

QUINOA-BASED AGROECOLOGY FOR TRANSFORMING TRADITIONAL OASIS FARMING: ENHANCING SUSTAINABILITY, RESILIENCE, AND LIVELIHOODS IN ARID LANDSCAPES

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Abstract: In the context of accelerating climate change, conventional agricultural systems, characterized by monocultures, heavy reliance on synthetic inputs, intensive irrigation, and mechanization, have emerged as both major contributors to ecological disruption and sectors highly vulnerable to climate-related impacts. These systems compromise essential ecosystem services, including microclimate regulation, water purification, and natural pest control, through biodiversity loss. Oases represent unique and historically resilient agro-ecosystems that have thrived under extreme arid conditions for centuries, supporting human civilizations despite environmental constraints. However, they are increasingly threatened by climate change and declining interest from younger generations due to socio-economic shifts. In this context, understanding oasis agro-ecology and its traditional management practices is crucial for developing new productive and smart systems that are both sustainable and climate-resilient. Here we propose the agroecological potential of quinoa-based farming systems which has emerged within small-scale farming system as a scientifically grounded and transformative approach, gaining traction globally for its potential to restore ecosystem services and support sustainable food systems. Quinoa, a pseudo-cereal native to the Andean region, has recently gained attention in the Mediterranean for its adaptability to marginal soils, drought tolerance, and resistance to salinity and other abiotic stresses. Its grains provide a highly nutritious, gluten-free source of protein with a balanced profile of essential amino acids, vitamins, minerals, and dietary fiber. Here we will explore how quinoa cultivation can enhance the productivity and sustainability of oasis farming systems through technical, social, and organizational innovations. Strategies such as improved water management, soil amendment, and land-use optimization will be discussed alongside best practices for quinoa production. By integrating quinoa into oasis agro-ecosystems, we aim to diversify cropping systems, strengthen local value chains, and provide a reliable source of food and income for smallholder farmers.

KEYWORDS: *Quinoa, oasis, agroecology practices, climate-resilience, sustainability, smallholder-farming*

ORAL COM N° : 86.

INTEGRATED VALORIZATION OF TUNISIAN *MORINGA OLEIFERA*: EXTRACTION, PHYSICOCHEMICAL CHARACTERIZATION, AND FORMULATION OF STABLE NANOEMULSIONS FOR THE OPTIMIZED DELIVERY OF BIOACTIVE COMPOUNDS.

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Abstract: *Moringa oleifera* is recognized as a significant source of bioactive compounds, including polyphenols, flavonoids, unsaturated fatty acids, and terpenoid compounds, which confer substantial antioxidant, antimicrobial, and nutraceutical properties to this plant. However, the valorization of its essential and vegetable oils is limited by their intrinsic physicochemical instability, characterized by high volatility, susceptibility to oxidation, and low dispersibility in aqueous media. In this context, the present study proposes an integrated approach aimed at valorizing different fractions of *Moringa oleifera*, namely leaves, seeds, and by-products. An exhaustive physicochemical characterization of the plant powders was performed in accordance with AOAC official methods, including the determination of moisture, dry matter, ash, lipid, protein, fiber, and mineral contents. Furthermore, essential oils extracted from leaves via Soxhlet extraction and hydrodistillation were compared to optimize extraction yields. The obtained oils, both essential and vegetable, underwent thorough physicochemical and phytochemical analyses, including the quantification of polyphenols and flavonoids, as well as the evaluation of their antioxidant activity. To overcome the limitations associated with oil instability, oil-in-water nanoemulsions were formulated using high-energy methods combining mechanical agitation and ultrasonication. The formulations were characterized in terms of droplet size, polydispersity index (PDI), and zeta potential, which are essential parameters for evaluating their colloidal stability. The results demonstrate the potential of nanoemulsions as effective delivery systems, enabling the protection, bioavailability enhancement, and controlled release of bioactive compounds extracted from *Moringa oleifera*. This study thus opens promising perspectives for the development of innovative formulations intended for the functional food, nutraceutical, and biomaterial sectors.

KEYWORDS: *Moringa oleifera, Essential oil, Nanoemulsion, Bioactive compound delivery, Physicochemical Characterization.*

ORAL COM N° : 87.

TRIPLOID AND TETRAPLOID INDUCTION IN DATE PALM (*PHOENIX DACTYLIFERA* L.): A PLATFORM FOR GENETIC IMPROVEMENT

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Abstract : The date palm is the **key foundational plant** in desert regions, providing economic resource and **favorable microclimate** that supports the entire oasis agricultural system. However, its long juvenile phase and dioecious nature make sexual multiplication and conventional intra-varietal breeding inefficient for generating new elite genotypes susceptible to resist to major contemporaneous biotic and abiotic stresses. In this study, a naturally occurring 2n/4n ploïdy chimera of date palm was identified. The tetraploïd sector was successfully propagated through in vitro culture and subsequently used as the female parent in a cross with diploid male palms. Four confirmed triploids with distinct phenotypes, including a sterile bisexual palm, a sterile male, and two fertile females producing high-quality fruits with very small seeds were produced. Furthermore, tetraploid males were produced by treating embryogenic callus with oryzalin. Surely, this genotype opens new breeding perspectives, as crosses with diploid, triploid, or tetraploid females can generate novel genomic combinations inaccessible through conventional and even modern methods. In date palm, polyploids may also enhance fiber quality for construction and papermaking, increase secondary metabolite production, and improve tolerance to major environmental stresses, as well as landscape value and potential resistance to pests and diseases, notably the red palm weevil, due to the robustness of their organs. These results highlight polyploidization as a powerful tool for future genetic improvement and functional research in date palm.

ORAL COM N° : 88.

FROM OLIVE LEAVES TO OLIVE RESILIENCE: ULTRASOUND-ASSISTED EXTRACTION, UHPLC PROFILING AND BIOSTIMULANT ACTIVITY UNDER WATER STRESS

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Abstract: The olive tree (*Olea europaea* L.) is one of the most emblematic and economically important crops of the Mediterranean basin. Yet, it faces increasing threats from water scarcity driven by climate change. In this context, the present study explores a circular and sustainable approach: using olive leaf-derived bioactive compounds to enhance the resilience of olive trees themselves under water stress conditions. Olive leaf extracts were prepared using ultrasound-assisted extraction (UAE), a green and efficient technique that maximizes the recovery of bioactive compounds while minimizing processing time and solvent consumption. The obtained extracts were thoroughly characterized through ultra-high performance liquid chromatography (UHPLC) for phenolic compound identification and quantification, alongside the determination of total polyphenol content (TPC), protein content, and total sugar content, providing a comprehensive biochemical profile. The extracts were subsequently applied as biostimulants to olive seedlings subjected to controlled water stress. Key physiological and biochemical parameters were monitored in treated and untreated plants to assess the protective and growth-promoting effects of the extract under drought conditions. The results highlight the potential of olive leaf extracts, obtained through an eco-friendly process, to serve as natural biostimulants capable of improving olive tree tolerance to water deficit. This work underlines the value of a fully circular approach "from the olive tree, for the olive tree" as a promising strategy for sustainable and climate-resilient olive cultivation.

KEYWORDS: *Biostimulant, Drought stress, Olea europaea, Green extraction, Leaf extract, Phenolic compounds, UHPLC, Ultrasound-assisted extraction.*

ORAL COM N° : 89.

THE EFFECT OF COLORS AND LIGHT INTENSITY ON THE GROWTH AND BIOCHEMICAL COMPOUNDS OF THE CHLOROPHYCEAE *NEPHROSELMIS* SP.

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Light is a key factor influencing microalgal growth and metabolism. This study evaluates the effects of different light intensities (3000, 8000, and 15,000 lux) and colors (white, red, blue, yellow, and green) on the physiology of *Nephroselmis* sp.. Results show that yellow and green light promoted the highest growth rates (up to 2.15 d^{-1} at 15,000 lux), while red light stimulated carotenoid synthesis, reaching **13 µg mL^{-1}** at 15,000 lux. Under white light, *Nephroselmis* exhibited a maximum protein content of **64% D.W**, confirming its nutritional potential. Cultures also revealed significant levels of **carbohydrates (up to 31% D.W)**, **lipids (19–21% D.W under blue and red light)**, and **polyphenols (0.6% D.W at 15,000 lux)**, suggesting an adaptive response to oxidative stress. Chlorophyll-a concentrations exceeded **10 µg mL^{-1}** under yellow light at 15,000 lux, while chlorophyll-b reached about **10 µg mL^{-1}** during the lag phase under white and red light. Overall, *Nephroselmis* sp. demonstrates remarkable physiological plasticity, capable of producing valuable metabolites under diverse light regimes. These findings highlight its relevance as a robust candidate for biotechnological applications in nutrition, bioactive compounds, and phytoremediation.

Keywords: *Nephroselmis sp.*, light intensity, color, growth, pigments, metabolite

ORAL COM N° : 90.

CHARACTERIZATION AND INVESTIGATION OF THE BIOLOGICAL PROPERTIES OF HEMICELLULOSES RECOVERED FROM PISTACHIO BY-PRODUCTS

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Abstract:

By-products derived from pistachio processing are, of course, associated with significant challenges; however, they also offer excellent opportunities for biotechnological exploitation. The present work therefore falls within the general framework of the biotechnological valorization of plant-derived by-products. The extraction of hemicelluloses from pistachio by-products constituted the primary focus of our research. The hemicelluloses extraction yield relative to dry matter was approximately 6%. The polysaccharide content was approximately 83%. Microstructural analysis of hemicelluloses from pistachio by-products was carried out using scanning electron microscopy. The ultraviolet-visible absorption spectrum and the Fourier-transform infrared spectrum of the hemicelluloses from pistachio by-products were also acquired and analyzed. The second part was devoted to the investigation of the antioxidant activity of hemicelluloses extracted from pistachio by-products. This activity was assessed in vitro using various assays: the free radical scavenging activity assay (DPPH), the reducing power assay, and the ABTS assay. The hemicelluloses exhibited variable antioxidant activity depending on the assay employed. The results demonstrated that this activity is concentration-dependent.

KEYWORDS: *Pistachio By-products;* valorization*; hemicelluloses*

ORAL COM N° : 91.

PHYSIOLOGICAL EFFECTS OF SEED PRIMING IN CHENOPODIUM QUINOA CULTIVATED UNDER PHOSPHORUS DEFICIENCY AND/OR SALINITY

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Abstract: Phosphorus (P) deficiency and salinity are major abiotic constraints limiting crop productivity in many soils worldwide, and they frequently coexist in calcareous salt-affected soils. To alleviate the adverse effects of salinity and P deficiency, applied individually or in combination, various strategies have been proposed, including seed priming. The present study aimed to investigate the interactive effects of P deficiency and salinity in *Chenopodium quinoa* (var. Titicaca). In addition, we evaluated the effects of seed priming using three agents: water (hydropriming) and two osmotic agents (osmopriming), NaCl (300 mM) and KH_2PO_4 (200 mM), on plant growth, photosynthetic performance, and nutritional status under phosphorus-deficient and/or saline conditions.

Quinoa seeds were soaked for 8 h in the priming solutions, rinsed three times with distilled water, and dried at room temperature. Both unprimed and primed seeds were germinated in plastic pots filled with inert sand. After one month, an initial harvest was conducted, and the remaining plants were grown under low or sufficient P supply, with or without 80 mM NaCl. A final harvest was performed after 32 days of treatment. Our results showed that, in plants derived from unprimed seeds, P deficiency significantly reduced plant growth, phosphorus and potassium contents, and photosynthetic activity. In contrast, salinity alone had no significant effect on biomass production, or photosynthetic performance. The combined effects of P deficiency and salinity were additive, as no significant differences were observed in biomass accumulation, gas exchange parameters, or photosynthetic pigment contents between plants grown under P deficiency alone and those exposed to both stresses. Seed priming with NaCl and, more notably, with KH_2PO_4 significantly enhanced quinoa tolerance to P deficiency. Under saline conditions, plants derived from KH_2PO_4 and especially NaCl-primed seeds exhibited greater shoot growth than those originating from unprimed seeds grown under the same conditions. In addition, hydropriming improved quinoa tolerance to the combined stresses of salinity and phosphorus deficiency. This enhanced tolerance is likely mediated by multiple mechanisms, including the preservation photosynthetic apparatus integrity, increased root biomass, and improved nutritional status. These results open the way for the application of an ecological approach that optimizes the production of quinoa plants in marginalized habitats.

KEYWORDS: *Quinoa, phosphorus deficiency, salinity, combined stress, seed priming, photosynthesis, nutritional status.*

ORAL COM N° : 92.

FROM GENOME TO FUNCTION: DECODING MULTIFUNCTIONAL BIOCONTROL MECHANISMS OF *BACILLUS VELEZENSIS* HT_B8 AGAINST GRAPEVINE TRUNK DISEASES

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Grapevine trunk diseases (GTDs) remain a major constraint to sustainable viticulture, driving the need for environmentally friendly disease management strategies. Among emerging solutions, endophytic bacteria with multifunctional traits represent promising candidates for biological control.

In this study, we explored the functional potential of *Bacillus velezensis* HT_B8, an endophytic strain isolated from *Vitis vinifera* cv. Muscat of Italy in Tunisia, by integrating genomic insights with phenotypic characterization. Beyond its previously observed antifungal activity against key GTD-associated pathogens such as *Neofusicoccum parvum* and *Diplodia seriata*, HT_B8 was investigated for traits supporting plant colonization and growth promotion.

Genome mining revealed multiple gene clusters involved not only in the biosynthesis of antimicrobial compounds, but also in ecological fitness and plant interaction. Functional annotation highlighted genes associated with motility, chemotaxis, biofilm formation, siderophore production, and phytohormone (indole-3-acetic acid) biosynthesis. These features suggest a strong capacity for host colonization and indirect pathogen suppression.

Importantly, the integration of genomic and functional data indicates that HT_B8 operates through a combination of mechanisms, including antibiosis, competition for nutrients and niches, and potential induction of plant defenses. Comparative analysis with related *B. velezensis* strains further revealed distinct genomic traits that may contribute to its adaptation to the grapevine environment.

Overall, this study provides a comprehensive view linking genomic potential to functional biocontrol traits in *B. velezensis* HT_B8, collectively decoding the molecular basis of its multifunctional biocontrol strategy and highlighting its integrated roles in pathogen suppression, plant growth promotion, and ecological adaptation, thereby supporting its potential application in sustainable viticulture.

Keywords: Grapevine trunk diseases (GTDs), *Bacillus velezensis* HT_B8, Biocontrol mechanisms, Endophytic bacteria, Functional genomics, Plant–microbe interactions, Sustainable viticulture.

ORAL COM N° : 93.

PHYSICOCHEMICAL, RHEOLOGICAL, AND STABILITY PROPERTIES OF VEGAN MAYONNAISE FORMULATED WITH ULTRASOUND-TREATED LENTIL AQUAFABA

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Abstract:

The growing demand for plant-based alternatives to animal-derived products has driven significant interest in egg-free emulsified foods. Conventional mayonnaise relies on egg yolk as the primary emulsifier, raising concerns related to cholesterol and allergenicity. This study aimed to develop a vegan mayonnaise using lentil aquafaba as a natural egg substitute and to optimize its formulation parameters.

Lentil aquafaba was characterized to evaluate its functional properties as a natural emulsifier, with sonication applied to improve its protein, emulsifying, and foaming properties. Three mayonnaise formulations, egg-based, sonicated aquafaba, and non-sonicated aquafaba, were then prepared using an optimized 33% aquafaba-to-60% oil ratio and analyzed for their rheological, physicochemical, and stability properties.

The results showed that sonicated aquafaba mayonnaise exhibited a smaller mean droplet size (37.1 µm) compared with non-sonicated aquafaba mayonnaise (71.2 µm), indicating that ultrasound treatment significantly improved emulsion homogeneity and stability. Fatty acid profiling revealed that all formulations were rich in linoleic acid (54.78–60.14%) and oleic acid (28.03–29.73%), reflecting the composition of the vegetable oils. Notably, aquafaba-based mayonnaises exhibited markedly higher oxidative stability than egg-based mayonnaise, with induction times of 5.63 h and 8.50 h for non-sonicated and sonicated samples, respectively, compared with only 1.05 h for the egg formulation, corresponding to oxidative stability indices of 78.19, 117.99, and 14.55 day/kg. All vegan mayonnaise emulsions exhibited non-Newtonian shear-thinning behaviour, while the sonicated aquafaba formulation showed the highest viscosity and viscoelastic properties ($G' > G''$), alongside significantly greater firmness, adhesive force, and adhesiveness compared with the non-sonicated sample ($P < 0.05$).

These findings suggest that sonicated aquafaba mayonnaise represents a promising, functionally superior alternative to commercially available vegan emulsions.

***KEYWORDS:** Lentil aquafaba, Vegan mayonnaise, Sonication, oxidative stability, viscosity and viscoelastic properties*

ENVIRONMENT

ORAL COM N° : 94.

KEY SPONTANEOUS PLANT SPECIES STRUCTURE ARTHROPOD ASSEMBLAGES AND SUSTAIN NATURAL ENEMIES IN OLIVE GROVES

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Abstract: Spontaneous vegetation in olive groves can greatly influence arthropod community structure and related ecosystem services. However, basic information on plant-arthropod diversity, species interactions, and the role of spontaneous vegetation as a reservoir of natural enemies in Tunisian olive agroecosystems remains limited. This study characterized arthropod assemblages in the spontaneous vegetation of two olive groves, with a focus on the roles of key plant species. We collected 23 plant taxa from 12 families, as well as 25 arthropod families across four guilds, using quadrat surveys and plant-based beating methods. Our results show that the naturally occurring flora was dominated by Asteraceae, which also supported the highest arthropod abundances. Seventeen plant species served as arthropod reservoirs, with phytophagous (mainly aphids and thrips) dominating across both groves. G*lebionis coronaria* hosted the highest number of predator captures, and *Senecio gallicus* specifically attracted *Chrysoperla carnea*. In contrast, *Anacyclus clavatus* hosted the highest parasitoid abundance and diversity. These Asteraceae species, along with the Brassicaceae *Diplotaxis erucoides*, supported key natural enemies, including Anthocoridae, Chrysopidae, spiders, and parasitoids. Positive predator-prey correlations indicate that predators and prey function as active reservoirs rather than passive shelters.
Overall, maintaining a functional assemblage of spontaneous plants may increase the density and diversity of natural enemies, thereby contributing to sustainable pest regulation in olive grove ecosystems.

KEYWORDS: *spontaneous plants, reservoir, arthropod guilds, natural enemies, olive groves*

ORAL COM N° : 95.

IMPACT OF PHYCOREMEDIATION ON THE HEALTH STATUS AND NUTRITIONAL VALUE OF THE MUSSEL *MYTILUS GALLOPROVINCIALIS* EXPOSED TO A PLASTICIZER UNDER GLOBAL WARMING SCENARIO: A MULTI-BIOMARKERS APPROACH

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Abstract: In the face of global change, marine bivalves are subjected to the dual impact of chemical pollution and temperature anomalies. This study examines the combined effects of a plasticizer (bisphenol A) and heat stress on the mussel *Mytilus galloprovincialis*, assessing its health status and nutritional value. The temperature increases were selected based on the climate scenario proposed by the IPCC in its 2021 report. Concurrently, the phycoremediation potential of a microalga was tested.
The mussels were exposed to the combined "plasticizer-heat" stress with or without the presence of the microalga. Health status was assessed using a panel of oxidative stress biomarkers and nutritional value was determined by analyzing the fatty acid profile. Oxidative stress is assessed based on the intensity of pro-oxidant production, antioxidant defence as measured by catalase and GST activities, a non-enzymatic antioxidant (GSH), and cellular damage as indicated by MDA levels, in conjunction with neurotoxicity as measured by AChE activity. Fatty acids (SFA, PUFA, Omega 3 and omega 6... were measured by HPLC.
The results show that bisphenol A is toxic regardless of temperature. This toxicity is exacerbated by rising temperatures. The effect of bisphenol A is most pronounced at 26°C, with an overproduction of reactive oxygen species, depletion of antioxidants (GSH), and induction of antioxidant enzymes (CAT and GST). The increase in MDA levels indicates lipid peroxidation induced by bisphenol A and amplified by heat stress. The addition of microalgae as a feed additive helped mitigate the impact of water stress and resulted in a marked improvement in the oxidative, along with a reduction in lipid peroxidation.
The combined stress severely alters the mussel's physiology, triggering a strong response in biomarkers of cellular toxicity and a collapse in essential polyunsaturated fatty acids, which degrades their nutritional quality. In contrast, co-exposure with the microalgae significantly mitigates these negative effects by moderating oxidative stress and preserving the lipid profile of interest.
This research highlights the vulnerability of *M. galloprovincialis* to anthropogenic and climatic pressures, while demonstrating the effectiveness of microalgae as a biological solution for protecting aquaculture resources.

Keywords: *Mytilus galloprovincialis*, Bisphenol A, Heat stress, Lipid profile, Biomarkers, Bioremediation

ORAL COM N° : 96.

ASSESSMENT OF THE ECOTOXICOLOGICAL EFFECTS OF SYNTHETIC POLYMER LEACHATES (PET AND TIRE RUBBER) ON MARINE MEIOFAUNA, WITH SPECIAL EMPHASIS ON NEMATODES

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Abstract: Synthetic polymer-derived contaminants are emerging threats to marine benthic ecosystems. This study aimed to assess the chronic effects of leachates derived from polyethylene terephthalate (PET) and tire rubber fragments (≈3 mm), applied separately and as mixtures (PET + tire rubber), on a natural meiobenthic community, with particular emphasis on free-living marine nematodes. Leachates were prepared by incubating plastic fragments in filtered seawater at concentrations of 1, 10, and 1000 mg·L^{-1} for 14 days under controlled agitation. Following sequential filtration (GF/C followed by 0.2 µm), the dissolved fractions were applied to microcosms containing natural sediments with previously acclimated meiofaunal communities. A 30-day chronic exposure experiment was conducted under controlled laboratory conditions to evaluate community-level responses. Across all treatments, nematodes remained the dominant taxon within the meiofaunal assemblages. Control microcosms exhibited high and relatively stable abundances (1129 ± 66 ind. microcosm^{-1}). In contrast, exposed treatments, particularly mixture treatments, showed a marked decline in abundance, especially at the highest concentrations, indicating a potential dose-dependent response to combined plastic leachate exposure. A pronounced taxonomic restructuring of nematode communities was also observed in contaminated microcosms, characterized by the dominance of *Metoncholaimus pristiurus*. Conversely, several species, including *Oncholaimus campylocercoides* and *Oncholaimellus* sp., were absent from contaminated treatments, suggesting species-specific sensitivity to plastic-derived chemical stress. These findings highlight the ecological relevance of free-living marine nematodes as sensitive bioindicators of plastic-derived chemical contamination and emphasize the importance of considering combined leachate exposure scenarios in marine ecological risk assessments.

KEYWORDS: *Leachates; meiofauna; abundance; free-living nematodes; diversity*

ORAL COM N° : 97.

INFLUENCE OF PGPR-BASED BIOPRIMING ON FENUGREEK RESPONSES (*TRIGONELLA FOENUM-GRAECUM* L.) UNDER ALUMINUM STRESS

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Abstract: Soil contamination with toxic heavy metals is a major issue worldwide and affects a significant amount of agricultural land. Aluminum (Al) toxicity in acid soil ecosystems considered one of the principal factors limiting crop productivity as it severely inhibits plant root growth, thereby acquisition of nutrients from the soil. Plant growth-promoting bacteria offers a promising and eco-friendly strategy for enhancing plant growth and improving tolerance. An *in vitro* study was conducted to evaluate the potential of hydropriming and biopriming treatments using *Bacillus subtilis*, the indigenous strain IG2, and aluminum-adapted bacterial suspensions to enhance aluminum stress tolerance in fenugreek (*Trigonella foenum-graecum* L., Beja population) exposed to 1.5 and 3 mM $AlCl_3$ during germination. Germination performance and biochemical parameters, including ROS accumulation, DPPH activity, and total phenolic content, were assessed, while genome analysis of strain IG2 was performed to identify genes associated with aluminum resistance and plant growth-promoting activities under aluminum stress conditions. The results showed that aluminum stress negatively affected germination and seedling growth, particularly under severe stress conditions. However, biopriming treatments significantly improved germination performance, reduced germination delay, and enhanced root and shoot growth compared with uninoculated seeds. Among all treatments, the aluminum-induced IG2 strain exhibited the strongest protective effect under high aluminum stress. Biochemical analyses further demonstrated that bacterial inoculation reduced ROS accumulation while enhancing antioxidant activity and phenolic compound production, indicating improved regulation of oxidative stress and activation of plant defense mechanisms. Genetic pathways for organic acid production and indole-3-acetic acid (IAA) production were identified as major genetic machinery for plant growth promotion and mitigation of Al-stress in plants. The *in-vitro* analyses revealed the production of siderophores and organic acid as primary mechanisms for mitigation of Al-toxicity. Other plant growth-promoting properties such as phosphate solubilization, and IAA production were also detected.

KEYWORDS: *Aluminum, Rhizobacteria, Fenugreek, Priming, Tolerance*

ORAL COM N° : 98.

CHARACTERIZATION OF A *BACILLUS THURINGIENSIS* STRAIN AND ITS VALORIZATION AS A BIOPESTICIDE FOR THE BIOCONTROL OF INSECT PESTS

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Abstract: Biological control has become a sustainable and environmentally friendly alternative to chemical pesticides in agriculture. In this context, *Bacillus thuringiensis* (Bt) is widely recognized for producing Cry toxins, which are responsible for its insecticidal activity against a wide range of insect pests. BUPM14 is a recently isolated Bt strain. Using conventional techniques (i.e., plasmid and protein profiling) and 16S rDNA analysis, the BUPM14 isolate was interestingly assigned as a *B. thuringiensis* subsp. *kurstaki* strain that acquired a *cry1C* gene. PCR screening identified the presence of the *cry1I*, *cry1A*, *cry2A*, *cry1C*, and *vip3A* toxin genes. The insecticidal potential of the BUPM14 strain was evaluated against third-instar larvae of *Prays oleae* (Lepidoptera), a major pest of olive trees. The strain exhibited significant toxicity, with an LC50 of 1.474 ± 0.4 µg/cm² after 48 h of treatment. Furthermore, the BUPM14 strain demonstrated promising insecticidal activity against third-instar larvae of *Culex pipiens* (Diptera), a human health-dreadful insect, with an LC50 of 14.71 ± 4.88 µg/mL. The ability of this novel strain to control two different insect orders outlines its importance as a biopesticide, especially an insecticide, that could be applied in an eco-friendly context to simultaneously solve serious problems in agriculture, the environment, and human health.

KEYWORDS: *Bacillus thuringiensis*, Cry toxins, biopesticide, biocontrol, insect pests, *Culex pipiens*, *Prays oleae*, sustainable agriculture

ORAL COM N° : 99.

IN SITU ASSESSMENT OF GENOTOXIC IMPACT IN BIZERTE LAGOON USING THE ALKALINE COMET ASSAY IN SEABREAM *SPARUS AURATA*

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Abstract: Coastal and lagoon ecosystems are highly productive environments but are increasingly threatened by anthropogenic contamination. Aquatic organisms are exposed to numerous xenobiotics, including genotoxic pollutants capable of inducing DNA damage and affecting ecosystem health. Biomarkers of genotoxicity therefore provide valuable tools for environmental monitoring. This study assessed DNA damage in the liver of seabream *Sparus aurata* collected from the Bizerte Lagoon, an ecosystem impacted by multiple contaminants including metals, pesticides, hydrocarbons, PCBs, PBDEs, and microplastics. Fish from the Mediterranean Sea were used as a reference group. DNA integrity was evaluated using the alkaline comet assay, a sensitive and reliable technique widely applied in ecotoxicology. Results showed significantly higher DNA damage in lagoon fish compared with reference specimens. Tail DNA values reached 1.19% in lagoon fish versus 0.13% in Mediterranean fish, indicating genotoxic effects associated with chronic exposure to environmental contaminants. These findings highlight the value of *Sparus aurata* as a sentinel species and demonstrate the usefulness of the alkaline comet assay as an effective early-warning biomarker for pollution assessment and biomonitoring in coastal ecosystems.

KEYWORDS: *Bizerte Lagoon, Sparus aurata; biomarkers of genotoxicity, alkaline comet assay, biomonitoring*

ORAL COM N° : 100.

ANALYSIS OF POLYBROMINATED DIPHENYL ETHERS (PBDE) AND THEIR METHOXYLATED ANALOGS (MEO-PBDE) IN HUMAN MILK FROM BIZERTE, TUNISIA

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Abstract: Concentrations of ten polybrominated diphenyl ethers (PBDEs) and eight methoxylated polybrominated diphenyl ethers (MeO-PBDEs) were determined in 36 breast milk samples of mothers from Bizerte region. The analytical procedure involved the application of liquid–liquid extraction and gas chromatography coupled to mass spectrometry (GC–NCI-MS) for identification and quantification. Among the examined PBDE congeners, BDE-28, BDE-47, BDE-99, BDE-100, BDE-154, BDE-153 and BDE-183 were found to be major compounds identified in more than 66% of analyzed samples. Levels of ΣPBDEs ranged from 2.5 to 22.6 ng g^{-1} lipid wt with a mean value of 9.8 ng g^{-1} lipid wt. From the eight MeO-PBDEs investigated, 6-MeO-BDE-47, 2'-MeO-BDE-68, 4'-MeO-BDE-49 and 5'-MeO-BDE-100 congeners were detected at measurable levels. Concentrations of ΣMeO-PBDEs ranged from 0.23 to 4.70 ng g^{-1} lipid wt, with mean value of 1.52 ng g^{-1} lipid wt. To the best of our knowledge, this is the first data of PBDEs and MeO-PBDE in Tunisian human milk

KEYWORDS: *Human milk, PBDEs and MeO-PBDEs, GC-NCI-MS, Bizerte Tunisia*

ORAL COM N° : 101.

TOXIC WATERS, SILENT FIELDS: ASSESSING THE IMPACT OF TANNERY EFFLUENT ON WHEAT GROWTH

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Abstract: The leather tanning industry generates large volumes of wastewater enriched with organic matter, salts, and heavy metals, posing serious risks to the environment and agricultural systems. In Tunisia, tannery effluents are frequently discharged without adequate treatment, leading to soil contamination and adverse effects on crop productivity. This study aimed to characterize the physicochemical composition of raw tannery effluent collected from Gafsa (Tunisia) and to evaluate its phytotoxic effects on wheat (*Triticum aestivum*). The effluent was analyzed for pH, electrical conductivity (EC), organic load, and heavy metal content. Protein concentration, biochemical oxygen demand (BOD_5), and metal concentrations (Pb, Cr, and Fe) were determined, while UV–Visible and FTIR spectroscopy were used for qualitative characterization. Phytotoxicity was assessed through seed germination and seedling growth assays under different effluent concentrations, followed by photosynthetic pigment analysis. The results revealed high salinity (13.93 mS/cm), alkaline pH (9.38), and elevated organic load (proteins: 115.15 mg/L; BOD_5: 50 mg/L). Heavy metals were detected at concentrations of 1.097 mg/L for Pb, 0.017 mg/L for Cr, and 1.082 mg/L for Fe. Increasing effluent concentrations caused dose-dependent inhibition of seed germination and seedling growth, accompanied by visible symptoms including chlorosis, wilting, and necrosis. Chlorophyll a and b contents decreased markedly, whereas β-carotene and lycopene levels increased, suggesting the induction of oxidative stress responses. Overall, the findings demonstrate the pronounced phytotoxicity of untreated tannery effluents and emphasize the urgent need for effective pretreatment strategies before environmental discharge in order to protect agricultural crops and surrounding ecosystems.

KEYWORDS: *Tannery effluent, Wheat, phytotoxicity, Heavy metals, Oxidative stress, Environmental impact*

ORAL COM N° : 102.

ARTIFICIAL INTELLIGENCE-DRIVEN SURVEILLANCE OF WATERBORNE PATHOGENS FROM WASTEWATER TREATMENT PLANTS ACROSS TUNISIA

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Background: In water-stressed regions like Tunisia, the reuse of treated wastewater for agricultural irrigation poses significant risks for pathogen transmission. Despite the detection of *Salmonella* and *Vibrio* in treated effluents, surveillance remains limited. In the present study, we developed a responsible, AI-driven predictive tool to enable early pathogen detection in wastewater treatment plants (WWTPs).

Methodology: Bacteriological compliance monitoring reports for *Salmonella* and *Vibrio* from 64 WWTPs across Tunisia over the past five years were provided by the Ministry of Health and served as the primary dataset. Complementary data was scraped from official government sources (ONAS, AFI), including connected population size, treatment and biological capacities, proximity to industrial areas, and surface area of adjacent industrial zones. Robust statistical parametric and non-parametric tests were applied to eliminate non-significant features. Five machine learning models (SVC, LR, GB, XGBoost, RF) were trained and optimized through systematic combinations of sampling strategies, dimensionality reduction, and multicolinearity mitigation techniques. Recursive Feature Elimination (RFE) was used to refine feature sets per model to enhance predictive performance.

Results: The data collection and preprocessing revealed 27 and 21 features correlating with *Salmonella* and *Vibrio*, respectively. Most models presented a trade-off between precision and recall. Thus, the F1-score was used as the main evaluation metric. For *Salmonella*, XGBoost trained on the oversampled and dimension-reduced dataset (ADASYN+PCA) achieved the highest F1-score (0.72), that improved to reach 0.756 with RFE, alongside an MCC of 0.72, and balanced accuracy of 0.90. For *Vibrio*, LR and SVC models trained on the PCA-reduced dataset achieved MCC scores of 0.54 and 0.55, with F1-scores improving to 0.57 and 0.53, respectively. Further ensemble learning approaches combining the best-performing models significantly improved outcomes. For *Vibrio*, a RFC meta-model on SVC+LR achieved an F1-score of 0.67, an MCC of 0.65, and a balanced accuracy equal to 0.82. For *Salmonella*, an LR meta-model on XGBoost+SVC+GB achieved better results with an F1-score, an MCC and a balanced accuracy of 0.77, 0.74, and 0.92, respectively.

The final models for both *Salmonella* and *Vibrio* were integrated into a dual-interface dashboard, enabling real-time risk assessment and historical data visualization to support site-specific safety decisions

Conclusion: This study demonstrated the feasibility of implementing AI models to predict waterborne pathogens risks in WWTPs. The developed tool offers a reliable early warning system, supporting outbreak detection, public health interventions, and sustainable wastewater reuse in agriculture.

Keywords : Artificial Intelligence, Waterborne Pathogens, Wastewater Surveillance; *Salmonella*, *Vibrio*, Early Warning System

ORAL COM N° : 103.

ECOPHYSIOLOGICAL SCREENING OF WOODY TREE SPECIES FOR CADMIUM PHYTOREMEDIATION POTENTIAL IN CONTAMINATED SOILS

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Abstract: Cadmium (Cd) contamination represents a major environmental issue due to its toxicity and persistence in soils. The use of woody and ornamental plants with tolerance to Cd may offer sustainable strategies for phytoremediation, either through phytoextraction or phytostabilization. The aim of this study was to identify potential Cd accumulator species among woody ornamental plants and to evaluate their morphological, physiological, and biochemical responses under Cd stress.

A pot experiment was conducted using Cd at three concentrations (0, 5, and 15 ppm). Candidate woody ornamental species were grown for 180 days in Cd-contaminated soils. Morphological traits (leaf number, number of secondary branches, and Relative Growth Rate, RGR), physiological parameters, Cd accumulation in roots, shoots, and leaves (young and old), and translocation percentage (%) were determined. In addition, the interactions of Cd with other mineral elements (Fe, Zn, Mn, Cu, Pb, P, Na, Ca, Mg, and K) were analyzed to assess their influence on Cd absorption. Significant interspecific variability was observed in Cd uptake and distribution within plant organs. RGR decreased with increasing Cd stress in all the studied species. *Eucalyptus occidentalis* exhibited high Cd accumulation in shoots, with Cd translocation percentages exceeding 50% at both 5 and 15 ppm Cd

concentrations, indicating a strong phytoextraction potential. In *Eucalyptus camaldulensis*, increasing Cd stress from 5 to 15 ppm induced reduced Cd translocation to shoots and enhanced root accumulation. In contrast, Cd translocation percentages remained below 50% in all other studied species (*Ficus nitida*, *Nerium oleander* and *Casuarina equisetifolia*), indicating root sequestration process, and suggestion their utilization as phytostabilizing species. The comparative analysis between young and old leaves further highlighted differential Cd partitioning, while nutrient interaction studies revealed that essential elements influenced Cd uptake and translocation.

Based on RGR, Cd accumulation, and translocation percentage, species *E. camaldulensis* and *E. occidentalis* can be proposed as a model for phytoextraction, while other species are suitable for phytostabilization. These findings demonstrate the potential use of woody ornamental plants in Cd-contaminated environments and provide insights into their physiological and elemental interactions under heavy metal stress.

KEYWORDS: *Cadmium, Phytoremediation, Woody species, Translocation percentage, RGR, Ecophysiology*

ORAL COM N° : 104.

EFFECT OF PHOSPHOGYPSUM AMENDMENT ON SOIL PROPERTIES AND DATE PALM (*PHOENIX DACTYLIFERA* L.) GROWTH IN SALINE CONDITIONS

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Abstract: In this study, we investigated the effect of amendment of saline soils by different rates of phosphogypsum (PG) on saline soil and *date palm* growth. Different substrates were prepared by mixing saline soil with different concentrations of phosphogypsum from 0% to 40%. A culture period of 18 months was performed and then plant morphology, physiological and biochemical parameters were determined. Our results showed that an improvement of the soil quality was noticed after addition of PG by the decrease of pH and electrical conductivity and an increase of phosphate and calcium contents. In addition to that, plant growth was improved in PG -supplemented substrates especially at 10 and 20% concentrations, compared to control. However, higher concentrations of PG (30 and 40%) significantly increased the concentration of oxidative stress indicators in plant tissues such as MDA and H_2O_2. All these data suggested that date palm (*Phoenix dactylifera* L.) can tolerate the PG amendment at doses greater than 30% in saline soil by activating antioxidant enzymes that reduce the accumulation of ROS in plant tissues and thus limit oxidative damages. Hence, the amendment of saline soils by PG at 10 to 20% concentrations can have a positive impact on date palm (*Phoenix dactylifera* L.) growth. It can be used as an alternative fertilizer at specific concentration.

KEYWORDS: *Salinity, Phosphogypsum, Phoenix dactylifera* L., *Oxidative stress.*

ORAL COM N° : 105.

ECOLOGICAL EFFECTS OF THE BIOCIDE DIURON ON A COASTAL MEIOBENTHIC COMMUNITY: A LABORATORY MICROCOSM EXPERIMENT

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Abstract : Following the worldwide ban of Tributyltin (TBT), diuron has become one of the most widely used biocides in antifouling paints. The present study investigated the effect of diuron on meiofaunal assemblages collected from the Bizerte channel. Sediment samples were experimentally contaminated with four increasing concentrations of diuron: D1 (10 ng g^{-1}), D2 (50 ng g^{-1}), D3 (250 ng g^{-1}) and D4 (1250 ng g^{-1}), and compared with uncontaminated control sediments. The results revealed that diuron significantly affected meiofaunal abundance, leading to a marked decline in nematodes and oligochaetes densities, while increasing the relative abundance of copepods and polychaetes. In addition, diuron exposure altered nematodes diversity and community structure. All univariate diversity indices were lower in diuron treated microcosms compared with the control.

Overall, these findings highlight the potential ecological impact of the antifouling booster biocide diuron on non-target benthic organisms, particularly meiofaunal communities, and provide new insights into its possible consequences for fragile marine ecosystems.

KEYWORDS: *Diuron, benthic meiofauna, densities, Bizerte lagoon, microcosms*

ORAL COM N° : 106.

OPTIMIZING CACTUS-BASED BIOCOAGULATION FOR THE SUSTAINABLE GREEN TREATMENT OF SOAP INDUSTRY WASTEWATER

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Abstract: Global water scarcity, exacerbated by rapid industrialization and unchecked urbanization, has led to critical levels of industrial wastewater pollution, posing severe risks to public health and socioeconomic development. To address this challenge, the reclamation and remediation of industrial effluents have emerged as primary environmental strategies. Conventional physico-chemical treatments, such as chemical coagulation-flocculation, adsorption, and electrocoagulation, are frequently employed to remove suspended and dissolved pollutants. However, these traditional methods present several critical limitations, including prohibitive operational costs, diminished removal efficiencies at low pollutant concentrations, and the continuous generation of toxic chemical sludge that requires specialized, hazardous disposal. In light of these drawbacks, there is a pressing necessity to adopt greener, more economical, and eco-friendly water treatment technologies. Recently, the utilization of natural coagulants—particularly those derived from plant materials (e.g., Moringa oleifera, cactus) and other biological sources (e.g., insect-derived extracts)—has garnered substantial scientific interest. These biocoagulants are biodegradable, cost-effective, and capable of destabilizing colloidal suspensions through charge neutralization and polymeric bridging. Exploiting locally sourced plant and biological materials not only mitigates the ecological and health hazards associated with synthetic chemical treatments but also minimizes lifecycle impacts and reduces the overall carbon footprint. Ultimately, the integration of natural coagulants promotes a sustainable, circular-economy approach to water remediation and environmental protection. Environmental scientists identified several plant types, like Moringa oleifera, Stryconus potatorum, Cactus species, Phaseolus vulgaris, surjana seed, maize seed, tannin, gum arabic, Prosopis juliflora and Ipomoea dasysperma seed gum, as natural coagulants. Among these, Cactus leaves were selected because they are a readily available and renewable natural resource in Tunisia.
This study investigates the potential of Cactus (Opuntia ficus-indica) cladode extract as a natural, green coagulant for the treatment of wastewater generated by the soap industry. To establish optimal process conditions, coagulation experiments were conducted using a jar test apparatus, optimized via the Box-Behnken Design (BBD). Three independent variables were evaluated: biocoagulant concentration (X1), flocculant dosage (X2), and initial pH (X3). The efficiency of the treatment was assessed based on turbidity and chemical oxygen demand (COD) reduction. The experimental optimization revealed that maximum pollutant removal was achieved at a biocoagulant dosage of 198.79 mL/L, a flocculant dosage of 21.79 mg/L, and an initial pH of 9. Under these optimal conditions, the treatment yielded a remarkable turbidity removal efficiency of 94.5%, while the COD reduction reached 16%. Despite a substantial reduction in turbidity resulting in a highly clarified effluent, the elevated residual COD implies that a subsequent biological treatment, such as an activated sludge process, is mandatory to achieve an advanced effluent quality suitable for water recycling and reuse within a circular economy framework. Overall, these findings highlight the high viability of Cactus leaves as an effective, environmentally sustainable, and economically viable alternative to conventional synthetic chemical coagulants. The transition towards plant-derived coagulant technologies directly aligns with global paradigms promoting a circular economy and sustainable industrial wastewater management.

KEYWORDS: *Soap Industry Wastewater, Coagulation/flocculation, plant-derived natural coagulants, Cactus-based extract juice*

ORAL COM N° : 107.

TMULTI-MATRIX ENVIRONMENTAL QUALITY ASSESSMENT AND ECOTOXICOLOGICAL IMPACT WITHIN THE ICHKEUL LAKE WATERSHED (TUNISIA)

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Abstract: Ichkeul Lake, a UNESCO World Heritage site recognized for its exceptional ecological value, is increasingly threatened by anthropogenic activities, agricultural intensification, and climate change.
This study aimed to evaluate the environmental degradation of the watershed using an integrated approach combining water physicochemical characterization, sediment geochemistry, organic micropollutant analysis, and benthic bioindicators at four main river stations: Tinja, Joumine, Melah, and Sejnane. Water and surface sediment samples were collected from each site in triplicate. In situ measurements of water physicochemical parameters, including pH, dissolved oxygen, conductivity, and total dissolved solids (TDS), were carried out at each station. Additional parameters, such as total suspended solids (TSS), chlorophyll-a, nutrients, major anions, and cations, were analyzed in the laboratory. In parallel, surface sediments were analyzed to determine trace metal element (TME) concentrations and organochlorine pesticide (OCP) residues. Furthermore, bacterial load and benthic meiofauna indices were used to assess the biological impact of contamination.

The analyses revealed two distinct hydrochemical dynamics. The downstream station (Tinja) exhibited a major salinity anomaly, with extremely high conductivity (59543 µS/cm) and total dissolved solids (59500 ppm). This hypersaline character was confirmed by elevated concentrations of anions (23180 ppm), cations (15337 ppm), and nutrients (281 ppm), reflecting a strong marine or lagoonal influence. Upstream, a eutrophication gradient emerged at the Joumine station, marked by a peak in total suspended solids (73.3 mg/L) and maximum chlorophyll-a concentration (13.8 µg/L), indicating intense primary production. Regarding the sediment matrix, TMEs increased progressively upstream, reaching a peak at the Sejnane station (59.5 ppm), while OCP contamination was critical, ubiquitous, and relatively homogeneous throughout the watershed, with concentrations ranging from 40 to 60 ppb. This diffuse chemical contamination was associated with severe anthropogenic pressure, as evidenced by high bacterial loads and a collapse of benthic biodiversity at the Joumine station, where the Nematode/Copepod index reached 244.6, reflecting acute ecological stress. This work highlights the systemic degradation of water quality in the tributaries of Ichkeul Lake.

Beyond downstream salinity variations and elevated ionic loads, the widespread presence of organochlorine pesticides in sediments underscores the persistence of historical agricultural inputs at the watershed scale. This combination of chemical and organic pollution severely alters the structure of biological communities, emphasizing the urgent need for sustainable management and restoration strategies to protect this fragile socio-ecosystem.

KEYWORDS: *Ichkeul Lake, Watershed, Organochlorine pesticides, Chlorophyll-a, Trace metal elements, Hydrochemistry, Nematode/Copepod index*

ORAL COM N° : 108.

VALORIZATION OF REFINING WASTES AND OPTIMIZATION OF THEIR CONVERSION INTO BIODIESEL

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Abstract: Faced with global dependence on fossil fuels and the ethical conflicts associated with first-generation biodiesel, the exploitation of non-food waste (second-generation) has become an ecological and economic imperative. This study fits into a circular economy framework aimed at valorizing used bleaching earth (UBE) and used winterization earth (UWE) generated during the industrial oil refining process. These massive industrial wastes contain up to 40% of trapped residual oil, posing severe environmental risks such as soil pollution and spontaneous ignition. Our methodology relies on a green extraction process that offers an enhanced extraction yield (34.2% for soy UBE) compared to conventional toxic hexane (33.7%). The molecular integrity and fatty acid profiles of the recovered oils (palm, soy, sunflower) were thoroughly characterized using advanced molecular techniques, namely gas chromatography-mass spectrometry (GC-MS) and proton nuclear magnetic resonance (^{1}H NMR). Diagnostic results revealed that oils extracted from sunflower UWE exhibit low and controlled oxidation, making them ready for direct transesterification into biodiesel. Conversely, oils recovered from UBE (palm and soy) require a prior neutralization step due to their high oxidation state and elevated acid values. This work demonstrates the technical viability of optimizing biodiesel production from industrial refining wastes while eliminating petrochemical solvent toxicity, thus contributing to sustainable bioenergy development.

KEYWORDS: *Biodiesel, Refining waste, Green extraction, NMR, GC-MS.*

ORAL COM N° : 109.

EFFECTS OF SEDIMENT HEAVY METAL CONTAMINATION ON BENTHIC FAUNA DIVERSITY, COMMUNITY STRUCTURE AND ECOLOGICAL QUALITY OF THE GULF OF GABES

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Heavy metal contamination in marine ecosystems represents a major environmental concern due to its significant impacts on marine biodiversity and ecosystem functioning. Among marine organisms, benthic macroinvertebrates are widely recognized as reliable bioindicators because of their high diversity and differential sensitivity to environmental disturbances and contaminants.

This study investigated the relationship between sediment heavy metal enrichment and the composition, diversity, and structure of macrobenthic fauna communities in the Gulf of Gabès, Tunisia. Standard community descriptors, as well as trophic and ecological characteristics, were assessed at 80 sampling stations distributed among ten localities during surveys during 2024 and 2025.

The highest concentrations of heavy metals (such as cadmium and lead) were recorded at stations located near phosphogypsum discharge areas and were associated with significant biodiversity loss and low diversity indices. In contrast, the highest diversity values were observed in less-polluted localities situated farther from industrial waste discharges.

Certain zoological groups, particularly porifera, mollusca, and crustacea, showed high sensitivity to industrial effluents and elevated heavy metal concentrations in polluted areas such as Gabès and Skhira. Seagrass meadows also exhibited negative responses to increasing pollution levels and industrial discharges.

Furthermore, the biotic indices (AMBI, BENTIX, and BO2A) were consistent with the patterns obtained from classical diversity descriptors and closely reflected the spatial distribution of sediment heavy metals across the Gulf of Gabès.

KEYWORDS : *Sediment contamination, Marine pollution, Coastal ecosystems, environmental assessment*

ORAL COM N° : 110.

VARIABILITÉ SPATIO-TEMPORELLE DE LA CONTAMINATION PAR LES MICROPLASTIQUES DANS LES OUEDS AUTOUR DU LAC ICHKEUL

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Abstract : Les eaux douces tunisiennes sont soumises à une contamination récurrente par les microplastiques, résultant de l'interaction entre les activités anthropiques et les caractéristiques hydrologiques des bassins versants. La présente étude met en évidence une variabilité spatiale et saisonnière significative de cette contamination dans les principaux oueds entourant le Lac Ichkeul. Les concentrations en microplastiques diffèrent considérablement selon les oueds et les saisons, avec des niveaux généralement plus élevés au printemps et en automne, tandis que les valeurs les plus faibles ont été principalement enregistrées en été et en hiver. Des différences saisonnières statistiquement significatives ont été observées dans certains cours d'eau, alors que d'autres ne présentaient pas de variations notables, traduisant une forte hétérogénéité spatio-temporelle de la contamination. Par ailleurs, la répartition des microplastiques selon leurs formes, couleurs et tailles semble davantage influencée par les sources locales de pollution et les conditions hydrodynamiques spécifiques à chaque oued que par une tendance saisonnière homogène. Ces résultats confirment l'existence d'une importante variabilité entre les sites étudiés et les périodes d'échantillonnage, et soulignent la nécessité d'adopter des approches multisites et multi-saisonnières afin d'obtenir une évaluation représentative de la contamination par les microplastiques dans les écosystèmes d'eau douce tunisiens.

KEYWORDS: Microplastiques; eaux douces; variabilité saisonnière; Lac Ichkeul.

ORAL COM N° : 111.

EXTRACTION OF THE PROTEIN-POLYPHENOL COMPLEX FROM PISTACHIO BY-PRODUCTS: CHARACTERIZATION, BIOLOGICAL PROPERTIES, AND BIOTECHNOLOGICAL APPLICATION

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Abstract : This study is part of a broader strategy for the biotechnological valorization of pistachio by-products, aiming to transform agro-industrial waste into high-value functional ingredients with potential applications in the food, nutraceutical, pharmaceutical, and cosmetic sectors. The first phase of this work focused on the physicochemical characterization of pistachio by-products and the extraction of protein–polyphenol complexes (PPCs), which are recognized for their potential synergistic bioactivities and technological functionalities.

In the second phase, the biological properties of the extracted PPCs were comprehensively investigated, including their antioxidant, antibacterial, and antihypertensive activities. The results demonstrated that the complexes exhibited remarkable bioactive potential, including the ability to scavenge free radicals, inhibit the growth of pathogenic microorganisms, and regulate blood pressure through significant antihypertensive effects.

Additionally, the functional properties of the protein–polyphenol complexes were evaluated in terms of their technological performance, including solubility, emulsifying capacity, foaming properties, and water- and oil-holding capacities. These characteristics revealed the strong potential of PPCs as multifunctional ingredients suitable for incorporation into a range of formulated products.

Finally, the effectiveness of the extracted complexes in meat preservation was assessed. The results showed promising preservative effects, particularly in reducing oxidative deterioration and microbial growth, thereby improving product stability and shelf life.

Overall, this study demonstrates that protein–polyphenol complexes derived from pistachio by-products represent a sustainable and innovative source of bioactive and functional compounds. Their remarkable biological activities and techno-functional properties make them highly promising candidates for diverse industrial applications, particularly in the development of natural functional ingredients and eco-friendly preservation systems.

Keywords: Pistachio by-products; Protein–polyphenol complexes; Antioxidant activity; Antibacterial activity; Functional properties; Meat preservation.

ORAL COM N° : 112.

VALORIZATION OF CHEESE WASTEWATER THROUGH SPIRULINA SP. CULTIVATION: GROWTH, NUTRIENT RECOVERY AND ORGANIC MATTER REMOVAL IN A TUBULAR PHOTOBIOREACTOR

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Abstract: This study investigates the potential of Spirulina cultivated in cheese wastewater under tubular photobioreactor conditions for the simultaneous production of algal biomass, nutrient recovery, and organic load reduction. Due to the high organic content of cheese effluents, different wastewater dilutions (2.5, 5, and 10%) were evaluated over a 14-day cultivation period in order to determine the optimal balance between microalgal growth and wastewater treatment efficiency. Growth performance was monitored through optical density measurements and final dry biomass production, while depollution efficiency was assessed through chemical oxygen demand (COD), biochemical oxygen demand (BOD_5), and ion chromatography analyses of nitrate and phosphate removal. In parallel, oxidative stress biomarkers, including catalase (CAT), glutathione S-transferase (GST), hydrogen peroxide (H_2O_2), and lipid peroxidation (MDA), were evaluated to determine the physiological response of Spirulina sp. to increasing organic load and environmental stress conditions. The study aims to provide insights into the capacity of Spirulina sp. to valorize dairy wastewater while maintaining physiological stability under mixotrophic cultivation conditions. The obtained results are expected to contribute to the development of sustainable microalgal-based strategies for wastewater remediation, nutrient recycling, and biomass production within a circular bioeconomy framework.

KEYWORDS: *Spirulina, Phycoremediation, Cheese wastewater, Organic load reduction*

ORAL COM N° : 113.

EFFECTS OF MICROPLASTICS AND PHOSPHONOCAPROLACTAMS ON BIOMARKERS OF OXIDATIVE STRESS IN THE CLAM RUDITAPES DECUSSATUS

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Abstract: To assess the toxicity of microplastics (M) and phosphonocaprolactams (P) in bivalves, clams (Ruditapes decussatus) were exposed to two concentrations of microplastics (10 and 100 mg/L), phosphonocaprolactams (50 and 100 µg/L), and a mixture of these contaminants (MP). The impact of these contaminants was studied through physiological responses, particularly filtration capacity (FC), as well as by assessing oxidative stress through the quantification of hydrogen peroxide (H_2O_2), the activity of antioxidant enzymes (catalase (CAT) and glutathione-S-transferase (GST)), and the level of malondialdehyde (MDA), an indicator of lipid peroxidation. The results revealed that microplastics, phosphonocaprolactams, and a mixture of the two significantly affect the filtration capacity of contaminated clams. An increase in H_2O_2 was observed in the gills and digestive glands of organisms exposed to microplastics and the mixture. CAT activity remained unchanged under microplastic exposure, whereas phosphonocaprolactams induced an increase in CAT activity in the gills and a decrease in the digestive gland. Furthermore, GST activity remained stable, while a significant increase in MDA was observed in the group exposed to the mixture.
These results highlight the induction of oxidative stress and physiological disturbances, particularly under conditions of co-exposure, and underscore the vulnerability of aquatic ecosystems to this type of pollution.

Keywords: *Microplastics, Phosphonocaprolactam, Ruditapes decussatus, Biomarkers*

ORAL COM N° : 114.

EFFECT OF BIOCHAR AND MICROALGAE SLUDGE AS SOIL AMENDMENT FOR TOMATO AND PEPPER

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Abstract: The application of low-cost and eco-friendly fertilizers represents a promising strategy to improve crop performance and soil health. A pot experiment was conducted from May to September 2025 to evaluate the effects of different soil amendments—Control (C), Biochar (B), and Biochar combined with Microalgae (BM)—on the yield and main quality traits of two tomato genotypes (Sabra and Rio Grande) and two pepper genotypes (Marconi and Nabeul). For peppers, the results indicated significant variations in yield depending on the treatments and genotypes, which was further supported by Principal Component Analysis (PCA). Furthermore, soil enzymatic activity analysis revealed that the Biochar (B) treatment significantly enhanced both acid phosphatase and Beta-glucosidase activities compared to the other treatments. For tomatoes, the application of the combination (Biochar + Microalgae) (BM) significantly improved both the average fruit weight and the total fruit weight per plant compared to the control. The Biochar (B) treatment results showed the highest Vitamin C content. Significant genotypic responses were also observed: the 'Rio Grande' variety exhibited a higher average fruit weight and total yield per plant, whereas the 'Sabra' variety showed superior Vitamin C content and soluble solids (°Brix). Neither treatments nor genotypes showed significant differences in the number of fruits per plant or titratable acidity.

In conclusion, amending soils with biochar and its combination with microalgae can modulate soil biological activity and enhance specific agronomic and fruit quality traits. These findings

emphasize the potential of these low-cost amendments and the importance of genotype- treatment interactions in developing sustainable agricultural practices.

Keywords: Sustainable cropping, Biochar, Microalgae, Solanaceae, Yield, Quality traits, Soil

GENETICS AND IMMUNOLOGY

ORAL COM N° : 115.

MUTATIONAL SPECTRUM OF MITOCHONDRIAL COMPLEX I GENES IN HUMAN DISEASES IN TUNISIAN PATIENTS

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Abstract: Mitochondrial complex I, or NADH ubiquinone oxidoreductase, is the largest enzyme of the oxidative phosphorylation system, which plays a central role in cellular energy production. Its mitochondrially encoded subunits, including MT-ND1, MT-ND2, MT-ND3, MT-ND4L, MT-ND4, MT-ND5 and MT-ND6, are essential components of the membrane arm of the enzyme and contribute to complex I assembly, stability, ubiquinone reduction and proton translocation. Variants affecting these genes are associated with a wide spectrum of human mitochondrial disorders, ranging from isolated organ involvement to severe multisystem disease.

Mitochondrial mutations in complex I genes have been increasingly reported and are now recognized as major contributors to the heterogeneity of mitochondrial disease. Large-scale sequencing studies and databases such as MITOMAP, ClinVar, and GeneReviews have expanded the list of pathogenic, likely pathogenic, and candidate variants affecting complex I subunits. However, genotype–phenotype correlations remain challenging because the same variant may lead to different clinical presentations depending on heteroplasmy level, tissue distribution, nuclear background, and environmental or population-specific modifiers.

The mutational spectrum of mitochondrial complex I genes identified mutations in Tunisian patients includes mutations in MT-ND1, MT-ND2, MT-ND4, MT-ND5 and MT-ND6, are associated with heterogeneous manifestations such as sensorineural hearing loss, developmental delay, encephalopathy, cardiomyopathy, mitochondrial diabetes, Leber hereditary optic neuropathy, and neuromuscular presentations. Complete mitochondrial DNA sequencing was performed using specific primer pairs designed to cover the entire mitochondrial genome. Amplified mtDNA fragments were analyzed to identify sequence variants affecting mitochondrially encoded complex I genes and to evaluate their potential clinical relevance.

The Tunisian data illustrate the clinical and genetic heterogeneity of complex I-related mitochondrial diseases. They also highlight the difficulty of interpreting mitochondrial DNA variants. Therefore, variant interpretation should integrate clinical presentation, heteroplasmy level, maternal inheritance, evolutionary conservation, topological localization within the ND subunits, biochemical evidence and literature-based classification. Overall, we emphasize the importance of mitochondrial complex I genes in human diseases and supports the need for comprehensive molecular screening in patients with neurological, cardiac, auditory, muscular or metabolic phenotypes.

KEYWORDS: *Mitochondrial complex I; NADH:ubiquinone oxidoreductase; oxidative phosphorylation; mitochondrial DNA; MT-ND genes; ND subunits; mitochondrial diseases*

MICROBIOLOGY AND VIROLOGY

ORAL COM N° : 116.

DE NOVO HYBRID GENOME ASSEMBLY AND BIOMEDICAL ANTIOXIDANT DETECTION IN A NOVEL TUNISIAN FUNGAL STRAIN

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Abstract: Edible medicinal mushrooms have long been used as food and in traditional medicine. These species contain biologically active substances with numerous potential beneficial effects on human health such as ergothioneine, glutathione, etc. The characterization of new species provides valuable insights into genomic diversity and metabolite production. This study aimed to (1) extract high-quality genomic DNA from a de novo fungal species (BS6), (2) perform whole-genome sequencing using short and long reads to obtain a hybrid assembly, and (3) detect and quantify ergothioneine production using HPLC. Genomic DNA was extracted using optimized based-QIAGEN DNeasy Plant Pro Kit protocol from fungal mycelium (BS6). Whole-genome sequencing was conducted with a hybrid approach combining Illumina platform (NextSeq550) and Oxford Nanopore Technologies (MinION Mk1C and P2Solo). Genome assembly and annotation were performed using a customized Galaxy Workflow. The detection of ergothioneine was carried out by high-performance liquid chromatography. The hybrid sequencing strategy yielded a genome assembly with 21.66 Mbp (>1,000bp), 40,332 bp and [20.6 % (Complete); 18.9 % (Single); 1.8 % (Duplicated); 0.5 % (Fragmented); 78.8 % (Missing)] as genome size, N50, completeness metrics, respectively. Annotation revealed candidate genes associated with ergothioneine and glutathione biosynthesis. HPLC analysis confirmed the presence of ergothioneine in the fungal extract with 5.55 µg/ml, supporting the genomic findings. This work presents the first de novo hybrid sequencing of the entire genome of the Tunisian species BS6. The integration of sequencing and metabolite detection highlights its potential for nutraceutical and therapeutic applications and contributes to a better understanding of Tunisian fungal diversity.

KEYWORDS: *mycology, antioxidant, high-throughput sequencing*

ORAL COM N° : 117.

MICROBIOLOGICAL CHANGES IN VACUUM-PACKED CARROT SLICES INOCULATED WITH *SALMONELLA ENTERITIDIS* FOLLOWING TREATMENT WITH *LOBULARIA MARITIMA* AQUEOUS EXTRACT

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Abstract:

Fresh vegetables are highly susceptible to postharvest contamination by pathogenic microorganisms, representing an important source of foodborne outbreaks worldwide. This study investigated the effect of aqueous extracts of *Lobularia maritima* (AE*Lm*) on the microbiological quality of vacuum-packed carrot slices artificially inoculated with *Salmonella enterica* subsp. *enterica* serovar Enteritidis during refrigerated storage at 4 °C for 7 days. Carrot slices were treated with four concentrations of AE*Lm*: AE*Lm*1 (10 mg/mL), AE*Lm*2 (5 mg/mL), AE*Lm*3 (2.5 mg/mL), and AE*Lm*4 (1.25 mg/mL). Microbiological analyses, including total viable counts (TVC), coliform bacteria (CB), and *Salmonella* counts, were performed on days 1 and 7. In addition, bacterial isolates recovered from carrot samples were identified using MALDI-TOF MS Biotyper mass spectrometry.

The results revealed that microbial populations varied according to treatment concentration and storage time. The untreated control group exhibited the highest microbial loads on both sampling days, whereas AELm-treated samples showed reduced bacterial growth, highlighting the antimicrobial potential of the extract. Among the identified microorganisms, *Salmonella enterica* and *Pantoea agglomerans* predominated on day 1, while *Klebsiella oxytoca* became the dominant species by day 7.

These findings demonstrate the potential of *Lobularia maritima* aqueous extract as a natural and sustainable sanitizing agent for minimally processed vegetables, contributing to improved microbial safety and enhanced preservation of fresh-cut carrots during refrigerated storage.

KEYWORDS: *Lobularia maritima; fresh-cut carrots; Salmonella enterica serovar Enteritidis; vacuum packaging; microbiological quality; food safety; MALDI-TOF MS.*

ORAL COM N° : 118.

REPURPOSING KETOPROFEN AS AN ANTIVIRULENCE STRATEGY AGAINST QUORUM SENSING AND BIOFILM IN SERRATIA SP.

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Abstract: Serratia species are opportunistic Gram-negative bacteria capable of forming biofilms and expressing several quorum sensing-regulated virulence factors. Due to the increasing emergence of multidrug-resistant strains, alternative antivirulence strategies are being actively explored. In this study, we investigated the potential quorum-quenching activity of ketoprofen against Serratia sp. using both in-vitro and in-silico approaches.

Phenotypic assays demonstrated that sub-inhibitory concentrations of ketoprofen significantly reduced bacterial adhesion, biofilm formation, motility, protease activity, and prodigiosin production without affecting bacterial growth. Biofilm inhibition reached up to 90%, while protease activity was completely suppressed.

To better understand the molecular mechanism involved, computational analyses including molecular docking, molecular dynamics simulations, and MM/PBSA calculations were performed. The results revealed a strong and stable interaction between ketoprofen and the LuxR-type quorum sensing receptor SmaR, suggesting that ketoprofen may competitively interfere with quorum sensing signaling.

Overall, our findings highlight ketoprofen as a promising repurposed antivirulence agent against Serratia infections and support the potential of targeting quorum sensing pathways as an alternative strategy to combat antimicrobial resistance

KEYWORDS: *repurposing1, antibiofilm2, QSI3, Serratia sp4. Ketoprofen5.*

ORAL COM N° : 119.

LAWSONE AS A MODULATOR OF MULTIPLE EFFLUX PUMPS TO ENHANCE ANTIBIOTIC ACTIVITY IN MULTIDRUG RESISTANT STAPHYLOCOCCUS AUREUS.

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Abstract: Multidrug resistant Staphylococcus aureus (MRSA) continues to be a major clinical concern because efflux pump–mediated pathways are involved in the reduced intracellular accumulation of antibiotics and impaired treatment efficiency. Targeting these systems with natural chemicals is a promising way to enhance the action of existing antibiotics

This study tested the plant-derived naphthoquinone, Lawsone as an efflux pump modulator in multidrug resistant S. aureus.

Methicillin-resistant S. aureus clinical isolates were examined. Minimum inhibitory concentrations (MICs) of lawsone alone and in combination with antibiotics from three classes, fluoroquinolones, macrolides, and tetracyclines were measured by broth microdilution method. Antibiotic-compound interactions were evaluated by assessing the changes in MIC values, in the presence of sub-inhibitory concentrations of lawsone.

In silico molecular docking and 100 ns molecular dynamics simulations were conducted to study interactions of lawsone with selected efflux pump proteins (NorA, NorB, MsrA, SepA, MefA). Physicochemical and pharmacokinetic characteristics were evaluated using ADMET prediction techniques.

Lawsone enhanced the in vitro action of fluoroquinolones, macrolides and tetracyclines against multidrug-resistant S. aureus indicated by reductions in MIC values against numerous clinical isolates . The effect was strain-dependent and the extent of antibiotic potentiation was variable.

Computational analysis suggested that lawsone might bind to several efflux pump proteins with favourable binding energies and persistent ligand-protein complexes during the whole simulation period, supporting a potential efflux modulation mechanism. Drug-likeness and overall safety profiles were predicted to be acceptable by in silico pharmacokinetics predictions with certain predicted toxicological alerts that require additional investigation.

Lawsone is a promising multi-target efflux pump modulator, which can improve the in vitro activity of clinically important antibiotics against multidrug-resistant S. aureus . The results provide support for the continued exploration of lawsone as a potential antibiotic adjuvant targeting efflux-mediated resistance.

KEYWORDS: *MRSA, Lawsone, Efflux pump inhibition, Antibiotic adjuvant, Molecular docking*

ORAL COM N° : 120.

EVALUATION OF THE ANTIMICROBIAL PROPERTIES OF ROSEMARY ESSENTIAL OIL AGAINST ORAL BACTERIA

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Abstract:
The prevalence of oral infections has increased following the adoption of harmful behaviours, notably smoking and the use of oral hygiene products that are chemically irritating to gingival tissues, which inevitably disrupts the oral flora. Our study aimed to examine the impact of rosemary essential oil on the inhibition of bacterial growth and biofilm formation, as well as on the expression of virulence genes an effect attributable to its biological activity, which has long been widely recognized. To evaluate the antibacterial activity of rosemary essential oil, two strains were used: Streptococcus mutans and Enterococcus faecalis, strains obtained from GREB. The antibacterial efficacy was evaluated in triplicate at different concentrations (1 µL, 3 µL, and 5 µL). It decreased to 1.6% and 13.5% with 5 µL. Similarly, hydrophobicity consecutively decreased to 52.8% and 57.8% according to a chemical technique performed with the solvent hexadecane. Biofilm analyses using crystal violet staining and histology showed that rosemary essential oil has an anti-adhesive effect on biofilm structure, where we observed a marked reduction reaching up to 37%.
Consistently, the expression of genes responsible for antibiotic resistance, adhesion, and thermal and oxidative stress in real-time PCR (dnaK, ace, groEL, sprE, ctsR, ComX, LuxS, Spap, ClipB, and RelA) in S. mutans and (dnaK, GelE, ace, groEL, and efaA) in E. faecalis was significantly repressed.
The observations of our study are consistent with those of E. Selem et al. (2025), who highlighted the antibacterial activity of rosemary against E. faecalis (MIC = 25 mg/mL). Furthermore, Arianda et al. (2024) confirmed its efficacy against S. mutans with an MIC of 1 mg/mL, reinforcing the idea that this plant represents a promising source of natural antimicrobial agents.
Our observations indicate that rosemary essential oil exhibits therapeutic potential against oral infections, offering a natural approach that could substitute conventional chemical treatments.

KEYWORDS: *rosemary essential oil, S. mutans, E. faecalis, bacterial growth, biofilm, hydrophobicity, gene expression*

ORAL COM N° : 121.

ISOLATION AND IDENTIFICATION OF POTATO SOFT-ROT BACTERIAL PATHOGENS: CASE OF *PECTOBACTERIUM* SPP. AND *DICKEYA SPP.* IN TUNISIA

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Abstract
This study focused on the isolation and characterization of bacterial strains associated with potato soft rot symptoms threatening Tunisian potato crops, alongside the investigation of native antagonistic bacteria as potential biological control agents.
Symptomatic potato tissues were processed using selective and semi-selective media targeting pectinolytic and cellulolytic bacteria. The obtained isolates were characterized through macroscopic, microscopic, and preliminary molecular analyses (PCR) alongside enzymatic activity testing. In parallel, antagonistic bacterial isolates were screened using in vitro agar diffusion assays, hydroponic assays, and plant-based co-inoculation bioassays.
Preliminary results revealed the presence of aggressive *Pectobacteriaceae* strains, more particularly belonging to *Pectobacterium* spp. or *Dickeya* spp., exhibiting strong pectinolytic and cellulolytic activities in Tunisian potato fields. Among the tested antagonistic isolates, one native *Bacillus* strain showed significant inhibitory activities during *In Vitro* testing as well as demonstrating preventive, curative, and competitive effects during *In Vivo assays* , highlighting the potential of indigenous microbial resources as sustainable alternatives for potato soft rot management.
This work also emphasizes the need for further molecular investigations into the diversity of soft rot-associated bacteria and the characterization of antimicrobial compounds involved in plant–pathogen–antagonist interactions, as limited data are currently available in Tunisia regarding these phytopathogens and their control strategies.

Keywords: *Inhibitory activity, Pectobacteriaceae, Pectinolytic, Solanum Tuberosum.*

ORAL COM N° : 122.

MACHINE LEARNING-BASED PREDICTION OF ANTIBIOTIC RESISTANCE PATTERNS IN NOSOCOMIAL PATHOGENS

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Background: Antimicrobial resistance (AMR) is a major threat for public health. AMR caused by nosocomial pathogens may cause severe infections, complicating the treatment. This study aims to better understand the genetic patterns deployed by pathogens to acquire and conserve the AMR using bioinformatic and Machine Learning techniques .

Methodology: Genomic sequences with phenotypic labels (resistance) to 5 different families of antibiotics were collected from public repositories (NCBI GenBank and BioSample). Resistance genes were screened using AMRFinder, thus allowing the generation of binary matrices reflecting presence/absence of AMR genes for each sample. Machine learning models, including Random Forest (RF), eXtreme Gradient Boosting (XGBoost), Support Vector Machines (SVM), and Logistic Regression (LR), were trained to predict resistance phenotypes from these genes-based features. Models performance were evaluated using cross-validation and standard metrics (accuracy, precision, recall, F1-score, ROC-AUC). Feature importance was assessed using the SHAP values approach, highlighting key genes that contribute to resistance prediction by each model.

Results: Gene frequency analysis revealed that 4 resistance genes were highly conserved across isolates, while others appeared only in specific bacterial species, underlining the genetic heterogeneity of nosocomial pathogens. The trained ML models achieved overall satisfactory performances. Noticeably, RF and XGBoost exhibited accuracy values higher than 92%, thereby slightly outperforming the SVM and LR classifiers. The SHAP analysis revealed five resistance genes that were consistently identified as major contributors to the resistance prediction. The combination of the prediction accuracy and the biological interpretability supported the interest of our approach towards implementing ML-based AMR surveillance tools.

Conclusion: This work demonstrates the effectiveness of machine learning in predicting antibiotic resistance phenotypes from genomic data. Beyond prediction, the interpretability of ML models provided valuable insights into the genetic determinants of resistance . Future perspectives include expanding the dataset to additional pathogens and more antibiotics families, refining models, and exploring deep learning approaches to capture more complex gene–phenotype relationships, ultimately contributing to improved surveillance and control of antimicrobial resistance.

Key words : Nosocomial Bacteria , Antimicrobial Resistance , Machine Learning.

ORAL COM N° : 123.

CHEMICAL COMPOSITION, ANTI-ENTEROCOCCUS FAECALIS, AND ANTIBIOFILM ACTIVITIES OF LAVANDULA MAROCCANA ESSENTIAL OILS: AN IN VITRO AND IN SILICO STUDY

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Abstract: To investigate chemical composition, in vitro and in silico antibacterial and antibiofilm potentials of essential oil (EO) derived from endemic *Lavandula maroccana* (LMEO) against *Enterococcus faecalis*. The phytochemical profiles were investigated using Gas Chromatography-Mass Spectrometry (GC-MS-MS). The antibacterial activities were tested against the reference and clinical isolates of *E. faecalis*, by measuring the inhibition zone (IZ), the minimum inhibitory, and bactericidal concentrations of the EOs (MIC and MBC). The antibiofilm activities explored both the biofilm inhibition and biofilm disruption by measuring the biofilm biomass. Molecular docking studies were performed to explore the potential interactions of the major compounds of the EO with the microbial target Sortase A. Absorption, Distribution, Metabolism, Excretion, and Toxicity (ADMET) prediction analysis was completed in silico. carvacrol (56.42 %) were identified as major compounds in LMEO. The EO LMEO exhibited antibacterial activity against *E. faecalis* with values varying between 24.00 ± 1.0 mm, 8.93 ± 0.0 mg/mL and 17.86 ± 0.0 mg/mL for IZ, MIC, and MBC. EO significantly inhibited and disrupted *E. faecalis* biofilms compared to untreated control ($p < 0.05$). Molecular docking revealed high affinity binding interactions of (+)-leden (–7.2 kcal/mol) from LMEO. This EO is suggested as alternative antimicrobials against *E. faecalis* associated infections. Further experiments should be conducted to enhance and validate their safety.

KEYWORDS: *Enterococcus faecalis ,In vitro, In silico, Essential oil, Biofilm ,Molecular docking, Endodontics*

PHARMACOLOGY AND TOXICOLOGY

ORAL COM N° : 124.

DRUG REPURPOSING METHOD TO IDENTIFY POTENTIAL EGFR TYROSINE KINASE INHIBITORS

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Abstract:

The epidermal growth factor receptor (EGFR) plays a pivotal role in the progression and survival of various cancers, making it a well-established therapeutic target. Despite the availability of several EGFR tyrosine kinase inhibitors (TKIs), the emergence of resistance and adverse effects necessitate the discovery of novel inhibitory compounds. Drug repurposing has emerged as a cost-effective and time-efficient strategy to identify new therapeutic uses for existing drugs with known safety profiles. In this study, we employed an integrative drug repurposing approach combining in silico screening and molecular modeling techniques to identify potential EGFR inhibitors among approved and investigational drugs. A curated library of compounds was subjected to virtual screening against the ATP-binding site of the EGFR kinase domain. Top-ranked candidates were further analyzed through molecular docking, binding energy calculations, and interaction profiling to evaluate their affinity and stability within the active site. Our results identified several promising compounds exhibiting strong binding affinities and key interactions with critical residues involved in EGFR activity. Notably, these candidates demonstrated comparable or superior binding characteristics to known EGFR inhibitors. Preliminary pharmacokinetic and toxicity predictions further supported their potential as viable therapeutic agents.This study highlights the potential of drug repurposing strategies in accelerating the identification of novel EGFR TKIs and provides a foundation for further experimental validation. Such approaches may contribute to overcoming resistance mechanisms and improving targeted cancer therapies.

Keywords*: EGFR, tyrosine kinase inhibitors, drug repurposing, molecular docking, cancer therapy*

ORAL COM N° : 125.

STUDY OF THE EFFECT OF GREEN MANGANESE FERRITE NANOPARTICLES DOPED WITH COBALT ($CO_{0.5}MN_{0.5}FE_2O_4$) ON HEPATIC FUNCTION IN MALE WISTAR RATS

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Abstract: The aim of this study was to assess the effect of green cobalt-doped manganese nanoparticles $Co_{0.5}Mn_{0.5}Fe_2O_4$ on hepatic function in male Wistar rats. In this work, we adopted a subchronic treatment (20 days) of $Co_{0.5}Mn_{0.5}Fe_2O_4$ NPs at a dose of 10 mg/kg b.w (i.p) followed by ethanol (EtOH) administration to evaluate their potential protective role against ethanol-induced hepatotoxicity. Our results indicate that $Co_{0.5}Mn_{0.5}Fe_2O_4$ NPs exhibit a partial hepatoprotective effect, as reflected by an improvement in biochemical markers (ASAT, ALAT and LDH) of hepatic function and a restoration of oxidative stress parameters (MDA, SOD and CAT) in both the NPs-treated and co-treated groups compared to EtOH group. These biochemical findings suggest that these nanoparticles may attenuate ethanol-induced oxidative damage at the molecular level. Regarding histopathological findings, some hepatic tissue alterations were observed in both the NPs-treated and co-treated groups, which are likely attributed to the administrated dose rather than an inherent toxic effect of the nanoparticles. These observations suggest that the hepatoprotective effect of $Co_{0.5}Mn_{0.5}Fe_2O_4$ NPs was partial, as the biochemical and oxidative stress improvements were not fully reflected at the histological level. These findings highlight the importance of dose optimization in future studies, in order to achieve a more complete hepatoprotective response and to better elucidate the mechanisms underlying the biological activity of these nanoparticles.

KEYWORDS: *green synthesis, cobalt-doped manganese nanoparticles, liver, membrane integrity.*

ORAL COM N° : 126.

NATURAL MULTI-OCCURRENCE AND DIETARY EXPOSURE ASSESSMENT OF MYCOTOXINS IN TUNISIAN CEREALS

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Abstract : Climatic change is a key factor of cereal crops diseases including mycotoxin contamination by fungi spoilage in pre, post or during storage. Mycotoxins are compounds, which may reduce cereal quality and represent a potential risk to consumer health. The occurrence of AFs, OTA, and ENs (ENA, ENA1, ENB, and ENB1) was investigated in Tunisian cereals collected during the early post-harvest period. A total of 61 raw durum wheat, 57 barley, and 40 maize samples were analyzed. Mycotoxins were extracted using the QuEChERS method and detected and quantified by UHPLC–MS/MS. The results revealed the presence of several mycotoxins at high concentrations in all cereal types. Wheat samples were contaminated with AFG1 and AFB1 at concentrations ranging from below the limit of quantification (LOQ) to 127.75 µg/kg, while ENs concentrations were ranged from 0.44 to 1385.83 µg/kg. All AFG1-positive wheat samples exceeded the European Union maximum limit for AFs in cereals (4 µg/kg). Barley samples were contaminated only with ENs, with concentrations ranging from 12.33 to 266.14 µg/kg. Maize samples showed contamination by AFB1, AFB2, AFG2, OTA, and ENs, with concentrations ranging from 40.94 to 1769.89 µg/kg for AFB1, from 16.89 to 2236.82 µg/kg for AFB2, 593.17 µg/kg for AFG2, from 92.88 to 99.93 µg/kg for OTA, and from 15.16 to 1113.37 µg/kg for ENs. The detected levels of AFs and OTA in maize exceeded the European Union regulatory limits. The co-occurrence of multiple mycotoxins was observed in all cereal types, with up to six mycotoxins detected in one sample. Dietary exposure assessment indicated high estimated daily intakes (EDIs) of AFB1, AFG1, and ENs through the consumption of Tunisian wheat and barley by adults. Overall, the findings highlight the frequent occurrence of mycotoxins in Tunisian cereals and underline the importance of regular monitoring programs and preventive measures to ensure food safety in Tunisia.

KEYWORDS: *Wheat, barley, maize, mycotoxins, Tunisia; UHPLC–MS/MS, risk assessment*

ORAL COM N° : 127.

A GREEN ALTERNATIVE: THE PRESERVATIVE CAPACITY OF *PELARGONIUM ODORATISSIMUM* ESSENTIAL OIL

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Abstract : Pelargonium plants are very popular and well known for their essential oils, which are widely used in food and for medicinal purposes. This study focused on the essential oil of *Pelargonium odoratissimum* (*PO*EO). Firstly, its chemical composition, antioxidant, and antimicrobial activity were evaluated, and finally, its efficacy as a natural preservative in ground beef was tested. Of the 25 components detected in *PO*EO, the main constituents were citronellol (40.0%), nerol (15.3%) and citronellyl formate (12.6%). The antibacterial and antioxidant activities of *PO*EO were evaluated. *Enterococcus faecalis* ATCC 29212 was the most sensitive strain. The antioxidant activity was dose-dependent and comparable to the standard used, gallic acid. The direct addition of *PO*EO to ground beef (3.7, 7.4 and 14.8%) effectively inhibited the microbial growth of aerobic plate count (APC), psychotropic plate count (PTC) and Enterobacteria (especially *Salmonella*). The oxidative stability was effectively improved, with Thiobarbituric Acid Reactive Substances (TBARS) values of 0.63, 0.90 and 1.04 mg MDA/kg of meat for 4*PO*EO, 2*PO*EO and 1*PO*EO, respectively, compared to 1.68 mg MDA/kg of meat for the untreated sample. On the other hand, the results of MetMb showed a preservative effect with lower values than BHT, extending the meat shelf life of, which has a direct impact on its sensory properties (appearance, odor, color and overall acceptability). The ability to discriminate between all samples and correlate protein and lipid oxidation processes, microbiological characteristics and sensory measurements was made possible through the use of Principle Component Analysis (PCA) and heat maps.
This study demonstrates the potential benefits of using *PO*EO as a natural preservative in the preservation of ground beef meat as it can effectively extend the shelf life of meat products and improve their safety.

KEYWORDS: Biological activity; food safety; shelf life extension

ORAL COM N° : 128.

PROTECTIVE EFFECTS OF *CINNAMOMUM CASSIA* POLYSACCHARIDES AGAINST LAMBDA-CYHALOTHRIN- INDUCED HEPATIC AND RENAL DAMAGE

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Background and aim: Lambda-cyhalothrin (LCT) is a widely used synthetic pyrethroid insecticide characterized by its environmental persistence and potential toxicity in non-target organisms. It is one of the new pesticides, that chemical industry is currently developing, whose main objective is to overcome the reduction in yields of existing pesticides to which insects are becoming resistant gradually This study aimed to investigate the detrimental effects of Lambda-cyhalothrin on hepatic and renal structures and to assess the protective role of polysaccharides (P) extracted from *Cinnamomum cassia*.
Methods: Adult Wistar rats were assigned to four groups: a control group (T), a group treated with polysaccharides from *C.cassia* (P), a group treated with LCT (LCT), and a group co-treated with a polysaccharide extract and then with the pesticide LCT (P+ LCT). Histopathological, biochemical, and antioxidant markers were evaluated to assess tissue damage and oxidative stress.
Results: LCT exposure induced marked hepatocellular degeneration, vacuolization, necrosis, and glomerular disorganization. The administration of Lambda-cyhalothrin is linked to potential liver and kidney dysfunction. This is evidenced by an increase in malondialdehyde (MDA) accompanied by a noticeable decrease in the activity of key antioxidant enzymes such as superoxide dismutase, catalase and glutathione peroxidase.Co-administration of the polysaccharides significantly mitigated these alterations, restoring tissue architecture to near-normal conditions and enhancing antioxidant enzyme activity.
Conclusion: Overall, these findings indicate that *C. cassia* polysaccharides can reduce the toxic risks and oxidative stress induced by exposure to pesticides and exert a strong protective effect against LCT-induced hepatorenal toxicity, likely through their antioxidant and cytoprotective properties.

Keywords: Cinnamomum cassia *polysaccharides; Lambda-cyhalothrin; Hepatic injury; Renal toxicity; Antioxidant protection.*

ORAL COM N° : 129.

ANTIOXIDANT AND GASTROPROTECTIVE EFFECTS OF THE ETHANOLIC EXTRACT OF *SALICORNIA ARABICA* ON ETHANOL-INDUCED GASTRIC MUCOSAL LESIONS

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Abstract: Native to arid and saline coastal locations, particularly North Africa, *Salicornia arabica* is a halophytic plant species belonging to the Amaranthaceae family. It has been traditionally used to cure asthma, rheumatism, hypertension, and gastroenteritis. Nonetheless, no scientific studies exist on its activity as an anti-gastric ulcer agent in modern pharmacology. The current study was designed to evaluate the antioxidant and anti-ulcer effect of the ethanolic extract of *Salicornia arabica* in rat models of ethanol-induced gastric ulcer. Gastric ulceration was induced according to the method described by **Wasman S. Q. *et al. (2010), Raish et al. (2018),*** and **Tijani A.S *et al. (2022).*** The rats (n = 25) were divided into the following five groups at random and equally: Group 1 rats (ulcer control group) received a vehicle (distilled water) pretreatment. Rats in Group 2 (the reference group) received an oral pretreatment of 20 mg/kg omeprazole. Physiologically distilled water and omeprazole were used as negative and positive controls, respectively. Oral pretreatment with 250 mg/kg/w was administered to group 3 (experimental groups). Group 4 represents the ethanol group (distilled water-treated + ethanol-treated group) and Group 5 extract only. The mice were treated intragastrically once daily for 7 days. At 1 h post the last administration, the mice in all groups except the blank control group and group 5 were intragastrically administered with absolute ethanol (**5 mL/kg)** in order to cause gastric ulcers. All the rats were sacrificed after an extra hour, and the gastric juice was taken to measure the mucous weight and pH. The stomachs were checked for regions of gastric ulcers. The crude extracts phytochemical screening showed that different amounts of flavonoids and polyphenols were present. The aqueous ethanol extract fraction showed significant antioxidant activity. The ulcer control group demonstrated significant mucosal damage, but pretreatment with either omeprazole or hydrolic ethanol extract provided substantial protection against stomach mucosal injury and enhanced mucus production. The aqueous ethanol extract of *salicornia arabica* exhibited anti-gastric ulcer activity, and the dose of 250 mg/kg exhibited comparable activity to that of omeprazole.

Keywords: *Salicornia arabica, antioxidant activity, anti-ulcer effect, gastroprotective effects*

ORAL COM N° : 130.

EXPLORATION OF HUMAN NEUTROPHIL SIGNALLING MECHANISMS FOR THE DEVELOPMENT OF SYNTHETIC AND NATURAL PRODRUGS IN INFLAMMATORY BOWEL DISORDERS

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Abstract: Neutrophils are primarily responsible for identifying and selecting antioxidants and anti-inflammatory agents. Using isolated cells to select natural and synthetic prodrugs is a valuable approach for targeting oxy-inflammatory pathways and identifying the potential therapeutic applications of each product in inflammatory responses.

This study aims to investigate two products: a natural *Silybum marianum* seed extract and the synthetic compound apocynin, which is derived from *Picrorhiza kurroa*. We identified these extracts in vitro using isolated human neutrophils to evaluate their pharmacological signalling pathways and in vivo to assess their potential to prevent colitis. We examined these products' ability to limit total ROS (reactive oxygen species) production in PMA- and fMLP-stimulated neutrophils. We examined their potential to limit superoxide anion production and neutrophil degranulation by assessing NADPH oxidase subunit phosphorylation, xanthine oxidase activity, and myeloperoxidase activity. Furthermore, we investigated the potential protective effects of these products against ulcerative colitis using different staining methods for histological analysis and assessed their ability to limit the overproduction of inflammatory and oxidative stress biomarkers.

Our results demonstrate that both apocynin and *Silybum marianum* seeds limit total ROS production in isolated human neutrophils. Specifically, we demonstrate that apocynin regulates the NADPH oxidase system in neutrophils and degranulation, thereby limiting excessive ROS release. In contrast, *Silybum marianum* seeds play a significant role only in mitigating neutrophil degranulation by controlling primary degranulation, without affecting the xanthine oxidase system or the phosphorylation of NADPH oxidase subunits. Furthermore, in vivo application of these products in a colitis model demonstrates their effectiveness in protecting the colonic microstructure, modulating inflammatory markers, and stabilising oxidative stress biomarkers.

KEYWORDS: *human neutrophils, Apocynin, Silybum marianum seeds, Colitis*

ORAL COM N° : 131.

SALVIA ROSMARINUS ESSENTIAL OIL TREATMENT REDUCES IRON OVERLOAD- INDUCED ANXIETY AND IRON ACCUMILATION IN THE RAT BRAIN

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Abstract

Iron is an essential trace element that supports many body functions, especially in the brain where it helps to regulate key metabolic activities. Its level in the brain is carefully controlled, and any imbalance too little or too much can be harmful. Excess iron has been linked to the development of neurodegenerative diseases. In the search for new treatments, medicinal plants offer promising options due to their rich content of bioactive compounds with potential protective effects on the brain.

In our study, we tested the protective effect of *Salvia Rosmarinus* (rosemary) essential oil after inducing iron overload in rats for 15 days (30 mg/kg/day). We evaluated anxiety-like behaviors using four tests: light/dark box, unfamiliar environment, elevated plus-maze, and open-field. Iron levels and Acetylcholinesterase (AChE) activity were measured in five regions of interest: medial prefrontal cortex hippocampus, striatum, cerebellum, and amygdala. Rats exposed to excess iron showed more anxiety-like behaviors, higher iron content and acetylcholine activity, especially in brain areas linked to fear and anxiety. Systemic administration of rosemary essential oil (200 mg/kg) combined with excess iron treatment attenuated anxiety-like behavior. This treatment resulted in a decreased iron content in all ROI compared to Iron-treated rats. AChE activity was restored to control-like levels in the striatum, cerebellum and amygdala. The results thus indicate that rosemary treatment partially counteracted the behavioral and neurobiological deleterious effects of iron overload. These neuroprotective effects may result from antioxidant and metal chelating properties, suggesting a natural therapeutic potential against iron-related brain toxicity and anxiety.

Key words**:** *Iron overload, anxiety-like behavior, iron metabolism, Salvia Rosmarinus, rat*

ORAL COM N° : 132.

CC8, A DISINTEGRIN DERIVED FROM THE VENOM OF *CERASTES CERASTES*, AS A PROMISING THERAPEUTIC CANDIDATE FOR GLIOBLASTOMA TREATMENT

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Abstract: Glioblastoma (GBM) is the most aggressive and common primary malignant brain tumor in adults and remains highly resistant to current therapies. Snake venom disintegrins have emerged as promising therapeutic agents due to their targeted pharmacological activities. In this study, we investigated the pro-apoptotic and anti-dissemination effects of CC8, a disintegrin isolated from the venom of *Cerastes cerastes*, on human GBM cells.CC8 significantly reduced the viability and proliferation of U87, LN18, and LN229 cells, while U251 cells remained resistant up to 200 nM. CC8 induced apoptosis in sensitive cell lines, associated with decreased *BCL2* expression and increased *BAX*, *CASP3*, and *CASP8* expression. Furthermore, CC8 inhibited cell adhesion to fibrinogen and fibronectin through interaction with the αvβ3 and α5β1 integrins. It also reduced GBM cell invasion through Matrigel and blocked migration from spheroids, as confirmed by phase-contrast analysis and DAPI staining. These findings support further investigation of CC8-derived peptidomimetics against aggressive and therapy-resistant glioblastoma.

KEYWORDS: *Cerastes cerastes snake venom, disintegrins, glioblastoma cell lines, apoptosis, cell adhesion.*

ORAL COM N° : 133.

PRENATAL DELTAMETHRIN EXPOSURE DISRUPTS LIPID METABOLISM AND INDUCES CARDIAC DYSFUNCTION IN OFFSPRING RATS: INTEGRATION OF IN VIVO AND COMPUTATIONAL MODELING

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Abstract: Deltamethrin (DLM), a common pyrethroid insecticide used in agriculture and public health, has well-documented acute toxicity affecting heart function and lipid metabolism. However, the long-term effects on cardiovascular and lipid health following prenatal exposure are not well understood. This study investigates cardiac and lipid changes in adult male offspring after in utero exposure to deltamethrin. Wistar rats were divided into four groups: a control group and three treatment groups receiving daily gavage doses of deltamethrin (1.28, 2.56, and 5.12 mg/kg) from the 6th day of gestation until birth. At 8 weeks postnatal, the male offspring were sacrificed. Results showed a dose-dependent rise in malondialdehyde (MDA) levels and a decrease in antioxidant enzymes SOD, CAT, and GSH, indicating oxidative stress. Deltamethrin also impaired cardiac function, evidenced by reduced heart weight, altered lipid profiles (higher TC, TG, LDL-C; lower HDL-C), increased cardiac biomarkers (troponin, CK-MB, LDH, AST), and structural heart changes such as myofibrillar disorganization, hypertrophy, inflammation, and focal necrosis. Computational analysis revealed gene dysregulation affecting lipid metabolism (PPARα, PPARγ, HMGCR, LDLR, APOA1), antioxidant defenses (Nrf2, SOD1, CAT), and inflammation (NF-κB), leading to irreversible cardiac damage. Combining experimental data with AI predictions and molecular docking, the study outlines a mechanistic pathway from placental transfer and oxidative stress to persistent cardiac and lipid abnormalities driven by molecular and tissue-level damage. Overall, the findings highlight that prenatal deltamethrin exposure results in lasting cardiac pathology, emphasizing the vulnerability of the developing heart to environmental toxins and the importance of stricter regulation during pregnancy to minimize prenatal exposure.

KEYWORDS*: Deltamethrin; prenatal exposure; cardiotoxicity; Computational modeling; oxidative stress; dysregulation of genes*

ORAL COM N° : 134.

EXPLORATION OF PYRAZOLOPYRIMIDINE DERIVATIVES FOR PEROXIDASE INHIBITION THROUGH INTEGRATED *IN SILICO* AND *IN VITRO* APPROACHES

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Abstract: Five synthetic pyrazolo[1,5-a]pyrimidine derivatives, differing by their functional substituents, were investigated for their peroxidase inhibitory potential. AH11 and AH16 are monosubstituted derivatives with a single methyl group, whereas AH15 and AH18 are disubstituted derivatives: AH15 contains two methyl groups, while AH18 carries one chlorine and one methyl group. L59 is a tetra-substituted derivative containing two methyl groups and two ethyl-acetamide groups.

Molecular docking analysis was performed to rank these compounds according to their affinity and interactions toward horseradish peroxidase (HRP) and myeloperoxidase (MPO). All compounds, except L59, exhibited favorable binding energies. Among them, AH15, containing two methyl groups, showed the highest affinities, with binding energies of −7.7 kcal/mol against HRP and −9.2 kcal/mol against MPO, along with interactions involving key residues within the active sites of both enzymes. Furthermore, *in silico* ADME and toxicity predictions revealed a favorable pharmacokinetic and safety profile for this compound.

Experimental enzymatic assays using HRP confirmed these findings. AH15 displayed an IC_{50} value of 1.2 ± 0.006 µg/mL, corresponding to an inhibitory potency approximately 18-fold higher than AH16 (IC_{50} = 21 ± 0.105 µg/mL), 26-fold higher than AH11 (IC_{50} = 31 ± 0.155 µg/mL), and 13-fold higher than AH18 (IC_{50} = 16 ± 0.080 µg/mL), highlighting the significant role of the methyl substituent in enhancing enzymatic inhibition. In contrast, the L59 derivative exhibited negligible inhibitory activity.

In addition, cytotoxicity evaluation on isolated peripheral blood mononuclear cells (PBMCs) confirmed the low toxicity of the compound. Collectively, these findings suggest that AH15 represents a promising candidate as a peroxidase inhibitor.

KEYWORDS: *Peroxidase, Pyrazolopyrimidine, Molecular docking, ADMET, Inhibition assay, Cytotoxicity*

ORAL COM N° : 135.

STUDY OF THE PHARMACOLOGICAL PROPERTIES OF THE TAPENADE'S OLIVE *IN VITRO* AND *IN VIVO*

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Abstract : This study demonstrates that black and green olive tapenades are natural sources rich in bioactive compounds with potent antioxidant and anti-inflammatory effects. Phytochemical analysis confirmed the presence of oleuropein, rutin, quercetin, ferulic acid, resveratrol, and β-carotene, with higher polyphenol, flavonoid, and tannin contents in the black tapenade. Both extracts exhibited strong antioxidant activity (DPPH, $O_2^{\bullet -}$, H_2O_2), inhibition of protein denaturation, membrane stabilization, and significant COX-1 and COX-2 enzyme inhibition, with green tapenade generally showing superior performance. *In vivo* assays confirmed these effects, including a notable reduction of carrageenan- induced edema, inflammatory markers (TNF-α, IL-6), and oxidative stress (MDA). In a formaldehyde- induced arthritis model, green tapenade demonstrated stronger systemic effects, reducing inflammation and preserving body weight, while black tapenade remained highly effective. Hematological analysis showed normalization of blood parameters, particularly for green tapenade, highlighting its ability to maintain immuno-hematological homeostasis. These findings confirm the potential of olive tapenades as natural sources of bioactive compounds with therapeutic relevance. They support their valorization in the development of antioxidant and anti-inflammatory nutraceutical or pharmaceutical formulations.

Keywords: olive tapenade; antioxidant activity; anti-inflammatory activity; nutraceuticals

POSTER COMMUNICATIONS

BIOCHEMISTRY AND MOLECULAR BIOLOGY

POSTER N° : 1.

EPIGENETICS OF MULTIPLE SCLEROSIS IN TUNISIA: THE DIAGNOSIS POTENTIAL OF MICRO RNAS

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Abstract: Multiple sclerosis (MS) is an autoimmune inflammatory disease of the central nervous system characterized by demyelination and axonal degeneration. Beyond genetics, epigenetic factors particularly microRNAs (miRNAs) play a key regulatory role in MS pathogenesis. Aberrant miRNA expression in immune cells is increasingly linked to MS diagnosis and treatment, and identifying novel miRNAs may offer new diagnostic, prognostic, and therapeutic perspectives.

This study aimed firstly to identify and characterize MS-related miRNAs via bioinformatic analysis, then validate findings through in-vitro experimentation. Differentially expressed genes were retrieved from the Gene Expression Omnibus using Bioconductor tools, filtered by p-value <0.05 and logFC thresholds. miRNA data were analyzed via GEO2R, and target genes annotated using Mienturnet. Results revealed several potentially novel miRNAs not previously described associated with MS.

For validation, small RNAs were extracted from blood samples of 30 MS patients collected and disease confirmed at the National Institute of Neurology Mongi Ben Hmida, along with 8 healthy controls. Differential expression profiles of selected miRNAs are being studied via qRT-PCR, assessing their potential as diagnostic biomarkers in MS.

Keywords: *Neurodegenerative diseases, Multiple Sclerosis, Epigenetics, miRNAs, bioinformatics.*

POSTER N° : 2.

ANTIBACTERIAL ACTIVITY OF AQUEOUS EXTRACTS FROM THE LEAVES OF CELTIS AUSTRALIS L.

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Abstract: In this study, we examined the antibacterial activity of aqueous extracts obtained from the leaves of Celtis australis L. using the well diffusion method on a solid agar medium. The evaluation of the antibacterial activity was carried out by measuring the diameter of the microbial growth inhibition zone around the wells containing the tested samples, against two bacterial strains: Staphylococcus aureus (Gram-positive) and Escherichia coli (Gram-negative). The results revealed significant antibacterial activity against both strains at concentrations ranging from 50 mg/ml to 100 mg/ml. In contrast, the activity was less pronounced at concentrations of 2, 4, and 8 mg/ml for E. coli, while no effect was observed against Staphylococcus aureus at these same concentrations.

KEYWORDS: *Celtis australis, antimicrobial, aqueous extract, leaves*

POSTER N° : 3.

FACTEURS MÉTABOLIQUES ASSOCIÉS À L'HYPERTENSION CHEZ LES FEMMES MÉNOPAUSÉES

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Abstract: Cette étude avait pour objectif d'évaluer l'association entre l'obésité abdominale, l'apolipoprotéine B (apoB) et la résistance à l'insuline (IR) et le risque d'hypertension chez les femmes ménopausées. Un total de 242 femmes âgées de 35 à 70 ans a été inclus. Les paramètres étudiés comprenaient la pression artérielle, les indices anthropométriques, le profil lipidique, la glycémie à jeun, l'insulinémie ainsi que les concentrations d'apolipoprotéines. La résistance à l'insuline a été estimée à l'aide du modèle HOMA. L'hypertension était définie par une pression artérielle systolique ≥ 140 mmHg et/ou diastolique ≥ 90 mmHg, ou par la prise d'un traitement antihypertenseur.
Les femmes hypertendues présentaient des valeurs significativement plus élevées d'âge, de pression artérielle systolique et diastolique, de tour de taille, de glycémie à jeun, d'insulinémie, de HOMA-IR et d'apoB.
L'analyse selon le statut ménopausique a montré une prévalence significativement plus élevée de l'hypertension chez les femmes ménopausées par rapport aux femmes préménopausées (72,8 % vs 26,0 %, p < 0,001). Les femmes ménopausées présentaient également des valeurs plus élevées de pression artérielle, de tour de taille, de résistance à l'insuline et d'apoB.
Les analyses de régression linéaire multivariée ont montré que la pression artérielle systolique était significativement associée au tour de taille (p = 0,034), à l'apoB (p = 0,038) et au log HOMA-IR (p = 0,007) chez les femmes ménopausées. Une interaction significative entre ces trois variables (tour de taille × apoB × log HOMA-IR) a également été observée sur la pression artérielle systolique (p = 0,001), après ajustement sur l'âge.
Enfin, la régression logistique multivariée a montré que le tour de taille (p = 0,001), le log HOMA-IR (p = 0,007) et le statut ménopausique (p = 0,008) étaient indépendamment associés au risque d'hypertension, après ajustement sur l'âge et l'apoB.
Conclusion : Les modifications de l'obésité abdominale, de l'apoB et de la résistance à l'insuline associées à la ménopause contribuent à l'augmentation du risque d'hypertension chez les femmes ménopausées.

KEYWORDS: Obésité abdominale ; apolipoprotéine ; hypertension artérielle ; résistance à l'insuline ; ménopause.

POSTER N° : 4.

EXTRACTION, PURIFICATION AND CHARACTERIZATION OF POLYSACCHARIDES FROM *VACHELLIA TORTILIS*: FUNCTIONAL PROPERTIES AND BIOLOGICAL ACTIVITIES

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Abstract: Polysaccharides derived from plants are essential biological macromolecules that have attracted considerable scientific attention owing to their wide range of bioactivities. The water-soluble polysaccharides (PFA) were isolated from Umbrella thorn acacia (*Vachellia tortilis*) using a sequential purification protocol comprising hot water extraction, ethanol precipitation, deproteinization, and dialysis. The physicochemical characteristics of these polysaccharides were analyzed by Fourier Transform Infrared Spectroscopy (FTIR) and Ultraviolet (UV) spectroscopy, revealing spectral complexity indicative of structural heterogeneity. Antioxidant activities were evaluated at different concentrations using several *in vitro* assays, including DPPH radical scavenging, reducing power and ferrous ion chelation assays. Overall, the results demonstrate that water-soluble polysaccharides from *V. tortilis* possess potent antioxidant properties and hold promise as natural additives in food, pharmaceutical, and cosmetic formulations."

KEYWORDS: *Vachellia tortilis, polysaccharides, structural characterization, antioxidant properties.*

POSTER N° : 5.

HORMONE THERAPY RESISTANCE IN PROSTATE CANCER: MOLECULAR MECHANISMS AND CLINICAL IMPLICATIONS

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Abstract: Prostate cancer (PCa) remains one of the most common cancers among men worldwide and represents the leading urological malignancy in Tunisia. Androgen deprivation therapy (ADT), targeting androgen receptor (AR) signaling, is the standard treatment for advanced prostate cancer. Although most patients initially respond to treatment, resistance eventually develops, leading to castration-resistant prostate cancer (CRPC), which constitutes a major clinical challenge.

Building on our previous work investigating signaling pathways involved in hormone therapy resistance, this study aims to further explore the molecular mechanisms associated with treatment response and disease progression through a literature-based approach.

A review of the literature was conducted using PubMed and Scopus databases, focusing on studies related to hormone therapy resistance, androgen receptor signaling alterations, and predictive biomarkers associated with clinical outcomes in prostate cancer.

The literature highlights several mechanisms contributing to therapeutic resistance, including androgen receptor overexpression, mutations, and splice variants such as AR-V7. In addition, alternative signaling pathways, including PI3K/AKT/mTOR, Wnt/β-catenin, and TP53-related pathways, appear to play an important role in tumor progression and treatment escape. Several biomarkers, including PTEN, FOXA1, BRCA1/2, and AR-V7, have also been associated with disease aggressiveness and response to therapy.

These findings support the idea that resistance to hormone therapy in prostate cancer is a multifactorial process involving several interconnected signaling pathways. A better understanding of these mechanisms may help identify predictive biomarkers and contribute to the development of more personalized therapeutic strategies for patients with advanced prostate cancer.

KEYWORDS: *Prostatic Neoplasms ; Drug Resistance, Neoplasm ; Androgen Receptors ; Signal Transduction : Biomarkers : Precision Medicine : Castration-Resistant Prostatic Neoplasms*

POSTER N° : 6.

EVALUATION OF THE EFFECT OF A SOIL MICROORGANISM ON THE RESPONSE OF A TOMATO VARIETY TO ENVIRONMENTAL STRESSES

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Abstract: In response to the growing mandate for organic and sustainable farming systems, considerable effort is being directed toward replacing synthetic inputs with effective microbial biostimulants. The current investigation explores this strategy by examining how PGPR inoculation influences both the development of tomato plants and their physiological defense against TYLCSV. Experiments conducted on the 'Rio Grande' cultivar revealed a distinct biostimulatory impact, significantly improving key agronomic parameters and host biomass accumulation. Crucially, the inoculated plants exhibited an enhanced capacity to withstand viral pressure, displaying significantly lower disease severity indices when evaluated using the Friedman scale. The molecular basis of the induced systemic tolerance was assessed through viral monitoring, which demonstrated that bacterial pre-treatment actively suppresses the viral spread and accumulation. These lines of evidence indicate that the effective action of this bacterium effectively restricts viral progression within the host tissue, offering a viable biological tool for tomato crop protection.

Key words: PGPR ; TYLCSV, spread, tolerance , Tomato

POSTER N° : 7.

AI-ASSISTED VARIANT EFFECT PREDICTION REVEALS CANDIDATE MUTATIONAL HOTSPOTS IN DROUGHT-RESPONSIVE RICE GENES

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Abstract: Drought stress remains a major constraint on global rice productivity, highlighting the need for rapid identification of functional variants associated with stress adaptation in Oryza sativa. Here, we present an AI-assisted framework for Variant Effect Prediction (VEP) and in silico mutagenesis of drought-responsive genes, including OsDREB1C, OsNAC10, OsGSK1, and ASR3, using the Selene implementation of the DeepSEA-based model DeeperDeepSEA. All possible single-nucleotide substitutions across 1,000-bp coding and flanking regions were evaluated in two contrasting rice genomes: the drought-tolerant MH63 and the drought-sensitive IR64. Predicted variant effects were visualized using positional heatmaps and nucleotide logos, revealing distinct mutational sensitivity landscapes between the two genomes. MH63 exhibited broader regulatory tolerance, whereas IR64 displayed localized sequence vulnerabilities. Several loci, particularly within OsDREB1C and ASR3, emerged as potential mutational hotspots influencing regulatory activity and transcription factor binding.
This study demonstrates the value of AI-driven comparative genomics for rapid functional annotation of crop variants and highlights the utility of deep learning-based VEP approaches in accelerating climate-resilient rice breeding and genomic selection strategies.

KEYWORDS: *Oryza sativa; drought stress; climate-resilient breeding; Variant Effect Prediction (VEP); in silico mutagenesis; deep learning; comparative genomics; regulatory variants*

POSTER N° : 8.

EFFECT OF *MARRUBIUM VULGARE* EXTRACT ON THE VIABILITY OF INS832/13 CELL, AND BIOCHEMICAL PARAMETERS OF DIABETIC RATS

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Abstract: Diabetes, a chronic metabolic disease whose prevalence is continuously and alarmingly increasing, has now become crucial to manage and treat in order to curb its prevalence. Nowadays, the use of plants in diabetes treatments has attracted attention due to their therapeutic effects, and several studies have shown interest in plants like *Marrubium Vulgare* because of their potential hypoglycemic properties. In this study, we investigated the effect of the extract of *Marrubium Vulgare* on cell viability and examined its effect on biochemical parameters in diabetic rats. In vitro study of the viability of INS832/13 cell exposed to different concentrations of *Marrubium vulgare* extract (50 µg/ml, 150 µg/ml, 500 µg/ml and 1000 µg/ml) showed no significant effect induced by doses 50 µg/ml and 150 µg/ml, whereas doses 500 µg/ml and 1000 µg/ml significantly induced a decrease in cell viability. In addition, the treatment of diabetic rats with 300 mg/kg of extract led to a significant improvement in the biochemical profile reflected by the decrease in the level of glycemic (blood sugar), hepatic (AST, ALT) and lipid (triglyceride and total cholesterol) markers.

KEYWORDS *Viability, INS832/13 Cell, Diabetic rats, Biochemical parameters, Marrubium Vulgare*

POSTER N° : 9.

PHYTOCHEMICAL CHARACTERIZATION AND BIOLOGICAL POTENTIAL OF *ERICA ARBOREA* LEAVES: ANTIOXIDANT, ALLELOPATHIC, ANTIMICROBIAL AND PHYTOREMEDIATION APPLICATIONS

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Abstract:
This research focuses on the valorization of a forest species and investigates the phytochemical, biological, and environmental potential of Erica arborea, a plant widely distributed in the Tabarka region (Djebel Ourahnia). The main objective of this study was to evaluate the richness of secondary metabolites in the leaves of this species and to assess their antioxidant, allelopathic, antimicrobial, and depolluting activities, particularly in the context of wastewater treatment.
Phytochemical analyses revealed high levels of phenolic compounds and flavonoids, confirming the richness of *E. arborea* in bioactive secondary metabolites. Antioxidant activity, evaluated using the DPPH assay, demonstrated a significant free radical scavenging capacity that was strongly correlated with the phenolic content. Allelopathic assays were carried out using four concentrations of aqueous leaf extracts of *E. arborea* (control, 1%, 2.5%, 5%, and 7.5%). The results showed a pronounced inhibitory effect on the germination and seedling growth of Trigonella foenum-graecum seeds, suggesting the presence of biologically active allelochemicals.
In addition, antimicrobial tests revealed variable inhibitory effects of the extracts against bacterial strains isolated from wastewater, as indicated by the formation of inhibition zones, highlighting their potential application in phytoremediation processes. Overall, the findings demonstrate that *E. arborea* is a promising plant species for environmental, agricultural, and biological applications, particularly for eco-friendly wastewater treatment and the sustainable valorization of natural plant resources.

KEYWORDS*: Allelopathy; Antioxidant activity; Bioherbicide; Flavonoids; Phenolic compounds; Phytoremediation; Wastewater treatment.*

POSTER N° : 10.

THE ROLE OF MOLECULAR ELECTRON DENSITY THEORY (MEDT) IN THE STUDY AND OPTIMIZATION OF BIOACTIVE MOLECULES

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Abstract: The study and optimization of bioactive molecules are fundamental steps in modern medicinal chemistry and drug discovery. Molecular Electron Density Theory (MEDT) has emerged as an innovative theoretical framework for understanding chemical reactivity through the analysis of electron density changes during molecular interactions and reactions. Unlike traditional orbital-based approaches, MEDT emphasizes the role of electron density as the key factor governing molecular behavior. This theory provides valuable insights into reaction mechanisms, regioselectivity, stereoselectivity, and the electronic properties of bioactive compounds. By applying MEDT, researchers can better predict how molecules interact with biological targets and how structural modifications influence biological activity. MEDT also contributes to the rational design of new therapeutic agents by identifying reactive sites and optimizing molecular stability and efficiency. In addition, the theory supports the interpretation of experimental results and complements computational chemistry methods used in pharmaceutical research. The integration of MEDT with modern computational tools enables the rapid screening and optimization of candidate molecules with improved pharmacological properties. Consequently, MEDT has become an essential approach in the development of safer and more effective bioactive compounds. Its applications extend to organic synthesis, drug design, and the study of molecular mechanisms involved in biological systems. Overall, MEDT represents a powerful scientific strategy for advancing the discovery and optimization of bioactive molecules in contemporary medicinal chemistry.

KEYWORDS: *MEDT, optimization, drug discovery, regioselectivity,*

POSTER N° : 11.

COMPARATIVE GERMINATION PERFORMANCE OF BIOPRIMED SEEDS WITH SALT-CONTRASTING PGPR FROM SALICORNIA

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Abstract: Soil salinization poses a critical threat to seed germination and early crop establishment, particularly in salt-sensitive species such as tomato (Solanum lycopersicum). To overcome salinity-induced germination failure, we investigated a seed biopriming strategy employing plant growth-promoting Bacillus velezensis strains isolated from distinct ecological niches. One strain was recovered from the rhizosphere of the extremophile halophyte Salicornia europaea L. colonizing hypersaline soils along the southeastern coast of Tunisia, where it withstood up to 20% NaCl. A second strain was sourced from the bacterial collection of the Laboratory of Molecular Genetics, Immunology, and Biotechnology, originally isolated from compost derived from tomato residues collected at agricultural sites on the eastern shore of Cap-Bon, Tunisia, and characterized as halosensitive. Tomato seeds of the "Sabra" genotype were surface-sterilized and coated with these bacterial suspensions prior to germination assays under saline conditions. Under salinity, unprimed control seeds suffered complete germination inhibition. Biopriming markedly reversed this effect, restoring germination rate and energy while accelerating emergence kinetics and improving overall seedling vigor. Thus, seed biopriming with B. velezensis from either halophyte-associated rhizospheres or agricultural composts offers a promising biological approach to secure germination success in salt-affected soils.

KEYWORDS: *PGPR; Seed biopriming; Salinity stress; Tomato germination; Bacillus velezensis; Salicornia europaea L.*

POSTER N° : 12.

SOLENANTHUS TUBIFLORUS MURB. ESSENTIAL OIL: PHYTOCHEMICAL ANALYSIS, ANTIBACTERIAL ACTIVITY, WITH MECHANISTIC INVESTIGATION THROUGH SCANNING ELECTRON MICROSCOPY AND *IN SILICO* DOCKING STUDIES

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Abstract: The essential oil (EO) extracted from fresh flowers of Solenanthus tubiflorus Murb. growing in Tunisia was analyzed by GC/MS and its chemical composition was reported for the first time. Seventy-two compounds were identified, with 3-carene (19.57%), estragole (17.75%), bicyclo[3.1.0]hexane, 4-methylene-1-(1-methylethyl)- (7.32%), and α-terpinyl acetate (6.13%) as the major constituents. The antibacterial activity of the EO was evaluated against five bacterial strains using the microbroth dilution assay. It showed notable activity, particularly against Gram-positive bacteria, with a minimum inhibitory concentration (MIC) of 1% (v/v). The antibacterial mechanism of the essential oil against S. aureus was investigated by scanning electron microscopy (SEM), which revealed severe morphological alterations including membrane disruption, cell deformation, and cytoplasmic leakage. Moreover, molecular docking of the main compounds with the acylated penicillin-binding protein 2a from methicillin-resistant S. aureus (PDB: 1MWT) demonstrated promising interactions. These findings highlight the potential of Solenanthus tubiflorus Murb. EO as a natural antibacterial agent.

KEYWORDS: *Solenanthus tubiflorus Murb.; Chemical composition; Antibacterial activity; Scanning electron microscopy; molecular docking study*

POSTER N° : 13.

GENES AND ITS INFERENCE IN POLYPHENOLS PATHWAY IN ALMOND (*PRUNUS DULCIS*)

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Abstract: Almond (*Prunus dulcis*) species represents a promising yet underexplored source of bioactive secondary metabolites, particularly within leaf tissues, where the molecular mechanisms governing their biosynthesis remain insufficiently characterized. This study aims to investigate the expression profiles of key genes associated with antioxidant activity in almond species. A transcriptomic approach was employed to evaluate the transcriptional regulation of the core phenylpropanoid and flavonoid biosynthetic pathways, which yield polyphenolic compounds with notable antioxidant properties. Expression analysis focused on critical target genes encoding key regulatory enzymes, including phenylalanine ammonia-lyase (PAL), cinnamate 4-hydroxylase (C4H), 4-coumarate-CoA ligase (4CL), chalcone synthase (CHS), and chalcone isomerase (CHI). These enzymes drive the metabolic flux toward secondary metabolites essential for antioxidant defense mechanisms. This study is expected to reveal distinct, cultivar-specific variations in gene expression, thereby advancing the understanding of the molecular mechanisms underlying bioactive compound biosynthesis within almond species.

KEYWORDS: Almond; phenolic pathway; antioxidant genes; leaves

POSTER N° : 14.

INVESTIGATION OF THE MOLECULAR MECHANISMS UNDERLYING HEAVY METAL TOLERANCE IN GREEN MICROALGAE

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Abstract: Industrialization, rapid urbanization, and intensive agricultural practices have significantly contributed to environmental pollution, making it one of the most pressing global concerns. Among the various pollutants released into the environment, heavy metals are considered particularly hazardous due to their persistence, toxicity, and non-biodegradable nature. Most heavy metals tend to accumulate in living organisms and ecosystems, leading to long-term detrimental effects. Their mutagenic, carcinogenic, and teratogenic properties pose a serious threat to human health as well as ecological balance and diversity.
Among these metals, zinc occupies a unique position. Although it is an essential trace element required for biological functions, high concentrations of zinc can become toxic. Due to its extensive use in industries such as metallurgy, electroplating, batteries, and fertilizers, zinc is considered one of the most widespread ecotoxic metals. Excess zinc in the environment can disrupt cellular metabolism and negatively affect aquatic and terrestrial organisms. Several conventional methods, including precipitation, ion exchange, hydrolysis, and filtration, have been used to mitigate heavy metal pollution. However, these methods often present limitations such as high costs, low efficiency, and secondary pollution. As a result, greater attention is being directed toward the development of sustainable and environmentally friendly alternatives. In this context, microalgae have emerged as a promising solution for heavy metal remediation because of their ability to absorb, accumulate, and detoxify metals. While the physiological and biochemical responses of microalgae to heavy metal stress have been widely studied, the underlying molecular mechanisms remain insufficiently understood. Therefore, this study aims to identify and quantify the expression levels of genes associated with heavy metal tolerance and bioaccumulation in green microalgae, with a particular focus on zinc stress.

KEYWORDS: *Microalgae, Bioremediation, Heavy metals, Toxicity, Gene expression, Phycoremediation*

POSTER N° : 15.

IMPROVING DIAGNOSTIC TECHNIQUES FOR INVASIVE ASPERGILLOSIS IN TUNISIA

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Abstract: Invasive aspergillosis (IA) is a major public health concern, particularly among immunocompromised patients. Current mycological diagnosis of IA relies heavily on conventional tools based on morphological characteristics which are unable to differentiate species within the genus *Aspergillus*.
The aim of this work is to contribute to improving diagnostic approaches for IA. Innovative diagnostic techniques are being developed to enable rapid and accurate diagnosis of *Aspergillus* infections, with a focus on the predominant species circulating in Tunisia.
To this end, 53 samples of various origins were collected from Tunisian patients with confirmed IA at Farhat Hachad hospital in Sousse. Fungi were isolated and *in vitro* cultured, followed by DNA extraction and quantification. Species-specific primers were then designed using the Primer BLAST tool and conventional PCR reactions were optimized. Besides, Sanger sequencing of the PCR amplicons confirmed primers specificity. Species identification is currently underway for the Tunisian cohort, in addition to samples from IA patients originating from France. The next phase of this work will focus on applying multiplex PCR with species-specific primers directly to diverse clinical samples, including bronchoalveolar lavage fluid and nasal swabs, without prior *in vitro* culture. Ultimately, a sensitive, specific, and clinically reliable diagnostic tool for the accurate detection of invasive aspergillosis will be established.

Keywords: *Invasive Aspergillosis, Aspergillus, fungal infection, PCR, Sanger sequencing.*

POSTER N° : 16.

MULTILEVEL RESPONSES OF MICROALGAE TO SILVER-MODIFIED BENTONITE NANOCOMPOSITES: FROM PHYSIOLOGY TO GENE EXPRESSION

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Abstract: The increasing use of nanocomposites has raised significant environmental concerns regarding their potential toxicity to aquatic organisms. This study aimed to assess the effects of silver-modified bentonite nanocomposites on *Chlamydomonas* sp., focusing on physiological, biochemical, and molecular responses. Two materials were evaluated: silver-exchanged bentonite (Ben-Ag) and its hydrogen-reduced form (Ben-Ag(H_2)). Microalgae were exposed to concentrations corresponding to 0.5, 1.5, and 2 IC_{50}.
The findings indicated a significant difference in toxicity between the two materials. Ben-Ag exhibited stronger inhibitory effects, whereas Ben-Ag(H_2) induced a slight growth stimulation at low concentrations. Fluorescence microscopy revealed marked cellular alterations, including reduced cell volume and impaired chloroplast organization.
Biochemical analyses indicated a significant reduction in growth rate and photosynthetic pigment content, along with increased accumulation of phenolic compounds and malondialdehyde (MDA), reflecting enhanced oxidative stress and lipid peroxidation. Antioxidant enzyme activities were also disrupted, suggesting a disturbance in cellular redox homeostasis.
At the molecular level, transcriptomic analysis revealed that Ben-Ag exposure led to a broad change in gene expression under exposure to Ben-Ag. Key genes involved in carotenoid metabolism (*Q2CHY*), apoptosis regulation *via* caspases (*casp*), and photosynthetic electron transport (*petB, psbL*) were downregulated. In contrast, genes associated with β-carotene biosynthesis (*Q2BKT*), carbon fixation pathways (*rbcL*, PGQ1), and oxidative stress defense systems (*SOD, peroxidase*) were significantly upregulated.
Overall, these findings demonstrate that Ben-Ag exerts greater toxicity on *Chlamydomonas* sp. than its reduced form, underscoring the importance of considering the transformation state of silver-based nanomaterials when evaluating their ecological risks in aquatic systems.

KEYWORDS: *Nanocomposites, Silver-exchanged clays, Toxicity, Chlamydomonas* sp., *Oxidative stress.*

POSTER N° : 17.

GC–MS CHARACTERIZATION AND BIOLOGICAL ACTIVITY OF LIPOPHILIC EXTRACTS FROM *OROBANCHE CRENATA* PARASITIZING PEA AND CHICKPEA

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Abstract: *Orobanche crenata* is a parasitic plant that affects several legume crops, particularly pea and chickpea, and represents a promising source of bioactive secondary metabolites. This study investigated the lipophilic fractions of *O. crenata* parasitizing pea (OCPP) and chickpea (OCPC) hosts using gas chromatography–mass spectrometry (GC–MS) and evaluated their biological activities. GC–MS analysis revealed a diverse range of metabolites, including fatty acids, long-chain alcohols, sterols, phenolic compounds, aromatic acids, and alkanes. The lipophilic fractions exhibited antioxidant and anti-inflammatory activities, highlighting the pharmacological potential of this parasitic plant and consistent with its rich bioactive composition. Variations in chemical profiles between host plants suggest metabolic adaptation of the parasite. These findings indicate that *Orobanche crenata* could be a valuable natural source of biologically active compounds for applications in pharmaceuticals and biotechnology.

Keywords: Orobanche crenata*; GC–MS; Biological activity; Pea; Chickpea; Lipophilic extract.*

POSTER N° : 18.

TRICHOME DIVERSITY AND SECRETORY ACTIVITY IN *L. STOECHAS* AND THE ROLE OF IN VITRO CULTURE

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Abstract: Trichomes play a key role in the production and storage of secondary metabolites in L. stoechas, and these results highlight the importance of in vitro culture (CIV) as an effective tool for preserving and potentially enhancing these secretory structures. Scanning electron microscopy (SEM) analysis showed that micropropagated and greenhouse-grown plants share the same trichome types at the vegetative stage, although trichome density is higher in in vitro plantlets. The observed trichomes include non-glandular forms (uniseriate non-branched and stellate trichomes) as well as glandular peltate and capitate types.
Peltate trichomes and medium-stalked capitate trichomes exhibit a strong accumulation of secretions in the subcuticular space, whereas short-stalked capitate trichomes contain lower amounts. Histochemical analysis confirmed the lipophilic nature of the secretions, which are rich in essential oils and terpenoids, particularly abundant in peltate trichomes.

KEYWORDS: *Lavandula stoechas; trichomes; in vitro culture; SEM; essential oils.*

POSTER N° : 19.

CELL SURFACE RELOCALIZATION OF THE ENDOPLASMIC RETICULUM CHAPERONE GRP78 IN REPONSE TO HEAT STRESS AND ASSOCIATION WITH PROSTATE-SPECIFIC MEMBRANE ANTIGEN IN PROSTATE CANCER

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Abstract: Prostate-specific membrane antigen (PSMA) expression is significantly elevated in advanced prostate cancer (PC), where it has gained considerable attention as both a diagnostic biomarker and a therapeutic target. However, the molecular mechanisms underlying PSMA-associated Endoplasmic reticulum (ER) stress responses remain poorly understood. In this study, we investigated the effect of heat stress on the cellular localization of the ER chaperone: GRP78/BiP in conjunction with the expression and folding, or misfolding, of the PSMA. We examined cell surface GRP78 and PSMA localization in PC cells under standard conditions and heat stress, and assessed their interaction. The results demonstrated a distinct, PC cell line-dependent response of GRP78 expression to heat stress, showing different PSMA regulatory patterns under the same conditions. Additionally, GRP78 translocates to the plasma membrane in prostate cancer cells via its interaction with PSMA.
These findings suggest that GRP78 chaperone activity may play a crucial role in regulating PSMA folding, stability and function in prostate cancer.

KEYWORDS: *Prostate Cancer- Endoplasmic Reticulum- GRP78-PSMA- Heat stress- Cell surface*

POSTER N° : 20.

LDL SIZE PROFILE IN PATIENTS WITH CHRONIC RENAL FAILURE: ASSOCIATION WITH ALTERATION OF THE LIPID PROFILE AND Ω -3 FATTY ACIDS OF THE DIET

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Aim: To identify the effect of chronic kidney disease (CKD) on lipid parameters, to determine the LDL size profile and the effect of different dietary habits, notably ω-3 PUFAs consumption, on these lipid parameters.
Methods: we conducted a comparative study on 194 subjects [controls, patients with CKD, type 2 diabetic patients (DT2) and CKD patients with DT2]. The lipid profile (mainly LDL size) was performed and dietary survey was carried out.
Results: Small and dense LDL showed a significant increase. An effect of high intakes of SFAs on the disruption of cholesterol and LDL-C metabolism was detected by increasing their serum concentrations, as was the effect of increased intakes of PUFAs on HDL-C metabolism by decreasing its serum concentrations. With regard to intakes of ω-3 PUFAs, these fatty acids were found to have a greater effect on sdLDL, by increasing its serum concentration. Therefore, we conclude that dyslipidemia is as common in chronic renal failure patients as in the general population and constitutes an additional cardiovascular risk factor, requiring close dietary monitoring in this population.

Keywords*: chronic renal failure, LDL size, lipid profile, diet*

POSTER N° : 21.

SYNTHESIS, BIOLOGICAL EVALUATION, AND ANTI-CORROSION PROPERTIES OF A NOVEL ZWITTERIONIC

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Abstract: A novel zwitterionic Schiff base, (6E)-3-benzyloxy-6-[[[2-hydroxy-1,1-bis (hydroxymethyl) ethyl]amino]methylene] cyclohexa-2,4-dien-1-one, was successfully synthesized via the condensation reaction of 4-benzyloxy-2-hydroxy-benzaldehyde with 2-amino-2-(hydroxymethyl)propane-1,3-diol (Trizma). The structural elucidation of the synthesized compound was confirmed through Fourier-transform infrared (FT-IR) alongside 1H and 13C Nuclear Magnetic Resonance (NMR) spectroscopy.

Given the interdisciplinary importance of Schiff-base ligands, the in vitro antioxidant potential of the compound was evaluated utilizing five distinct assays: ABTS, DPPH, O-phenanthroline, silver nanoparticle (SNP), and reducing power. The compound exhibited a notable scavenging capacity against ABTS radicals, yielding an IC50 value of 196.52±1.06 µg/mL. To further evaluate its biological significance, molecular docking studies were conducted targeting the active site of mushroom tyrosinase (PDB ID: 2Y9X). The computational findings revealed a strong binding affinity (−6.16 kcal/mol) between the Schiff base and the receptor protein, an interaction predominantly stabilized by conventional hydrogen bonds.

In addition to its biological evaluations, the compound's efficacy as an industrial anti-corrosive agent was experimentally investigated. Electrochemical measurements, including potentiodynamic polarization and electrochemical impedance spectroscopy, demonstrated excellent inhibition performance for API5L grade B mild steel immersed in a 0.5 M H2SO4 corrosive medium. The compound functions as a mixed-type inhibitor, achieving an inhibition efficiency of 78.53% at a concentration of 2 mM.

This study underscores the synthesized Schiff base as a versatile compound, offering promising prospects in both biotechnological frameworks as a targeted tyrosinase inhibitor and in industrial applications as a highly effective anti-corrosive agent.

KEYWORDS: *Schiff base, Zwitterion, Antioxidant activity, Molecular docking, Anti-corrosion.*

POSTER N° : 22.

CENTRAL COMPOSITE DESIGN FOR ENHANCING THE PHYSICOCHEMICAL AND EMULSIFYING PROPERTIES OF LENTIL AQUAFABA AS A PLANT-BASED INGREDIENT

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Abstract: Aquafaba, a by-product generated during the cooking or canning of pulses, has emerged as a promising natural emulsifier for food applications. Lentils are particularly attractive for aquafaba production due to their high protein and carbohydrate contents, which contribute to desirable emulsifying and stabilizing properties. However, the functional properties of lentil aquafaba are highly dependent on processing conditions. This study aimed to optimize the preparation conditions of lentil aquafaba in order to improve its functional properties, by simultaneously varying sonication time (X_1) and cooking time (X_2). A two-factor central composite design (CCD) was implemented, with three levels for each variable: 10, 20, and 30 minutes for X_1, and 40, 60, and 80 minutes for X_2. The response variables investigated included protein content, emulsion stability and emulsifying capacity, emulsifying activity index (EAI), emulsion stability (ES%), protein concentration, foaming capacity (FC%), foam stability (FS%), water holding capacity (WHC), and oil holding capacity (OHC).

Desirability-based optimization identified optimal conditions at a sonication time of 20.42 min and a cooking time of 62.52 min, with an overall desirability of 90.05%. Experimental validation under these conditions confirmed the model predictions. The emulsifying activity index (EAI) reached 143.26 m²/g (vs. 127.34 m²/g predicted), emulsion stability 74% (vs. 68.64%), and foaming capacity 193% (vs. 188.95%). Foam stability reached 150% at 30 min and 137% at 60 min, while protein content increased to 2.598 mg/mL (vs. 2.01 mg/mL predicted).

These findings demonstrate that the combination of moderate sonication and intermediate cooking time effectively enhances the functional properties of lentil aquafaba, particularly its emulsifying, foaming, and protein characteristics as confirmed by both predictive modeling and experimental validation. The optimized process highlights the potential of lentil aquafaba as a sustainable, plant-based functional ingredient for a wide range of food applications, while also promoting the valorization of pulse-processing by-products within a circular and eco-friendly food system.

KEYWORDS: *Aquafaba, Lentils, Central Composite Design, Sonication, Cooking Time*

POSTER N° : 23.

SCREENING OF LACTIC ACID BACTERIA FOR THE PRODUCTION OF ANTIFUNGAL, ANTIBACTERIAL, AND ANTIOXIDANT SUBSTANCES AND THE DEVELOPMENT OF NOVEL FUNCTIONAL AND PROBIOTIC PRODUCTS

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Abstract : Lactic acid bacteria (LAB) isolated from traditional fermented foods are promising sources of natural antimicrobial compounds. This study aimed to isolate and characterize LAB strains from Tunisian traditional fermented products and evaluate their antibacterial activity. Samples included fermented dairy products, vegetables, olives, pickles, sourdough, capers, and spices. A total of 60 presumptive LAB isolates were obtained and identified as Gram-positive and catalase-negative bacteria.

Antibacterial activity was evaluated using the agar well diffusion method against several foodborne pathogens, including Listeria monocytogenes, Escherichia coli, Staphylococcus aureus, Klebsiella spp., Pseudomonas spp., Salmonella spp., and Enterobacter spp. Inhibition zones ranged from 10 to 26 mm depending on the isolate and target strain. Several isolates exhibited broad-spectrum antibacterial activity against both Gram-positive and Gram-negative bacteria. The most active isolates were CAP1, CAP2, CH2, CH8, and FN3, with CAP2 showing the highest activity against Listeria monocytogenes (26 mm).

To investigate the nature of the inhibitory compounds, cell-free supernatants obtained from selected LAB isolates were subjected to pH neutralization (pH 7) and proteinase K treatment prior to antibacterial assays. The disappearance of antibacterial activity after neutralization suggested that the inhibitory effect was mainly associated with the production of organic acids, particularly lactic acid, resulting in medium acidification. Furthermore, the absence of significant changes after proteinase K treatment indicated that proteinaceous antimicrobial compounds were not significantly involved under the experimental conditions tested.

These findings demonstrate that Tunisian traditional fermented products constitute valuable reservoirs of LAB strains with promising applications in food biopreservation and probiotic development.

***Keywords** : Lactic acid bacteria, antimicrobial activity, organic acids, fermented products, probiotics*

POSTER N°: 24.

SONOPHOTOCATALYTIC TREATMENT OF METHYLENE BLUE IN AQUEOUS SOLUTION

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Abstract: Methylene blue (MB) is a non-biodegradable industrial dye that poses a potential threat to health and the environment. This study presents an investigation into the photocatalytic and sonochemical degradation of methylene blue using zinc oxide (ZnO) nanoparticles in the presence of hydrogen peroxide (H_2O_2). The synergistic combination of photocatalysis under UV-visible irradiation and sonolysis significantly increases the generation of hydroxyl radicals, which are primarily responsible for the rapid and complete degradation of the dye. ZnO nanoparticles, characterized by high specific surface area and good stability, play a crucial role in activating H_2O_2 and facilitating advanced oxidation reactions. The influence of operating parameters such as ZnO concentration, H_2O_2 dose, ultrasonic power and irradiation time was evaluated to optimize process efficiency. The results demonstrate decolorization rate exceeding of 95% in a short treatment time, confirming the potential of this sonophotocatalytic approach as an innovative, eco-friendly and cost effective solution for dye-contaminated industrial wastewater.

***Keywords**: dye; ZnO; H2O2;photosonocatalysis;*

POSTER N° : 25.

TRIGLYCERIDES GLUCOSE INDEX (TYG): A USEFUL INDICATOR OF INSULIN RESISTANCE IN TYPE 2 DIABETIC PATIENTS

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Bakground : Metabolic syndrome and obesity are associated with insulin resistance in type2 diabetic patients.
Objective : The aim of the study is to evaluate TyG index as a marker to diagnose metabolic syndrome in comparison to HOMA and QUICKI.
Subject and methods : It is a prospective study, which includes 205 type 2 diabetics (118 women, 87 men), age (55.56 ± 8.79 years). For all the patients we evaluated using a questionnaire their anthropometric data, in fasting venous blood their lipid profile, glycaemia, HbA1c, uric acid and insulin resistance by 3 indexes: HOMA, QUICKI and TyG. The ROC curve analysis was carried out to measure AUC (Aea Under Curve) for these parameters.
Results : The prevalence of metabolic syndrome according to IDF is 56.59%, with a predominance in women (66.3%). The estimated insulin resistance is 56.10% according to the HOMA index, 20% according to the QUICKI and 70.24% according to TyG. Comparison of the indexes showed a statistically significant difference ($p<0.001$). However, depending on the glycemic control, a significant difference was observed for the QUIKI index ($p=0.013$) and TyG ($p<0.001$).A negative and significant correlation was observed between the HOMA index and QUICKI ($r=-1.000$, $p<0.0001$), a significant correlation between HOMA and TyG ($r=0.384$, $p<0.0001$). For the ROC curve, the AUC was (0.696) for the TyG index, (0.639) for the HOMA followed by the QUIKI (0.361).

Conclusion : In our series, we observed that TyG index has the highest AUC in comparison to HOMA and QUICKI, it can be a better marker for diagnosing metabolic syndrome in type2 diabetic patients.

POSTER N° : 26.

INTERACTION BETWEEN METABOLIC SYNDROME, INSULIN RESISTANCE AND OXIDATIVE STRESS IN HYPERTENSIVE PATIENTS

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Abstract : Oxidative stress and endothelial dysfunction are observed in hypertensive subjects.
Objective : The aim of this study was to determine the prevalence of metabolic syndrome and insulin resistance in hypertensive patients, also to assess several parameters
of the antioxidant status among patients with MetS.
Material and methods : It is a prospective study, 245 hypertensive patients (57±8.49 years: women (79,60%)/ men (20,40%), 115 patients with MetS and 130 without MetS were examined for metabolic status in fasting blood, and for activities of superoxide dismutase (CuZnSOD), glutathione peroxidase(GPX), total antioxidant (TAS), oxidized LDL and antioxidant vitamins A, E. MetS was defined with the National Cholesterol Education Program Adult Treatment Panel III. Insulin resistance estimated by the HOMA-IR.
Results : The prevalence of metabolic syndrome in our series is 47.35%, 36.32% of patients are obese and the HOMA-IR reveals 46.53% of insulin resistance. Consideration of the presence or not of the MetS, a significant statistical difference was observed for IMC ($p=0.002$), waist circumference ($p<10^{-8}$), HOMA-IR ($p<10^{-5}$), adiponectin ($p = 0.007$), uric acid ($p=0.006$), oxidized LDL ($p = 0.003$), vitamin E ($p = 0.002$) and the alpha tocopherol index ($p <10^{-6}$). In the HTA group with MetS, there is a significant correlation between leptin and the parameters: TT (<0.0001), BMI (<0.0001), HDLc ($p = 0.004$) and TG ($p = 0.02$). For SOD with TT ($p = 0.04$), BMI ($p = 0.01$) and oxidized LDL ($p = 0.06$). For vitamin A with TG ($p = 0.02$), uric acid ($p = 0.001$) and PAS ($p = 0.02$). For vitamin E with PAS ($p = 0.06$), HOMA ($p = 0.04$), CRPus ($p = 0.03$) and alpha tocopherol ($p <0.0001$).

Conclusion : Our preliminary results implicated an increased oxidative stress in hypertensive patients with MetS and a decreased antioxidative defence that correlated with serum leptin and anthropometric biomarkers (BMI, waist circumference).

POSTER N° : 27.

BIOLOGICAL EVALUATION OF THE ANTIOXIDANT ACTIVITY OF A NOVEL BENZIMIDAZOLE DERIVATIVE AND ITS ZN(II) COMPLEX: *IN VITRO* AND MOLECULAR DOCKING APPROACHES

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Abstract: Benzimidazole-based compounds have attracted increasing interest due to their diverse biological and pharmacological properties, particularly their antioxidant potential. In the present study, a novel benzimidazole derivative, 2-(((1-methyl-1H-imidazol-2-yl)methyl)sulfanyl)methyl)-1H-benzo[d]imidazole (MIMTMB), and its Zn(II) complex were synthesized and biologically evaluated using *in vitro* and *in silico* approaches. The synthesized compounds were characterized by FT-IR, ^{1}H NMR, ^{13}C NMR spectroscopy, elemental analysis, and single-crystal X-ray diffraction. The antioxidant activity was investigated using the DPPH radical scavenging assay. The ligand MIMTMB exhibited significant antioxidant activity with a DPPH inhibition percentage of 44.80 ± 2.44%, whereas the Zn(II) complex showed lower activity (14.84 ± 1.60%). To better understand the molecular basis of the observed antioxidant activity, molecular docking studies were performed against cytochrome c peroxidase (CCP, PDB ID: 2X08) using AutoDock Vina. The docking results revealed favorable binding affinity of MIMTMB toward the active site of CCP with a binding energy of −5.7 kcal/mol. The ligand established hydrogen bonding and hydrophobic interactions with key amino acid residues involved in antioxidant mechanisms. In contrast, the Zn(II) complex exhibited weaker binding affinity and fewer stabilizing interactions. These findings highlight the promising antioxidant potential of the benzimidazole derivative and demonstrate the usefulness of combining experimental and molecular docking approaches for the biological evaluation of new bioactive compounds.

KEYWORDS: *Benzimidazole, oxidative stress, antioxidant activity, molecular docking, bioactive compounds.*

POSTER N° : 28.

PROTECTIVE ROLE OF SELENIUM AGAINST CADMIUM-INDUCED TOXICITY IN DATE PALM (*PHOENIX DACTYLIFERA*) SEEDLINGS

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Abstract:
This study investigated the role of selenium (Se) in modulating plant responses to cadmium (Cd) stress. The exposure of *Phoenix dactylifera* seedlings to 20 µM Cd inhibited biomass production, strongly increased accumulation of Cd in both roots and shoots. Similarly, Cd enhanced hydrogen peroxides content and lipid peroxidation as indicated by malondialdehyde accumulation. Pre-soaking seeds with Se (5, 10 and 20 µM) alleviated the negative effect of Cd on growth and led to a decrease in oxidative injuries caused by Cd. Furthermore, Se enhanced the activities of catalase, ascorbate peroxidase and glutathione reductase, but lowered that of superoxide dismutase and guaiacol peroxidase. The contents of key antioxidants, ascorbate and glutathione, were also significantly reduced in Cd-stressed leaves following Se treatment. The results suggest that the beneficial effects of Se during early growth stages may be attributed to the prevention of cumulative damage under Cd exposure, thereby alleviating oxidative stress associated with heavy metal toxicity.

Keywords : Selenium, Cd, *Phoenix dactylifera*, oxidative damages, antioxidants.
Abbreviations: Se, Selenium; H_2O_2, hydrogen peroxides; MDA, malondialdehyde; CAT, catalase; APX, ascorbate peroxidase; SOD, superoxide dismutase; GSH glutathione; POD guaiacol peroxidase.

POSTER N° : 29.

ANTINOCICEPTIVE AND PRO-RESOLVING ANTI-INFLAMMATORY ACTIVITY OF *SCENEDESMUS* SP. Ω-3 PUFA EXTRACT IN A MURINE GASTRIC ULCER MODEL

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Abstract: ***Scenedesmus*** sp. is a freshwater microalga exceptionally rich in ω-3 polyunsaturated fatty acids (PUFAs>45%), notably α-linolenic acid (ALA, 21%) and stearidonic acid (SDA, 4.4%), which bypasses the rate-limiting Δ6-desaturase step to produce EPA more efficiently. Using a validated murine ethanol-HCl acute gastric ulcer model, we evaluated the antinociceptive and cytokine-modulatory activity of a *Scenedesmus* sp. hydroethanolic extract (SCH) at three concentrations (AG 1/10, 1/30, 1/90) versus omeprazole (20 mg/kg). Behavioral nociception scoring and gastric RT-qPCR (TNF-α, IL-1β, IL-6, IL-10; $2^{-}\Delta\Delta Ct$ method) were performed after seven days of oral pre-treatment. At AG 1/10, the extract completely abolished visceral nociceptive agitation, equivalent to omeprazole. RT-qPCR revealed a coherent pro-resolving cytokine shift: significant downregulation of TNF-α, IL-1β, and IL-6, with concurrent IL-10 upregulation a molecular profile virtually superimposable on omeprazole, yet achieved through NF-κB suppression and specialized pro-resolving mediator generation, independently of acid secretion. Lower concentrations (1/30, 1/90) produced partial or no protection. These results identify *Scenedesmus* sp. ω-3 PUFAs as potent natural cytoprotective agents with translational potential for gastric inflammatory disorders.

Keywords: *Scenedesmus sp.; ω-3 PUFAs; gastric ulcer; nociception; RT-qPCR; pro-resolving mediators*

POSTER N° : 30.

RHEOLOGICAL AND EMULSIFYING PROPERTIES OF THE EXOPOLYSACCHARIDE PRODUCED BY *ERWINIA* SP. STN24

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Abstract

Exopolysaccharides (EPS) are recognized for their technological and functional applications across various industries due to their rheological, emulsifying, and physicochemical properties. As environmental awareness increases, more industries are seeking natural rheological and emulsion agents as alternatives to synthetic chemicals. In this study, the rheological properties and emulsifying behavior of a novel exopolysaccharide produced by *Erwinia* sp. STN24 were investigated. The EPS viscosity increased with concentration, and non-Newtonian shear-thinning behavior was observed for concentrations above 1 wt%. The elastic modulus (G') depended strongly on both concentration and frequency, exceeding the viscous modulus (G") at higher frequencies, revealing a predominantly elastic behavior. The EPS maintained its shear-thinning behavior and viscoelastic properties in the presence of NaCl and $CaCl_2$ and at temperatures up to 55 °C. The viscous and viscoelastic properties were recovered after heating (95 °C) and cooling (0 °C), indicating good thermal stability and recoverability. After exposure to high shear force, the solution recovered its original rheological properties within a few seconds, demonstrating self-healing properties. The produced EPS was used as a stabilizing agent for oil-in-water (O/W) emulsions of olive oil, caprylic oil, and liquid paraffin at different concentrations ranging from 1 to 8 wt% (w/w) polymer, with emulsification indexes higher than 90%, indicating a strong emulsion-stabilizing capacity. The emulsion stability and droplet size distribution were found to be significantly affected by the oil's chemical structure. These results suggest that the EPS produced by *Erwinia* sp. STN24 is highly promising for numerous industrial applications due to its high intrinsic viscosity and excellent stabilizing and emulsifying properties.

KEYS WORDS: *Exopolysaccharide, Rheological properties, Emulsifying behavior.*

POSTER N° : 31.

ELECTROCHEMICAL BIOSENSORS FOR THE DETECTION OF CIRCULATING MIRNAS IN MUSCLE-INVASIVE BLADDER CANCER: AN INNOVATIVE LIQUID BIOPSY APPROACH IN THE TUNISIAN CONTEXT

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** : equal contribution*

Abstract : The identification of reliable, accessible, and minimally invasive biomarkers is becoming increasingly important for improving cancer diagnosis and patient management, particularly in the context of precision oncology. Circulating microRNAs (miRNAs) have emerged as promising biomarkers in urothelial carcinoma, particularly in muscle-invasive bladder cancer (MIBC), owing to their stability in biological fluids and their diagnostic potential. However, conventional detection methods remain expensive and are not always adapted for routine clinical use in certain settings. This study investigates the use of electrochemical biosensors as a rapid and minimally invasive alternative for serum miRNA detection. Serum samples from patients with MIBC were analyzed and compared with non-tumoral controls. The system was based on an electrochemical biosensor using a competitive hybridization strategy between target miRNAs and biotinylated analogs. Specific probes immobilized on gold nanoparticle-modified electrodes enabled detection through an amperometric signal generated by a streptavidin–peroxidase enzymatic system. Signal variation was inversely correlated with target miRNA concentration. The analyses demonstrated significant modulation of the electrochemical signal in the presence of target miRNAs, validating the detection principle. Downregulation of miR-200a and upregulation of miR-200b were observed in patients with MIBC compared with controls, suggesting their involvement in tumor pathophysiology and their relevance as potential biomarkers. Electrochemical biosensors represent a promising approach for the detection of circulating miRNAs within a liquid biopsy framework. Their rapidity, simplicity, and potential cost-effectiveness make them particularly suitable for integration into healthcare systems with limited resources, such as Tunisia. These preliminary findings pave the way for larger-scale studies to confirm their diagnostic value and their integration into personalized medicine strategies.

Keywords: *Urinary Bladder Neoplasms; MicroRNAs; Biomarkers; Noninvasive Diagnostic Techniques; Liquid Biopsy, Precision Medicine; Gold Nanoparticles; Electrochemical Biosensors*

POSTER N° : 32.

ASSOCIATION OF GENETIC VARIANTS IN ESTROGEN RECEPTOR *ESR1* AND *ESR2* WITH SUSCEPTIBILITY TO RECURRENT PREGNANCY LOSS IN TUNISIAN WOMEN: A CASE CONTROL STUDY

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Abstract : Recurrent pregnancy loss (RPL) is a multifactorial reproductive disorder involving genetic, hormonal, and immunological mechanisms. Estrogen receptors, encoded by the *ESR1* and *ESR2* genes, are essential for endometrial receptivity, embryo implantation, and pregnancy maintenance. This case-control study aimed to evaluate the association between specific polymorphisms in these genes and susceptibility to idiopathic RPL in a Tunisian population.

A case-control study was conducted including women with a history of recurrent pregnancy loss and a control group with successful pregnancies. Genotyping was performed using real-time PCR for the following SNPs: *ESR1* rs2234693, *ESR1* rs3020314, and *ESR2* rs928554. Allele and genotype distributions were compared between groups to assess associations with RPL risk.

The results showed that *ESR1* rs2234693 was significantly associated with increased risk of RPL ($P < 0.05$). In contrast, no significant association was observed for *ESR1* rs3020314 and *ESR2* rs928554 ($P > 0.05$).

These findings suggest that genetic variation in *ESR1*, particularly rs2234693, may contribute to susceptibility to recurrent pregnancy loss in Tunisian women. *ESR1* polymorphisms could serve as potential genetic biomarkers for RPL risk assessment and highlight the role of estrogen signaling in pregnancy maintenance.

Key words: *RPL, ESR1, ESR2,genetic polymorphism, PCR-RFLP*

ANIMAL PHYSIOLOGY
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POSTER N° : 33.

HEDERA HELIX COMBINED WITH MICROBIOTA EXTRACT ATTENUATES BLEOMYCIN-INDUCED PULMONARY FIBROSIS IN RATS: EVIDENCE FROM MOLECULAR DOCKING, HISTOLOGY, IMMUNOHISTOCHEMISTRY, AND OXIDATIVE STRESS ANALYSIS

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Abstract: Pulmonary fibrosis (PF) is a progressive interstitial lung disease characterized by excessive extracellular matrix deposition with limited therapeutic options. The gut-lung axis has emerged as a key regulatory pathway in pulmonary pathophysiology. *Hedera helix*, with documented anti-inflammatory and antioxidant properties, and fecal microbiota transplantation represent promising complementary strategies. This study investigated the combined therapeutic potential of *H. helix* extract and fecal microbiota extract (FME) in a bleomycin (BLM)-induced rat model of PF.

PF was induced in male Wistar rats by intratracheal BLM instillation (2 mg/kg). Animals were assigned to five groups: control, BLM, BLM + *H. helix (100mg/kg)*, BLM + FME, and BLM + *H. helix* + FME (n=6/group), treated orally for 21 days. Molecular docking assessed binding affinity of α-hederin and hederacoside C against TGF-β1. Lung tissues underwent H&E and Masson's Trichrome staining to evaluate inflammation and collagen deposition. TGF-β1 expression was assessed by immunohistochemistry. Oxidative stress markers (SOD, CAT, GPx) were measured in lung homogenates.

Molecular docking revealed favorable binding energies of α-hederin and hederacoside C to TGF-β1. Combined treatment significantly reduced alveolar inflammation, collagen deposition, and architectural distortion compared to monotherapies. Immunohistochemistry confirmed marked TGF-β1 downregulation in the combination group. Antioxidant enzyme activities (SOD, CAT, GPx), depleted by bleomycin, were substantially restored following combined treatment.

The combination of *H. helix* extract and FME exerts synergistic antifibrotic, anti-inflammatory, and antioxidant effects in BLM-induced PF. These findings support a novel gut-lung axis-based therapeutic strategy, warranting further mechanistic and clinical investigations.

KEYWORDS: *Hedera helix; microbiota extract; pulmonary fibrosis; bleomycin; TGF-β; molecular docking*

POSTER N° : 34.

LC–MS CHARACTERIZATION OF PHENOLIC AND FLAVONOID COMPOUNDS IN *EOBANIA VERMICULATA* MUCUS AND THEIR CONTRIBUTION TO WOUND HEALING.

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Abstract

The aim of this study was to evaluate the biological efficiency of mucus extract of *Eobania vermiculata* snails for antioxidant and wound healing properties. LC-MS analysis revealed a total of 24 distinct molecules, which are classified as phenolic acids, flavonoids, and anthocyanins. The antioxidant activity of the mucus was found to be moderate, effectively scavenging DPPH free radicals and demonstrating reducing power. The efficacy of wound healing was evaluated by a combination of macroscopic, histological and biochemical analysis. Snail mucus treatment in rats resulted in a significant increase in the rate of wound closure. Additionally, histopathological and biochemical assessments indicated complete regeneration of the epidermis, along with enhancements in epidermal thickness and collagen density in the rats treated with mucus. Molecular docking studies suggested potential interactions between the constituents of the mucus and the binding sites of collagenase and fibroblasts. In conclusion, these results highlight the potential of *Eobania vermiculata* mucus as a valuable natural source for antioxidant and wound healing applications.

KEYWORDS: *Snail mucus, Polyphenols, Wound healing, antioxidant activity.*

POSTER N° : 35.

ANTIOXIDANT AND ANTI-NEURAL-APOPTOTIC POTENTIAL OF CRUDE POLYSACCHARIDES FROM THE COMMON FUMITORY PLANT: IN VITRO AND IN SILICO DOCKING APPROACHES

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Abstract: Synthetic pesticides have become a major public health concern due to their involvement in the development of metabolic disorders and damage to the nervous system. In response to these risks, plant-derived polysaccharides (FOP) have attracted increasing interest for their antioxidant and neuroprotective properties. This study aims to investigate the antioxidant and anti- neural-apoptotic of FOP in vitro and *in silico* approaches.
The optimal conditions of polysaccharides extraction yield determined as: temperature 95 °C, extraction time 2h50 min and ratio of water to raw material 40 mL. g^{-1} .In addition, crude FOP showed a strong antioxidant activity *in vitro*. Hence, *in silico* docking study have shown that FOP interact more strongly with the active site of caspase-3. The three molecules, glucose, ribose, and xylose, interact synergistically with a binding energy of approximately -4.4, -4.3, and -4.2 kcal/mol, respectively.
The results revealed significant antioxidant and anti-apoptotic activities of FOP and may be useful in the pharmaceutical and food industries with appreciable human health-promoting properties.

KEYWORDS: *Crude polysaccharides, antioxidant, apoptose, Fumitory, in vitro, in silico.*

POSTER N° : 36.

IMPACT OF COBALT CHLORIDE ON MEMBRANE LIPID ORGANIZATION AND INHIBITION OF NA^+/K^+-ATPASE IN *CYPRINUS CARPIO*

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Abstract: Changes in membrane lipid composition, both in terms of relative proportions and the different subclasses, were analyzed in the liver of juvenile common carp (*Cyprinus carpio*) exposed to various $CoCl_2$ concentrations, as well as their effects on Na^+/K^+-ATPase activity. Fish were randomly divided into four groups: group 1 served as control and T1, T2 and T3 were exposed to 25µg/L, 50µg/L and 100µg/L respectively, during 72h. A marked increase in hydrogen peroxide and lipid hydroperoxides was observed in all exposed livers. In the outer membrane, an increase in phospholipids particularly phosphatidylcholine and phosphatidylethanolamine and cholesterol was observed, accompanied by significant changes in polyunsaturated fatty acids, especially n-3 and n-6 PUFAs, including DHA, EPA, and ARA. In contrast, in the inner membrane, only phosphohistidine showed a significant decrease, with a composition distinct from that of the controls. These lipid disturbances affected Na^+/K^+-ATPase activity. However, the addition of Mg^{2+} restored this activity in the treated fish. The increased activity of this pump appears to be associated with specific interactions between phospholipids and proteins, contributing to optimal adjustment of membrane fluidity and integrity. Overall, these results highlight the selective toxicity of $CoCl_2$ towards phospholipids and cholesterol, as well as its effects on the stability and function of Na^+/K^+-ATPase, leading to disruption of ionic homeostasis within liver cells.

Keywords: *freshwater fish; liver tissue; membrane bilayer; protein pump activity; reactive oxygen species generation.*

POSTER N° : 37.

PROTECTIVE ROLE OF SELENIUM AGAINST PRENATAL PYRETHROID-INDUCED HEPATIC AND RENAL TOXICITY IN WISTAR RAT OFFSPRING

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Abstract : Pyrethroids, such as allethrin and deltamethrin, are widely used insecticides in agriculture and public health, and their toxic effects on hepatic and renal functions, as well as oxidative stress, are well documented. However, the consequences of *in utero* exposure on tissue dysregulation in offspring remain insufficiently investigated. Owing to its antioxidant properties, selenium may attenuate the alterations induced by these pesticides.

This study evaluated the prenatal impact of two pyrethroids, deltamethrin and allethrin, on renal and hepatic health in Wistar rat offspring, as well as the potential protective role of maternal selenium supplementation. The results showed that *in utero* exposure to deltamethrin induced significant nephrotoxicity characterized by reduced relative kidney weight, elevated plasma biomarkers (creatinine, urea, and uric acid), increased oxidative stress (elevated MDA levels and decreased GSH and CAT activities), and notable renal histopathological alterations, including tubular dilation, leukocyte infiltration, and cellular vacuolization.

Similarly, prenatal exposure to allethrin induced significant hepatotoxicity, characterized by disruption of the lipid profile, antioxidant imbalance with decreased GSH and CAT activities, and a marked reduction in body and liver weights, indicating metabolic impairment and hepatic oxidative stress. Furthermore, biochemical analyses revealed a significant increase in serum hepatic enzymes, including ALAT, ASAT, and alkaline phosphatase (ALP), reflecting hepatocellular damage, as well as elevated total bilirubin levels, indicating impaired liver function and possible disruption of hepatobiliary excretion pathways. Altogether, these findings confirm that allethrin induces hepatocellular injury, impairs hepatocyte membrane integrity, and causes hepatic metabolic dysfunction in offspring exposed during fetal development.

Prenatal selenium supplementation demonstrated a marked protective effect by significantly reducing biomarkers of renal and hepatic toxicity, attenuating lipid peroxidation, partially restoring endogenous antioxidant defenses (GSH and CAT), improving renal histological architecture, and normalizing hepatic parameters, including transaminases, ALP, bilirubin levels, lipid profile, and body mass. This study highlights the vulnerability of the kidney and liver to prenatal toxic stress induced by pyrethroids, demonstrating that deltamethrin exerts nephrotoxic effects, whereas allethrin causes severe hepatotoxicity associated with enzymatic and metabolic liver dysfunction. It also confirms selenium's potential as a powerful protective agent that can modulate oxidative stress and preserve the structural and functional integrity of vital organs. These findings offer promising perspectives for developing nutritional and pharmacological preventive strategies to reduce developmental risks associated with gestational pesticide exposure.

Keywords: *deltamethrin, allethrin, nephrotoxicity, hepatotoxicity, prenatal exposure, selenium, oxidative stress.*

POSTER N° : 38.

THERAPEUTIC EFFECT OF QUERCETIN ON OXIDATIVE STRESS AND OVARIECTOMY-INDUCED HEPATO-RENAL ALTERATIONS IN RATS

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Quercetin (Qn) is a polyphenolic flavonoid widely found in fruits and vegetables and is recognized for its potent antioxidant, anti-inflammatory, antimicrobial, and anticancer properties. In postmenopausal women, characterized by estrogen deficiency, quercetin has demonstrated a notable protective effect against cellular alterations. The present study aimed to evaluate the therapeutic effect of quercetin on ovariectomy-induced hepatic and renal alterations in rats by assessing body weight gain, relative liver and kidney weights, liver enzyme activities (AST and ALT), and tissue oxidative stress biomarkers including malondialdehyde (MDA), catalase (CAT), superoxide dismutase (SOD), and hydrogen peroxide (H_2O_2).

Our results showed that intraperitoneal (i.p.) administration of quercetin at doses of 5 and 10 mg/kg body weight (BW) for 15 days significantly reduced weight gain ($p < 0.05$) compared with ovariectomized (OVX) rats. Body weight progression was 14.4% and 7.6% in the groups treated with 5 and 10 mg/kg Qn, respectively, compared with 23.2% in untreated OVX rats and 11% in control animals. Furthermore, quercetin induced a significant dose-dependent decrease ($p < 0.01$) in relative liver weight (8.2% and 9.3%) and kidney weight (4.9% and 11.7%) at doses of 5 and 10 mg/kg, respectively, compared with OVX rats. MDA levels significantly increased ($p < 0.001$) by 166.8% in the liver and 73.8% in the kidney of OVX rats compared with controls. Following 15 days of quercetin treatment, a significant dose-dependent reduction in MDA levels was observed. This decrease reached 48.1% and 51.1% in the liver and 26.9% and 43.7% in the kidney at doses of 5 and 10 mg/kg, respectively, compared with OVX rats. SOD activity showed a significant reduction in OVX rats (26% in the liver and 30.3% in the kidney) compared with controls. However, treatment with quercetin for 15 days significantly increased SOD activity, reaching 19.4% in the liver and 27.2% in the kidney at the higher dose compared with OVX rats.Similarly, hepatic CAT activity significantly increased by 20.2% and 60% at doses of 5 and 10 mg/kg, respectively, in treated rats compared with untreated OVX rats. H_2O_2 levels significantly increased ($p < 0.001$) by 39.5% in the liver and 56.3% in the kidney of OVX rats compared with controls. Quercetin treatment induced a significant dose-dependent reduction ($p < 0.01$), decreasing H_2O_2 levels by 9.5% and 17.5% in the liver and by 9.2% and 26.4% in the kidney at doses of 5 and 10 mg/kg, respectively. Finally, AST and ALT activities significantly increased ($p < 0.001$) in OVX rats compared with controls. Quercetin treatment significantly reduced AST levels by 21.5% and 36.2% and ALT levels by 17.4% and 23.5% at doses of 5 and 10 mg/kg, respectively, compared with OVX rats. These findings suggest that quercetin exhibits promising therapeutic potential against oxidative stress and ovariectomy-induced hepatorenal damage.

KEYWORDS: *Quercetin; Ovariectomized rats; Oxidative stress, Hepatic and renal injury*

POSTER N° : 39.

FROM BIO-INVASION TO BIO-RESOURCE: ASSESSMENT OF THE HEALTH-PROMOTING FATTY ACIDS IN THE TUNISIAN *BRACHIDONTES PHARAONIS*

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Abstract: The invasive mussel *Brachidontes pharaonis* has progressively colonized the Tunisian coastline, presenting both ecological challenges and opportunities for bio-resource valorization. This study aims to evaluate the nutritional quality of this species by analyzing its biochemical composition, with a specific focus on lipid content and fatty acid profiles. Specimens were sampled in winter 2025 from northern Tunisian sites including Radès, Hammam Chatt, and Menzel Bourguiba. Total lipids were extracted using the Folch method, while fatty acid methyl esters (FAMEs) were analyzed by gas chromatography.

The results revealed significant spatial variations in biochemical composition among sampling sites. Mussels collected from Radès exhibited the highest lipid and protein contents, associated with a favorable nutritional profile rich in polyunsaturated fatty acids (PUFAs), particularly omega-3 fatty acids. In contrast, specimens from Hammam Chatt showed higher proportions of omega-6 fatty acids. Saturated fatty acids (SFAs), monounsaturated fatty acids (MUFAs), and PUFAs constituted the major lipid classes identified in all samples, with palmitic acid (C16:0), oleic acid (C18:1n-9), eicosapentaenoic acid (EPA, C20:5n-3), and docosahexaenoic acid (DHA, C22:6n-3) being among the dominant fatty acids detected.

Nutritional lipid indices, including the atherogenicity index (AI), thrombogenicity index (TI), and the n-3/n-6 PUFA ratio, indicated a potentially beneficial nutritional value for human consumption, particularly for specimens from Menzel Bourguiba, which exhibited lower AI and TI values. These findings suggest that *Brachidontes pharaonis* could represent a valuable alternative marine bioresource despite its invasive status.

***KEYWORDS*:** *Brachidontes pharaonis*, Invasive species, Fatty acids, Nutritional value.

POSTER N° : 40.

CHRONIC PROLONGED LIGHTING INDUCES HISTOLOGICAL CHANGES IN THE ADRENAL ZONA FASCICULATA AND MEDULLA OF A DESERT-DWELLING RODENT

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Abstract: The effects of chronic exposure to prolonged lighting, used as a model of stress, on the histological organization of the adrenal zona fasciculata (ZF) and medulla (M) were examined in the nocturnal desert rodent *Gerbillus tarabuli*.

The animals were divided into two groups of 10 gerbils each. The control group was kept under a 12 : 12 h light-dark cycle. The stressed group was exposed to a disrupted light-dark cycle consisting of alternating periods of a normal 24-hour cycle and a modified cycle with a 20-hour light phase every other day for three months. At the end of experimental period, animals were sacrified, and the adrenal glands were collected and processed for histological and morphometric analyses.

In the stressed group, the zona fasciculata showed a more compact organization with narrower cells, lighter cytoplasm, eccentric nuclei, increased lipid inclusions, and dilated sinusoidal spaces. Morphometric analysis revealed a significant increase in ZF thickness (60%; $P<0.01$), while cell diameter, cell area, and nuclear area showed slight non-significant decreases (-4%, -5%, and -6%, respectively; $P>0.05$) compared to controls. In parallel, the adrenal medulla showed condensed chromaffin cells with large vesicular nuclei, heterogeneity in nuclear size, shape, and density, microvacuolated cytoplasm, and congested blood vessels. Morphometric analysis revealed significant reductions in medullary length and area (-14% and -36%, respectively; $P<0.001$). In contrast, medullary cell diameter, cell area, and nuclear area significantly increased (22%, 36%, and 53%, respectively; $P<0.001$) compared to the control group.

These findings suggest that prolonged exposure of nocturnal gerbils to chronic light stress alters the histological organization of the adrenal zona fasciculata and medulla, highlighting *Gerbillus tarabuli* as a valuable model for studying the effects of artificial light at night exposure.

KEYWORDS: light stress, nocturnal gerbil, zona fasciculata, medulla, histology, morphometry

POSTER N° : 41.

HYPOGLYCEMIC ACTIVITY OF *DIOSPYROS KAKI* IN ALLOXAN INDUCED DIABETIC RATS

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Abstract: The present study aims to investigate the protective effects of *Diospyros kaki* leaf aqueous extract (DKLAE) against alloxan-induced diabetes and oxidative stress in rats.The animals were divided into five groups: Control (C); Diabetic Control (DC); Diabetic + DKLAE (200mg /kg, p.o.), Diabetic + DKLAE (400mg /kg, p.o.), Diabetic + Glibenclamide (10 mg /kg, p.o.) The use of GC/MS technique has allowed us to identify nine compounds in DKLAE. We have found that alloxan administration induced hyperglycaemia, lipid metabolic parameters deregulation as well as liver and kidney dysfunctions. Alloxan administration has also induced an oxidative stress status as assessed by malondialdehyde (MDA) content increase, thiol groups (−SH) level decrease and antioxidant enzyme activities depletion such as catalase (CAT), total superoxide dismutase (SOD), Cu/Zn-SOD, Mn-SOD and Fe-SOD in both liver and kidney tissues. More importantly subacute (15 days) DKLAE administration has significantly corrected all biochemical alterations induced by alloxan intoxication. We propose that *Diospyros kaki aquous extract* exhibit protective effects in alloxan-induced hyperglycaemia as well as protecting against liver and kidney oxidative stress in rats, reflecting its antioxidant properties.

KEYWORDS: *Diospyros kaki; glucose; absorption; diabetes; rat*

POSTER N° : 42.

EFFECTS OF *HERNIARIA HIRSUTA* L. EXTRACT ON EXPERIMENTAL UROLITHIASIS IN WISTAR RATS

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Abstract: Urolithiasis is a prevalent urological disorder that contributes significantly to global morbidity. This study aimed to assess the anti-urolithic effects of Herniaria hirsuta hydroalcoholic extract (HHE) against ethylene glycol (EG) and ammonium chloride (AC)-induced experimental urolithiasis in rats. Rats were divided into five groups : group 1 served as the normal control, group 2 received 0.75% v/v EG for 28 days along with 1% w/v AC for the first 14 days to induce urolithiasis, groups 3, 4 and 5 were administered with EG and co-treated from day 14 to day 28 with Cystone tablet (750 mg/kg) and HHE at 250 or 500 mg/kg respectively. Urolithiasis rats exhibited a significant increase in serum levels of creatinine, uric acid and urea, whereas renal superoxide dismutase (SOD) and catalase (CAT) activities decreased, while H2O2 and malondialdehyde (MDA) levels increased in the kidney as compared to normal control group, indicating oxidative stress. However, treatment with either HHE, or Cystone, normalized serum parameters. Moreover, following treatment with HHE (500 mg/kg), an increase in CAT activity, and a significant decrease in MDA and H_2O_2 levels were recorded compared to the EG/AC group. It can be inferred that Herniaria hirsuta extract demonstrated protective effect against ethylene glycol-induced urolithiasis due to its potent antioxidant activity.

KEYWORDS: *Urolithiasis; Herniaria hirsuta; oxidative stress; kidney; liver, rat.*

POSTER N° : 43.

GENETIC AND MORPHOLOGICAL DISCORDANCE AMONG *BUTHUS* SPECIES COMPLEX (SCORPIONES) FROM TUNISIA WITH THE IDENTIFICATION OF A NEW SPECIES

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Abstract: The taxonomy of the scorpion genus *Buthus* is complicated because of the significant rise in newly discovered species, their high degree of resemblance, and, as a result, the difficulty of differentiating them morphologically. Tunisian species are not exempt from this issue, with several references highlighting the need for taxonomic revisions. In order to investigate the *Buthus* diversity in Tunisia and to provide morphological details that facilitate species identification, this study combines DNA sequence data and morphological assessments. According to the results, the majority of Tunisian specimens are distributed within two clades. One clade comprises four subclades corresponding to *B. tunetanus* Herbst, 1800, *B. paris* C. L. Koch, 1839, *B. chambiensis* Kovařik 2006 and a southern group that most likely corresponds to *B. lourencoi* Rossi, Tropea & Yağmur, 2013. There is no indication of *B. dunlopi* Kovařik 2006 in the examined samples. The second clade represents a new species identified in this study as *B. saidnouirai* Hajri, Bahri & Harris, *sp. nov*. The minimal divergence thresholds for *Buthus* species are exceeded by the distances between all five species. The southern group and *B. saidnouirai. sp. nov.* were found to be the furthest distant, while *B. tunetanus* and *B. paris* were the closest. The morphological evaluation did not disclose the same pattern, despite the genetic differences showing significant divergence of the new group from the four remaining species. These five species show a morphological shape gradient where *B. cf. lourencoi* and *B. paris* represent the two extremes, with the latter being the most ornamented and *B. cf. lourencoi* the least. The new species presents an intermediate morphology. This work discusses the geographic distributions of the five species that have been recorded in relation to the topography and orography of the region

KEYWORDS: *molecular taxonomy, morphology, Buthus, gradient*

POSTER N° : 44.

BEHAVIORAL AND CHOLINERGIC BENEFITS OF ATRIPLEX HALIMUS EXTRACT IN HIGH-CALORIE DIET-FED RATS: IN VIVO AND IN SILICO APPROACH

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Abstract: High-calorie diet (HCD)-induced obesity is closely linked to anxiogenic-like behaviors and cholinergic dysfunction. This study investigates whether the aqueous extract of *Atriplex halimus* (AH) can alleviate HCD-induced anxiety-like behaviors and modulate cholinesterase activity. Male Wistar rats were fed an HCD for 6 weeks, and then treated with saline or AH. Anxiety-like behavior was evaluated using the open field test, elevated plus maze, and light/dark choice test. Acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) activities were measured in vivo. Molecular docking was performed to explore the binding affinity of AH phytoconstituents to both enzymes. HCD-fed rats exhibited marked anxiety-like behavior alongside altered cholinesterase activity. AH treatment significantly improved behavioral outcomes and restored AChE and BChE activities. Molecular docking confirmed strong interactions between AH compounds and both enzymes. AH displays notable anxiolytic properties and effectively modulates cholinesterase activity in HCD-induced obesity.

KEYWORDS: *Atriplex halimus; High-calorie diet; Anxiety-like behavior ; Acetylcholinesterase*

POSTER N° : 45.

SYMPATRIC *IXODES INOPINATUS* AND *IXODES RICINUS* FROM NORTHWESTERN TUNISIA ARE ASSOCIATED WITH SIMILAR PATHOGENS AND ENDOSYMBIONTS

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Abstract: *Ixodes inopinatus* occurs sympatrically with the closely related *Ixodes ricinus* in Northwestern Tunisia. *Ixodes inopinatus* and *I. ricinus* are morphologically different, and we postulate that their behavior is different too, resulting in differences in infection prevalence of tick-borne pathogens and endosymbionts. Ticks were collected by flagging the vegetation during March 2023 from the forest of Jouza-Amdoun and Sejnane. Ticks were morphologically identified and screened molecularly for pathogens and endosymbionts. Only adult *I. inopinatus* (N= 40) and *I. ricinus* (N=183) from Northwestern Tunisia were found. The pathogen prevalence in respectively *I. inopinatus* and *I. ricinus* were as follows: *Borrelia lusitaniae* (12.5% vs 8.7%); *Rickettsia helvetica* (22.5% vs 21.8%); *Rickettsia monacensis* (12.5% vs 8.7%); *Rickettsiella spp.* (7.5% vs 6.5%); *Babesia microti* (0% vs 2.7%); *Babesia spp*. (0 % vs 0.5%) and *Midichloria mitochondrii* (35% vs 37.1%). Both tick species were negative for *Borrelia miyamotoi, Anaplasma phagocytophilum, Spiroplasma ixodetis, Neoehrlichia mikurensis*, and *Ixodiphagus hookeri* DNA. No significant differences in pathogen prevalence were observed between both species. Despite their morphological differences, strong similarities concerning pathogens and symbionts associated with *I. inopinatus* and *I. ricinus* from Tunisia are observed. This indicates comparable vector capacity in *I. inopinatus* and *I. ricinus*, possibly indicating that these taxa are sublineages of the same species.

KEYWORDS: *Ixodes inopinatus, Ixodes ricinus, sympatry, Tunisia, similarity, pathogens, endosymbionts, parasitoid,*

POSTER N° : 46.

CELLULAR AND ACELLULAR ANTIOXIDANT POTENTIALS OF *ZIZIPHUS SPINA-CHRISTI* USING MULTIPLE SOLVENT OF EXTRACTION

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Abstract: *Ziziphus spina-christi* is a medicinal plant widely used in traditional medicine to alleviate various diseases related to oxidative stress. However, it's in vitro applications to alleviate and mitigate the overproduction of pro-oxidant markers remain underexplored. The aim of this study was to evaluate the antioxidant and anti-inflammatory potentials of the proposed plant *in vitro* using human enterocyte cells, as well as different acellular approaches involving scavenging of acellular free radicals and chelation of ferrous iron. These assays were specifically employed to select the optimal extraction solvent for *Ziziphus spina-christi*.

All extraction procedures were performed by maceration (24 h at room temperature) followed by sonication (40 kHz, 30 min) using various solvents including pure water, ethanol, or methanol (1:20 w/v ratio). Yields were determined, total phenolic contents were examined using the Folin-Ciocalteu method. Total flavonoids were assessed based on the $AlCl_3$ method. Antioxidant activities were evaluated by ABTS and DPPH acellular tests. *In cellulo*, studies were performed using the NCM460 cells (human enterocytes, ATCC) to evaluate the cytotoxicity of those extracts using the Alamar Blue technique. Anti-inflammatory efficacies of those extracts were tested against LPS and H_2O_2-induced oxidative stress.

Results from yield extraction demonstrate that methanolic extract present the highest yield than the other solvents used which correlated with its high content of polyphenols and condensed tannins. However, the aqueous extract which present the lowest yield of extraction is marked by its richness with flavonoids. Using the ABTS and DPPH methods, we demonstrate that all extracts present a notable antioxidant potontials, justifying their *in vitro* roles in protecting NCM460 cells line against from oxidative stress provoked by LPS and H_2O_2. Those *in vitro* characteristics present the *Ziziphus spina-christi* as a valuable approach for *in vivo* application, specifically in treating inflammation and limiting the over-production of free radicals.

KEYWORDS: *Ziziphus spina-christi; free radicals; NCM460 cells; inflammation; oxidative stress*

POSTER N° : 47.

IN VIVO AND *IN VITRO* EVALUATION OF THE NEPHROPROTECTIVE ACTIVITY OF THE HYDROETHANOLIC EXTRACT OF *SOLANUM ELAEAGNIFOLIUM* IN A MODEL OF ETHYLENE GLYCOL-INDUCED NEPHROLITHIASIS.

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Abstract : Nephrolithiasis, a multifactorial and recurrent urological condition, affects 4 to 20% of the world population depending on the region. Faced with the limits and adverse effects of conventional treatments, phytotherapeutic approaches are generating considerable interest. This study evaluates the nephroprotective and antioxidant properties of the hydroethanolic extract of *Solanum elaeagnifolium* (Se), an invasive plant species, on a model of oxalocalcium nephrolithiasis induced in rats by ethylene glycol (0.75%). The qualitative and quantitative phytochemical analysis reveals a richness in total phenolic compounds (42.1 mg EAG/g MS), flavonoids (22 mg EQ/g MS) and condensed tannins (19 mg EC/g MS), conferring strong reducing power and antiradical activity in vitro. These antioxidant potentials are confirmed in vivo by the increase of enzymatic activities: superoxide dismutase (SOD: 9.21 U/mg protein), catalase (CAT: 8.89 IU/mg protein) and glutathione peroxidase (GPx: 1.22 µmol/mg protein/min), restoring renal oxidative balance. Histopathological analyses show, in untreated lithium rats, tubular obstruction by calcium oxalate crystals (C.Eg), tubular dilation, epithelial alteration, and a decrease in glomerular filtration rate, leading to a decrease in creatinine clearance and plasma accumulation of urea and creatinine. Treatment with extract significantly improves diuresis, corrects crystalluria, restores urinary parameters and reduces serum biomarkers: uric acid (4.10 mg/dL), urea (7.45 mg/dL) and creatinine (3.37 mmol/L).
Key words: *Solanum elaeagnifolium*, renal lithiasis, ethylene glycol

POSTER N° : 48.

ANTIFIBROTIC AND ANTIOXIDANT EFFECTS OF *LAVANDULA STOECHAS* EXTRACT IN EXPERIMENTAL PULMONARY FIBROSIS; AN IN VIVO AND IN VITRO STUDY

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Abstract: Pulmonary fibrosis is the most frequent and severe interstitial pneumonia. It's a chronic and progressive disease with limited therapeutic options. A pathological characteric of PF is excessive accumulation of extracellular matrix leads to profound alteration of lung architecture and ultimately, respiratory failure. *Lavandula stoechas* is a medicinal plant widely found in the Mediterranean region, known for its anti-inflammatory and antioxidant properties.
The study aim to evaluate the effect of the aqueous extract of lavandula stoechas (AE LV) on pulmonary fibrosis *in vivo* and *in vitro* combined with a phytochemical characterization of the plant.
In vitro MRC5 and A549 cells were stimulated with TGFB (10 ng/kg) and then treated with different concentration of AE LV (0.1, 10 and 100 ug/kg). The expression of fibrogenic genes (TGF-Beta, Fibronectin and collagen) was assessed by RTqPCR. *In vivo*, PF was induced by intratracheal installation of bleomycin (2 mg/kg) in wistar rats, divided into five experimental groups (control, BLM, BLM+ AE LV (100 mg/kg) and BLM+ AE LV (200 mg/kg)). Histopathological analyses (H&E and Masson's trichrome) as well as the assessment of oxidative stress (SOD, CAT, GPX, and MDA) were performed on lung tissues.
The results showed that treatment with aqueous extract induced a significant improvement in the parameters studied with restoration of antioxidant enzyme activity, a decrease in OS, and reduction in the fibrosis score. Furthermore, a marked attenuation of the expression of fibrogenic genes was observed in vitro, suggesting a potential antifibrotic effect of *lavandula stoechas*.
Keywords: *LAVANDULA stoechas*, bleomycin, pulmonary fibrosis TGF-Beta, MRC5, A459

POSTER N° : 49.

PROTECTIVE EFFECTS OF *OPUNTIA FICUS-INDICA (L.) MILL* FLOWER EXTRACT AGAINST ETHYLENE GLYCOL–INDUCED UROLITHIASIS AND HEPATORENAL DAMAGE IN RATS

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Abstract : This study investigated the protective effects of *Opuntia ficus-indica* flower extract against ethylene glycol- and ammonium chloride-induced urolithiasis and associated hepatorenal alterations in rats through both *in vitro* and *in vivo* approaches. *In vitro* analyses revealed significant antioxidant activity associated with high contents of polyphenols, flavonoids, and tannins. *In vivo*, hyperoxaluria was induced by administration of 0.75% ethylene glycol and 2% ammonium chloride for 28 days. Urolithiatic rats exhibited significant increases in serum urea, uric acid, creatinine, ALT and AST levels, indicating renal and hepatic dysfunction. Histopathological examination revealed renal tubular dilation, crystal deposition, glomerular edema, and inflammatory infiltration, associated with hepatic hemorrhagic lesions. Treatment with *O. ficus-indica* flower extract (250 and 500 mg/kg) markedly improved biochemical parameters and attenuated renal and hepatic histological alterations, with effects comparable to Cystone. These findings support the nephroprotective and hepatoprotective potential of *O. ficus-indica* flower extract in experimental urolithiasis.

KEYWORDS: *Opuntia ficus-indica (L.) MILL*; Urolithiasis; Hyperoxaluria; Antioxidant activity; Nephroprotective effect; Hepatoprotective effect; Histopathology.

POSTER N° : 50.

MORPHOLOGICAL VARIATION OF THE GOBIID SPECIES *ZOSTERISESSOR OPHIOCEPHALUS* (PERCIFORMES: GOBIIDAE) FROM THE TUNISIAN COAST

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Abstract*:* *Zosterisessor ophiocephalus* is a common gobiid species inhabiting marine and lagoon ecosystems along the Tunisian coast. As a benthic species with low dispersal ability and a strong association with shallow coastal habitats, it represents an excellent biological model for investigating phenotypic variation and local adaptation processes. Its wide distribution along contrasting environmental gradients may promote adaptive morphological variation among populations. The present study aimed to investigate the morphological variation of body shape and otolith contours among Tunisian populations of this species. A total of 181 specimens were collected from six coastal localities distributed between northern and southern Tunisia: Ghar El Melah Lagoon, Northern Lagoon of Tunis, Sfax, Zarzis, Kerkennah Islands, and Boughrara Lagoon. Body shape variation and otolith contour shape were analysed using geometric approaches (Procrustes and Elliptic Fourier Analyses). Multivariate statistical analyses (CVA) were carried out using R version 4.4.1. Body shape results revealed a clear morphological discrimination between northern and southern samples. Deformation grids highlighted important shape differences along the main discriminant axis: north-eastern specimens exhibited a more compressed head, a horizontally elongated trunk, and more separated dorsal fins, whereas south-eastern individuals showed a more elongated head, a narrower caudal peduncle, and a greater vertical development of the trunk region. Otolith contour analyses also discriminated samples according to geographic areas, confirming the existence of significant phenotypic structuring. These morphological differences may reflect the influence of local environmental conditions and habitat heterogeneity along the Tunisian coast. This study provides new insights into the phenotypic adaptive variation of Tunisian populations of *Zosterisessor ophiocephalus.*

KEYWORDS: *Zosterisessor ophiocephalus, body shape, otoliths, adaptation, Tunisian coast.*

PLANT PHYSIOLOGY
BIOLOGY AND ECOLOGY

POSTER N° : 51.

DEVELOPMENT OF A ROOM-TEMPERATURE-STABLE SAVORY MOONCAKE FILLING

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Abstract: The aim of this study was to develop a savory mooncake filling stable at room temperature through the partial substitution of eggs using plant-based proteins, hydrocolloids, emulsifiers, and sweeteners. Initially, the physicochemical characterization of the raw materials was performed, focusing on moisture content and water activity (aw), which are critical parameters affecting product stability and shelf life. The results revealed that the commercial egg replacer (CER) exhibited the lowest water activity value (0.368), whereas sorbitol showed the highest water activity and moisture content, with values of 0.749 and 29.91%, respectively.

To achieve partial egg substitution, a mixture design consisting of 13 experimental formulations was carried out using three variables: X1 (commercial egg replacer + water), X2 (sorbitol), and X3 (a mixture of modified starch and monoglycerides). The influence of these formulation variables on batter viscosity, firmness, cohesiveness, and adhesiveness was evaluated. The mathematical model demonstrated that the incorporation of the commercial egg replacer significantly increased batter viscosity, likely due to its high content of plant proteins and hydrocolloids with strong water-holding capacity. Sorbitol acted as a humectant, retaining moisture and maintaining a softer texture, thereby reducing excessive firmness and improving cohesiveness. Modified starch contributed to increased firmness through water absorption and swelling, while monoglycerides enhanced structural uniformity and adhesiveness by stabilizing the emulsion system.

The physicochemical properties of the control sample (mooncake filling prepared with eggs) were used as a reference to optimize a new formulation with improved quality attributes. Significant differences were observed between the control and optimized formulations in terms of physicochemical characteristics. Furthermore, storage stability studies indicated that the optimized formulation exhibited superior stability regarding firmness, cohesiveness, and adhesiveness compared to the control sample. Sensory evaluation through a hedonic test showed that the optimized formulation was the most appreciated by panelists, confirming the feasibility of partially replacing eggs in savory mooncake filling while maintaining product quality and stability.

KEYWORDS: *savory filling; egg substitution; mixture design; plant-based protein; hydrocolloids; emulsifiers; sweeteners.*

POSTER N° : 52.

MYCO-SYNTHESIZED ZNO NANOPARTICLES ENHANCE FABA BEAN GERMINATION IN A CONCENTRATION-AND EXPOSURE-DEPENDENT MANNER

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Green-synthesized nanoparticles have emerged as promising nanobiostimulants for sustainable agriculture due to their potential to enhance seed germination and early plant development.

In the present study, zinc oxide nanoparticles (ZnO-NPs) were biosynthesized using *Fusarium oxysporum* biomass and zinc sulfate heptahydrate ($ZnSO_4 \cdot 7H_2O$) as precursor, and their effects on faba bean seed germination were evaluated under different exposure strategies. Five experimental groups were investigated: untreated control, hydro-primed seeds, nano-primed seeds, continuous exposure, and full exposure treatments. ZnO-NPs were tested at six concentrations (10, 25, 50, 100, 200, and 500 ppm). Each treatment consisted of three biological replicates containing seven seeds each. Germination kinetics were monitored by daily assessment of germinated seeds throughout the experimental period.

The results demonstrated that ZnO-NP treatments significantly influenced germination responses depending on both concentration and exposure mode. Among all treatments, nano- priming at 100 ppm exhibited the strongest stimulatory effect on seed germination, suggesting enhanced metabolic activation during the imbibition phase. In contrast, the most favorable outcomes under continuous nanoparticle presence were observed in full exposure treatments at 10 and 25 ppm, indicating that low ZnO-NP concentrations may promote early seedling establishment while higher concentrations could induce inhibitory effects. Overall, the findings highlight the importance of exposure strategy and nanoparticle dosage in determining the biological response of seeds to ZnO-NPs. This study supports the potential application of biologically synthesized ZnO nanoparticles as eco-friendly nanopriming agents for improving seed germination and early vigor in legumes.

Keywords: *Green-synthesized ZnO nanoparticles, Fusarium oxysporum, Faba bean, Seed Nano-priming, Germination kinetics*

POSTER N° : 53.

SEED PRIMING OR EXOGENOUS APPLICATION WITH SALICYLIC ACID AND HYDROGEN PEROXIDE IMPROVES PLANT GROWTH OF LENTIL (*LENS CULINARIS*) UNDER SALT STRESS

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Soil salinity severely restricts lentil (*Lens culinaris*) productivity worldwide by impairing physiological and biochemical processes. This study evaluates and compares the potential of salicylic acid (SA) and hydrogen peroxide (H_2O_2) to mitigate the detrimental effects of salt stress using two different application methods. Lentil seedlings subjected to 75 mM NaCl salt stress were treated with 0.1 mM SA or 0.1 mM H_2O_2. The treatments were applied either through seed pretreatment (priming) or exogenously via the rooting medium. Growth parameters, photosynthetic pigments, gas exchange attributes, ionic balance, and oxidative stress indicators were monitored. Salt stress severely reduced shoot and root dry weights (DW) by 39.01% and 42.81%, respectively. This inhibition correlated with significant declines in chlorophyll and carotenoid contents, net photosynthetic assimilation (*A*), stomatal conductance (*gs*), transpiration rate (*E*), and internal CO_2 concentration (*Ci*). Salinity also caused severe ion toxicity (Na^+ and Cl^- accumulation), reduced nutritional uptake (K^+ and Ca^{2+}), and triggered oxidative stress via malondialdehyde (MDA) and H_2O_2 accumulation. Notably, both SA and H_2O_2 interventions successfully recovered plant growth, increasing shoot and root DW by 67.65% and 82.36%, respectively, compared to non-treated stressed plants. Both methods restored gas exchange parameters, improved membrane stability, restricted Na^+ and Cl^- accumulation, and boosted K^+ and Ca^{2+} uptake. These physiological improvements were driven by a robust up-regulation of antioxidant enzyme activities (SOD and GPOX), which significantly reduced oxidative damage. While both application methods enhanced salt tolerance, H_2O_2 seed priming proved to be the most effective strategy. This cost-effective method is highly recommended for optimizing lentil seedling establishment and performance in salinity-affected agricultural soils.

Keywords : *Lens culinaris*, seed priming, salinity, antioxidant system

POSTER N° : 54.

ENHANCEMENT OF FABA BEAN (*VICIA FABA* L.) TOLERANCE AGAINST OROBANCHE SPP BY SALICYLIC ACID, BENZOTHIADIAZOLE, AND OTHER COMMERCIAL BIOSTIMULANTS

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Broomrape (*Orobanche* spp.) infestations represent a major agricultural constraint in Tunisia, severely reducing faba bean (*Vicia faba*) cultivated areas and yields. This study investigated the potential of chemical inducers (Salicylic Acid [SA] and Benzothiadiazole [BTH]) and commercial bio-inducers (Serenade, Trianum-P, and Panoramix) to induce tolerance against *O. foetida* and *O. crenata*. The treatments were applied as seed priming or coating on the susceptible small-seeded faba bean cv 'Bachaar' under both controlled and field conditions. Results demonstrated that chemical pretreatments with SA and BTH achieved the highest efficacy, significantly minimizing *O. foetida* infestation while simultaneously boosting vegetative growth and seed yield across both experimental environments. This chemical-induced tolerance was biochemically linked to a reduced *Orobanche* seed germination rate and a lower number of established tubercles. Conversely, while biological inducers effectively suppressed broomrape development under controlled laboratory conditions (specifically in quadratic plastic dishes), their protective effects were not maintained under open field conditions. Ultimately, these findings underscore the efficacy of SA and BTH seed priming as dependable tools for inducing resistance. This approach offers a valuable and practical component that can be easily integrated into comprehensive pest management strategies to control parasitic weeds in faba bean crops.

Keywords : Broomrape, inducers, *Vicia faba.*

POSTER N° : 55.

SEROTONIN AND MELATONIN PRIMING ENHANCES COPPER TOLERANCE IN BARLEY (*HORDEUM VULGARE* L.) BY MODULATING PROLINE AND POLYAMINE METABOLISM

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Abstract: This study examines the protective effects of serotonin and melatonin against copper (Cu) toxicity in barley (*Hordeum vulgare* L.). Seeds were primed with 10 µM serotonin or melatonin for 12 hours and subsequently exposed to 400 µM $CuCl_2$. Cu stress significantly restricts growth, while neurotransmitter pretreatment mitigates these toxic effects. The biochemical analysis reveals that Cu-induced stress increases proline levels, a response further amplified by serotonin and melatonin priming. This accumulation is driven by the up-regulation of Δ1-pyrroline-5-carboxylate synthase and ornithine aminotransferase activities, coupled with the inhibition of proline dehydrogenase activity. Additionally, the modulation of ornithine decarboxylase and arginine decarboxylase activities suggests that these neurotransmitters coordinate polyamine pathways to reinforce cellular defense. These findings demonstrate that serotonin and melatonin priming reconfigures nitrogen metabolism to enhance heavy metal resilience in cereal crops.

Keywords: Neurotransmitter, Heavy metal, Proline, Seed priming.

POSTER N° : 56.

EFFECT OF FOLIAR NITROGEN FERTILIZATION ON PHENOLIC COMPOUNDS, ANTIOXIDANT AND ANTIBACTERIAL ACTIVITIES OF PUNICA GRANATUM

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Abstract : Foliar nitrogen fertilization is an important agronomic strategy for improving fruit quality and enhancing the biosynthesis of bioactive compounds in fruit crops. The present study aims to evaluate the effect of foliar nitrogen application at two critical phenological stages, namely before fruit growth and at the beginning of fruit growth, on the phytochemical composition and biological activities of Punica granatum cultivated under Tunisian conditions. The experiment will investigate the effects of different nitrogen treatments on the accumulation of phenolic compounds and the antioxidant and antibacterial activities of pomegranate extracts.

Leaves and fruits from treated and untreated plants will be collected and analyzed for total phenolic content using spectrophotometric methods. Antioxidant activity will be evaluated using standard assays, including DPPH radical scavenging and ferric reducing antioxidant power (FRAP). Antibacterial activity will be tested against selected Gram-positive and Gram-negative bacterial strains using agar diffusion and minimum inhibitory concentration methods.

Expected results suggest that foliar nitrogen application, particularly during the early stages of fruit development, may stimulate the synthesis of secondary metabolites and significantly increase the concentration of phenolic compounds in the Gabsi pomegranate variety. Enhanced antioxidant activity is also anticipated due to the higher accumulation of polyphenols and flavonoids. Furthermore, extracts from nitrogen-treated plants are expected to exhibit stronger antibacterial activity against pathogenic bacteria than untreated controls.

This study could provide valuable insights into optimizing nitrogen fertilization practices to improve the nutraceutical and biological value of pomegranate fruits. The findings may contribute to the development of sustainable agricultural strategies to enhance fruit quality and promote the use of natural bioactive compounds in food and pharmaceutical applications.

KEYWORDS: *Punica granatum*, foliar fertilization, phenolic compounds, antioxidant activity, antibacterial activity.

POSTER N° : 57.

BIOCONTROL POTENTIAL OF RHIZOSPHERE BACTERIA FOR MANAGING FUSARIUM WILT AND MYCOTOXIN BIOSYNTHESIS IN DATE PALM

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Biological control represents a promising yet underexploited alternative to chemical fungicides, particularly in Southern Mediterranean countries where sustainable agricultural practices remain a priority. In Tunisia, date palm (*Phoenix dactylifera* L.) production faces recurrent and severe threats from soilborne fungal pathogens, highlighting the urgent need for innovative bioprotection strategies. The present study investigated the diversity of cultivable endophytic bacteria associated with the rhizospheric compartment of Tunisian date palm and evaluated their antagonistic potential against key *Fusarium* pathogens, namely *Fusarium proliferatum*, *Fusarium clavum*, and *Fusarium oxysporum* — causative agents of sudden decline, vascular wilt, and Bayoud disease, respectively.

A total of 110 bacterial isolates exhibiting distinct colony morphologies on PCA medium were selected and characterized through molecular identification based on 16S rRNA gene sequencing. Phylogenetic analysis clustered these isolates into **10 distinct groups**, further classified into three functional categories: beneficial bacteria, opportunistic potentially pathogenic bacteria, and bacteria with poorly characterized ecological functions. Antagonistic potential was assessed through a **comprehensive multi-assay framework** encompassing: *(i)* direct dual-culture antagonism assays to quantify inhibition of mycelial growth; *(ii)* volatile organic compound (VOC) emission assays to assess long-distance fungal suppression; *(iii)* antimicrobial activity assays to characterize the spectrum of secreted bioactive metabolites; *(iv)* spore germination and morphology assays, which revealed significant conidial alterations including deformation, swelling, and germination inhibition; and *(v)* mycotoxin biosynthesis reduction assays targeting fumonisins and beauvericin.

Several strains demonstrated **stable and broad-spectrum antagonistic activity** across all experimental conditions, along with a significant capacity to modulate fungal secondary metabolism. These results suggest intricate microbial interactions that extend well beyond a simple detoxification process, pointing to the involvement of multiple biocontrol mechanisms acting synergistically.

Collectively, this work underscores the remarkable biocontrol potential harbored within the rhizospheric microbiota of Tunisian date palm and advocates for the development of selected bacterial strains as **effective microbial inoculants** within integrated disease management programs, a crucial step toward more resilient and sustainable oasis agroecosystems.

Keywords : biological control1; endophytic bacteria 2; *Phoenix dactylifera 3; Fusarium 4;* mycotoxin biosynthesis 5, Antagonistic potential 6.

POSTER N° : 58.

QUALITY IMPROVEMENT OF FRIED CHICKEN DRUMSTICKS USING A POLYMERIC COATING ENRICHED WITH OLIVE LEAF EXTRACT

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Abstract: Chicken drumsticks are one of the most popular poultry products due to their desirable nutritional and sensory qualities. However, frying often leads to excessive oil absorption, lipid oxidation, and and change dramatically in both texture and color. In this context, edible coatings enriched with natural bioactive compounds represent a promising alternative to synthetic additives. Olive leaves, an abundant by-product of the olive industry, are rich in phenolic compounds with strong antioxidant properties. his study evaluated the effect of a carboxymethylcellulose and gum arabic polymeric coating enriched with olive leaf extract from the Tunisian variety Aloui on the quality of fried chicken drumsticks. Three extract concentrations were tested: 5% (A1), 10% (A2), and 15% (A3). Samples were fried at 180 °C for 10 min and compared with coated (CT+) and uncoated (CT−) controls. The study particularly aimed to reduce oil absorption while preserving the physicochemical and textural quality of the fried drumsticks.

The results showed that increasing olive leaf extract concentration improved coating adhesion, with pickup values increasing from 2.69% in CT+ to 4.07%, 4.36%, and 4.63% for A1, A2, and A3, respectively. Lipid content decreased significantly from 38.15% in CT− and 23.31% in CT+ to 21.11%, 17.15%, and 7.91% for A1, A2, and A3, respectively. TBARS values also decreased from 1.76 mg MDA/kg in CT− to 1.33 mg MDA/kg in A3, confirming the antioxidant effect of olive leaf phenolics against lipid oxidation during frying. Color analysis revealed lower L* and b* values in coated samples, while ΔE increased with extract concentration. Texture profile analysis showed decreases in hardness, gumminess, and chewiness, indicating a softer and more tender texture, particularly in A3. Overall, the incorporation of Aloui olive leaf extract into carboxymethylcellulose and gum arabic coatings effectively improved the quality of fried chicken drumsticks by reducing oil uptake, limiting lipid oxidation, and preserving desirable textural properties, with the 15% treatment showing the best overall performance.

KEYWORDS: *Olive leaf extract, edible coating, fried chicken drumsticks, lipid oxidation.*

POSTER N° : 59.

SILICON ENHANCES DROUGHT TOLERANCE IN CAROB (*CERATONIA SILIQUA* L.) BY IMPROVING PHOTOSYNTHETIC PERFORMANCE AND REDUCING OXIDATIVE STRESS

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Abstract: Water deficit is a major environmental constraint that limits plant growth and productivity by impairing physiological processes and inducing oxidative stress. Silicon has been increasingly recognized for its beneficial role in enhancing plant tolerance to abiotic stresses, including drought.

Carob (Ceratonia siliqua L.) plants (8-month-aged) were subjected to two levels of water stress: moderate stress (SH1) and severe stress (SH2), for a period of 30 days. Silicon (Si) was applied through irrigation water, and its effects on plant growth, photosynthetic performance, and oxidative status were evaluated. The results indicated that water deficit significantly affects growth, photosynthetic performance, and oxidative status in carob seedlings, with more pronounced effects under severe stress (SH2). Indeed, SH2 markedly reduced total leaf area, leaflet surface, and leaf number compared to the control and SH1-exposed plants. In parallel, severe stress led to a decline in chlorophyll content and photosynthetic efficiency, as reflected by reduced ΦPSII and Electron Transport Rate (ETR), along with alterations in energy dissipation parameters (NPQ and NPQt). Moreover, oxidative stress was exacerbated under SH2, as shown by the significant increase in H_2O_2 content.

The application of silicon (Si) through irrigation mitigated the adverse effects of water stress. Si treatment improved growth parameters, particularly under severe stress, restoring leaf area and leaflet development. It also preserved chlorophyll content and enhanced photosynthetic performance, maintaining ΦPSII and ETR at levels comparable to the control. Additionally, Si modulated photoprotective mechanisms by increasing NPQ and reducing excessive energy dissipation under stress conditions. Importantly, Si application significantly decreased H_2O_2 accumulation, indicating a reduction in oxidative damage. Overall, these results demonstrate that silicon plays a protective role in alleviating water stress effects, especially under severe conditions, by improving photosynthetic efficiency and limiting oxidative stress.

***KEYWORDS**: Antioxidant enzymes, Drought, Oxidative stress, Photosynthesis*

POSTER N° : 60.

LOBULARIA MARITIMA ESSENTIAL OIL MODULATES HEAVY-METAL TRANSPORTER EXPRESSION AND MITIGATES CADMIUM STRESS IN DURUM WHEAT

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Abstract: Cadmium (Cd) pollution has emerged as a critical global environmental concern due to its significant toxicity, environmental persistence, and the pervasiveness of contamination. In recent years, essential oils (EOs) have been recognized as a promising, environmentally friendly substitute for traditional chemical treatments to counteract metal toxicity in plants. Moreover, these naturally derived compounds improve plant resilience when facing challenging environmental conditions. This study explores the potential of EOs extracted from the aerial tissues (flowering shoots and leaves) of the halophyte plant Lobularia maritima to alleviate Cd toxicity in durum wheat exposed for 10 days to 30 µM C dCl2. GC–MS analysis revealed that L. maritima essential oil (LmEO) was predominantly composed of oxygenated monoterpenes (74.40%). The impact of various LmEO concentrations (2, 4, 6, and 8 ppm) on seed germination and early growth of durum wheat identified 4 ppm as the most effective. Application of LmEO (at 4 ppm) significantly enhanced seedling tolerance to Cd by promoting growth, reducing Cd accumulation in shoots by approximately 41%, and malondialdehyde content (a marker membrane damage) by 43% compared to the Cd-stressed plants. LmEO treatment also reduced oxidative stress by boosting antioxidant enzyme activity and reducing ROS accumulation. Furthermore, RT-qPCR analysis of six genes encoding heavy metal transporters in roots (TdNRAMP, TdHMA5, TdHMT1, TdZIF1, TdZIFL2, and TdZTP29) revealed that several key genes were upregulated by approximately twofold in durum wheat seedlings treated with LmEO, suggesting a potential link to improved Cd tolerance. Our findings suggest that exogenous LmEO application is associated with enhanced Cd stress resilience through reduced metal accumulation and improved antioxidant defense in durum wheat. These results indicate the potential of LmEO as a natural biostimulant to improve crop growth in contaminated soils.

***KEYWORDS:** Lobularia maritima essential oil · Durum wheat · Biostimulant · Antioxidant enzymes · Metal stress*

POSTER N° : 61.

PROTECTIVE ROLE OF SALICYLIC ACID AGAINST SALINITY-INDUCED OXIDATIVE DAMAGE IN ALFALFA (*MEDICAGO SATIVA* L.) SEEDLINGS

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Abstract: Salinity is a major abiotic stress that adversely affects plant growth and productivity by inducing osmotic imbalance and oxidative stress. High concentrations of NaCl lead to excessive accumulation of reactive oxygen species (ROS), resulting in cellular damage and metabolic disturbances. In this study, alfalfa (*Medicago sativa* L.) seeds were either pretreated with 1 mM salicylic acid (SA) or left untreated. The seeds were then germinated under controlled conditions in the presence or absence of 100 mM NaCl. After six days of growth, the seedlings were harvested for subsequent analyses.
The results revealed that salt stress induced by NaCl (100 mM) induced a significant decrease in both fresh and dry biomass, accompanied by a marked increase in oxidative stress, as evidenced by elevated levels of H_2O_2 and MDA. Simultaneously, NaCl led to a disruption of the antioxidant system, as indicated by reduced activities of key antioxidant enzymes, namely ascorbate peroxidase APX), glutathione reductase (GR), and dehydroascorbate reductase (DHAR), despite a slight increase in total proteins and glutathione peroxidase (GPX) activity. The application of salicylic acid (SA), either as a pretreatment (SA1-NaCl100) or as a cotreatment (SA1+NaCl100), significantly alleviated the deleterious effects of salt stress. This improvement is reflected in a partial restoration of the growth (fresh and dry biomass), a reduction in oxidative stress biomarkers, such as hydrogen peroxide (H_2O_2) and malondialdehyde (MDA), and an enhancement of the antioxidant defense system, particularly through increased activities of APX, GR, and DHAR enzymes. Overall, SA pretreatment appears to be slightly more effective than cotreatment, suggesting a preventive protection triggered by SA against salt stress.
Overall, these findings highlight the crucial role of salicylic acid in enhancing salinity tolerance in alfalfa by mitigating oxidative damage and reinforcing the plant antioxidant defense system.

KEYWORDS*: Alfalfa, Antioxidant enzymes, Oxidative stress, Salinity.*

POSTER N° : 62.

SMART BIOPOLYMERIC ANTIOXIDANT SYSTEM BASED ON CHITOSAN GALLATE: KINETIC MODELING AND RADICAL SCAVENGING UNDER SIMULATED DIGESTIVE CONDITIONS

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Abstract: Biopolymer-based antioxidant delivery systems have gained considerable attention as eco-friendly strategies for targeted nutraceutical and pharmaceutical applications. In this study, a novel chitosan gallate conjugate was successfully prepared via a green free-radical grafting approach using an ascorbic acid/hydrogen peroxide redox initiation system, avoiding the use of toxic chemical coupling agents. This environmentally benign method enabled the simultaneous grafting of ascorbic acid and gallic acid onto the chitosan backbone under mild aqueous conditions. The pH-dependent release behavior of the conjugate was subsequently investigated under simulated gastrointestinal conditions in gastric fluid (pH 1.2, HCl/NaCl) and intestinal fluid (pH 6.8, phosphate buffer) at 37°C over 240 minutes. Results revealed a solubility-driven release mechanism governed by the polyelectrolyte nature of chitosan, whose amine groups undergo protonation at acidic pH, promoting polymer dissolution and antioxidant liberation. A cumulative release of 76% was recorded at pH 1.2, whereas the conjugate remained nearly insoluble at pH 6.8, yielding only 18% release. Released fractions demonstrated potent radical scavenging activity, reaching 81% DPPH inhibition at 240 min at pH 1.2, confirming preserved biological activity. Kinetic modeling best fitted the Korsmeyer-Peppas model (R^2 = 0.981, n = 0.58), indicating anomalous non-Fickian transport. These findings position chitosan gallate as a promising green-synthesized, gastric-targeted antioxidant carrier for oxidative stress-related applications.

KEYWORDS: *Biopolymer; Antioxidant delivery system; Ascorbic acid; Gallic acid; Controlled release · Polyelectrolyte; Oxidative stress.*

POSTER N° : 63.

SILICON ENHANCES FABA BEAN (*VICIA FABA* L.) SALT TOLERANCE BY IMPROVING PHOTOSYNTHETIC EFFICIENCY AND MODULATING CHLOROPHYLL FLUORESCENCE PARAMETERS

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Abstract : Salinity is a major abiotic stress causing severe damages to plants. Thus, proper management approaches need to be developed to lessen the detrimental effect of salinity on crop growth and productivity. In this study, we explored the potential function of silicon (Si) in mitigating the adverse effects of salt stress on three faba bean cultivars (Najeh, Chourouk and Bachaar) at the seedling stage. Ten day-old seedlings were subjected for two weeks to 150 mM NaCl, with or without 2 mM Si supplementation. Obtained results showed that salt stress resulted in reduced growth rate (shoot and root dry weights and water contents) associated with significant decreases in leaf chlorophyll content, stomatal conductance, transpiration rate, electrochromic shift (ECSt) in the thylakoid membrane, as well as in quantum yield (ΦII) and photochemical efficiency (Fv/Fm) of photosystem II for the three faba bean varieties. Non-photochemical quenching (ϕNPQ) were significantly increased by salt stress for Najeh and Chourouk cultivars, and remarquably decreased for Bachaar. Non-regulated heat dissipation (ϕNO) were not affected by salt stress for Najeh and Chourouk varieties? However, significant increase was observed for Bachaar cultivar. Si supplementation enhanced salt stress tolerance in the three faba bean cultivars by improving the stomatal conductance, increasing the chlorophyll content, stabilizing the photosystem II reaction center and thylakoid membrane, particularly for the Bachaar salt-sensitive cultivar. Overall, our findings indicate that exogenous Si helps to reduce salt-induced stress by enhancing photosynthetic efficiency in faba bean, positioning it as a promising strategy for improving crop performance in saline environments.

Key words: *Vicia faba*, salt stress, silicon, growth, photosynthetic efficiency, non-photochemical quenching, non-regulated heat dissipation

POSTER N° : 64.

AGRONOMIC RESPONSE OF COMMERCIAL POTATO (*SOLANUM TUBEROSUM* L.) VARIETIES AND SELECTED CLONES TO WHOLE VERSUS CUT SEED TUBERS: IDENTIFICATION OF CUTTING-SUITABLE GENOTYPES

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Abstract: In Tunisia, high seed tuber costs significantly impact potato production profitability, leading farmers to practice seed cutting despite uncertain agronomic outcomes. This study, conducted at the Teboulba Experimental Station, evaluated the effects of seed tuber type (whole vs. cut) on emergence, vegetative development, yield components, and final yield of five potato varieties (Spunta, Synergy, Universa, El Beida, Naima) and five selected clones (VC06–VC10). A randomized complete block design with three replications was employed. Results showed that whole seeds significantly improved early emergence (reaching 90% for Universa vs. 50% for cut seeds at 21 days after planting), increased stems per plant (3.22 vs. 2.22), and produced a higher number of tubers per plant (10.78 vs. 7.87). Conversely, cut seeds produced tubers with a higher average individual weight (149.9 g vs. 139.6 g). For total yield per plant, whole seeds were generally superior (1.437 kg vs. 1.155 kg). Critically, the variety Naima and clone VC06 exhibited a specific aptitude for cutting, achieving yields statistically equivalent to those from whole seeds. This finding allows for a 50% reduction in seed tuber quantity without compromising yield. We confirm that the response to seed cutting is genotype-dependent, and we identify Naima and VC06 as promising genetic materials for optimizing potato crop profitability in semi-arid conditions.

KEYWORDS: *potato, seed cutting, whole seed, yield, Naima, clone VC06, profitability, Tunisia.*

POSTER N° : 65.

EXOGENOUS IAA APPLICATION ALLEVIATED ALTERED PHYSIOLOGICAL AND BIOCHEMICAL PROCESSES THROUGH PROMOTING H-ATPASE AND FE CHELATE REDUCTASE ACTIVITIES IN COMMON BEAN (*PHASEOLUS VULGARIS* L.) SUBJECTED TO IRON DEFICIENCY

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Abstract : Iron deficiency is a common nutritional disorder observed in calcareous soils, where its resolution by classical methods has shown its failure. However, the exploitation of
certain potentialities possessed by crops (rhizosphere acidification, H-ATPase; Fe chelate reductase, FeCR, etc.), and the use of some biostimulants remains most efficient and sustainable approach.
A greenhouse experiment was conducted on common bean plants subjected (FeD), or not (control, C) to Fe deficiency, or subjected to Fe deficiency and sprayed with 1mM indole-3-acetic acid (FeD-IAA). The key physio-biochemical traits developed by plants in the different treatments, and their interrelationships were analysed. Iron deficiency induced specific Fe chlorosis, reduced chlorophyll and disrupted photosystem II performance. Plant growth and Fe concentration also significantly decreased, despite the stimulation of H-ATPase and FeCR activities. However, exogenous IAA application alleviated the adverse effects of FeD, particularly through promoted H-ATPase and FeCR activities, and Fe2+ concentration.
The polar transport of IAA promoted root growth, H-ATPase and FeCR activities under FeD. The resulted Fe promotes chlorophyll biosynthesis and photosynthetic functioning. The calculated rhizosphere acidification capacity (RAC) and Fe chelate reductase capacity (FeCRC) are two useful traits for tolerant plant screening. The exogenous IAA application is a useful, efficient and eco-friendly approach for Fe-chlorosis alleviation. It promotes soil quality through the improvement of the soluble, plant-available form of iron. photosynthetic assimilation, leading to improved biomass production.

POSTER N° : 66.

PROLINE-MEDIATED SALINITY TOLERANCE IN *MORINGA OLEIFERA* UNDER GROUNDWATER IRRIGATION CONDITIONS

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Abstract: Salinity is one of the principal abiotic stresses limiting plant growth and agricultural productivity, particularly in arid and semi-arid regions where irrigation water often contains elevated salt concentrations. This study evaluated the physiological responses and adaptive behavior of *Moringa oleifera* under saline conditions using groundwater irrigation. The physicochemical characteristics of irrigation water and agricultural soil were analyzed to determine their suitability for cultivation. The groundwater showed high electrical conductivity, while the soil was moderately saline and rich in organic matter (6.03%).
Moringa seeds were cultivated under controlled conditions and subjected to different salinity levels. Germination rates remained relatively high despite salt stress, reaching 92.8% during the first cultivation cycle and 83.3% during the second, indicating good tolerance to saline conditions. Plant physiological adaptation was assessed through proline accumulation, recognized as an important biochemical marker involved in osmotic adjustment under salt stress. The results revealed a significant increase in proline content in stressed plants compared with untreated controls. At 6 g L^{-1} NaCl, proline accumulation was approximately six to seven times higher than in control plants.
These findings demonstrate that *Moringa oleifera* possesses efficient adaptive mechanisms to withstand salinity through enhanced osmoprotective responses and proline biosynthesis. The species exhibited physiological characteristics associated with moderate salt tolerance, highlighting its potential for cultivation in saline and marginal environments.
KEYWORDS: *salinity stress, Moringa oleifera, proline accumulation, plant physiological adaptation*

POSTER N° : 67.

NICKEL TOXICITY IMPAIRS GROWTH AND PHOTOSYNTHETIC EFFICIENCY IN BARLEY BY DISRUPTING PHOTOCHEMICAL ACTIVITY, ELECTRON TRANSPORT, AND THYLAKOID INTEGRITY

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Abstract: This study investigated the phytotoxic impact of nickel (Ni) on barley (*Hordeum vulgare* L.). Exposure to a range of Ni concentrations (25–200 μM) severely inhibited plant growth, as evidenced by significant reductions in shoot and root elongation and fresh matter, with the shoots being more severely affected. To elucidate the underlying mechanisms, chlorophyll metabolism and electron transport chain functioning were evaluated at 25 μM Ni. This concentration induced a drastic decline in chlorophyll a and b contents, concomitant with a significant stimulation of chlorophyll degradation. Chlorophyll fluorescence analysis showed a marked decrease in the maximum quantum yield (Fv/Fm), operating quantum yield (PhiPSII), and linear electron flow (LEF), associated with a notable increase in non-photochemical quenching (NPQ). Furthermore, Ni stress compromised thylakoid integrity and disrupted ion flux, as indicated by reductions in the proton motive force (ECSt), ATP synthase conductivity (gH+), and proton flux (vH+). Data also revealed a functional impairment of Photosystem I (PSI). Specifically, Ni toxicity reduced the oxidation capacity of the P700 special pair and restricted electron transfer to final acceptors, leading to an increased PSI over-reduced state. Collectively, these results demonstrate that Ni toxicity restricts barley productivity by disrupting chlorophyll homeostasis and thylakoid integrity.

KEYWORDS: *Chlorophyll fluorescence, Photosystem, Nickel, Thylakoid integrity*

POSTER N° : 68.

PRIMED BY THE DESERT: A PRELIMINARY INVESTIGATION ON THE EFFECTIVENESS OF *CITRULLUS COLOCYNTHIS* L. SCHRAD. MATURE SEED FIXED OILS AS ENHANCERS OF PLANT VIGOR PERFORMANCE.

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Abstract : *Citrullus colocynthis* L. Schrader is medicinal annual plant, belonging to the Cucurbitaceae family, that is widely distributed in the arid areas of the Mediterranean basin. Due to the biological activity that extracts from different organs have shown during decades of scientific investigation, the applications of this species in the most various contexts are continuously increasing. With the aim to evaluate the possible beneficial effect of fixed oil extracts from *C. colocynthis* mature seeds in the improvement of plant vigor for both conservation and agricultural purposes, we analysed their effect on model species such as *Sorghum vulgare* (sorghum), *Raphanus sativus* (radish) and *Lactuca sativa* (lettuce). A gas chromatography-flame ionization detection (GC-FID) was performed in order to explore the fatty acids composition of fixed oils, that resulted to differ from literature available data. Experiments conducted *in vitro* and greenhouse conditions revealed that fixed oils of mature seeds improved the germination and seedling growth of tested species, acting as vigor promoters. Mature seed extract exhibited the best performance on sorghum.

Keywords : *Citrullus colocynthis* L. Schrad., mature seeds, fixed oil, germination performance, seedling priming, plant vigor

POSTER N° : 69.

ROLE OF SALICYLIC ACID IN ALLEVIATING ZINC-INDUCED OXIDATIVE DAMAGE IN BEAN (*PHASEOLUS VULGARIS*) PLANTS

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Abstract: Zinc (Zn) is an essential micronutrient for plants; however, at elevated concentrations, it becomes toxic and negatively affects seed germination and early seedling growth. In common bean (*Phaseolus vulgaris*), Zn application has been shown to significantly reduce germination rate, root and shoot elongation, and overall biomass. Concomitantly, Zn enhanced H_2O_2 content and lipid peroxidation as indicated by malondialdehyde (MDA) accumulation. Salicylic acid (SA) pretreatment effectively mitigated oxidative damage, as demonstrated by the decreased levels of hydrogen peroxide (H_2O_2) and malondialdehyde (MDA). Notably, SA application enhanced the activities of catalase (CAT) and ascorbate peroxidase (APX), while significantly reducing the activities of superoxide dismutase (SOD) and peroxidase (POD). Overall, these findings indicate that SA alleviates zinc-induced toxicity during bean germination by limiting oxidative stress and strengthening the antioxidant defense system, thereby promoting better growth performance.

Keywords: salicylic acid, Zn, Zinc, *Phaseolus vulgaris*, oxidative damages, antioxidants.

Abbreviations: SA, salicylic acid; H_2O_2, hydrogen peroxides; MDA, malondialdehyde; CAT, catalase; APX, ascorbate peroxidase; SOD, superoxide dismutase.

POSTER N° : 70.

ASSESSING THE DUAL ROLE OF GREEN SYNTHESISZED MGO NANOPARTICLES IN MODULATING SOIL MICROBIAL COMMUNITIES AND *VICIA SATIVA* PERFORMANCE UNDER FIELD CONDITIONS

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Abstract: Bio-synthesized nanoparticles (NPs) have emerged as promising tools in the agri-tech revolution, contributing to enhanced agricultural productivity, resilience, sustainability, and food security. Widely applied as nano-fertilizers, these specialized nanomaterials exhibit unique physiological and biological properties that depend on the raw components used during their synthesis. In this context, nanotechnology holds significant potential to improve crop productivity and sustainable agricultural practices; however, its impact on soil microbial communities remains a critical concern due to the essential role of soil microbiota in maintaining soil health and ecosystem functioning.

This research aims to explore the potential of nano-interventions as sustainable solutions for agriculture by enhancing plant productivity, strengthening plant–microbe interactions, and promoting soil health. Specifically, it investigates the effects of biosynthesized MgO nanomaterials on microbial communities within soil–plant (*Vicia sativa*) systems under field conditions, with the objective of improving soil quality and supporting long-term agricultural sustainability. Understanding these mechanisms is essential for gaining comprehensive insight into the interactions among nanoparticles, plants, and their associated microbiota, thereby providing a foundation for the effective and responsible application of nanotechnology in agroecosystems, while maximizing the potential benefits of nano-based agricultural practices.

KEYWORDS: *Alfalfa growth, Green synthesis, MgO Nanoparticles, Metagenomic, Field conditions*

POSTER N° : 71.

VARIATION IN POLYPHENOL AND CITRULLINE CONTENTS BETWEEN CULTIVATED AND WILD *CITRULLUS* SPECIES

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Abstract: Drought and salinity stresses are the most important abiotic stresses responsible of crop failure worldwide, that cause reduction in plant growth, development and productivity. Irrigation efficiency is becoming crucial for vegetable and agronomic crop production particularly in the southern regions of Tunisia. Plants have developed a variety of strategies and mechanisms in response to changes in their environments. Drought and salinity tolerant plants accumulate various organic osmolytes, especially organic compatible solutes, in order to protect cells components from stress damage. Wild watermelon primarily accumulates citrulline, which may increase its tolerance to salt and drought stress. Citrulline is a non-essential amino acid, contributes to oxidative stress tolerance under drought conditions as a novel hydroxyl radical scavenger. Additionally, citrulline is used in the nitric oxide system in humans and has antioxidant and vasodilatation roles.

The aim of the study was the assessment of polyphenols and citrulline content in cultivated varieties of watermelon (Citrullus lanatus L.) and wild specie (Citrullus colocynthis).

The cultivated genotypes showed high content of citrulline which ranged from 15,6 to 20,84 mg/g dw and from 13,32 to 22,14 mg/g dw respectively in flesh and rind fractions. The citrulline content in Citrullus colocynthis was lower (10,18 mg/g dw in the flesh and 4,47 mg/g dw in the rind) with respect to cultivated genotypes. Citrulline content varied considerably depending on the sampling areas. Thus, the richest fraction was cultivar-dependent. In addition, the studied genotypes showed high total phenolics content ranging from 44,53 to 84,53 mg GAE/g fw and from 53,23 to 114,79 GAE/g fw respectively in flesh and rind. Unlike citrulline, total phenols are regularly more abundant in the rind than in the flesh.

These results highlight the importance of watermelon rind as an underutilized source of phytochemicals in commercial and the wild watermelon species

KEYWORDS: *watermelon, citrulline, phenolic compound, abiotic stress, biotic stress*

POSTER N° : 72.

SEED HORMONAL PRIMING IMPROVES DROUGHT RESILIENCE IN DURUM WHEAT THROUGH MODULATION OF PHYSIOLOGICAL AND BIOCHEMICAL TRAITS

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Abstract: Drought stress is one of the most severe constraints affecting wheat production worldwide. Under these conditions, the development of sustainable and economically viable strategies, such as seed priming, is essential to improve wheat performance and drought resilience. The present study carried out a greenhouse experiment on four Mediterranean durum wheat cultivars (*Triticum turgidum ssp. durum* Desf), i.e., Karim (Kr) and Khiar (Kh) from Tunisia, and Espelta (Esp) and Mocho (Mo) from Spain, subjected to drought stress conditions, and using primed abscisic acid (ABA), indole-3-acetic acid (IAA), melatonin (Mlt), and salicylic acid (SA), and non-primed seeds. In order to assess the physio-biochemical responses of durum wheat, such as plant growth, chlorophyll, relative water content (RWC), water potential (Ψw), osmotic potential (Ψs), proline, soluble sugars, starch, glycine betaine, hydrogen peroxide, malondialdehyde, and antioxidant enzyme activities. The results showed that water stress significantly reduced plant growth, SPAD index, RWC, Ψw, and Ψs, while upregulating H_2O_2 and MDA levels, depending on the wheat cultivars. Soluble sugars decreased, whereas starch, glycine betaine, and proline accumulated in all cultivars. Superoxide dismutase activity reduced (24-37%) under water stress as compared to the control condition, while APX, CAT, and POD activities significantly increased. Among the cultivars, Esp exhibited the greatest plasticity in response to water deficit, whereas Kh appeared to be most sensitive. Furthermore, the present results revealed that the priming durum wheat seeds with ABA, IAA, Mlt, and SA improved leaf hydration, particularly through soluble sugar accumulation. Seed priming also alleviated oxidative stress while stimulating APX, CAT, POD, and SOD activities. Depending on their degree of tolerance, the cultivars can be ranked in decreasing order of stress tolerance as Esp > Kr > Mo > Kh.

KEYWORDS: *Antioxidant enzymes; drought; durum wheat; hormonal priming; osmotic adjustment; reactive oxygen species.*

POSTER N° : 73.

IMPACT OF GROWING LOCATION ON THE PHENOLIC AND MINERAL COMPOSITION OF CHETOUI OLIVE LEAVES

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Abstract

This study investigated the effects of soil properties and altitudinal variation on the mineral nutrient composition, phenolic profile, and antioxidant activity of olive leaves. Leaf samples of the Chetoui olive cultivar were collected from eight geographical locations spanning different altitudinal ranges. The concentrations of phenolic compounds varied significantly with altitude. Classification of the sampling sites showed that locations situated above 500 m (Altitude 1) were characterized by elevated levels of secoiridoids and simple phenols, whereas sites at intermediate (300–500 m; Altitude 2) and lower altitudes (<300 m; Altitude 3) exhibited higher concentrations of flavonoids. Significant correlations were observed between manganese (Mn), calcium (Ca), and boron (B) concentrations in the leaves, as well as zinc (Zn) levels in the soil, and the accumulation of oleuropein and luteolin-7-O-glucoside, the two major phenolic compounds identified in Chetoui olive leaves. These findings indicate that, in addition to soil characteristics, environmental factors associated with altitude play an important role in modulating phenolic biosynthesis in olive leaves.

Keywords : Olive leaves, phenolic compounds, mineral nutrients, soil properties, environmental factors, oleuropein

BIOTECHNOLOGY

POSTER N° : 74.

IMPROVING THE CULTURE OF *PHASEOLUS VULGARIS* BY BIOTECNOLOGY

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Abstract: *Phaseolus vulgaris* is a vegetable which is rich in plant-protein and packed with nutrients, it is considered as an excellent antioxidant, hence our interest in it. Therefore, with the aim of improving it cultivation through biotechnology, we have attempted to design a culture medium highly conducive to his callogenesis growth. We have launched in *vitro* cultures of stems and leaflets of *Phaseolus vulgaris* genotypes. The calluses were produced from ″ Mangetout variety″, which was collected from three (3) regions of north Algeria, these genotypes were called: HA1, HAB, and HAV. The used hormones were: Cytokinines and Auxines, we varied the hormonal balances and the nutrient medium was ″Murashige et Skoog″. Best results of callogenesis were obtained with the following hormonal balances: D1 (2 mg/l 2,4-D and 1 mg/l BAP), D2 (2 mg/l 2,4-D), DM (2 mg/l 2,4-D and 3 mg/l Kinetin), and M4 (2 mg/l 2,4-D and 2 mg/l Kinetin). These hormonal balances prove to be the best for the in vitro culture of bean.
Keywords: *Phaseolus vulgaris, in vitro culture, callogenesis, Auxines, Cytokinins.*

POSTER N° : 75.

STUDY OF THE ANTIBIORESISTANCE PROFILE OF *BACILLUS CEREUS* AND *STAPHYLOCOCCUS AUREUS* SPECIES ISOLATED FROM ROW COW MILK AND THE INVESTIGATION OF THEIR ERADICATION WITH ESSENTIAL OILS

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Abstract: The investigation of contaminating microorganisms in cow and goat milk is an essential approach to better assess milk quality as well as the type of feeding to which the animals are subjected. Indeed, milk free of certain germs such as *Bacillus cereus* and *Staphylococcus aureu*s likely comes from animals that have received significant amounts of antibiotics. This situation raises a major public health concern: on one hand, the development of bacterial resistance to antibiotics, and on the other hand, the contamination of food products derived from such milk by resistant, biofilm-producing bacteria.

It is within this context that the present study was conducted. The objective of this work was to collect cow and goat milk samples from various farms in the Tizi Ouzou region, to detect contaminating microorganisms—mainly *Bacillus cereus* and *Staphylococcus aureus*—and to evaluate their antibiotic resistance profile and biofilm formation capacity. Milk samples were collected under strict hygiene measures and transported to the laboratory in compliance with proper transport conditions. Upon arrival, microbiological analyses were performed the same day. Initial enrichment followed by identification of macroscopic, microscopic, and biochemical characteristics was carried out in the first days, and confirmation of identification was performed using MALDI-TOF MS.

The antibiotic resistance profiles of the isolated strains were assessed using the disk diffusion (antibiogram) method, and biofilm formation was evaluated using a 96-well microplate assay.

Results showed that out of approximately one hundred samples—72 from cows and 28 from goats—76% tested positive for contaminating microorganisms. Among the isolated and identified *S. aureus* strains, 8% were MRSA (methicillin-resistant Staphylococcus aureus), and 100% demonstrated moderate to strong biofilm-forming ability. Regarding *B. cereus*, 11% were multidrug-resistant and 100% also exhibited moderate to strong biofilm formation capacity.

The use of an essential oil extracted from *Thymus algeriensis* yielded promising antibacterial results. Chromatographic analysis revealed thymol as the dominant compound. The essential oil inhibited the growth of 50% of MRSA strains and 80% of multidrug-resistant Bacillus cereus strains; however, its effect on biofilm formation was less pronounced.

These findings highlight that, in these farms, animals are frequently exposed to excessive antibiotic administration, leading to a progressive increase in antibiotic resistance over the years. Moreover, this issue is now recurrent in the agri-food industry, where such contaminants pose risks to public health and result in significant economic losses.
KEYWORDS: *row milk, contaminant, Bacillus cereus, essential oils*

POSTER N° : 76.

PROCESSING AND RECOVERY METHODS OF BIOACTIVE COMPOUNDS FROM SEEDLESS CAROB (*CERATONIA SILIQUA* L.) PULP

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Abstract:
Seedless carob pulp, a by-product of carob powder production, is rich in bioactive compounds but often discarded. Thus, efficient sample preparation and extraction methods are essential to recover natural antioxidants for nutraceutical and cosmetic applications.
Pulp was freeze-dried and ground to increase surface area. Four extraction methods were evaluated: maceration, ultrasound-assisted extraction (UAE), maceration followed by UAE, and UAE followed by maceration. Solvents tested included water, 70% ethanol, and 96% ethanol. UAE was optimized by varying sonication time (10–40 min). Extracts were assessed for yield, total polyphenol content (TPC), total flavonoid content (TFC), and antioxidant activity. Polyphenolic profiles were analyzed by UPLC-DA for detailed characterization.
UAE was the most efficient extraction technique. 70% ethanol and water gave the highest yields, with UAE for 30 min in 70% ethanol achieving the highest TPC (10.64 mg GAE/g DM) and flavonoid content. Extracts displayed notably strong antioxidant activity and were biocompatible. Major polyphenols (vanillic acid, catechin, rutin, quercetin) were identified and showed strong significant molecular docking affinity to antioxidant targets.
Optimized sample preparation and UAE extraction allow efficient and effective recovery of bioactive compounds from carob pulp. These techniques support the valorization of agro-industrial by-products into high-added-value natural antioxidants for nutraceutical and cosmetic applications.

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POSTER N° : 77.

OPTIMIZATION STUDY USING CENTRAL COMPOSITE DESIGN: EFFECT OF POTASSIUM SORBATE ON RAW MILK MICROBIOLOGICAL QUALITY

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Abstract:
The use of natural preservatives such as potassium sorbate has gained increasing attention as a strategy to control microbial growth in raw milk and extend its shelf life. This study investigated the antimicrobial efficacy of potassium sorbate in raw cow's milk using a central composite design. Microbiological responses were evaluated as logarithmic reductions in total bacterial count, coliforms, aerobic spores, psychrotrophic bacteria, yeasts, and molds. The optimal microbial reductions achieved were 4.8 log for total bacteria, 2 log for coliforms, 4.8 log for psychrotrophic flora, 1 log for spores, and 0.5 log for yeasts and molds. These effects were obtained at potassium sorbate concentrations of 0.1–0.2% after incubation at 4 °C for 4 h 40 min. The antimicrobial action varied among microbial groups and increased with both sorbate concentration and incubation time. Overall, potassium sorbate significantly reduced foodborne microorganisms while maintaining raw milk quality, underscoring its potential as an effective preservation strategy to enhance the safety, stability, and marketability of dairy products.

KEYWORDS: *Potassium sorbate; Incubation time; Milk Quality; Antibacterial effect; Total bacteria count*

POSTER N° : 78.

KOMAGATAELLA PHAFFII AS A PLATFORM FOR HETEROLOGOUS EXPRESSION OF ENZYMES

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Abstract:

Komagataella phaffii has gained recognition as a versatile platform for recombinant protein production, with applications covering biopharmaceuticals, industrial enzymes, food additives, etc. Its advantages include high-level protein expression, moderate post-translational modifications, high-density cultivation, and cost-effective methanol utilization. Nevertheless, it still faces challenges for the improvement of production efficiency and extension of applicability.

In spite of a number of obvious advantages of this yeast as host cell, there are some limitations on their use as expression systems, for example, inefficient secretion, misfolding, hyperglycosylation, and aberrant proteolytic processing of proteins. Currently, the *K. phaffii*-based expression system is one of the most popular for the production of heterologous proteins. Along with the low secretion of endogenous proteins, *K. phaffii* efficiently produces and secretes heterologous proteins in high yields, thereby reducing the cost of purifying the latter. Different approaches and technological solutions for the efficient expression of recombinant proteins in *K. phaffii*, mainly based on the example of enzymes used for the feed industry must be executed for various biotechnological applications.

KEYWORDS: *Komagataella phaffii, protein expression regulation, advanced methods, biotechnology applications*

POSTER N° : 79.

IMPLEMENTATION OF AN OPTIMIZED FERMENTATION PROCESS FOR THE LARGE-SCALE PRODUCTION AND STABILIZATION OF PROBIOTIC STRAINS

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Abstract: The probiotic sector is a highly dynamic and promising market. In this context, the main objective of this study was to develop an industrial-scale production process for the life of two probiotic strains: *Bacillus* clausii and Saccharomyces *boulardi*i to obtain a stable, marketable, and dehydrated final product. To achieve this, the composition of the culture medium was investigated to determine how different carbon and nitrogen sources influence the strain's growth kinetics. Additionally, the efficiency of various cryoprotectants used in encapsulation was examined to produce stable, lyophilized biomass forms. Batch kinetic analysis established a specific growth rate of 0,62 h^{-1} and a biomass yield of approximately $6{,}210^{6}$ufc/g COT for Bacillus clausi and specific growth rate of 0.28 h^{-1} and a biomass yield of 50% for Saccharomyces *boulardi*i . The encapsulation study highlighted the critical importance of incorporating a cryoprotectant during lyophilization to maximize cell viability. Starch proved to be the most effective agent, achieving a strain survival rate of 90% in the dried product while maintaining high viable cell counts.

This study successfully set ways needed to make live and dried Saccharomyces boulardii through and Bacillus clausi freeze-drying on a half-workroom scale. Still, further searching with greater-sized brewing vats is bidden, and finding a cheaper, more cost-wise food-bed stays a foremost goal.

KEYWORDS: Probiotic*, fermentation, dried cell, fermentation, cryo-protecteur*

POSTER N° : 80.

DIVERSITY OF RESISTANCE IN TWELVE FABA BEAN (VICIA FABA MINOR) VARIETIES AGAINST FIVE AERIAL AND ROOT PATHOGENS: FROM BIOMETRIC SCREENING TO OXIDATIVE STRESS BIOCHEMISTRY

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Abstract: Faba bean (*Vicia faba M.*) is an important legume crop frequently threatened by several phytopathogenic fungi, leading to significant yield losses. This study aimed to evaluate the diversity of response of twelve faba bean varieties against five aerial and roots fungal pathogens. In a first step, biometric traits and dry weight were assessed to determine the impact of fungal infection and identify contrasting varieties in terms of tolerance and susceptibility. Considerable variability was observed among the tested genotypes, revealing differential responses to pathogen stress. Based on these findings, the most resistant and the most susceptible varieties were selected for biochemical investigations to better understand the mechanisms involved in tolerance. Oxidative stress markers and antioxidant enzyme activities, including H_2O_2, MDA, SOD, CAT, and GPOX, were analyzed. The results provide insights into the physiological and biochemical mechanisms associated with fungal stress tolerance and may contribute to future breeding strategies for disease-resistant faba bean varieties.

***KEYWORDS**:* Faba bean (*Vicia faba M.*), phytopathogenic fungi, biotic stress, disease resistance, genotypic variability, oxidative stress, antioxidant enzymes.

POSTER N° : 81.

IMPROVEMENT OF CHEMLALI OLIVE OIL QUALITY BY BLENDING WITH CHETOUI AND SAYALI CULTIVARS

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In order to improve the quality of Chemlali olive oil (the dominant Tunisian olive oil variety), blending with two different monovarietal oils in various proportions was carried out. Results showed that blended oils had an improved oil composition compared to that of Chemlali. In fact, the highest percentage of Chetoui and Sayali olive oils (60% of blending) can reduce the acidity up to 65.39% and 76.73%, respectively. At 40% blending, oleic acid increased from 57.52% to 65.62%, while palmitic acid decreased from 18.51% to 15.35% when mixed with Sayali olive oil. At the lowest percentage (20%), chlorophylls in Chemlali olive oil underwent an increase (from 3.09 to 3.42 mg kg^{-1}). The amount of carotenoids was higher when Chemlali was blended by 40% with Chetoui olive oil (from 1.46 to 1.67 mg kg^{-1}). The blending process improved the amount of phenolic compounds. At 40%, Blending with Chemlali olive oil underwent a significant increase from 307.81 to 708.35 mg kg^{-1}. Bending can be used in industrial applications to provide oils with improved composition related to stability, nutrition and functionality and endowed with the characteristics requested by consumer's preferences.

Keywords: Blending, Chemlali× Chetoui, Chemlali× Sayali, Quality

POSTER N° : 82.

APPLICATION OF A MIXTURE OF PROBIOTICS STRAINS IN THE PRESERVATION OF FRESH SAUSAGES

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Abstract: This study investigated the effects of partially or completely replacing nitrite with a cocktail of probiotic strains TN8 and TN9, isolated from the chicken gastrointestinal tract, on the textural, sensory, microbiological, and physicochemical properties, as well as the oxidative stability, of fresh sausages during refrigerated storage at 4 °C. The results demonstrated that complete nitrite substitution with the TN8–TN9 mixture significantly enhanced the textural properties of the sausages, including hardness, cohesiveness, chewiness, adhesiveness, and elasticity, while maintaining their physicochemical characteristics and color stability. In addition, the reformulated sausages exhibited improved oxidative and microbiological stability throughout storage, reflecting the pronounced antioxidant and antimicrobial activities of TN8 and TN9. Sensory evaluation performed by a panel of 20 assessors further indicated that sausages produced with complete nitrite replacement achieved superior texture, aroma, and overall acceptability compared with the control formulation.

KEYWORDS: Probiotics, Nitrite, Fresh sausages, Preservation, Oxidation, Microbial stability.

POSTER N° : 83.

CHARACTERISATION OF PESTICIDE-TOLERANT BACTERIA: COMPARATIVE KINETIC OF PESTICIDE USE AS CARBON SOURCE UTILIZATION EFFECIENCY

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Abstract : The excessive use of pesticides in agriculture represents a major environmental issue due to their persistence and toxicity in soils. In this study, 115 bacterial isolates were evaluated for their tolerance to 14 commercial pesticides at the recommended agricultural concentration. Ten strains tolerant to Scatto, Vivando, Charter, and Macotape were selected and further analyzed using spot assay and direct growth methods. Six strains were subsequently retained to investigate their ability to use pesticides as the sole carbon source in a liquid minimal medium containing three pesticide concentrations during a five-day growth kinetics study. Strain 6 exhibited the highest growth performance under all tested conditions. Plant growth-promoting activities and molecular identification by sequencing were also performed. These findings highlight the biotechnological potential of strain 6 for the bioremediation of pesticide-contaminated soils.

KEYWORDS: pesticide tolerance, biodegradation, bioremediation, growth kinetics, bacterial sequencing.

POSTER N° : 84.

PROCESSING AND RECOVERY METHODS OF BIOACTIVE COMPOUNDS FROM SEEDLESS CAROB (*CERATONIA SILIQUA* L.) PULP

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Seedless carob pulp, a by-product of carob powder production, is rich in bioactive compounds but often discarded. thus, efficient sample preparation and extraction methods are essential to recover natural antioxidants for nutraceutical and cosmetic applications.

pulp was freeze-dried and ground to increase surface area. four extraction methods were evaluated: maceration, ultrasound-assisted extraction (UAE), maceration followed by uae, and UAE followed by maceration. solvents tested included water, 70% ethanol, and 96% ethanol. UAE was optimized by varying sonication time (10–40 min). extracts were assessed for yield, total polyphenol content (tpc), total flavonoid content (tfc), and antioxidant activity. polyphenolic profiles were analyzed by uplc-da for detailed characterization.

UAE was the most efficient extraction technique. 70% ethanol and water gave the highest yields, with uae for 30 min in 70% ethanol achieving the highest tpc (10.64 mg gae/g dm) and flavonoid content. extracts displayed notably strong antioxidant activity and were biocompatible. major polyphenols (vanillic acid, catechin, rutin, quercetin) were identified and showed strong significant molecular docking affinity to antioxidant targets.

optimized sample preparation and uae extraction allow efficient and effective recovery of bioactive compounds from carob pulp. these techniques support the valorization of agro-industrial by-products into high-added-value natural antioxidants for nutraceutical and cosmetic applications.

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POSTER N° : 85.

USING PLANT EXTRACTS TO IMPROVE SEWAGE SLUDGE DEWATERING

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Abstract: The present study investigates the use of plant extracts, specifically from cactus, Aloe vera, moringa, date pits, and potato peels, as natural bioflocculants for sewage sludge dewatering. This approach offers an alternative to synthetic chemical polymers such as polyacrylamide, which pose neurotoxic and carcinogenic risks. The sludge used in this study was obtained from the Agareb wastewater treatment plant in Sfax. The plant extracts were dried, ground, and then analyzed to determine their composition in proteins, lipids, sugars, etc. Flocculation tests (Jar test) were carried out to compare the efficiency of the bioflocculants with that of polyacrylamide. The results show that moringa, *Aloe vera*, and cactus significantly improve the settling velocity, reduce the turbidity of the supernatant (below 45 NTU), and increase the dryness of the sludge, with performances close to those obtained with synthetic polymer. In contrast, date pits and potato peels proved to be less effective. The study concludes that bioflocculants, especially cactus, which is widely available in Tunisia, represent a viable, economical, and ecological alternative for sludge conditioning. This approach enables the agricultural reuse of the treated sludge without adverse environmental impacts.

KEYWORDS: *bioflocculant, cactus, Aloe vera, moringa, date pits, potato peels, sludge dewatering*

POSTER N° : 86.

DEVELOPMENT AND EVALUATION OF A *CORCHORUS OLITORIUS* POLYSACCHARIDE CREAM FOR THE TREATMENT OF INFECTED DIABETIC WOUNDS

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Abstract: Diabetic wounds infected with *Pseudomonas aeruginosa* are difficult to treat due to delayed tissue regeneration and increased microbial resistance. This study investigated the extraction, characterisation, and therapeutic potential of hetero-polysaccharides obtained from *Corchorus olitorius* leaves and formulated into a topical cream for the healing of *P. aeruginosa*-infected wounds in diabetic rats. The hetero-polysaccharide were extracted from *Corchorus olitorius* using hot-water extraction and characterized.
The extracted polysaccharides were incorporated into cream formulations and evaluated for stability, viscosity, and wound-healing efficacy. The cream demonstrated significant antibacterial activity against *P. aeruginosa* and promoted accelerated wound contraction, collagen deposition, fibroblast proliferation, and epithelialisation in diabetic wound models. Treated wounds also showed reduced inflammation and improved tissue regeneration compared with untreated control.
The results suggest that *C. olitorius*-derived hetero-polysaccharide cream formulations possess promising antimicrobial and wound-healing properties and may serve as effective natural therapeutics for managing infected diabetic wounds.

KEYWORDS: *heteropolysaccharide, cream formulation, wound infection*

POSTER N° : 87.

ECO-FRIENDLY PRETREATMENT OF EXHAUSTED OLIVE POMACE USING ALKALINE HYDROGEN PEROXIDE FOR ANIMAL FEED APPLICATIONS

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Abstract: Due to the rising increase in animal feed costs, the search for sustainable and low-cost alternative feed resources has become increasingly important. This study investigated the effectiveness of alkaline hydrogen peroxide (AHP) pretreatment as a simple and non-toxic technology to improve the in vitro ruminal digestibility of exhausted olive pomace (EOP), an abundant agro-industrial by-product, for its potential use as animal feed.
The study also evaluated the efficiency of the pretreatment in reducing toxic phenolic compounds and limiting lipid oxidation in EOP. Process optimization was carried out using a central composite experimental design. Under the optimized conditions (1.6% H_2O_2 and 5% NaOH), the phenolic content of treated olive pomace (TOP) decreased significantly to 1.51 ± 0.03 mg/100 g dry weight (DW), compared with 4.91 ± 0.06 mg/100 g DW in untreated EOP. Approximately 25% lignin removal was achieved after pretreatment.
Chemical characterization revealed significant improvements in the nutritional composition of TOP. Crude protein, neutral detergent fiber (NDF), and acid detergent fiber (ADF) contents reached 3.320 ± 0.05, 75.24 ± 0.23, and 54.05 ± 0.35 g/100 g DW, respectively, showing notable enhancement compared with untreated EOP. Enzymatic hydrolysis using a cellulase-based cocktail (Celluclast, 15 FPU/g DW) resulted in a reducing sugar yield of 48% for TOP versus 33% for untreated EOP.
These findings demonstrate that alkaline hydrogen peroxide pretreatment is an effective strategy for the detoxification and enhancement of olive pomace digestibility. This straightforward and eco-friendly approach highlights the potential valorization of treated olive pomace as a promising alternative feedstock for animal nutrition.

KEYWORDS: *Olive pomace, Detoxification, Alkaline hydrogen peroxide, Pretreatment, Animal feed*

POSTER N° : 88.

TDNF-YA2A-1 TRANSCRIPTION FACTOR CONFERS SALT AND OSMOTIC STRESS TOLERANCE IN TOBACCO THROUGH REGULATION OF THE ANTIOXIDANT DEFENSE SYSTEM

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Abstract : NF-YA1 (nuclear factor Y, subunit A1) is a key transcription factor that participates in the regulation of plant growth and stress responses. In plants, NF-YA proteins are encoded by multigene families and play crucial roles in controlling gene expression related to develop-ment, metabolism, and adaptation to environmental constraints. Therefore, *NF-YA* transcrip-tion factors are considered promising targets for improving plant tolerance to abiotic stress. In our previous study, we demonstrated that *TdNF-YA2A-1* transcripts from durum wheat are induced by various abiotic stressors, and that heterologous expression of this gene enhances stress tolerance in yeast. Herein, we functionally investigated its role in transgenic tobacco. RT-qPCR analysis demonstrated that *TdNF-YA2A-1* expression was differentially regulated in durum wheat tissues subjected to salt (150 mM NaCl), osmotic (10% PEG 8000), and oxidative (10 µM H_2O_2) stresses. Transgenic *TdNFY-YA2A-1*-overexpressing tobacco lines exhibited enhanced tolerance to both salt and osmotic stress relative with non-transgenic (NT) plants. This enhanced tolerance was correlated with a reduction in oxidative damage and the upregulation of several stress-responsive genes involved in antioxidant defense and stress signaling. Taken together, our results suggest that *TdNF-YA2A-1* is a promising candi-date gene for developing crops with improved tolerance to salt and osmotic stresses.

KEYWORDS: *Triticum turgidum*; *TdNF- YA2A-1 gene*; salt tolerance; osmotic tolerance; oxidative stress; transgenic tobacco.

POSTER N° : 89.

CHEMICAL COMPOSITION OF ESSENTIAL OIL FROM THE MEDICINAL PLANT *ORIGANUM MAJORANA* (SWEET MARJORAM) AND ITS PROMISING ANTIBACTERIAL ACTIVITY AGAINST PATHOGENIC BACTERIA

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Abstract: *Origanum majorana* L., commonly known as sweet marjoram, is an aromatic medicinal plant widely used in traditional and folk medicine to treat various ailments, including gastrointestinal, ocular, nasopharyngeal, respiratory, cardiac, rheumatologic, and neurological disorders. This study aimed to characterize the chemical composition and evaluate the antibacterial activity of its essential oil against selected pathogenic bacteria. The essential oil was extracted by hydrodistillation using a Clevenger apparatus and analyzed by gas chromatography-mass spectrometry (GC-MS). Antibacterial activity was assessed using the agar disc diffusion method against Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, and Acinetobacter baumannii. Chemical analysis revealed a predominance of oxygenated monoterpenes, with terpinen-4-ol (24.16%), γ-terpinene (14.61%), and α-terpinene (8.27%) as the major constituents. The essential oil showed notable broad-spectrum antibacterial activity against all tested strains, with Gram-positive bacteria exhibiting greater susceptibility than Gram-negative bacteria. This differential sensitivity may be due to structural differences in bacterial cell walls. These findings highlight the potential of the essential oil extracted from this perennial bushy plant as a natural antimicrobial agent.

Keywords: *Origanum majorana*; Essential oil; Chemical composition; Antibacterial activity; Pathogenic bacteria

POSTER N° : 90.

MULTISCALE ANALYSIS OF CAMEL MILK ENRICHED WITH DATE SEED FRACTIONS USING TD-NMR AND RHEOLOGY

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Abstract: This study explores the multiscale structural and rheological modifications in camel milk induced by the incorporation of date seed powder (DSP) and fibro-protein extracts obtained by alkaline–isoelectric extraction (E-CH) and ultrasound-assisted extraction (E-US). A combined approach using FTIR spectroscopy, Solid Echo, TD-NMR relaxometry (T_1, T_2), apparent diffusion coefficient (ADC), and rheology was applied. FTIR analysis showed that extraction techniques modified date seed structure, including polysaccharide breakdown, protein rearrangement, and lipid reduction, especially in E-US. Solid Echo using TD-NMR revealed a decrease in second moment (M_2), indicating lower crystallinity and increased amorphous character after the extraction procedure. TD-NMR results indicated that camel milk has naturally limited water mobility, which was further affected by enrichment. The alkaline extract (E-CH) caused the strongest decrease in T_2 values, reflecting stronger interactions with milk proteins and a more compact structure. In contrast, E-US exhibited non-uniform hydration behavior, with coexistence of strongly confined and more mobile water, indicating partial and heterogeneous restructuring. ADC measurements confirmed a concentration-dependent decrease in diffusion. DSP induced the strongest reduction through a physical fibrous network limiting mobility, while E-CH acted mainly through molecular interactions, and E-US showed intermediate behavior. Rheological analysis showed non-Newtonian, pseudoplastic behavior in all samples, with increased viscosity and shear stress after enrichment.

KEYWORDS: *Date seed, Camel milk, TD-NMR, Rheology*

POSTER N° : 91.

BIOGAS BASED SOLUTION FOR COMMON DATES (PHOENIX DACTYLIFERA L.) VALORIZATION.

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The Tunisian second-grade date cultivar Kenta generates substantial amounts of low-value biomass that are largely discarded during harvesting, processing, and storage, leading to both economic losses and environmental concerns. This by-product remains insufficiently explored as a renewable resource for biotechnological and bioenergy applications. In the present study, discarded Kenta dates were biochemically characterized and valorized through an integrated biorefinery approach. The date flesh was found to contain high levels of soluble sugars (79.5 ± 0.8% VS) and fibers (7.4 ± 0.5% VS). Soluble sugars were selectively recovered by aqueous extraction for the production of date syrup, while the remaining fibrous fraction was further evaluated as a substrate for anaerobic digestion. Biochemical analysis of this residual fraction revealed appreciable carbohydrate (33.2 ± 0.7% VS) and protein (8.8 ± 0.1% VS) contents, confirming its suitability for methane production. The proposed process enabled the co-production of a high-value date syrup, with a sugar recovery yield of 0.6 g sugars/g VS, and biogas, achieving a maximum methane yield of 225 mL CH_4/g VS of fibers. Overall, this study highlights the potential of discarded Kenta dates as a renewable feedstock for integrated valorization and demonstrates the feasibility of an efficient and sustainable bioconversion strategy aligned with circular bioeconomy principles.

POSTER N° : 92.

NATURAL STABILIZATION OF SOYBEAN OIL USING *NANNOCHLOROPSIS GADITANA* BIOMASS: OXIDATIVE PROTECTION AND MOLECULAR DOCKING INSIGHTS

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Abstract: The application of microalgal biomass as a natural additive offers a sustainable route for enhancing the stability and functional properties of vegetable oils. This study investigates the impact of *Nannochloropsis gaditana* biomass (LIPMB-INSAT) on the oxidative stability of soybean oil and explores the inhibitory potential of its signature pigments against lipase. Oxidative stability was evaluated using the Rancimat method, comparing pure soybean oil with oil enriched with 5% (w/w) lyophilized microalgal biomass. The results demonstrated a significant protective effect, as the induction time increased from 6.21 to 8.65 hours, representing a 39% improvement in oxidative resistance. To understand the molecular interactions between the algal components and lipid-degrading enzymes, molecular docking was performed using Schrödinger Maestro against lipase. Among the analyzed pigments, vaucheriaxanthin achieved a superior docking score of -8.507 kcal/mol, theoretically outperforming the reference inhibitor Orlistat (-7.251 kcal/mol). 2D interaction mapping revealed that vaucheriaxanthin forms robust hydrogen bonds with key residues Phe77 and Thr21, effectively locking the enzyme's catalytic site. In contrast, beta-carotene (-7.001 kcal/mol) exhibited a strong non-polar affinity, acting as a hydrophobic plug within the catalytic pocket. Its interaction was characterized by extensive van der Waals contacts with residues such as Leu213, Val210, and Trp252, which stabilize the long polyene chain across the enzyme's active site entrance. These findings suggest that N. gaditana biomass acts as a natural stabilizer, where its carotenoid profile provides both chemical protection against oxidation and a significant capacity for lipase inhibition, supporting its use as a multi-functional ingredient for the development of stable and nutritionally enhanced food lipid systems

KEYWORDS: *Nannochlorepsis gaditana, lipase, docking, oxidative stability*

POSTER N° : 93.

NATURAL BIOHERBICIDAL POTENTIAL OF *GLOBULARIA ALYPUM*: PHYTOCHEMICAL PROFILE, ANTIOXIDANT CAPACITY, AND OXIDATIVE RESPONSES

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Abstract : Leaf extracts of Globularia alypum were evaluated for their phytochemical composition, antioxidant activity, and allelopathic potential. Methanolic extracts exhibited a higher extraction yield and significantly greater phenolic and flavonoid contents than aqueous extracts, resulting in stronger radical-scavenging activity. The allelopathic effects of aqueous leaf extracts were assessed on Phalaris canariensis and Raphanus sativus seedlings exposed to increasing extract concentrations (0–125 g L^{-1}) for seven days. Germination and seedling growth were inhibited in a concentration-dependent manner, with canary grass showing markedly greater sensitivity than radish. At 125 g L^{-1}, germination inhibition reached nearly complete suppression in canary grass, whereas radish maintained partial tolerance at low and moderate concentrations. The phytotoxic effects were associated with enhanced oxidative stress, characterized by increased hydrogen peroxide accumulation, lipid peroxidation, and NADPH-oxidase activity. High extract concentrations also caused substantial reductions in antioxidant enzyme activities, including ascorbate peroxidase, monodehydroascorbate reductase, and glutathione reductase, leading to disruption of cellular redox homeostasis. In contrast, radish seedlings preserved a relatively stable antioxidant balance under moderate treatments. These findings demonstrate the selective allelopathic activity of Globularia alypum and highlight its potential as a natural source of bioherbicidal compounds for sustainable weed management strategies.

KEYWORDS: *Allelopathy; Antioxidant system; Bioherbicide; Oxidative stress; Phenolic compounds; Sustainable agriculture.*

POSTER N° : 94.

VALORIZATION OF GRAPE POMACE: EXTRACTION AND COSMETIC APPLICATIONS OF GRAPE SEED OIL

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Abstract : Grape pomace, a major by-product of the wine industry, represents an abundant source of bioactive compounds, particularly phenolic compounds with significant antioxidant and skin-protective properties. However, the large quantities of this agricultural waste generated during winemaking raise environmental concerns. Therefore, the valorization of grape pomace has become an important approach within the framework of sustainable development.
The objective of this work is to describe the extraction process of grape seed oil, highlight its bioactive composition, and evaluate its potential application in cosmetic formulations. Grape seeds were first dried and properly stored to preserve their quality, followed by oil extraction. The main phenolic compounds identified in grape pomace include gallic acid, catechin, epicatechin, and quercetin, known for their antioxidant and anti-aging activities, particularly through the inhibition of collagenase and elastase enzymes.
The results show that grape pomace is composed of approximately 25% seeds, 25% stems, and 50% skins. The fatty acid profile of the extracted grape seed oil revealed a high content of polyunsaturated fatty acids (69.9 g/100 g), mainly linoleic acid (69.6 g/100 g), along with monounsaturated fatty acids (16.1 g/100 g), predominantly oleic acid (15.8 g/100 g), and saturated fatty acids (9.6 g/100 g), including palmitic (6.7 g/100 g) and stearic acids (2.7 g/100 g). Minor amounts of palmitoleic (0.3 g/100 g) and α-linolenic acids (0.1 g/100 g) were also detected. Additionally, the oil exhibited a significant content of vitamin E (28.8 mg/100 g), while trans fatty acids and vitamin K were not detected. The extracted oil was successfully incorporated into cosmetic formulations, demonstrating its potential as a natural active ingredient.
These results suggest that grape seed oil could serve as a multifunctional cosmetic ingredient combining antioxidant protection and emollient properties, enhancing skin health benefits in final formulations
In conclusion, the use of grape pomace contributes to the development of sustainable and eco-friendly products while reducing environmental impact. This approach also supports the expansion of the value chain of grape-derived products.

Keywords : *Grape pomace; Grape seed oil; Sustainable valorization, bioactive compounds, Phenolic compounds, Antioxidant activity, Cosmetic applications, formulations, Fatty acid profile, Anti-aging*

POSTER N° : 95.

DEVELOPMENT OF ACTIVE BIODEGRADABLE FILM BASED ON CAROTENOIDS FROM *PAVLOVA* SP.

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Abstract: In the present study, active biodegradable films based on a gelatin-sodium alginate incorporated with a carotenoid extract derived from *Pavlova* sp. (CEP) were developed. Firstly, the culture conditions for carotenoid production by *Pavlova* sp. were optimized using response surface methodology (RSM), followed by an assessment of antioxidant and antimicrobial properties of CEP. Films were then prepared with varying concentrations of CEP to evaluate their physical parameters, biological activities, and efficacy in strawberry preservation. All formulated films were completely biodegradable within 10 days of burial in soil. Furthermore, the incorporation of CEP significantly enhanced both the physical properties and antioxidant capacity of the films in a dose-dependent manner. When applied to strawberry packaging, the CEP-enriched films effectively minimized moisture loss and delayed microbial growth in strawberries stored at 25 °C during four days. These findings demonstrate the potential of the developed films to extend the shelf life of strawberry fruits.

Keywords : *Microalgae; Pavlova sp.; carotenoids; packaging films*

POSTER N° : 96.

EFFECT OF DRYING TEMPERATURE AND ACETIC ACID/FREEZING PRETREATMENTS ON THE DRYING KINETICS OF OPUNTIA FICUS-INDICA PEELS: A COMPARISON OF THIN-LAYER AND ARTIFICIAL NEURAL NETWORK MODELS

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Abstract: This study focuses on the valorisation of Opuntia ficus-indica peels using a drying process at four different temperatures (50, 60, 75, and 85 °C) combined with acetic acid and freezing pretreatment in order to optimize the drying conditions while reducing energy consumption. The experimental results showed that moisture removal occurred entirely in the falling-rate period, indicating that the drying process was governed by internal moisture diffusion. Increasing the drying temperature significantly accelerated the drying rate and reduced the total drying time, with reductions ranging from 8.64–17.39% for acetic acid pretreated peels, 23.46–36.70% for frozen peels and 28.39–39.45% for peels subjected to combined freezing and acetic acid pretreatment compared to untreated peels. Additionally, moisture diffusion increased with the drying temperature and applied pretreatments. The effective moisture diffusivity, estimated using Fick's second law, was ranging from 5.7×10^{-8} m².s⁻¹ to 12×10^{-7} m².s⁻¹, from 7.1×10^{-8} m².s⁻¹ to 14.4×10^{-7} m².s⁻¹ and 8.3×10^{-8} m².s⁻¹ to 15.4×10^{-7} m².s⁻¹ for acetic acid pretreated peels, frozen peels and combined freezing and acetic acid pretreatment, respectively. These results demonstrate that freezing and acetic acid pretreatment effectively enhance mass transfer during drying by reducing the energy barrier for moisture diffusion. Moreover, thin-layer and artificial neural network (ANN) modelling were investigated, finding that both methods produce highly accurate moisture-ratio prediction during the drying process. Nevertheless, the ANN model stands out as a superior prediction tool since it is adapted for analyzing all data simultaneously using different inputs.

Keywords: *Opuntia ficus-indica peel waste, convective drying, pretreatment, effective moisture diffusivity, thin-layer modelling, artificial neural network (ANN).*

POSTER N° : 97.

SEED PRIMING IMPROVES GROWTH AND YIELD OF FENUGREEK UNDER MEDITERRANEAN FIELD CONDITIONS IN TUNISIA AND GREECE

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Abstract: Orphan legumes such as Fenugreek (*Trigonella foenum graecum* L.) are climate-resilient and nutritionally valuable crops with strong potential to support sustainable agriculture and food security in Mediterranean regions increasingly affected by drought and soil degradation. This study investigated the effects of seed priming on fenugreek growth and yield under field conditions in Tunisia and Greece, with the aim of identifying practical strategies to improve crop establishment and productivity in semi-arid environments.

Field experiments were conducted in Agareb (Sfax), Tunisia, and the Fthiotida region of Central Greece using a randomized complete block design with three replications. Two fenugreek varieties, Tborsek and Rhyane, were assigned to the main plots and subdivided into four priming treatments: Untreated control (T1), Hydro-priming (T2), Biopriming (T3), and Hydro-biopriming (T4). Agronomic and biometric parameters, including field emergence, shoot and root length, leaf development, flowering, nodulation, pod number, fresh and dry biomass, and seed yield, were evaluated to assess crop performance under Mediterranean field conditions.

In the Tunisian trial, seed priming treatments significantly improved crop establishment and growth, with increases exceeding 10% for most measured traits. Hydropriming enhanced seed emergence, shoot and root growth, biomass accumulation, and reproductive performance, including pod and seed production. Biopriming positively affected vegetative growth and yield traits, while hydro-biopriming produced the most consistent improvements across biomass and yield-related parameters. Similar trends were observed in the Greek trial, where all priming treatments promoted plant development and productivity. Hydropriming improved plant height, biomass accumulation, and yield components, whereas biopriming enhanced both vegetative and reproductive traits. Hydro-biopriming resulted in the highest overall performance in terms of plant growth, biomass production and yield.

In conclusion, seed priming, particularly hydropriming, proved to be an effective, low-cost strategy for improving fenugreek establishment, growth, and productivity under Mediterranean field conditions. These findings highlight the potential of priming technologies to enhance the resilience of orphan legumes to drought stress and to support sustainable crop production in semi-arid agroecosystems.

KEYWORDS: *Fenugreek, Seed priming, Hydropriming, Mediterranean agroecosystems*

POSTER N° : 98.

STUDY OF THE PROBIOTIC AND PREBIOTIC POTENTIAL OF LACTIC BACTERIA

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Abstract: This study examines some probiotic characteristics of TN8 and TN9 strains isolated from the gastrointestinal tract of poultry and LC38 strain isolated from Tunisian camel milk.Several probiotic characteristics of these *Lactobacillus plantarum* strains were evaluated, including their survival under simulated gastrointestinal conditions, tolerance to 4% phenol, adhesion capacity to intestinal epithelial cells, and antibiotic susceptibility. In addition, the hemolytic, antimicrobial, antioxidant, and antifungal activities of the probiotic strains were assessed.The obtained results demonstrated that strains TN8, TN9, and LC38 maintained high viability after 6 h of incubation across a pH range of 2–6 and in the presence of bile salt concentrations of 0.1%, 0.3%, 1%, 2%, and 3%. Furthermore, the strains exhibited high hydrophobicity percentages in the presence of toluene 90.19%, 87.95%, and 80.36%, respectively and chloroform 87.16%, 91.11%, and 89.69%, respectively, indicating strong adhesion potential. The three lactic acid bacterial strains also displayed variable antibacterial activities depending on the tested indicator strain. Moreover, they showed strong antioxidant activities, as confirmed by DPPH, ABTS, ferric reducing antioxidant power (FRAP), and β-carotene–linoleic acid assays.In another part of this work, exopolysaccharides produced by strain TN8 were purified through 65% ammonium sulfate precipitation followed by anion-exchange chromatography using DEAE-cellulose and subsequently characterized. GC–MS, HPLC, and CCM analyses revealed that the exopolysaccharide consisted mainly of glucose and galactose.

Keywords: lactic acid bacteria, probiotics, *Lactobacillus plantarum*, TN8, TN9, LC38, exopolysaccharides, antibacterial activity.

POSTER N° : 99.

SMART DRUG NANOCAPSULES FROM MICROBES AND THEIR DRUG DELIVERY

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Abstract: Microbial synthesis of nanoparticles has attracted growing attention as a sustainable and biologically driven alternative to conventional physicochemical routes. The inherent ability of microorganisms such as bacteria, fungi, and algae to reduce metal ions and stabilize the resulting nanoparticles through enzymatic and metabolite-mediated pathways enables the production of nanostructures with unique physicochemical and biological properties. The biosynthetic process is not only cost-effective and environmentally benign but also facilitates intrinsic surface functionalization that enhances stability and biocompatibility compared with chemically synthesized nanoparticles. In addition, the microbial approach provides opportunities for controlled nanoparticle morphology, tunable size, and surface charge modification key parameters influencing therapeutic efficacy. Nevertheless, current challenges such as scalability, yield optimization, and mechanistic standardization must be addressed to realize consistent production and clinical applicability. Recent advancements integrating molecular genetics, bioinformatics, and nanoengineering tools are improving our understanding of microbial metabolic pathways and their role in nanoparticles biosynthesis. Looking ahead, multidisciplinary collaborations involving microbiology, nanotechnology, and biomedical sciences are essential to translate microbial nanoparticle research from laboratory investigations to practical and industrial implementations, supporting a new generation of safe and sustainable nanomaterials.

Keywords: *Nanoparticles, Microbial synthesis, Drug delivery systems, Targeted drug delivery, Nano vaccines.*

POSTER N° : 100.

ISOLATION AND IN VITRO ASSESSMENT OF CHICKEN GUT STRAINS FOR PROBIOTIC POTENTIAL

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Abstract: Poultry production plays an important role in the economy of many countries. However, the rapid increase in broiler production in recent years has negatively affected profitability due to poor feed quality, excessive use of chemotherapeutic agents, and the emergence of diverse pathogens. In addition, the growing interest in the circular economy and sustainable agriculture has increased the need for biological alternatives such as probiotics. Previous studies have reported that bacteria isolated from the chicken gastrointestinal tract represent a promising source of potential probiotic strains. This study aimed to isolate and characterize potential probiotic bacteria from the intestines of healthy local poultry. The isolates were initially identified based on morphological and biochemical characteristics, followed by further evaluation of their probiotic properties, including autoaggregation, coaggregation, hydrophobicity, tolerance to acidic conditions and bile salts, antimicrobial activity, and safety assessment. The objectives of this study were to (i) isolate and identify bacteria from the intestines of healthy chickens, (ii) screen the isolates for potential probiotic properties, and (iii) evaluate their *in vitro* safety and functional characteristics.

The results revealed that several intestinal bacterial isolates exhibited promising probiotic properties. The selected strains demonstrated good tolerance to gastrointestinal-like conditions, significant antimicrobial activity against pathogenic microorganisms, and satisfactory safety profiles. These characteristics suggest their potential application as natural alternatives to antibiotics in poultry farming.

In conclusion, the chicken intestine represents a valuable source of beneficial bacteria with probiotic potential. The selected strains may contribute to improving poultry health and productivity while reducing dependence on antibiotics in poultry production systems, thereby supporting sustainable and eco-friendly poultry production practices.

Keywords: *Poultry, probiotics, intestinal bacteria, antimicrobial activity, acid and bile tolerance, antibiotic alternatives, sustainable agriculture, circular economy.*

POSTER N° : 101.

ARTIFICIAL INTELLIGENCE RENAISSANCE IN DRUG REPURPOSING FOR RARE DISEASES

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Abstract: Rare diseases affect millions of individuals worldwide, yet the vast majority still lack effective therapeutic interRare diseases collectively affect more than 300 million individuals worldwide, yet over 95% still lack approved disease-modifying therapies due to the high costs, long timelines, and elevated failure rates associated with conventional drug development. In this context, drug repurposing has emerged as a powerful and cost-effective strategy for accelerating therapeutic discovery by identifying new clinical applications for existing drugs. Recent advances in artificial intelligence (AI), multi-omics technologies, network medicine, and computational biology have fundamentally transformed the landscape of orphan drug development. Through an extensive litterature review, we synthesized data on contemporary drug repurposing strategies for rare diseases, tracing their evolution from serendipitous discoveries to mechanism-based, data-driven, and AI-enabled approaches. We critically examined the principal computational frameworks currently driving rare disease drug repurposing, including transcriptomic signature matching, machine learning and deep learning models,. Particular attention is given to the strengths, limitations, and translational potential of these methodologies in overcoming challenges associated with rare disease heterogeneity, limited patient populations, and fragmented biomedical data. Emerging technologies such as graph neural networks and explainable AI are also explored as next-generation solutions for precision therapeutic discovery. . Special emphasis is placed on the unique challenges and opportunities within North African populations, where high consanguinity rates and underrepresentation in global genomic databases highlight the urgent need for region-specific bioinformatics infrastructure and AI-driven precision medicine initiatives.As a conclusion, we highlighted the transformative role of AI-assisted drug repurposing in bridging the translational gap between computational prediction and clinical application. By integrating multi-omics data, systems biology, and advanced AI methodologies, modern repurposing frameworks offer a scalable and promising paradigm for accelerating therapeutic innovation in rare diseases and advancing precision medicine worldwide.

Keywords: Rare Diseases; Drug Repurposing; Artificial Intelligence;; Multi-Omics; Machine Learning; Knowledge Graphs; Molecular Docking; Precision Medicine, North Africa

POSTER N° : 102.

FROM WASTEWATER TO PEST CONTROL: CIRCULAR ECONOMY APPROACH FOR *BACILLUS THURINGIENSIS* BIOPESTICIDE PRODUCTION

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Bacillus thuringiensis (*Bt*) biopesticides represent an eco-friendly alternative to chemical pesticides due to their biodegradability, safety for humans and animals, compatibility with organic farming, and contribution to sustainable agriculture. However, the high cost of raw materials remains a major limitation for large-scale *Bt* biopesticide production. This study investigated the feasibility of using agro-food industrial wastewater as a low-cost fermentation medium for *Bt* production. Three wastewater samples (M1, M2, and M3) were characterized and used as a fermentation media for Bt biopesticide production. Wastewater composition analysis showed that M1 contained the highest levels of suspended solids, fats, organic matter, nitrogen, and phosphorus, while glucose was identified as the main carbohydrate at a concentration of 4 g/L. Bioprocess evaluation demonstrated that the nutrient composition of all effluents was sufficient to support Bt growth, sporulation, and delta-endotoxin synthesis, with the highest values obtained in M1, reaching 71×10^7 CFU/mL, 5×10^7 CFU/mL, and 690 mg/L, respectively. To enhance delta-endotoxin production, culture conditions were optimized using Central Composite Design, resulting in optimal conditions of pH 6.8 and solid contents of 40 g/L. Overall, this study highlights the potential of agro-food industrial wastewater as a sustainable and low-cost substrate for *Bt* biopesticide production within a circular economy framework. By valorizing wastewater into a value-added bioproduct, this approach simultaneously supports wastewater management and sustainable pest control.

Keywords: Biopesticides, Wastewater, *Bacillus thuringiensis*, Valorization

POSTER N° : 103.

GHEE–*PISTACIA LENTISCUS* L. SEED OIL FORMULATION: A BIOTECHNOLOGICAL APPROACH FOR WOUND HEALING

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Abstract

Natural lipid-based products represent promising resources for the development of biotechnological formulations intended for skin repair. Ghee and *Pistacia lentiscus* L. seed oil (PLSO) are traditionally associated with dermatological care and contain bioactive lipid components that may support tissue regeneration. This study aimed to evaluate the wound-healing potential of a topical formulation combining ghee and PLSO in an experimental excision wound model. Thirty-six female Wistar rats were divided into six groups: intact control, untreated wounded control, MEBO®-treated positive control, ghee ointment, PLSO ointment, and combined Ghee + PLSO ointment. Treatments were applied topically once daily for 18 days. Wound contraction was monitored over time, and healing quality was assessed through macroscopic observation, oxidative stress markers, histological examination, and antibacterial testing. The combined Ghee + PLSO formulation showed the most favorable healing profile compared with the untreated group and the single-treatment groups. It promoted faster wound closure, reaching almost complete contraction by day 18, and displayed improved global healing kinetics, as reflected by higher wound contraction performance and shorter time to advanced closure. Biochemically, the combined treatment reduced lipid peroxidation and restored antioxidant enzyme activities, including catalase and superoxide dismutase. Histological analysis confirmed enhanced re-epithelialization, better collagen organization, and reduced inflammatory infiltration. In addition, PLSO showed moderate antibacterial activity against tested bacterial strains. These findings suggest that the Ghee + PLSO formulation may represent a promising biotechnological approach for valorizing natural lipid resources in topical wound-healing applications.

Keywords: Ghee; *Pistacia lentiscus* L.; antibacterial activity; wound healing; oxidative stress.

POSTER N° : 104.

GENOMIC INSIGHTS INTO PLANT GROWTH-PROMOTING BACTERIUM *PSEUDOMONAS RHIZOPHILA* S211 REVEAL A MULTIFACETED ENTOMOPATHOGENIC ARSENAL CENTERED ON TYPE III SECRETION, INSECTICIDAL TOXINS, AND EXOENZYMES

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Abstract:
Chemical pesticides dominate agricultural pest control, but growing environmental and societal pressures demand sustainable biological alternatives. *Pseudomonas rhizophila* S211 stands out as a promising plant growth-promoting rhizobacterium (PGPR) and biocontrol agent against wheat fungal pathogens, acting as an effective biopesticide. This study unveils the genome of this novel entomopathogenic strain S211, revealing a rich repertoire of virulence factors that underpin its bio-insecticide potential. Key features include diverse insecticidal toxins (AB toxins with enzymatic and binding subunits, pore-forming toxins, RTX toxins), adhesins, invasins, exoenzymes (proteases, lipases), hydrogen cyanide synthases, and secondary metabolite pathways. Notably, S211 encodes all six bacterial secretion systems (I–VI), featuring a structurally characterized Type III secretion system (T3SS) injectisome homologous to *Yersinia* spp., enabling targeted effector delivery into insect cells to drive adhesion, invasion, and cytotoxicity. Genomic mapping of toxin complexes (e.g., TccA, TcdA4) and degradative enzymes further supports its insecticidal efficacy. This characterization positions *P. rhizophila* S211 as a versatile candidate for integrated pest management, underscoring the biocontrol potential of environmental isolates from contaminated soils. Future work will focus on functional validation and formulation of ecofertilizers integrated with smart compost for field applications. This work was conducted within the framework of the Green Impact Project T2P17 – COMPOSTINOV.

Keywords: *Pseudomonas rhizophila, Plant growth-promoting bacterium, Entomopathogenic strain, Genome analysis, Type III secretion system, Insecticidal toxins, Exoenzymes, Biocontrol.*

POSTER N° : 105.

STUDY OF THE IMPROVEMENT OF TILAPIA FEED BY MICROALGAE AND THEIR EXTRACTS

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Abtract: Microalgae are known as emerging sources of biologically active biomolecules. The current research focused on assessing the biological capacities of the microalga *Nannochloropsis gaditana* cultivated in the ASWalgal medium, and the potential of extracts derived from *N. gaditana* particularly its application in the enrichment of aquafeeds for farmed fish (Tilapia).
Our results showed that the methanolic extract of *N. gaditana* is rich in phenolic compounds (4.42 mg GAE/g dry matter DM). The antioxidant activity as determined by the scavenging of the DPPH radical also proved to be of interest (IC50 = 0.014 mg/ml). Similarly, the antibacterial activity against various reference strains was evaluated using the disk method, and the most significant antibacterial effect was observed against Bacillus subtilis with an inhibition zone of 13 mm.
The inhibition activity against induced peroxidation of the lipids present in the composition of a fish feed sample was also investigated. The results showed that the *N. gaditana* extract exhibits dose-dependent inhibition of lipid peroxidation with an IC50 = 7.282 ± 0.98 mg/ml. Studies are ongoing on the addition of *N. gaditana* microcapsules to feeds intended for farmed fish, specifically Tilapia.
Given the biological capacities of the microalga *N. gaditana,* it would be interesting to enrich aquafeeds for farmed fish in order to improve their preservation as well as the resilience and well-being of farmed fish.

Mots clés : Nannochloropsis gaditana, aquafeed, Tilapia, inhibition, IC50, lipid peroxidation inhibition

POSTER N° : 106.

COMPARATIVE ASSESSMENT OF GAMMA IRRADIATION EFFECTS ON THE POLYPHENOLIC CONTENT, ANTIOXIDANT ARCHITECTURE, AND PHYTOTOXIC PROPERTIES OF EXTRACTS FROM *CALLITRIS SP.*

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Abstract: This study investigates the impact of gamma irradiation (at doses of 5, 10, and 15 kGy) on the total phenolic content (TPC), total flavonoid content (TFC), antioxidant capacities (DPPH and ABTS assays), and the phytotoxic activity of methanolic extracts derived from distinct plant organs—needles, cones, and stems—of a species. The experimental results revealed an organ-dependent and dose-specific response to radiolytic processing. Unirradiated stem extracts exhibited the highest baseline antioxidant performance, which was uniquely modulated by gamma treatment; notably, ABTS scavenging activity peaked significantly at 10 kGy (5.06 ±3.77 mg mg TAEC/g ext), correlating with an elevated TPC (511.81 ±11.87mg GA/g Ext). For needle extracts, a notable drop in TPC and TFC was observed at low doses, but a remarkable recovery and expansion of flavonoids occurred at 10 kGy (289.83 ±49.31mg QE/g Ext). Conversely, cone extracts demonstrated high resilience but lower overall quantitative yields across all tested doses. Crucially, the parallel evaluation of phytotoxic activity demonstrated that gamma irradiation differentially influences the allelopathic potential of the extracts, altering their inhibitory effects on target species. The fluctuating trends in IC_{50} values, free-radical trapping kinetics, and phytotoxicity scores suggest that gamma irradiation induces a dynamic interplay of molecular degradation, cross-linking, and the radiolytic release of bound phenolic complexes and phytotoxic allelochemicals from the plant matrix. These findings demonstrate that tailored gamma irradiation can be strategically utilized as a sustainable post-harvest tool to optimize targeted antioxidant and bio-herbicidal properties in *Callitris* biomass for functional agrochemical and industrial applications.

Keywords: *Callitris sp.*, Gamma Irradiation, Phytotoxic activity, Polyphenols, Flavonoids, Antioxidant capacity.

POSTER N° : 107.

ANTIFUNGAL ACTIVITY OF GAMMA IRRADIATION AGAINST SEED-BORNE FUNGI IN WHEAT

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Abstract: Post-harvest losses caused by fungal contamination represent a major challenge in the agri-food sector, particularly for wheat seed preservation. Phytopathogenic fungi can deteriorate seed quality, reduce germination capacity, and pose health risks associated with mycotoxin production. In this context, the development of effective, sustainable, and environmentally friendly preservation methods is a priority. Among innovative technologies, gamma irradiation appears as a non-residual physical method capable of effectively limiting microbial proliferation while preserving the physiological properties of seeds.

In this study, wheat seeds from three varieties were irradiated using gamma rays from cobalt-60, with doses ranging from 1 to 5 kGy. This non-residual technology demonstrated significant effectiveness in reducing fungal development while maintaining the physiological and germination qualities of the seeds. Owing to its efficiency, safety, and sustainability, gamma irradiation represents a promising strategy for improving the post-harvest preservation of wheat seeds in the agri-food sector.

Keywords: *Post-harvest losses, Wheat seeds, Fungal contamination, Phytopathogenic fungi, Mycotoxins, Seed germination, Gamma irradiation*

POSTER N° : 108.

NOVEL TOPICAL CREAM FORMULA BASED ON PRICKLY PEAR CLADODES POLYSACCHARIDE ACCELERATES HEALING OF *PSEUDOMONAS AERUGINOSA*-INFECTED WOUNDS IN DIABETIC RATS : MECHANISTIC INSIGHTS FROM *IN VIVO* AND *IN SILICO* ANALYSES

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Abstract: This study aimed to develop and characterize a polysaccharide-based topical cream for the treatment of infected diabetic wounds, with the objective of improving wound healing outcomes, supporting overall patient health, and ultimately enhancing the quality of life of individuals with diabetes. For this purpose, a heteropolysaccharide (PPCP) was purified from Tunisian Prickly Pear cladodes and its physicochemical features were investigated. PPCP was mainly composed of galactose (50.53%), mannose (15.82%), arabinose (12.7%), glucose (8.34%), and xylose (6.84%). Nuclear magnetic resonance (NMR) and X-ray diffraction (XRD) spectra showed the characteristic bands of polysaccharides. PPCP exhibited pronounced emulsifying activity and stabilization capacity, fulfilling the functional and formulation requirements for its incorporation into a stable topical cream system. The formulated PPCP-based topical cream demonstrated favorable macroscopic, microscopic, and rheological characteristics, indicative of its structural integrity, stability, and suitability for topical application. The administration of the PPCP-based topical cream to *Pseudomonas aeruginosa*-infected wounds in diabetic rats significantly accelerated the wound healing process, promoting dermal regeneration, enhancing neovascularization and tissue granulation, and effectively reducing the local bacterial burden. Docking and density functional theory (DFT) results together suggest that β-D-(+)-mannopyranose and D-(+)-galactopyranose are the most promising candidates, exhibiting strong binding affinity (up to −6.1 kcal/mol) and favorable electronic stability (energy gaps ~7.8–7.9 eV) for potential therapeutic application. All compounds showed good pharmacokinetics and drug-likeness properties. Collectively, these findings offer novel insights into the design and therapeutic potential of PPCP-based cream as an effective intervention for the management of infected diabetic wounds.

Keywords: *Prickly Pear cladodes polysaccharide, Topical cream, Pseudomonas aeruginosa, Infected diabetic wounds, Rheological properties, Mechanistic insights, In silico analyses.*

POSTER N° : 109.

COMPARATIVE GROWTH, BIOCHEMICAL COMPOSITION, ANTIOXIDANT AND ANTIFUNGAL ACTIVITIES OF FRESH BIOMASS EXTRACTS FROM CYANOBACTERIAL PCC STRAINS AND MICROALGAE

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Cyanobacteria and microalgae are increasingly recognized as promising sources of bioactive compounds with potential applications in biotechnology, food, agriculture, and pharmaceuticals. In the present study, three cyanobacterial strains from the Pasteur Culture Collection (PCC7413, PCC6310, and PCC7416) were cultivated under controlled laboratory conditions using BG11 medium, and their growth performance, chlorophyll a accumulation, biomass productivity, antioxidant properties, and antimicrobial activities were comparatively evaluated. In addition, Nostoc sp. and Chlamydomonassp.were included for comparative biochemical analyses. Cultures were maintained at pH 7 and 25 °C under continuous illumination and aeration. Growth was monitored by optical density at 680 nm, while chlorophyll a content was determined according to a modified Talling and Driver method. Fresh biomass pellets were extracted using water, methanol, and hydroethanolic solvent systems. Total phenolic content (TPC), flavonoids, DPPH radical scavenging activity, ABTS scavenging activity, and ferric reducing antioxidant power (FRAP) were assessed spectrophotometrically.Among the investigated strains, PCC7416 exhibited the highest biomass productivity (15.4 mg/mL) and extraction yields, whereas PCC7413 demonstrated the fastest growth and highest chlorophyll accumulation. PCC6310 showed the strongest antioxidant properties in DPPH, FRAP, and flavonoid assays, suggesting elevated levels of reducing and radical-scavenging metabolites. Chlamydomonas sp. displayed the highest total phenolic content and ABTS activity. Antibacterial assays revealed no inhibitory effects against the tested bacterial strains; however, PCC6310 exhibited selective antifungal activity against *Candida albicans*, *Paecilomycesdivaricatus*, and *Botrytis cinerea*. These findings demonstrate the biotechnological potential of cyanobacterial PCC strains as sources of antioxidant and antifungal metabolites.

Keywords: Cyanobacteria, PCC strains, antioxidant activity, flavonoids, total phenolic content, DPPH, ABTS, FRAP, antifungal activity, microalgae.

POSTER N° : 110.

FUNGAL-DRIVEN BIOCHEMICAL ALTERATIONS IN DATE FRUITS: EFFECTS OF ASPERGILLUS SPP. ON NUTRITIONAL AND FLAVOR CHEMISTRY

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Abstract: Fungal contamination by *Aspergillus* spp. is a key factor affecting the postharvest quality of date fruits (*Phoenix dactylifera* L.). This study evaluates biochemical changes induced by *Aspergillus* ssp., focusing on nutrient degradation and flavor chemistry. Fungal activity led to significant reductions in soluble sugars (glucose and fructose), proteins, and lipids, along with decreased phenolic content and antioxidant activity, indicating loss of nutritional value. Gas chromatography–mass spectrometry (GC–MS) analysis revealed marked changes in volatile composition, including increased levels of alcohols, aldehydes, ketones, and organic acids associated with musty, fermented, and sour off-flavors. These changes were closely linked to sensory deterioration, including reduced sweetness, undesirable odors, and texture softening.

Overall, *Aspergillus*-driven metabolic activity contributes to both nutrient depletion and flavor disruption, providing key indicators for assessing spoilage and improving postharvest quality control in date fruits.

Keywords: *Date fruits , Fungal contamination, Nutritional degradation, Off-flavor formation*

POSTER N° : 111.

INFERENCE AND ANALYSIS OF HOST-PATHOGEN PROTEIN INTERACTION NETWORKS DURING HUMAN INFECTION BY LEISHMANIA MAJOR

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Leishmaniasis is a disease transmitted to humans through the bite of infected female sandflies (Phlebotomus and Lutzomyia). It is caused by tiny parasites called Leishmania and affects people in nearly 100 countries, putting around 350 million people at risk worldwide, making it a serious global health concern. The disease can take three different forms depending on the Leishmania species involved. The most common form is cutaneous leishmaniasis (CL), caused mainly by Leishmania major, which produces skin lesions at the site of the sandfly bite. Inside the host cells the parasite deploys complex mechanisms to circumvert the immune system initiated by macrophages and dendritic cells. Understanding exactly how Leishmania major survives inside the host cell remains an open challenging question. To address this, we focused on the molecular interactions between the parasite and its host, some of these interactions are mediated by short linear motifs (SLiMs), small peptide sequences of 3 to 10 amino acids found in disordered regions of proteins, that allow the parasite to hijack host signalling pathways and evade immune destruction. The aim of this project is to use a bioinformatics approach to characterize host–parasite interactions between Leishmania major and human cells, with a focus on identifying protein–protein interactions and molecular mimicry that may contribute to infection and immune escape. In this study, we used SLiMFinder to identify Short Linear Motifs (SLiMs) within the Leishmania major proteome. We then used un script Python to search for these motifs in human macrophage proteins data from four independent sources, HPA, UniProt, mapping proteins from the RNA-seq data, and a single-cell proteomics dataset SCoPE2, in order to identify the common SLiMs shared between the parasite and the host. In parallel, the identified motifs were functionally annotated using the ELM database to assign biological significance, and their structural properties were assessed using NetSurfP-2.0 for surface accessibility and secondary structure analysis, while IUPred2A was used to predict intrinsic unstructured proteins across the L. major proteome. These analyses are currently being done to filter and prioritize the identified SLiMs in order to select the most significant ones for further investigation. A total of 71 unique SLiMs were identified across 1,095 L. major proteins, with the most frequent motifs being unusually rich in glutamine. Functional annotation classified 19 of these motifs (26.8%) into known biological classes involved in protein degradation, apoptosis inhibition, and intracellular trafficking, while the remaining 52 motifs may represent novel parasite-specific molecular signatures. Among the 71 identified SLiMs, 61 were found to be shared across 17,300 human macrophage proteins. Structural analysis confirmed that the majority of identified SLiMs are surface-exposed and located in disordered regions, supporting their potential role as host-pathogen interaction interfaces.

Keywords: leishmaniasis, leishmania major, short linear motifs, host-pathogen interaction, molecular mimicry

POSTER N° : 112.

DEVELOPMENT OF A NOVEL CARBONATED BEVERAGE BASED ON ULTRAFILTRATION AND THERMAL PROCESSED DATE PALM SAP *(PHOENIX DACTYLIFERA L.):* NUTRITIONAL, SENSORIAL AND STABILITY PROFILES

RUNNIG TITLE: DATE SAP CARBONATED BEVERAGE

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Abstract : Carbonated beverages are worldwide largely produced and consumed. Their field is in perpetual evolution through the production of new tastes. The current research is focused on producing a novel carbonated beverage based on ultrafiltration and thermal processed date palm sap "SDDPS" and to characterize its physico-chemical, color, antioxidant and sensorial properties. Polyphenols composition was examined using HPLC. Monosaccharide composition was evaluated by GC-MS. Antioxidant activity was assessed using reducing power, H_2O_2, and DPPH scavenging activities. The results showed that 'SDDPS", free from synthetic sweetener or coloring, has good nutritional value marked by natural sugars (17.25%), protein (2.91%), ash (1.19%), flavonoid (74.54mg rutin/100g) and phenolic compounds (283.61 mg of gallic acid equivalents/100g). Five phenolic compounds were identified, with ferulic acid the major compound (94.68 mg/100g). "SDDPS" stability's evaluation showed that it was physico-chemically and microbiologically stable. The obtained results constitute the base for a significant implementation process.

Keywords : Carbonated beverages, Ultrafiltration and thermal process, Phenolic profile, antioxidant activity, physicochemical and microbiological profiles

POSTER N° : 113.

UNVEILING BIOCONTROL POTENTIAL AND PLANT GROWTH-PROMOTING TRAITS OF THE ENDOPHYTIC STRAIN *BACILLUS VELEZENSIS* R1 FOR SUSTAINABLE AGRICULTURE

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Abstract: Despite their crucial role in enhancing crop yield and ensuring food security, pesticides pose significant threats to human health and the environment. Consequently, the development of some alternatives, such as the exploring of biological control agents (BCAs), has become a key challenge for sustainable agriculture. In this context, the olive tree rhizosphere represents a valuable reservoir of beneficial bacteria that play a key role in maintaining plant health and productivity. Based on preliminary screening, the root-associated endophytic strain *Bacillus velezensis* R1 was selected for its potent antimicrobial activity against a broad range of phytopathogenic strains. The highest inhibition of phytopathogenic development was attributed to the synergistic effects of multiple mechanisms, which may be associated with the production of a diverse array of secondary metabolites, including lipopeptides, polyketides, and lytic enzymes. Furthermore, the beneficial effects of the strain were confirmed *in vivo* and *B. velezensis* R1 proved to be effective in protecting tomato plants against *Verticillium dahliae*. In order to better characterize the antagonistic activity of the strain, the production of secondary metabolites was analysed using high performance liquid chromatography coupled with mass spectrometry (RP-HPLC-MS) and mass spectrometry MALDI-TOF. In addition, genomic analyses were performed to identify biosynthetic gene clusters and genes associated with plant growth-promoting traits Collectively, our findings support the alternative of using the strain as a promising candidate for sustainable agricultural applications.

KEYWORDS: *Bacillus velezensis, secondary metabolites, biocontrol, plant growth promotion*

POSTER N° : 114.

EFFECT OF GAMMA IRRADIATION AND GERMINATION ON THE FATTY ACIDS COMPOSITION AND NUTRITIONAL QUALITY OF FLAX SEEDS AND PUMPKIN SEEDS

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Abstract : Our study showed that untreated flax and pumpkin seeds represent a rich source of α-linolenic acid (omega-3), and linoleic acid (omega-6) respectively. They are therefore potentially capable of helping to prevent and combat cardiovascular diseases. However, the irradiation of germinated or ungerminated flax seeds did not have a significant effect on the total saturated fatty acids (SFA) and unsaturated fatty acids (UFA) either at low dose (0.3 kGy) or at higher dose of (2 kGy). Consequently, it did not affect the nutritional quality of their lipid components. The irradiation of pumpkin seeds decreased SFA and increased UFA both in germinated and non-germinated seeds. Consequently, irradiation enhanced their nutritional qualities as showed the elevated values of lipid indices and ratios. It should be noted that germination decreased the PUFA of flax seeds, particularly ω3, in parallel with the increase in MUFA and SFA, particularly oleic acid and stearic acid respectively. This treatment caused a reduction in the PUFA/SFA index and the h/H ratio of irradiated and non-irradiated seeds. Nevertheless, it appears that germination has retained the beneficial potential of flax seeds as a food useful in the prevention or the management of cardiovascular diseases. Likewise, germination had a major negative effect on the PUFA of pumpkin seeds, particularly at the level of ω6 linoleic acid, in parallel with the significant increase in MUFA, particularly eicosenoic acid, and SFA as palmitic and stearic acids. Thus germination affected moderately nutritional indices and drastically the ω6/ω3 ratio. Our results revealed the potential of pumpkin seeds germinated for 4 days as a dietary food containing a high quality lipid component.

Key words: germination, irradiation, fatty acids, flax seed, pumpkin seed, nutritional indices

POSTER N° : 115.

COMPARATIVE EVALUATION OF ANTIOXIDANT ACTIVITY AND MICROBIAL STABILITY OF DATE SEED POWDER-FORTIFIED CAKES AND CONVENTIONAL CAKES

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Abstract. In recent years, there has been growing interest in the development of functional food products that not only satisfy basic nutritional needs but also provide additional health benefits. One promising approach is the incorporation of natural antioxidants derived from plant-based sources, which are rich in bioactive compounds. This study aimed to evaluate the impact of enrichment on the antioxidant capacity, phenolic content, and microbial stability of cake samples during storage over a 49-days period. Two formulations were assessed: a control cake and an enriched cake with date seeds powder. From the onset, the enriched cake showed a significantly superior antioxidant profile. On day 1, DPPH scavenging activity was more than double that of the control (52% vs. 21%), and TPC followed a similar trend, with the enriched sample containing 72 µg GAE/10g compared to 37 µg GAE/10g in the control. As storage progressed, both DPPH activity and phenolic content declined across all samples. However, the enriched cake consistently maintained significantly higher levels than the control, indicating a slower rate of degradation and suggesting that the enriched matrix was more resistant to oxidative changes. The microbiological results further highlighted the protective effects of enrichment. For the first six weeks of storage (up to day 35), both cake types remained microbiologically stable, with no detectable growth of spoilage organisms or coliform bacteria. By day 42, the control cake began to exhibit signs of microbial spoilage, with detectable levels of yeast and mould (40 CFU/g) and total coliforms (50 CFU/g) appearing by day 49. In contrast, the enriched cake showed a delayed onset of microbial activity and lower contamination levels, with yeast and mould counts reaching only 20–30 CFU/g and no presence of coliforms even at the end of the storage period. Overall, the results point to the dual benefits of enrichment in bakery products: providing added health value and improving shelf-life stability by delaying oxidation and microbial spoilage.

This work was elaborated under the framework of the PRIMA project "MEDGOAT"

POSTER N° : 116.

GENETIC DIVERSITY OF POWDERY MILDEW (*BLUMERIA GRAMINIS F. SP. AVENAE*) RESISTANCE IN *AVENA*: MACROSCOPIC AND HISTOCYTOLOGICAL APPROACHES

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Abstract: Powdery mildew, caused by *Blumeria graminis f. sp. avenae*, poses a significant damage to host (*Avena sativa* L.) production. This study aims to explore the genetic diversity of powdery mildew resistance within Tunisian and introduced oat germplasm and to characterise the cellular mechanisms associated with this resistance. Twenty-five genotypes were inoculated under controlled conditions with an isolate of *Blumeria graminis f. sp. avenae*. Disease severity was assessed using the relative area under the disease progression curve (rAUDPC), followed by microscopic analyses sixty hours post-inoculation. Statistical analyses, ANOVA, Tukey's HSD test and Pearson's correlations, were performed using RStudio. The results revealed high genetic diversity in responses to infection, with genotypes ranging from highly susceptible to highly resistant. Genotypes of Tunisian origin or those introduced into Spain exhibited the lowest levels of infection. Histocytological observations revealed significant papille formation and inhibition of hyphal development in resistant genotypes. A perfect negative correlation between papille density and hyphal growth confirms the essential role of pre-haustorial defences.

KEYWORDS: Blumeria graminis, durable resistance, genetic diversity, Oats, papillae, Powdery mildew.

POSTER N° : 117.

COMPARATIVE ANALYSIS OF WHITE AND BLACK GARLIC FROM TUNISIAN AND CHINESE VARIETIES

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Abstract: Black garlic, obtained through thermal transformation, surpasses fresh garlic in terms of bioactivity and flavor, thereby becoming a key ingredient for health (nutraceuticals).

This study aims to compare the physicochemical properties of fresh and black garlic from two varieties (Tunisian and Chinese), for the development of high-quality functional foods.
Implementation of a multi-scale approach combining classical nutritional analyses with cutting-edge techniques (SEM, FTIR, and fluorescence).
The Tunisian black garlic proved superior due to a more intense Maillard reaction, a better-optimized texture, and a higher content of proteins and flavonoids.
Our study confirms that black garlic possesses superior characteristics compared to fresh garlic, with the Tunisian variety offering exceptional potential for the development of high-quality functional foods.

KEYWORDS: *Allium sativum L, Black garlic, FTIR, SEM*

POSTER N° : 118.

COMPARATIVE EVALUATION OF THE QUALITY OF AN AGRI-FOOD PRODUCT DRIED BY A DESICCANT WHEEL ACCORDING TO TWO DRYING PROCESSES

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Abstract : This study investigated lemon drying using a desiccant wheel under two air conditions (process air and regeneration air) in order to evaluate their effects on the quality of the dried product.
Desiccant wheel drying is based on air dehumidification using a hygroscopic material, which enhances mass transfer while reducing the thermal stress applied to the product. Since lemon is rich in heat-sensitive bioactive compounds, this process represents an attractive alternative for preserving its nutritional and functional quality.
In this study, lemon slices were dried under two different air conditions and subsequently characterized through physicochemical, biological, structural, and thermal analyses. Physicochemical analyses showed that the moisture content rapidly decreased from 5.9 to 0.2 kg/kg within 60 min for samples dried under regeneration air, whereas under process air, it decreased from 0.40 to 0.05 kg/kg after 540–570 min of drying. Colorimetric parameters revealed better preservation of lemon color in the process air drying method, with lightness (L*) values of 55.77 compared to 43.83 for regeneration air.
Biological analyses highlighted better preservation of bioactive compounds in samples dried under process air. Likewise, antioxidant activity reached 42.14% for regeneration air drying and 52.93% for process air drying.
FTIR analysis identified structural modifications in the functional groups characteristic of dried lemon. Variations in peak intensities between the two drying processes indicated differences in the chemical transformations induced by drying.
Furthermore, thermal characterization by DSC revealed noticeable differences between the two drying processes. The main endothermic peak was observed at 57.51 °C for samples dried under process air, compared to 72.36 °C for those dried under regeneration air, indicating better thermal stability in the former case.
Overall, the results demonstrate that drying conditions significantly influence the physicochemical, biological, structural, and thermal quality of dried lemon. Drying under process air appears to be more favorable for preserving the properties of the final product.

KEYWORDS : *desiccant wheel drying, lemon, physicochemical quality,*

POSTER N° : 119.

TRANS AND SATURATED FAT CONTENT IN MARGARINES MARKETED IN TUNISIA: IMPLICATIONS FOR CARDIOVASCULAR HEALTH AND REFORMULATION

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Abstract : Margarines are widely used in processed foods and are important dietary sources of saturated and trans fatty acids (SFA and TFA), which can impact cardiovascular health. This study assessed the fatty acid profiles, TFA content, and nutritional indices including the Atherogenicity Index (AI), Thrombogenicity Index (TI), and Hypocholesterolemic/Hypercholesterolemic (HH) ratio across eight margarines marketed in Tunisia. Margarines were categorized into two groups: industrial hydrogenated products and premium non-hydrogenated products labeled as 0% TFA. Fat composition varied between samples, therefore, SFA ranged from 36.94 ±0.01% to 52.97 ±0.26%, MUFA from 25.60 ±0.09% to 34.35 ±0.38%, PUFA from 6.61 ±0.13% to 32.76 ±0.27%, and TFA from 0.44 ±0.02% to 9.00 ±0.16%. Cardiovascular risk indices also varied between samples, AI ranged from 0.70 to 1.58, TI from 0.98 to 2.30, and HH ratios from 1.12 to 2.13. Margarine samples with higher PUFA and lower TFA (SFA 36.94%, MUFA 30.15%, PUFA 28.37%, TFA 4.55%) had the most favorable AI (0.70), TI (0.98), and HH ratio (2.13), whereas samples with high SFA and TFA (SFA 52.97%, MUFA 34.35%, PUFA 6.61%, TFA 5.80%) exhibited the highest cardiovascular risk indices (AI 1.58, TI 2.30). Premium margarines met international guidelines for SFA, MUFA, PUFA, and trans fats, in line with Codex Alimentarius and ANSES recommendations. These findings highlight the promising potential of modern "heart-healthy" margarines in the Tunisian market alongside higher-risk industrial products. Using naturally unsaturated oils, particularly local olive oil, provides an opportunity to improve nutritional quality, reduce cardiovascular risk, and support sustainable dietary practices.

KEYWORDS*: Margarines; saturated fatty acids; trans fatty acids; cardiovascular risk; nutritional indices.*

POSTER N° : 120.

EFFECTS OF SEED PRIMING ON CHENOPODIUM QUINOA SEED GERMINATION UNDER OSMOTIC STRESS

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Abstract: Seed germination is a critical stage influencing crop establishment and productivity in quinoa. However, osmotic stress caused by salinity and drought can markedly reduce germination capacity and seedling growth. Seed priming is considered a simple and cost-effective approach to improve seed performance and enhance tolerance to abiotic stress. Therefore, this study aimed to evaluate the effect of different seed priming agents on quinoa germination under osmotic stress conditions. Seeds of two quinoa varieties, ICBA-5 and 115-R, were soaked for 8 h in different priming solutions including NaCl (100, 300, and 500 mM), PEG (175, 275, and 325 g/L), salicylic acid (0.1 mM), ascorbic acid (0.2 mM), KNO_3 (0.5%), and distilled water. After drying to their initial weight, primed and non-primed seeds were germinated under distilled water, 300 mM NaCl, or 275 g/L PEG conditions. Germination percentage, latency time, T50, radicle and hypocotyl length were evaluated. The results revealed clear varietal differences in response to osmotic stress and seed priming. Final germination percentage was high under control conditions for both varieties (92.5% in 115-R and 100% in ICBA-5). Osmotic stress (300 mM NaCl and 275 g/L PEG) significantly reduced germination, with a stronger effect on 115-R (up to 90% reduction). ICBA-5 exhibits a uniform response to priming, which is particularly effective with KNO_3 (0.5%) under saline stress conditions. In contrast, 115-R proved to be more sensitive to osmotic stress, although several germination parameters were improved by seed priming, particularly with KNO_3 (0.5%) and ascorbic acid (0.2 mM). These results confirm the key role of genetic variability and the priming agent in enhancing quinoa germination under stress. Overall, seed priming proved to be an effective strategy for enhancing quinoa germination and early seedling development under osmotic stress, particularly in sensitive varieties.
KEYWORDS: *Quinoa, germination, seed priming, osmotic stress, NaCl, PEG.*

POSTER N° : 121.

OPUNTIA STRICTA AS A BETALAIN COMPOUND SOURCE BASED ON ENVIRONMENTALLY FRIENDLY PROCESSES

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Abstract: The food industry faces several challenges in manufacturing safe products while balancing the need for environmentally and sustainably responsible industrial processes. Over the last few decades, betalain compounds, such as E162 from red beetroot extracts, have been incorporated as natural colorants and health-promoting substances in various formulations. Later, other species with betalain content were identified. *Opuntia Stricta*, a member of the *Cactaceae* family, is also among them and is distinguished by its vivid color and acidic flavor.
This study focuses on extracting betalain compounds from *Opuntia stricta* fruit as a natural alternative to synthetic colorants and as part of sustainable, environmentally friendly technology solutions. Betalain extraction is typically performed on dried plant material to reduce moisture content and improve betalain stability. Three drying temperatures (40, 50, and 60°C) and two microwave pretreatment durations (8 and 16 min) were applied during the convective drying process. The dried powder was then used to extract betalain using microwave technology. Water was used as the solvent, and the experimental setup was adjusted to ensure temperatures did not exceed 50°C. The drying kinetic curves obtained under the various drying conditions revealed that microwave pretreatment and drying temperature reduced drying time and thus lowered the energy required to stabilize the powder material. Furthermore, as compared to conventional extraction methods, the microwave technology applied for betalain extraction resulted in 13% increase in betalain content while reducing the extraction time by up to 90%. These findings highlight the microwave's potential as a sustainable green technology for both drying pretreatment and extraction of betalain compounds, with lower heat degradation, thereby offering a stable natural colorant.
KEYWORDS: *betalain 1, Opuntia stricta 2, drying 3, pretreatment 4, microwave 5*

POSTER N° : 122.

EVALUATION OF GAMMA IRRADIATION AS A PRETREATMENT FOR THE VALORIZATION OF SPENT COFFEE GROUNDS: PHYSICO-CHEMICAL AND ANTIOXIDANT PROFILES

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Abstract: Spent coffee grounds (SCG) represent a massive industrial byproduct rich in bioactive compounds, particularly polyphenols, which hold significant potential for cosmetic, pharmaceutical, and food applications. However, efficient extraction is often limited by the complex lignocellulosic matrix of the biomass. Gamma irradiation offers a promising, eco-friendly pretreatment method to disrupt these cellular structures and enhance the release of target molecules.

This study aims to investigate the impact of different gamma irradiation doses on the physico-chemical properties and antioxidant capacity of SCG to determine the optimal processing conditions for its valorization.

SCG samples were subjected to gamma irradiation at three distinct doses: 10 kGy, 15 kGy, and 20 kGy, alongside a non-irradiated control sample. The effects of the treatment were monitored through key physico-chemical and biochemical analyses. Monitoring included pH and electrical conductivity to assess structural and ionic changes. Total phenolic content (TPC) was quantified using the Folin-Ciocalteu method, while the antioxidant activity was evaluated via the DPPH radical scavenging assay.

Preliminary results indicated that gamma irradiation significantly alters the SCG matrix. A dose-dependent variation was observed across the parameters. Electrical conductivity showed a notable increase, suggesting enhanced cell wall permeability and ion release, which correlated with a slight decrease in pH. Furthermore, the 15 kGy dose yielded the highest concentration of total polyphenols. This increase in phenolic release strongly correlated with an enhanced antioxidant capacity, demonstrated by a lower value in the DPPH assay. However, at the highest dose, a slight degradation of bioactive compounds was observed, indicating a threshold effect.

Gamma irradiation serves as an effective pretreatment for breaking down the recalcitrant matrix of spent coffee grounds. Optimizing the irradiation dose successfully enhances the extractability of valuable polyphenols and boosts antioxidant performance, offering a sustainable pathway for scaling up SCG valorization.

KEYWORDS: *Spent Coffee Grounds, Valorization, Gamma Irradiation, Polyphenols, DPPH*

POSTER N° : 123.

CHARACTERIZATION OF FERMENTED CAMEL MILK : COMPOSITION AND BIOLOGICAL ACTIVITIES

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Abstract: Camel milk is increasingly recognized for its high nutritional value, being rich in vitamins, minerals, and bioactive compounds that offer potential health benefits. However, despite its promising composition, its industrial transformation remains challenging due to its unique physicochemical properties, which limit the application of conventional dairy processing techniques.

The main objective of this research work is to evaluate the physicochemical properties and biological activity of fermented camel milk (FCM) obtained from an intensive farming system. Fermentation was carried out at 37 °C for 12 hours using a lactic acid starter culture.

The physicochemical composition (pH, acidity, viscosity, color, fat, protein, dry matter, ash, and mineral content) and biological activity (antibacterial and antioxidant activities) were analyzed for camel fermented milk.

The physicochemical composition showed that the pH, acidity, and viscosity of FCM were respectively 4.39 ± 0.09, 91.4 ± 8.35 °D, and 48 ± 4 cP. The fat content was 30,5±4,123 g/l, and the protein content was 23,19±1,847g/l. The mineral content included **(**Na, K, Ca, Fe) with values of (0,739±0,158, 1,516±1,257, 2,592±1,200, 0,021±0,019).

Fermented camel milk exhibited the strongest antibacterial activity against *Candida albicans* and *Escherichia coli*, as well as antioxidant activity as revealed by both tests (DPPH and FRAP).

In conclusion, fermented camel milk presented favorable physicochemical properties, significant antibacterial activity, and notable antioxidant activity making it a promising functional dairy product.

KEYWORDS: Camel milk, fermentation, physicochemical composition, biological activity.

POSTER N° : 124.

EFFECT OF NATURAL SPICES AND PROBIOTIC CULTURE ON THE QUALITY OF FRESH CHEESE

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Abstract: Food safety and quality preservation remain critical challenges in the dairy sector, particularly for fresh cheese, which is highly prone to microbial spoilage. In this context, the incorporation of natural antimicrobial compounds and probiotic starter cultures represents a promising and sustainable approach to enhance product safety and functionality.
This study aimed to investigate the microbiological and physicochemical quality of Ricotta-type fresh cheese formulated with natural plant extracts, namely ginger (*Zingiber officinale*) and thyme (*Thymus vulgaris*), in combination with a selected probiotic lactic starter culture.
Plant materials were selected due to their well-established antimicrobial and antioxidant properties. Three strains of lactic ferment were screened for their technological performance, and the most efficient strain was selected for cheese manufacture.
The obtained results demonstrated that the combined application of plant extracts and lactic starter culture significantly reduced microbial load, ensured the absence of pathogenic bacteria such as *Salmonella*, and improved shelf-life stability.
Overall, the synergistic use of plant-compounds and probiotic lactic bacteria improved the physicochemical, microbiological, and functional quality of fresh cheese, supporting their potential for the development of safe and value-added dairy products.

Keywords: *Lactic ferment; Thymus vulgaris; Zingiber officinale; physico-chemical analysis; microbiological quality*

POSTER N° : 125.

VALORIZATION OF MICROGREENS AND AROMATIC AND MEDICINAL PLANTS AS SOURCES OF NATURAL BIOACTIVE COMPOUNDS FOR THE DEVELOPMENT OF ACTIVE EDIBLE COATINGS TO ENHANCE MEAT PRESERVATION AND SHELF LIFE

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Abstract: The growing demand for natural preservatives and sustainable food-packaging materials has encouraged the development of active edible films enriched with plant-derived bioactive compounds. This study aimed to valorize selected microgreens and aromatic and medicinal plants as sources of antioxidant and antimicrobial compounds for the formulation of gelatin–chitosan (Ge–CH)-based active edible films intended for meat preservation. Bioactive extracts were characterized and optimized prior to their incorporation into the film matrix. The developed films exhibited improved functional properties, including enhanced UV-light barrier capacity, reduced hygroscopicity, and effective antioxidant activity. The optimized extract blend reduced light transmittance at 280 nm from 21.17% in the control film to 2.59%, while maintaining satisfactory transparency. Meat coated with the optimized film showed the lowest hygroscopicity value after 72 h (1.120) compared with uncoated meat (1.195), indicating improved moisture retention. Microbiological analyses demonstrated a strong antimicrobial effect of the active coatings. After 21 days of refrigerated storage, total mesophilic counts reached 4.1×10^8 CFU/g in uncoated meat, whereas the optimized active film limited microbial growth to 9.5×10^3 CFU/g. The coatings also contributed to reducing lipid oxidation and preserving meat quality during storage. These findings highlight the potential of microgreens and aromatic and medicinal plants as sustainable bioresources for the development of active edible packaging systems, offering a natural alternative to synthetic preservatives and an effective strategy for extending the shelf life of meat products.

KEYWORDS: *Microgreens; Aromatic and medicinal plants; Active edible films; Antioxidant activity; TBARS; Barrier properties; Transparency; Light transmission; Hygroscopicity; Total mesophilic count; Meat preservation; Shelf-life extension.*

POSTER N° : 126.

PERFORMANCE EVALUATION OF SUPERCRITICAL CO2 TECHNIQUE IN DATE STONE OIL EXTRACTION

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Abstract: The date kernel, representing approximately 10% to 15% of the fruit's total weight, has long been a neglected by-product, often used solely as livestock feed or discarded as organic waste. This project focuses on the valorization of date pits specifically the Deglet Nour variety and a commercial mix of varieties through supercritical CO2 oil extraction and subsequent characterization. Initial biochemical analyses reveal a high fiber content (75–80%) and a significant oleaginous potential (9.6–12.6%), alongside valuable of interest such as phospholipids and polyphenols. Process optimization using the design of experiments methodology demonstrates that particle size and pump frequency govern the yield, whereas pressure and temperature influence the fraction oil purity. Under the optimal conditions, a total extraction yield of 100% of the available oil was successfully achieved. Finally, extract analysis via GC-MS, GLC, and HPLC confirmed the predominance of oleic acid in the oil extracts (38–41%), along with the presence of waxes, phenolic compounds, and vitamins, which varied by variety r. These extracts also exhibited promising antioxidant and antimicrobial properties, paving the way for various potential applications in the food, cosmetic, and pharmaceutical industries.

KEYWORDS: *Valorization, date kernel, physicochemical characterization, oil extraction, Supercritical CO2, optimization, Design of Experiment, Oil Analysis*

ENVIRONMENT

POSTER N° : 127.

MICROBIAL AND CHEMICAL ASSESSMENT OF OPEN BURNING MUNICIPAL SOLID WASTE SITES IN THE GAFSA REGION, TUNISIA

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Abstract:
Open dumping and burning of municipal solid waste (MSW) remain prevalent in the Gafsa region of Tunisia, releasing hazardous plasticizers and persistent organic pollutants (POPs) into surrounding soils and sediments. However, the impact of such contamination on indigenous microbial communities remains poorly characterized. This study assessed chemical contamination levels and associated microbiological properties in soil and sediment samples collected at increasing distances from an active open burning MSW site in Gafsa, compared to a non-impacted reference site.
Chemical analysis using gas chromatography–mass spectrometry revealed the presence of multiple phthalates (notably DEHP and DiBP), non-phthalate plasticizers, polycyclic aromatic hydrocarbons (including phenanthrene and benzo[a]pyrene), and polychlorinated biphenyls. Contamination levels decreased significantly with distance from the dumpsite.
Microbiological analysis showed that contaminated soils and sediments exhibited markedly reduced microbial biomass, lower culturable heterotrophic bacteria and fungi counts, and decreased soil respiration compared to control samples. Bacterial community sequencing revealed a shift in composition, with a decline in Proteobacteria and an increase in Firmicutes and Actinobacteria in highly contaminated samples. Putative degrader genera were positively correlated with pollutant concentrations, suggesting an intrinsic but overwhelmed bioremediation potential.
These findings demonstrate that open MSW burning in Gafsa severely impacts soil and sediment quality, altering microbial community structure and function. Improved waste management strategies and further investigation of resident degrading microorganisms are urgently needed.
Keywords: Municipal solid waste, open burning, plasticizers, POPs, soil microbiology, Gafsa, Tunisia

POSTER N° : 128.

SUSTAINING FRESHWATER AND AQUATIC BIODIVERSITY IN THE MOUNTAIN OASES OF SOUTHWESTERN TUNISIA: CHALLENGES AND PROPOSED SOLUTIONS

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Abstract: The mountain oases of Tamerza, Chebika, and Mides in southwestern Tunisia are unique freshwater ecosystems sustained by perennial springs fed by deep fossil aquifers. These spring-fed wetlands support traditional agroecosystems and diverse aquatic fauna, including molluscs, crustaceans, insects, fish, amphibians, and waterbirds. Their ecological functioning depends on continuous flow, suitable water quality, and natural habitats that enable reproduction and trophic interactions. However, groundwater overexploitation for phosphate washing and irrigation, along with rising temperatures, declining rainfall, and salinisation, has reduced spring discharge, causing habitat fragmentation, biodiversity loss, and weakened ecosystem services. The most strategic solution is to replace fossil groundwater used for phosphate processing with desalinated seawater, thereby reducing pressure on aquifers and preserving perennial flow. Complementary measures include improving irrigation efficiency, restoring habitats, strengthening governance, and monitoring biodiversity. Protecting freshwater is essential for conserving aquatic fauna, sustaining agriculture, and ensuring ecological resilience.
Keywords: Oases sustainability; Perennial springs; Freshwater; Aquatic fauna; Fossil aquifers; Overexploitation; Drying up of springs; Reduce pressure on underground water.

POSTER N° : 129.

PILOT-SCALE BIOREMEDIATION OF INDIGO-CONTAINING TEXTILE EFFLUENTS USING *C.GLOBOSUM* IN A FED-BATCH BIOREACTOR

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Abstract:
Textile effluents represent a major environmental concern due to their high organic load, elevated conductivity, and the presence of recalcitrant synthetic dyes that are poorly removed by conventional physicochemical treatment processes. In this context, fungal-based bioprocesses offer a sustainable and efficient alternative for the remediation of industrial wastewater. This study investigates the scale-up of a bioremediation process using *Chaetomium globosum*, from laboratory conditions (200 mL) to a 6 L pilot-scale fed batch bioreactor, for the treatment of textile wastewater containing indigo dye. The process was operated under controlled aeration and intermittent feeding, with continuous monitoring of pH and dissolved oxygen. An inoculum size of 10% (v/v) and an initial pH of 5.5 were applied to promote optimal fungal growth over a total treatment period of 72 hours. Process performance evaluation showed a 65% reduction in chemical oxygen demand (COD), indicating significant degradation of organic matter. Spectrophotometric analysis at 620 nm revealed a decolorization efficiency of 70.8%, confirming substantial removal of dye molecules. The increase in pH up to 8.2 at the end of the process suggested strong metabolic and enzymatic activity of *C. globosum*. In addition, the rise in suspended solids (SS) confirmed successful biomass development and effective adaptation of the fungus to the effluent matrix under the applied operating conditions. Overall, these results demonstrate the biotechnological potential of *C. globosum* for the development of efficient, cost-effective, and environmentally sustainable biological treatment systems for dye-laden industrial wastewater at pilot scale.

KEYWORDS: *membrane integrity, Chaetomium globosum, textile wastewater, bioremediation, indigo dye, fed-batch bioreactor, decolorization, chemical oxygen demand (COD), fungal biomass, pilot-scale treatment, industrial effluent treatment.*

POSTER N° : 130.

VALORIZATION OF A MICROALGAL STRAIN ISOLATED FROM A NATURAL ENVIRONMENT FOR BIOMASS PRODUCTION WITH ENERGETIC POTENTIAL

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Abstract: Faced with the challenges of climate change and the depletion of fossil resources, biofuels appear as a sustainable energy alternative. In this context, microalgae represent a promising renewable resource for CO_2 sequestration and the production of valuable biomolecules, particularly for third-generation biodiesel. In this study, a microalgal strain was isolated from a Tunisian sabkha and cultivated in BG-11 supplemented with CO_2 derived from biogas. Biomass production was monitored, and recovery was performed using two separation processes: sedimentation and filtration. The biochemical composition of the obtained biomass was evaluated through lipid estimation in order to assess its energetic potential. The isolated strain was identified as *Chlorella* sp. and showed good adaptation to the culture conditions, with a maximum specific growth rate (μmax) of approximately 0.1 day^{-1}. Regarding the recovery processes, sedimentation achieved a clarification efficiency of 66% after 1 h 30 min, whereas filtration reached 97% clarification efficiency. In addition, the produced biomass exhibited a lipid content of about 24%, confirming the potential of this strain for biomass valorization and biofuel applications. These results highlight the interest of naturally isolated microalgae for sustainable CO_2 valorization and renewable bioenergy production.

Keywords: Microalgae, Chlorella sp., CO_2 sequestration, Biogas, Biomass recovery, Lipid accumulation, Third-generation biodiesel, Biomass valorization, Sedimentation, Filtration.

POSTER N° : 131.

PARASITOFAUNA OF THE BLUE WHITING *MICROMESISTIUS POUTASSOU* (RISSO, 1827) ALONG THE WESTERN ALGERIAN COAST: PREVALENCE, INTENSITY AND IMPLICATIONS FOR STOCK HEALTH

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Abstract: The blue whiting *Micromesistius poutassou* (Gadidae) is a key mesopelagic species and a major fishery resource of the Mediterranean continental slope, yet its parasitological status off North Africa remains poorly documented. We examined the metazoan parasite community of 816 specimens (387 females, 429 males; total length 8.0–31.9 cm) collected between January and December 2024 at four sites along the western Algerian coast (Ghazaouet, Beni Saf, Oran, Mostaganem), at depths of 150–700 m. Three parasitic taxa were recovered: *Hemiuridae* (Digenea) with a prevalence of 36.4% (mean intensity 2.66 worms per infected host), *Anisakidae* (Nematoda) with 36.0% (3.36), and *Hysterothylacium aduncum* with 7.4% (1.60). The total infection prevalence reached 60.4%, with co-infections occurring in 17.5% of hosts. *Anisakidae* prevalence differed significantly among sites ($\chi^2 = 11.07$, df = 3, $p = 0.011$), with the highest values recorded at Ghazaouet (45.7%). *Hemiuridae* abundance increased significantly with fish total length (Spearman $\rho = 0.083$, $p = 0.018$), as did *Hysterothylacium* ($\rho = 0.071$, $p = 0.043$). No significant effect of sex or depth stratum was detected. The high anisakid burden raises sanitary concerns for both fish quality and human consumption (zoonotic potential of *Anisakis* spp.), while the dominant digenean component reflects an active pelagic trophic link involving euphausiids. These baseline parasitological indices provide a reference for future ecosystem-based stock monitoring of *M. poutassou* along the Algerian coast.

KEYWORDS: *Micromesistius poutassou, Anisakidae, Hemiuridae, Hysterothylacium aduncum, food safety, Mediterranean Sea, Algeria.*

POSTER N° : 132.

VALORIZATION OF UNCOOKED RESTAURANT VEGETABLE RESIDUES FOR LOW-COST MEDIUM OPTIMIZATION IN CHLORELLA SOROKINIANA CULTIVATION: A BOX–BEHNKEN APPROACH

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Abstract:
Organic vegetable residues generated by restaurants represent an abundant yet underexploited bioresource with high potential for sustainable bioprocess development. In the present study, a low-cost culture medium was formulated from vegetable waste juice and ash derived from uncooked restaurant vegetable residues to enhance the cultivation performance of *Chlorella sorokiniana*. The valorization approach aimed to simultaneously reduce organic waste accumulation and replace expensive synthetic nutrients with naturally available carbon and mineral sources.
To optimize the culture conditions, a Box–Behnken experimental design coupled with response surface methodology was applied in order to evaluate the combined effects of key medium components on microbial growth and metabolite production. Vegetable juice provided readily assimilable organic nutrients, while vegetable ash supplied essential minerals and trace elements required for cellular metabolism. The effects of three factors (or input parameters) (vegetable juice, glucose and Ash: Minerals powder) with 3 levels "low, medium and high", each level, coded as (−1), (0) and (+ 1), respectively.
The optimized medium significantly improved biomass production compared with the non-optimized formulation, demonstrating the strong influence of nutrient balance and mineral supplementation on strain performance.
This work highlights the potential of restaurant vegetable residues as renewable feedstocks for biotechnological applications and demonstrates that experimental design methodologies constitute powerful tools for medium optimization and process intensification. The developed approach may open promising perspectives for sustainable industrial fermentation processes with reduced environmental footprint and improved resource recovery.

KEYWORDS: *Microalgae, Culture medium, Chlorella sorokiniana, Optimisation, Circular econom, vegetable waste*

POSTER N° : 133.

INFLUENCE OF PHYSICO-CHEMICAL PARAMETERS ON PLANKTON DIVERSITY IN TABELLOUT DAM, NORTHEASTERN ALGERIA

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Abstract: Dams constitute essential infrastructures for sustainable water resource management, contributing to drinking water supply, agricultural irrigation, industrial activities, flood control, and the conservation of aquatic ecosystems. In this framework, the present study assessed the water quality of the Tabellout Dam, situated southeast of Jijel in Northeastern Algeria, during April 2025. Water samples were collected from five representative stations distributed throughout the reservoir. The physico-chemical characterization showed that the water exhibited a basic pH, accompanied by relatively elevated electrical conductivity and total dissolved solids (TDS), conditions that may influence the ecological equilibrium of the reservoir. Variations in turbidity among stations could affect light penetration and phytoplankton photosynthetic activity, whereas fluctuations in dissolved oxygen concentrations may impact aquatic organism survival. Nutrient levels, including phosphates, nitrates, nitrites, and ammonium, remained generally low, suggesting a limited risk of eutrophication. In addition, moderate spatial variations were observed for dissolved salts such as chlorides, sodium, sulfates, and bicarbonates. Planktonic analysis revealed the predominance of several phytoplankton genera, notably *Ceratium*, *Oscillatoria*, *Gymnodinium*, *Alexandrium*, and *Tintinnidium*. The zooplankton community was mainly represented by *Calanus*, *Pseudodiaptomus*, and *Keratella*, indicating a relatively stable ecological condition. Overall, the diversity and distribution of plankton communities underline the strong relationship between physico-chemical parameters and the structure and functioning of the aquatic ecosystem.

Keywords: Tabellout Dam; Water quality; Plankton; Nutrients; Aquatic ecosystem.

POSTER N° : 134.

CHARACTERIZATION OF BACTERIA ISOLATED FROM MINING AREA OF GAFSA (TUNISIA) AND ASSESSMENT OF THEIR GROWTH PROMOTION EFFECT ON VICIA FABA.

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Abstract: The present study was undertaken to study the microbiological characterization of soil contaminated by effluents from the Phosphate fertilizer industry (PFI) in the M'dhilla Gafsa region. From this perspective, soil was characterized by isolation of bacteria and assessment of their plant growth promotion. The isolates were characterized by testing various biological and biochemical parameters including salt and PH tolerance, phosphate solubilization, IAA production, siderophore production, biofilm production, cellulase production, and antifungal activity. Therefore, the results obtained showed that according to the in vitro tolerance tests of isolated to salinity and acidity, all isolates were halotolerant (≥ 7g/l NaCl) and showed high tolerance to acidity and alkalinity, they could grow at pH 2-10. In addition, these isolates demonstrated their ability to solubilize natural phosphate in a PVK liquid medium, their ability to produce other secondary metabolites such as IAA, EPS and siderophore, and to activate some enzymes such as cellulase. Furthermore, explore their potential as a bio-fertilizer. These selections have antifungal activity, they significantly inhibited in vitro, directly and indirectly, the development of F. oxysporum.

Key words: contaminated soil, isolation, bacteria, plant growth promotion

POSTER N° : 135.

RESPONSE OF MUSSELS TO NANOPARTICLES UNDER A GLOBAL CHANGE CONDITIONS

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Abstract: The current study investigated the effects of oxide nanoparticles under elevated temperature on the Mediterranean mussel. Mussels were subjected to two sub-lethal concentrations of TiO2 NPs under three temperature regimes (19 °C, 26 °C, and 30 °C, respectively) for 14 days. Structural and optical characterisation confirmed the quasispherical synthesis of nanostructured TiO2 NPs with size between 10 and 15 nm. Inductively coupled plasma optic emission spectroscopy (ICP-OES) analysis confirm the bioaccumulation of Ti in mussel tissues increased significantly with pollutant concentration and temperature. Biochemical analyses showed elevated levels of antioxidant enzymes, particularly under combined stress at 30 °C. Two-way ANOVA confirmed significant interactive effects of NPs exposure and thermal stress. The findings demonstrated a synergistic impact of NPs when combined to elevated temperature on oxidative stress status. The results raised concerns about the vulnerability of coastal species under climate change in presence of other pollutants, emphasizing the need for integrative ecotoxicological assessments to guide future monitoring and conservation strategies.

KEYWORDS: *Global change, Nanoparticles, Mytilus galloprovincialis, oxidative stress, Environmental health*

POSTER N° : 136.

GREEN SYNTHESIS OF IRON OXIDE NANOPARTICLES USING MICROALGAL METABOLITES FOR ENVIRONMENTAL APPLICATIONS

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Abstract: Hexavalent chromium [Cr(VI)] is a highly toxic, mutagenic, and carcinogenic pollutant that poses significant risks to environmental systems and human health. In this study, iron oxide nanoparticles were synthesized via a green biosynthesis approach using microalgae-secreted molecules, then structurally characterized and evaluated for their efficiency in removing Cr(VI) from aqueous solutions.The synthesized nanoparticles were characterized using dynamic light scattering (DLS), zeta potential analysis, Fourier transform infrared spectroscopy (FTIR), CHNS elemental analysis, scanning electron microscopy (SEM), X-ray diffraction (XRD), and X-ray fluorescence (XRF). The obtained results confirmed the successful formation of iron oxide nanoparticles at the nanoscale, exhibiting high colloidal stability and highlighting the contribution of microalgal-derived components in the biosynthesis process. Batch adsorption experiments were performed to evaluate the effect of key operational parameters, including contact time, adsorbent dose, initial Cr(VI) concentration, pH, and temperature. The results demonstrated high adsorption performance, with a removal efficiency reaching up to 94% under optimized conditions. Equilibrium studies showed that the experimental data fitted well with the Langmuir isotherm model ($R^2 = 0.99$). In addition, kinetic analysis revealed that the adsorption process follows the pseudo-second-order model ($R^2 = 0.99$), confirming the reliability of the adsorption system. Finally, reusability tests demonstrated that the nanoparticles maintained strong performance over five successive regeneration cycles, with regeneration efficiency remaining above 50%. Overall, these findings highlight the stability, reusability, and strong potential of green synthesized iron oxide nanoparticles for efficient and sustainable removal of Cr (VI) from wastewater.

KEYWORDS: *Green synthesis, Iron oxide nanoparticles, Hexavalent chromium (Cr (VI)), Wastewater treatment*

POSTER N° : 137.

BIOMETHANE RECOVERY FROM ANAEROBIC CO-DIGESTION OF THERMAL PRETREATED MUNICIPAL SLUDGE AND VEGETABLE WASTE FOR ENERGY BALANCE IMPROVEMENT: EXTRAPOLATION TO A FULL-SCALE WASTEWATER TREATMENT PLANT

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Abstract: The effects of thermal pretreatment (TP) on waste activated sludge (WAS) disintegration and its anaerobic co-digestion (AcoD) with sewage sludge (SS) and vegetable waste (VW) were investigated using semi-continuous mesophilic reactors. Technical and economic feasibility of different digestion scenarios were studied for implementation in a one million population equivalent wastewater treatment plant (WWTP). The same operating conditions of the full-scale digesters treating mixed sewage sludge (MSS) at a ratio of 40%SS/60%WAS were reproduced. Results showed that pretreatment of WAS at 120 °C for 20 min improved WAS biodegradability and volatile solids (VS) solubilization by 26.6% and 19.3% for initial total solids (TS) contents of 2% and 4%, respectively. However, the combination of WAS pretreatment and its co-digestion with SS and VW increased biomethane productivity by 150% over the untreated MSS control. Thus, the highest methane yield of 471 mL/g VS inlet and organic removal efficiency of 63% were achieved at an organic loading rate (OLR) of 1.38 kg VS/m3.d. Furthermore, the energy balance analysis outlined an improvement in total energy potential from 44 to 122 kWh/ton wastes. Electricity self-sufficiency could be ensured by 116% with a combined heat and power installation in the plant.

KEYWORDS: *Anaerobic co-digestion ; thermal pretreatment ; municipal wastewater treatment plant ; mixed sewage sludge ; energy balance ; vegetable waste.*

POSTER N° : 138.

MULTILEVEL TOXICITY ASSESSMENT OF TANNERY EFFLUENT: PHYTOTOXIC AND CYTOTOXIC APPROACHES

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Abstract: Tannery effluents are among the most hazardous industrial discharges due to their high concentrations of organic matter, salts, and heavy metals such as chromium, lead, and iron. Their uncontrolled release into the environment poses serious risks to ecosystems and public health, particularly in regions where wastewater treatment remains inadequate. This study aimed to evaluate the multilevel toxicity of raw tannery effluent collected from Gafsa (Tunisia) using complementary phytotoxicity and cytotoxicity assays. Different effluent concentrations were tested to assess their phytotoxic effects on seed germination and seedling growth of *Triticum aestivum*, *Raphanus sativus*, *Trigonella foenum-graecum*, and *Lens culinaris*. Cytotoxicity was evaluated using a hemolysis assay on blood agar to determine the presence and type of hemolytic activity as indicators of erythrocyte membrane damage. The effluent induced concentration-dependent inhibition of seed germination and seedling elongation in all tested species, revealing pronounced phytotoxicity. Visible symptoms included reduced radicle and plumule growth as well as tissue discoloration. The blood agar assay revealed α-hemolytic activity characterized by a greenish halo surrounding colonies, indicating partial hemoglobin degradation and moderate erythrocyte membrane damage. The findings demonstrate that untreated tannery effluent exerts both phytotoxic and cytotoxic effects, confirming its high ecotoxicological potential. These results highlight the urgent need for efficient pretreatment strategies and continuous environmental monitoring prior to wastewater discharge in order to minimize ecological and biological risks.

KEYWORDS: *Tannery effluent, Phytotoxicity, Cytotoxicity, Hemolysis, Ecotoxicology.*

POSTER N° : 139.

IONOMIC AND CELLULAR RESPONSES OF A CHLOROPHYCEAE STRAIN TO LEAD AND CADMIUM EXPOSURE: IMPLICATIONS FOR BIOREMEDIATION

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Abstract: Heavy metal contamination of aquatic environments by lead (Pb) and cadmium (Cd), mainly originating from industrial effluents, mining activities, battery manufacturing, pigments, fertilizers, and wastewater discharges, represents a major environmental concern. This study aims to assess the capacity of a *Chlorophyceae* strain to remove Pb and Cd and to characterize the cellular strategies involved in metal detoxification.
ICP-AES ionomic analysis was performed on total (IN/OUT) and intracellular (IN) fractions to evaluate metal accumulation and ionic homeostasis under metal stress. Under Cd exposure, the strain showed limited Cd removal capacity, associated with low adsorption and intracellular accumulation. However, increases in Mg and S suggested activation of detoxification pathways involving sulfur-containing compounds, while decreased K indicated disruption of ionic balance.
In contrast, Pb exposure induced a markedly different response characterized by strong membrane adsorption and limited intracellular internalization, highlighting an extracellular sequestration strategy that reduces Pb toxicity. Nevertheless, decreases in Fe, Mn, and Na revealed moderate metabolic and osmotic disturbances.
Leadmium Green fluorescence and fluorescence microscopy confirmed preferential Pb localization at the cell surface and revealed progressive morphological and photosynthetic alterations at higher Pb concentrations.
Overall, the Chlorophyceae strain demonstrates promising potential for Pb bioremediation through extracellular adsorption mechanisms, whereas its efficiency toward Cd remains limited.

KEYWORDS: *Lead; cadmium; bioremediation; metal homeostasis; ionomic analysis; membrane adsorption; intracellular accumulation; detoxification mechanisms.*

POSTER N° : 140.

DEVELOPMENT OF A MULTIPLEX QPCR ASSAY FOR THE SPECIFIC DETECTION OF TOXIGENIC *MICROCYSTIS AERUGINOSA* IN TUNISIAN FRESHWATER ECOSYSTEMS

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Abstract: Cyanobacterial blooms, particularly those dominated by Microcystis aeruginosa, pose severe environmental and public health threats due to their ability to produce toxins, mainly microcystins. Conventional monitoring methods are mainly based on microscopy, which cannot discriminate between toxic and non-toxic strains, or on costly analytical techniques such as HPLC and LC-MS. To overcome these limitations, this study developed a rapid, reliable, and cost-effective multiplex qPCR assay designed for early detection and monitoring of toxigenic Microcystis cells.
The methodology used in this study began with the design and optimization of specific primers simultaneously targeting the taxonomic 16S rRNA gene and the mcyA and mcyE genes, key components of the microcystin synthetase gene cluster, for multiplex qPCR applications. Secondly, to validate the assay, a wide range of samples was collected together with the isolation of cyanobacterial strains. Taking advantage of local biodiversity, these strains were isolated from several sensitive Tunisian aquatic environments, including fishponds and reservoirs, in order to establish a comprehensive DNA reference collection serving as both positive and negative controls.
Following in silico validation, the multiplex qPCR system was experimentally optimized to minimize primer-dimer formation and amplification competition. Evaluation using both reference strains and complex environmental DNA samples demonstrated the high specificity and sensitivity of the assay, allowing the detection of very low numbers of Microcystis cells. This molecular tool therefore represents a valuable advance for the proactive monitoring and eco-surveillance of toxigenic cyanobacteria in Tunisian water resources.

KEYWORDS: *qPCR multiplex, cyanobacteria, Microcystis aeruginosa, microcystins, eco-surveillance.*

POSTER N° : 141.

GREEN NANOTECHNOLOGY USING MICROALGAE-DERIVED NANOPARTICLES FOR THE EFFICIENT REMOVAL OF SYNTHETIC DYES FROM WASTEWATER

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Abstract: Water pollution caused by colored industrial effluents has become a major environmental challenge worldwide, creating an urgent need for sustainable and efficient wastewater treatment strategies. Synthetic dyes released from textile, paper, and pharmaceutical industries are particularly problematic because of their persistence and resistance to biodegradation. Among these pollutants, methylene blue is considered one of the most persistent contaminants due to its high chemical stability, posing significant risks to aquatic ecosystems and human health. In this context, green nanotechnology, particularly the microalgae-mediated synthesis of metal oxide nanoparticles (MONPs), has emerged as a promising and eco-friendly alternative to conventional physical and chemical synthesis methods. Microalgal extracts contain various bioactive compounds capable of acting as natural reducing, capping, and stabilizing agents, enabling the synthesis of nanoparticles through simple, cost-effective, and environmentally sustainable processes while minimizing the use of toxic chemicals.

The present study aimed to synthesize metal oxide nanoparticles (MONPs) using microalgal extracts through a green and eco-friendly approach. The synthesized nanoparticles were subsequently incorporated into alginate beads to enhance their stability, reusability, and adsorption capacity. The adsorption performance of the resulting bio-nanocomposite materials was evaluated under various experimental conditions in order to assess their potential as sustainable and efficient adsorbents for wastewater treatment applications. The findings of this study are expected to contribute to the development of environmentally friendly and efficient materials for water remediation.

KEYWORDS: *Green nanotechnology, Microalgae, Metal oxide nanoparticles, Nanocomposites, Synthetic dye treatment*

POSTER N° : 142.

AN AUTOMATED LOW-CARBON PROCESS DRIVEN BY SOLAR ENERGY FOR ENHANCED ORGANIC WASTE FERMENTATION, CO2 SEQUESTRATION, AND COMPOST DEHYDRATION

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Abstract: The management of organic waste from the food service sector represents a critical environmental challenge. Massive daily volumes of food residues, often stemming from suboptimal management and systematic losses, contribute significantly to global greenhouse gas emissions when disposed of through conventional methods. However, these residues, ranging from spoiled produce and unsold bread to preparation surpluses, hold immense potential for circular valorization if processed through innovative transformation and preservation technologies.

This project introduces a novel, automated, low-carbon bioremediation process designed to transform restaurant food waste into high-value agricultural inputs while minimizing the environmental footprint of the treatment cycle.

The proposed system integrates sustainable, automated engineering with biological processing. It relies on a solar-thermal assembly to provide controlled heating for the organic waste fermentation phase. Operational parameters including temperature, moisture content, pH, and airflow are continuously regulated via an automated control system to maintain optimal kinetics. Furthermore, a key innovation of this process is the integration of optimized fermentation and a low-energy dehydration technique to stabilize the end-product.

The anticipated outcomes include significantly enhanced microbiological stability of the organic waste, a drastic reduction in the volume of biowaste directed to landfills, and the production of nutrient-rich, stabilized compost with high agronomic value. By coupling solar energy with advanced carbon capture, this automated process drastically lowers the overall carbon footprint of organic waste treatment. This research provides a scalable, eco-efficient solution that aligns with global circular economy frameworks and sustainable energy transition strategies.

KEYWORDS: *Organic Waste Valorization, Food, Solar energy, Fermentation, Automated Bioprocessing, Carbon Sequestration, Circular Economy,*

POSTER N° : 143.

OPTIMIZING CACTUS-BASED BIOCOAGULATION FOR THE SUSTAINABLE GREEN TREATMENT OF SOAP INDUSTRY WASTEWATER

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Abstract: Global water scarcity, exacerbated by rapid industrialization and unchecked urbanization, has led to critical levels of industrial wastewater pollution, posing severe risks to public health and socioeconomic development. To address this challenge, the reclamation and remediation of industrial effluents have emerged as primary environmental strategies. Conventional physico-chemical treatments, such as chemical coagulation-flocculation, adsorption, and electrocoagulation, are frequently employed to remove suspended and dissolved pollutants. However, these traditional methods present several critical limitations, including prohibitive operational costs, diminished removal efficiencies at low pollutant concentrations, and the continuous generation of toxic chemical sludge that requires specialized, hazardous disposal. In light of these drawbacks, there is a pressing necessity to adopt greener, more economical, and eco-friendly water treatment technologies. Recently, the utilization of natural coagulants—particularly those derived from plant materials (e.g., Moringa oleifera, cactus) and other biological sources (e.g., insect-derived extracts)—has garnered substantial scientific interest. These biocoagulants are biodegradable, cost-effective, and capable of destabilizing colloidal suspensions through charge neutralization and polymeric bridging. Exploiting locally sourced plant and biological materials not only mitigates the ecological and health hazards associated with synthetic chemical treatments but also minimizes lifecycle impacts and reduces the overall carbon footprint. Ultimately, the integration of natural coagulants promotes a sustainable, circular-economy approach to water remediation and environmental protection. Environmental scientists identified several plant types, like Moringa oleifera, Stryconus potatorum, Cactus species, Phaseolus vulgaris, surjana seed, maize seed, tannin, gum arabic, Prosopis juliflora and Ipomoea dasysperma seed gum, as natural coagulants. Among these, Cactus leaves were selected because they are a readily available and renewable natural resource in Tunisia.
This study investigates the potential of Cactus (Opuntia ficus-indica) cladode extract as a natural, green coagulant for the treatment of wastewater generated by the soap industry. To establish optimal process conditions, coagulation experiments were conducted using a jar test apparatus, optimized via the Box-Behnken Design (BBD). Three independent variables were evaluated: biocoagulant concentration (X1), flocculant dosage (X2), and initial pH (X3). The efficiency of the treatment was assessed based on turbidity and chemical oxygen demand (COD) reduction. The experimental optimization revealed that maximum pollutant removal was achieved at a biocoagulant dosage of 198.79 mL/L, a flocculant dosage of 21.79 mg/L, and an initial pH of 9. Under these optimal conditions, the treatment yielded a remarkable turbidity removal efficiency of 94.5%, while the COD reduction reached 16%. Despite a substantial reduction in turbidity resulting in a highly clarified effluent, the elevated residual COD implies that a subsequent biological treatment, such as an activated sludge process, is mandatory to achieve an advanced effluent quality suitable for water recycling and reuse within a circular economy framework. Overall, these findings highlight the high viability of Cactus leaves as an effective, environmentally sustainable, and economically viable alternative to conventional synthetic chemical coagulants. The transition towards plant-derived coagulant technologies directly aligns with global paradigms promoting a circular economy and sustainable industrial wastewater management.

KEYWORDS: *Soap Industry Wastewater, Coagulation/flocculation, plant-derived natural coagulants, Cactus-based extract juice*

POSTER N° : 144.

IMPACT OF BAIT POLYCHAETE HARVESTING ON THE INTERTIDAL MACROFAUNA OF TIDAL MUDFLATS IN THE GULF OF GABES

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In the Gulf of Gabès (south-eastern Tunisia), polychaete harvesting is widely practiced for both recreational and commercial fishing and represents an economically important activity in the region. The present study aimed to assess the environmental impacts of intertidal bait digging on benthic communities in the intertidal zones of the Gulf of Gabès. The study was conducted between December 2025 and February 2026, following a sampling protocol including three control stations and six impacted stations subjected to polychaete collection.
The results revealed immediate and significant impacts on marine habitats, including the destruction of seagrass meadows and modifications in sediment characteristics at the impacted stations, whereas no significant changes were recorded at the control stations. In addition, a marked decrease in the abundance of total macrofauna (~60%), as well as reductions in several polychaete species, was observed in impacted stations compared to control stations. Socio-economic surveys also confirmed that bait harvesting is highly developed in the area.
These findings highlight the urgent need to regulate and organize this activity through the implementation of effective conservation and management measures aimed at protecting the biodiversity of these intertidal areas of high ecological and heritage value in the central Mediterranean Sea, while ensuring the sustainable use of marine resources.

KEYWORDS : *Gulf of Gabès, polychaete harvesting, intertidal mudflats, macrobenthic communities, biodiversity conservation.*

POSTER N° : 145.

GREEN IMPACT PROJECT T2P17 – COMPOSTINOV: SMART PGPR-ENRICHED COMPOSTING FOR SUSTAINABLE AGRICULTURE

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Abstract: In an era demanding sustainable solutions for organic waste and chemical-free farming, COMPOSTINOV pioneers an intelligent, ecological, intensive, and bioactive composter that transforms organic wastes into high-quality compost enriched with plant growth-promoting rhizobacteria (PGPR). By optimizing economic and agronomic outcomes, such as boosted crop yields and minimized chemical inputs, this device addresses pressing environmental and agricultural challenges.
At its core, COMPOSTINOV integrates cutting-edge technologies, including real-time sensors and automation, to enhance composting efficiency, reduce energy consumption, and accelerate production of premium compost. It further innovates by selecting multi-trait PGPR strains for inoculation, rigorously evaluating their effects on plant growth, soil quality, and microbial diversity to yield a novel ecological fertilizer.
Led by the Laboratory of Plant Improvement and Valorization of Agro-Resources (LAPVA-LR16ES20) at ENIS, the project unites six Tunisian labs (LETI-LR99ES37, LGEM-LR03ES08, LBVBGR-LR11ES31, LRGO-LR16IO01, and LBEB-LR22ES04) alongside industrial partner Candela Solar Power.
The outcomes promise transformative impacts: diverting organic waste from landfills to curb environmental nuisances; advancing science through optimized, bio-inoculated processes; fostering innovation via data-driven automation for agricultural transfer; and bolstering the circular economy by slashing costly chemical fertilizers and enabling technical training. COMPOSTINOV thus charts a path toward resilient, regenerative agro-food systems.

KEYWORDS: *Smart composter, PGPR enrichment, sustainable agriculture, waste valorization, circular economy*

POSTER N° : 146.

EXPLAINABLE MACHINE LEARNING–GUIDED OPTIMIZATION OF CHROMIUM AND COD REMOVAL FROM REAL WASTEWATER USING BIOCHAR

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Abstract: Hazardous wastewater represents a major environmental challenge due to the simultaneous presence of chromium contamination and high organic load in complex real effluents. This study proposes an integrated treatment and prediction framework combining engineered olive-stone biochar, real-effluent adsorption experiments, and explainable machine learning.
biochar was produced by controlled pyrolysis and applied for chromium and chemical oxygen demand (COD) removal from real tannery wastewater. The material showed a mesoporous structure and abundant oxygen-containing functional groups, supporting effective adsorption under acidic conditions. Under optimized experimental conditions, chromium removal reached 94.2%, while COD removal reached 59.6%, demonstrating promising treatment efficiency under realistic wastewater conditions.
To strengthen process interpretation and optimization, a machine-learning framework was developed using 420 literature-based adsorption records. XGBoost provided the best prediction for chromium removal, whereas Random Forest performed best for COD reduction. SHAP and permutation importance analyses identified pH, adsorbent dose, and BET surface area as the main factors controlling treatment performance. Descriptor-based interpretation suggested that chromium removal was mainly driven by redox- and electronegativity-related properties, while COD reduction was associated with aromaticity and hydrophobicity.
Overall, this work highlights olive-stone biochar as a sustainable adsorbent for tannery wastewater treatment and demonstrates the value of explainable machine learning for optimizing biochar-based remediation systems.

KEYWORDS: *Tannery wastewater; Olive-stone biochar; Chromium removal; COD reduction; Explainable machine learning; Adsorption*

POSTER N° : 147.

RESPONSE OF MUSSELS TO NANOPARTICLES AND PERSISTENT POLLUTANTS

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Abstract: This study aims to investigate the effects of individual and combined exposure to selected nanoparticles (NPs), polycyclic aromatic hydrocarbons (PAHs) on bivalves using a multi-biomarker approach involving chemical, physiological, and biochemical analyses. The Mediterranean mussel, *Mytilus galloprovincialis*, was selected as the biological model for this study.

The behavior and effects of five types of nanoparticles (ZnO, Au-ZnO, Cu-ZnO, TiO_2, and Au-TiO_2) were assessed through chemical, physiological, and biochemical investigations. Subsequently, the potential toxicity of three polycyclic aromatic hydrocarbons, namely benz[a]anthracene, fluoranthene, and benzo[a]pyrene, was evaluated using a battery of biomarkers.

Physiological responses were evaluated through the assessment of filtration and respiration capacities, whereas biochemical responses were determined using oxidative stress and neurotoxicity biomarkers, including superoxide dismutase (SOD), catalase (CAT), malondialdehyde (MDA), and acetylcholinesterase (AChE).

The main results obtained from chemical analyses using transmission electron microscopy (TEM), X-ray diffraction (XRD), dynamic light scattering (DLS), and zeta potential measurements confirmed the nanoscale size of the studied nanoparticles and demonstrated their stability under varying environmental conditions such as pH and salinity.

The evaluation of the toxicity of nanoparticles and PAHs through physiological parameters showed that the effects were dependent on both the nature of the contaminant and its concentration. In addition, oxidative stress and neurotoxicity biomarkers revealed that the biological responses varied according to the contaminant, exposure concentration, and target organ.

Overall, the use of an integrative approach combining chemical and ecotoxicological analyses represents an effective strategy for understanding the interactions between contaminants and aquatic organisms within the framework of coastal ecosystem biomonitoring programs.

KEYWORDS: *Nanoparticles, Polycyclic aromatic hydrocarbons, Co-exposure, Bioavailability, Bivalves, Biomarkers, Biomonitoring*

POSTER N° : 148.

VALORIZATION OF ANAEROBIC DIGESTATE AS A BIOFERTILIZER FOR DURUM WHEAT (*TRITICUM DURUM*) AND BARLEY (*HORDEUM VULGARE*) IN A CIRCULAR ECONOMY APPROACH

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Abstract: In the context of sustainable agriculture, this study evaluates the potential of anaerobic digestate from agricultural waste as a biofertilizer for durum wheat (*Triticum durum*) and barley (*Hordeum vulgare*). Germination tests revealed high phytotoxicity of raw digestate (complete inhibition at 50%), but a biostimulant effect at low concentrations.

Under hydroponic conditions, barley showed a positive response at 9.5%, with improved photosynthetic activity and no oxidative stress (stable MDA levels), especially with decanted digestate. In contrast, durum wheat exhibited high sensitivity, with reduced root growth (~33%) at 9.5% and severe chlorosis and oxidative damage at 25.7%, despite increased SOD activity.

These results highlight the potential of digestate as a biofertilizer for cereal crops at an appropriate dilution. This approach supports circular economy strategies in Tunisian agriculture and promotes environmentally sustainable practices by reducing waste and limiting the use of chemical fertilizers.

KEYWORDS: Anaerobic digestate, Biofertilizer, *Triticum durum*, *Hordeum vulgare*, Circular economy

GENETICS AND IMMUNOLOGY

POSTER N° : 149.

GENOMIC AND BIOINFORMATICS APPROACHES TO ELUCIDATE THE MOLECULAR BASIS OF MARFAN SYNDROME IN THE TUNISIAN POPULATION

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Genetic diseases constitute a major public health challenge in Tunisia, where their prevalence is amplified by high rates of consanguinity. Marfan syndrome (MS) is an autosomal dominant connective tissue disorder affecting the cardiovascular, skeletal, and ocular systems, with significant morbidity and mortality. Despite its clinical importance, the molecular landscape of MS remains poorly characterized in the Tunisian population.

This multicentric study aims to investigate the genetic basis of MS through an integrated strategy combining genomic sequencing, bioinformatics, and artificial intelligence (AI)–assisted analyses. In collaboration with multiple clinical departments across Tunisia, detailed clinical evaluations were conducted to document phenotypic heterogeneity. Initial molecular screening was performed using Sanger sequencing to identify known pathogenic variants in the *FBN1* gene. For unresolved cases, whole exome sequencing (WES) was applied, followed by advanced bioinformatics pipelines incorporating AI-based tools for variant filtering and prioritization. Candidate variants were validated by Sanger sequencing and segregation analysis.

To date, 23 families with suspected MS have been recruited, comprising 24 Tunisian patients, including seven individuals born from consanguineous unions across different regions of Tunisia. Clinical assessment revealed marked inter- and intrafamilial variability, particularly involving cardiovascular, skeletal, and ocular manifestations. Six patients underwent WES analysis, among whom three harbored pathogenic or likely pathogenic variants in *FBN1*, while the remaining cases are currently under tertiary bioinformatics analysis. Mendelian segregation was confirmed by Sanger sequencing in five patients, including three WES-positive cases and two additional patients from selected families. In silico analyses, including molecular modeling and docking, are being performed to assess the impact of these variants on protein structure, stability, and interactions, as well as to explore potential therapeutic modulation.

This study highlights the added value of integrating WES with bioinformatics and AI-assisted annotation tools to improve molecular diagnosis and variant interpretation in MS. The expected outcomes include a refined mutation spectrum, improved genotype–phenotype correlations, and support for personalized patient management. Newly identified variants will be incorporated into the national PREMEDIT database, contributing to genomic medicine and in silico drug discovery initiatives in Tunisia.

Keywords: *Marfan syndrome, Genetic diseases, Molecular diagnosis, Tunisian population, WES, Bioinformatics, Artificial intelligence-based prioritization tools*

POSTER N° : 150.

TRANSGENIC *LEISHMANIA TARENTOLAE* EXPRESSING A *LEISHMANIA* PROTEIN INDUCES A PROTECTIVE TH1 IMMUNE RESPONSE IN BALB/C MICE.

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Abstract

Leishmaniasis is a neglected tropical disease that remains highly endemic in many regions worldwide. This parasitic disease is caused by obligate unicellular parasites belonging to the *Leishmania* genus. Current treatment strategies rely on conventional chemotherapy, which is limited by systemic toxicity and the rapid emergence of drug resistance. Therefore, the development of an effective vaccine represents a major priority for disease control.

Recently, transgenic *Leishmania tarentolae* has emerged as a promising tool for vaccine development against leishmaniasis. In the present study, we developed and evaluated a vaccine approach using a transgenic *L. tarentolae* parasite expressing a *Leishmania*-derived protein.

The transgenic parasite *L. tarentolae* demonstrated significant potential as a vaccine candidate against leishmaniasis by inducing high levels of IgG production, characterized by an elevated IgG2a/IgG1 ratio, as well as a Th1-oriented cytokine response, reflected by elevated IFN-γ/IL-4 and IFN-γ/IL-10 ratios. These findings indicate the establishment of a protective pro-inflammatory immune response, which is essential for resistance against *Leishmania* infection. Collectively, our results suggest that the transgenic parasite *L. tarentolae* could be a promising vaccine candidate for the prevention and control of leishmaniasis.

Key words: Leishmaniasis, *Leishmania tarentolae*, Vaccination, Th1 immune response

POSTER N° : 151.

CLINICAL PROFILE OF TUNISIAN CHILDREN WITH AUTISM SPECTRUM DISORDER: A CROSS-ANALYSIS OF ADOS AND CARS SCORES, IQ, AND COMORBIDITIES

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Abstract: Autism Spectrum Disorder is a heterogeneous neurodevelopmental disorder characterized by deficits in social communication and restricted, repetitive behaviors. This study aimed to describe the clinical profile of Tunisian children with ASD through a cross-analysis of ADOS and CARS scores, cognitive functioning, and associated comorbidities. A total of 97 Tunisian children diagnosed with ASD were included in this descriptive study. Clinical assessment was performed using the Autism Diagnostic Observation Schedule (ADOS), the Childhood Autism Rating Scale (CARS), IQ evaluation, and medical record review for comorbidities. Descriptive analyses including means, medians, and frequencies were conducted. Most children showed severe ASD symptoms according to CARS scores, along with a high prevalence of intellectual disability and associated comorbidities. Clinical improvement was reported in 60% of cases. These findings highlight the clinical complexity of ASD in Tunisian children and underline the importance of combining standardized diagnostic tools with neurodevelopmental evaluation to support appropriate clinical management and follow-up.

KEYWORDS: *ASD, ADOS, CARS, intellectual disability*

POSTER N° : 152.

ADIPOQ VARIANTS RS1501299 AND RS3774261 AND HYPOADIPONECTINEMIA IN OBESE WOMEN WITH PCOS: GENETIC AND METABOLIC INTERACTIONS

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Abstract: Hypoadiponectinemia is common in polycystic ovary syndrome. To investigate whether ADIPOQ variants are associated with obesity in PCOS

Methodology: In 324 Tunisian women with PCOS, classified as obese or nonobese, serum adiponectin was measured, and nine ADIPOQ variants were genotyped using TaqMan assays. Associations with obesity were assessed using logistic regression, gene phenotype interaction analysis, and models incorporating a PRS; epistasis, QTL, and diplotypes were also evaluated. **Results:** Adiponectin levels were significantly lower in obese women and modestly predicted obesity (AUC = 0.605). Variants rs1501299 and rs3774261 were significantly associated with obesity under recessive models (OR up to 5.18, 95% CI [2.32 − 11.56], p = 7.14 × 10−5). A combined model including adiponectin, the two variants, and PRS outperformed single predictors. **Conclusions:** ADIPOQ rs1501299 and rs3774261 are associated with obesity in women with PCOS, demonstrating a specific relationship with reduced adiponectin. Integrating genetic and biochemical markers improves metabolic risk profiling.

KEYWORDS*:* association; PCOS; obesity; variants; ADIPOQ; hypoadiponectinemia

POSTER N°:153.

ELEVAGE ET PRODUCTION DE LA CHÈVRE DE LA CHÈVRE LOCALE DANS LES RÉGIONS ARIDES DU SUD TUNISIEN : DIVERSITÉ ET PLAN D'AMÉLIORATION GÉNÉTIQUE

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Résumé
La présente étude vise l'établissement des paramètres génétiques de la population caprine locale dans le parcours de la région aride du sud tunisien ainsi que sa diversité biologique et ses aptitudes adaptatives. La caractérisation phénotypique de la population locale, basée sur le profilage des phénotypes et de la stature générale des chèvres et des boucs, a été réalisée au niveau des troupeaux comportant des chèvres et des boucs. On se propose un plan d'amélioration génétique au niveau des différents systèmes d'élevage (extensif, intensif et semi intensif) pour améliorer le comportement génétique et productif de la chèvre locale dans un schéma d'amélioration génétique.
La caractérisation phénotypique réalisée confirme la large diversité intra population locale sur le parcours des régions arides (côtière, steppique et montagneuse). Les fréquences des différents patrons phénotypiques varient largement avec les localités et les systèmes d'élevage.

Mots clés: Chèvre locale ; diversité génétique ; plan d'amélioration génétique ; régions arides.

POSTER N° : 154.

IDENTIFICATION AND GENOME-WIDE CHARACTERIZATION OF THE BASIC HELIX-LOOP-HELIX (BHLH) GENE FAMILY IN DATE PALM (*PHOENIX DACTYLIFERA* L.)

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Abstract:
This study presents a genome-wide identification and characterization of the basic helix-loop-helix (bHLH) transcription factor family in date palm (*Phoenix dactylifera* L.), a crucial species for food security in arid and semi-arid regions. A total of 153 *PdbHLH* genes were identified, accounting for 0.41% of the total genome, with 124 genes successfully mapped across 17 of the 18 chromosomes. Phylogenetic analysis classified these genes into 25 distinct subfamilies, with Subfamily IV emerging as the largest group, mirroring evolutionary patterns and functional specialization seen in other angiosperms. Beyond the conserved bHLH domain required for DNA binding, several proteins featured atypical domains such as ACT-like domains, which function as regulatory switches, and RWP-RK or MFS superfamily domains, suggesting diverse roles in nitrogen response, sexual reproduction, and transmembrane material transport. Gene Ontology (GO) and protein-protein interaction analyses revealed that PdbHLHs are central to jasmonic acid (JA) signaling through interactions with TIFY/JAZ proteins and likely coordinate lipid metabolism via NPC1-like transporters to maintain membrane stability under environmental stress. While only 12% of the genes showed evidence in available EST databases, PdbHLH72 was identified as a primary candidate for future research due to its specific expression in drought-stressed leaves. Collectively, these findings provide a foundational framework for understanding the molecular mechanisms of stress resilience in date palm and support future breeding efforts to improve crop performance in extreme environments.

Keywords: *Phoenix dactylifera; bHLH transcription factors; Genome-wide analysis; stress resilience*

POSTER N° : 155.

EVALUATION OF *VDR* (RS7975232) AND *FCGR2A* (RS1801274) POLYMORPHISMS AS GENETIC FACTORS ASSOCIATED WITH AUTOIMMUNE THYROID DISEASES IN A TUNISIAN POPULATION

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Background :
Autoimmune thyroid diseases (AITDs), mainly represented by Hashimoto's thyroiditis (HT) and Graves' disease (GD), are multifactorial disorders resulting from complex interactions between genetic predisposition and environmental influences. Several immune-regulatory genes have been implicated in disease susceptibility and clinical heterogeneity.
Objective :
The present study aimed to investigate the association of the *VDR* rs7975232 and *FCGR2A* rs1801274 polymorphisms with susceptibility to AITDs and their clinical and biological characteristics in a Tunisian cohort. Methods :
A case-control study was conducted including 324 participants, comprising 162 patients diagnosed with AITDs and 162 healthy controls. Genotyping of the *VDR* polymorphism was performed using PCR-RFLP, whereas the *FCGR2A* variant was analyzed by ARMS-PCR. Statistical analyses evaluated allelic and genotypic distributions as well as correlations between genetic variants and clinical parameters, including thyroid hormone levels, autoantibody profiles, and age at diagnosis.
Results :
Analysis of the *FCGR2A* rs1801274 polymorphism revealed a significant association between the 131H allele and increased susceptibility to AITDs, particularly Hashimoto's thyroiditis, where the HH genotype was associated with a markedly elevated disease risk (OR = 2.39). This polymorphism also appeared to influence the initial biochemical presentation of Graves' disease through modulation of T4 levels.
In contrast, no significant association was observed between the *VDR* rs7975232 polymorphism and overall AITD susceptibility. However, the A allele was more frequently detected in patients with early disease onset and in those positive for anti-thyroglobulin antibodies. Among HT patients, the AA genotype was associated with higher T4 concentrations.
Conclusion :
These findings suggest that the *FCGR2A* rs1801274 polymorphism may contribute to genetic susceptibility to autoimmune thyroid diseases, whereas the *VDR* rs7975232 variant may primarily influence disease phenotype and biological expression. Both polymorphisms could therefore serve as potential biomarkers for prognostic assessment and patient stratification in Tunisian individuals affected by AITDs.
***Keywords** : Autoimmune thyroid diseases, genetic polymorphisms, PCR-RFLP, ARMS-PCR, VDR, FCGR2A.*

POSTER N° : 156.

ROLE OF VDR GENE POLYMORPHISMS AND ENVIRONMENTAL FACTORS IN THE DEVELOPMENT OF SKIN CANCERS: EVIDENCE BY UPDATED META-ANALYSIS

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The vitamin D and its receptor the VDR have pleiotropic effects on different biological mechanisms, including skin cancers. The sun UV radiation has confirmed effects on both skin cancers and on VD/VDR pathways. In the current study, we investigated the role of the VDR and its interaction with specific environmental factors to develop skin cancers. We conducted meta-analyses of published association studies on the VDR gene polymorphisms *Fok*I, *Bsm*I, *Taq*I and *Aap*I and skin cancers. Subgroup analyses were performed to investigate the impact of environmental factors on skin cancers. Meta-analysis showed that the VDR *Fok* I polymorphism was associated with melanoma risk with CT genotype as a significant risk factor. We found also significant association for the VDR *Bsm*I polymorphism (AG *vs*. GG model, $P = 0.020$), as AG genotype having a protective effect against melanoma. However the VDR *Taq*I and *Apa*I polymorphisms were not associated with melanoma in the overall analysis. Met-analysis of studies on non-melanoma cancers (NMSC) showed significant effects of *Fok*I, with TT genotype as a risk factor, whereas the CC genotype was protective against NMSC. The *Taq*I showed also significant association with NMSK, with T allele and TT genotype as having protective roles. Stratification according to geographic localization showed that the *Fok*I CC genotype had protective effect in both North America and North Europe. Stratification according to the study period revealed that the *Fok*I CT genotype had a highly significant risk in the last decade 2011–2020. In conclusion, VDR *Fok*I and *Bsm*I polymorphisms showed significant associations with melanoma, whereas *Fok*I and *Taq*I were significantly associated with NMSC. Subgroup analysis revealed that factors such as the geographic localization and study period influenced the association between the VDR gene and the risk of skin cancers.
Key words : Vitamin D, VDR polymorphism, Skin cancer

MICROBIOLOGY AND VIROLOGY

POSTER N° : 157.

IMPROVING AN IN HOUSE MADE LINEAR ASSAY FOR HPV GENOTYPING PASTEUR INSTITUTE

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ABSTRACT

The HPV (Human Papillomavirus) test is an essential screening tool, recommended every 5 years for women aged 30 to 65, designed to detect the DNA of the high-risk virus (HR-HPV) in cervical cells. More effective than a Pap smear alone, it allows for the early identification of the risk of cancerous lesions. The sample is collected by a doctor, midwife, or in a laboratory. It is quick and painless. The sample is analyzed by PCR in a laboratory to detect viral DNA.

In our laboratory, we have developed a novel in house made linear array assay for HPV genotyping. We used 20 proficiency test samples provided by the WHO HPV Lab net (DNA Proficiency Panel Study 2007-2008) 30 liquid- based pap smears and 10 FFPE specimens (CIN1-CINII); Genotyping results were compared with reference processes which could be used as references methods in genotyping HPV: linear array genotyping kit Roche and sequencing. PCR assay with biotinylated primers (PGMY and GP5+/GP6+) has been used for genotyping followed with 36 specific probes hybridizing (18 HR and 18 LR).

Our study out of a total sample size of 60 HPV tests, using three genotyping methods: the kit Roche and our inhouse linear array assay, has shown to bring the same results: 8 samples are HPV negative and 52 samples are HPV positive with the same found genotypes. With this technique, we worked on 300 samples received as part of screening 2008-2009. The positive HPV cases are validated by sequencing.

Our developed inhouse assay was even faster and cheaper and could be used as a reference method for limited resources laboratories for the diagnosis of HPV infections.

Key words: HPV TEST; Linear array HPV genotyping; probes hybridization.

POSTER N° :158.

ENCAPSULATED PROBIOTIC *LACTIPLANTIBACILLUS* STRAINS WITH PROMISING APPLICATIONS AS FEED ADDITIVES FOR BROILER CHICKENS

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Abstract :

Lactic acid bacteria (LAB), particularly Lactobacilli strains, represent a widely studied and promising group of probiotics with numerous potential health benefits. In this study, we isolated LAB strains from fecal samples of healthy broiler chickens and characterized their probiotic properties. Out of 62 initial isolates, five strains were selected for further investigations based on their antibacterial activity against pathogenic bacteria. These selected strains were identified as *Lactiplantibacillus* species. They exhibited desirable probiotic traits, including non-hemolyis, non-cytotoxicity, lack of antibiotic resistance, acid tolerance, auto-aggregation, and antioxidative potential. Encapsulation of these strains in alginate beads enhanced their survival compared to free cells, in stomach (69–87 % *vs*. 34–47 %) and intestinal (72–100 % *vs*. 27–51 %) juices, after 120 min exposure. These findings suggest that encapsulated *Lactiplantibacillus* strains could be used as feed additives for broiler chickens. Nevertheless, further studies are needed to set on their probiotic potential *in vivo*.

KEYWORDS: Probiotics, feed additives, broiler chicken, antibiotic, antibacterial activities.

POSTER N° :159 .

CLINICAL PRESENTATION OF TUBERCULOSIS AMONG HOSPITALIZED PATIENTS IN MILA DISTRICT, NORTHEASTERN ALGERIA.

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Abstract: Tuberculosis is a chronic respiratory infectious disease that frequently caused by *Mycobacterium tuberculosis*. Tuberculosis is a major public health problem worldwide, and particularly in Algeria. An epidemiological study was carried out in the Mila district, based on analyzing clinical and biological data of 163 adult patients hospitalized with different forms of tuberculosis. All these patients were admitted to the Mohamed Maddahi hospital at Ferdjioua, Mila, Algeria. In the light of our results, we found that among young patients women were more affected by tuberculosis than men. In addition, pulmonary tuberculosis was more prevalent than extra-pulmonary tuberculosis. Our study identified several risk factors, such as late age, and certain comorbidities such as renal failure and cardiovascular disease that were most frequently associated to the infection. Moreover, the study also identified several biological parameters that were strongly associated with an increased risk of mortality, such as elevated levels of C-reactive Protein (CRP), blood glucose, creatinine, and urea, as well as decreased platelet levels.

KEYWORDS: *Tuberculosis, Mycobacterium tuberculosis, Renal failure, cardiovascular disease.*

POSTER N° : 160.

WHOLE GENOME SEQUENCING ANALYSIS OF MULTIDRUG RESISTANCE IN *ACHROMOBACTER XYLOSOXIDANS* ASSOCIATED TO CYSTIC FIBROSIS

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Abstract: *Achromobacter xylosoxidans* is an emerging opportunistic pathogen related to cystic fibrosis (CF). In this study, a clinical strain, isolated from the sputum of a patient with CF, was characterized at molecular level. Whole-genome sequencing was conducted using Illumina technology, followed by genome assembly and annotation. The BV-BRC and PGAP pipelines were utilized to accomplish the resistome and virulence profiling. The clinically strain was identified as *Achromobacter xylosoxidans* MICB25. The whole-genome sequencing revealed a multifaceted resistome including β-lactamases, aminoglycoside-modifying enzymes, and other resistance determinants in addition to an exceptionally broad and varied efflux repertoire covering ABC, MFS, RND, and SMR families. The simultaneous presence of multiple secretion systems, varied efflux repertoire and biofilm-associated genes, highlights efflux-driven biofilm adaptation as a key mechanism influencing survival and treatment failure in the CF airway environment.

KEYWORDS: *Whole-genome sequencing, Achromobacter xylosoxidans, cystic fibrosis, antibiotic resistance.*

POSTER N° : 161.

ARBUSCULAR MYCORRHIZAL FUNGI ASSOCIATED WITH *OPUNTIA FICUS INDICA* L. GROWN IN SEMI ARID REGION OF TUNISIA IN RELATION TO SOIL PHYSICO- CHEMICAL PROPERTIES

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Abstract: Arbuscular mycorrhizal fungi (AMF) are present in a great variety of ecosystems, including arid lands. However, little is known regarding the environmental factors that affect their development within the rhizosphere of prickly pear (*Opuntia ficus indica* L.), the most cultivated crop in the semi-arid region of Tunisia. This study had the objective of describing the edaphic environment and the mycorrhizal status of two types of *O. ficus indica* and to identify the edaphic variables that determine the percentage of mycorrhizal colonization. To accomplish this, 54 samples of roots and rhizospheric soil were collected from the center of Tunisia. For each type, soil physico- chemical analysis and fungal variables: the percentage of root fungal colonization, and easily extractable glomalin- related soil protein content (EE-GRSP) were determined. Structural equation models were elaborated for each type to determine the relationship between the edaphic environment and arbuscular mycorrhizal colonization. Soil physicochemical properties and fungal variables differ significantly between the study sites. According to structural equation models, soil moisture, pH, total soil nitrogen and sand content are the edaphic variables that determine AMF colonization variation in spineless prickly pear while soil organic matter content is the edaphic variable that impacted AMF colonization variation in the spiny type. Investigating the relationship between soil physicochemical properties and AMF establishment associated with prickly pear is the first step towards the development of sustainable agricultural practices to promote cactus performance and productivity in the semi-arid region.

KEYWORDS: *semi-arid, prickly pear, mycorrhizal colonization, glomalin-related soil protein, soil physicochemical properties*

POSTER N° : 162.

PARAFUSIONNET AUTOMATED QUANTIFICATION OF INTRACELLULAR LEISHMANIA AMASTIGOTES IN GIEMSA-STAINED MICROSCOPY IMAGES
A MULTI-MODEL DEEP LEARNING FRAMEWORK FOR DRUG EFFICACY ASSESSMENT

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Abstract: Leishmaniases remain a major public health burden worldwide, with no vaccine currently available, underscoring the urgent need for accelerated drug discovery pipelines. The reliable quantification of intracellular *Leishmania* amastigotes within infected macrophages constitutes a critical readout for antileishmanial drug efficacy assessment, yet this process relies on time-consuming, operator-dependent manual microscopic examination. In the present study, we leveraged AIR-LEISH, a publicly available dataset of 180 Giemsa-stained microscopy images derived from two in vitro infection models, THP-1/*L. major* and MDM/*L. infantum*, encompassing 8,140 expert-annotated amastigotes across dark and light staining conditions. We developed ParaFusionNet, an ensemble detection framework combining three deep learning architectures, YOLOv8n, YOLOv11n, and RF-DETR, through Weighted Boxes Fusion, and evaluated its performance both in-distribution and under two cross-stain transfer scenarios simulating real-world staining variability. Model selection was guided by precision as the primary criterion, given that false positive detections lead to underestimation of drug efficacy and risk dismissal of genuinely active compounds. Our results demonstrated that ParaFusionNet consistently outperformed all standalone models in precision across all evaluated conditions, reaching up to 91% under cross-stain transfer, while standalone architectures suffered marked performance degradation when transferred across staining protocols. These findings suggest that ensemble-based automated amastigote quantification constitutes a robust and reproducible alternative to manual counting, with direct applicability to high-throughput antileishmanial drug screening workflows.

KEYWORDS: *Leishmaniases, Microscopy, Parasite Quantification, Drug Discovery*

POSTER N° : 163.

COMBATING MULTIDRUG-RESISTANT *KLEBSIELLA PNEUMONIAE*: ANTIBACTERIAL POTENTIAL OF *JUNIPERUS COMMUNIS*

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Abstract: *Klebsiella pneumoniae* is an important opportunistic pathogen responsible for a wide range of nosocomial and community-acquired infections. The increasing emergence of multidrug-resistant (MDR) strains has become a major global public health concern. The present study aimed to isolate and characterize clinical strains of *K. pneumoniae* and to evaluate the antibacterial activity of an aqueous extract of *Juniperus communis* against MDR isolates. *K. pneumoniae* isolates were identified using cultural, morphological, and biochemical characterization methods. Antibiotic resistance profiles were determined using standardized antimicrobial susceptibility testing. The antibacterial activity of *Juniperus communis* was evaluated by the disk diffusion method as well as by determining the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC). A total of twelve *K. pneumoniae* strains were isolated and characterized. The isolates exhibited high and variable levels of multidrug resistance to commonly used antibiotics. The aqueous extract of *Juniperus communis* demonstrated significant strain-dependent antibacterial activity against MDR isolates, with inhibition zone diameters ranging from 12 to 28 mm. The MIC and MBC values were determined to be 15 mg/mL and 30 mg/mL, respectively. These findings demonstrate that *Juniperus communis* possesses promising antibacterial activity against multidrug-resistant *K. pneumoniae*, suggesting its potential as a natural alternative therapeutic agent for combating antibiotic-resistant infections. This study highlights the potential of *Juniperus communis* as a valuable source of novel antibacterial compounds in the fight against bacterial antimicrobial resistance.

Keywords: *Klebsiella pneumoniae*; Multidrug resistance; *Juniperus communis*; Antibacterial activity; Phytotherapy; Medicinal plants; MIC; MBC; Antibiotic resistance.

POSTER N° : 164.

ANTIBIOTIC RESISTANCE AND VIRULENCE PROFILES OF CLINICAL *ESCHERICHIA COLI* ISOLATES

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Abstract: *Escherichia coli* is one of the most common non-pathogenic bacteria found in the human intestinal microbiota. However, certain strains have acquired the ability to cause gastrointestinal, urinary tract, and central nervous system infections, even in healthy individuals. The present study aimed to investigate clinical *E. coli* isolates through bacterial identification, antibiotic resistance profiling, and virulence factor evaluation. All samples analyzed between February 1 and May 30, 2024, were included in the study. During the study period, a total of 1,598 clinical specimens were analyzed in the bacteriology laboratory, among which 279 samples (17.45%) were positive. A total of 146 isolates were identified as *Escherichia coli*, representing 67.9% of all Gram-negative bacilli isolated. Most infections originated from outpatients (73.80%). Among the *E. coli* isolates, 140 strains (95.89%) were recovered from urine samples. The study revealed the presence of extended-spectrum β-lactamase (ESBL)-producing *E. coli* strains (n = 13; 8.72%), cephalosporinase-producing isolates (n = 5; 3.35%), and high-level penicillinase-producing strains (n = 3; 2.01%). High resistance rates to penicillins were observed. In contrast, monobactams, carbapenems—particularly imipenem—and aminoglycosides retained good antibacterial activity against most isolates. Sixteen representative *E. coli* strains were selected for virulence analysis. Hemolytic activity showed that 25% of isolates exhibited complete hemolysis (β-hemolysis), 37.5% displayed partial hemolysis (α-hemolysis), while 37.5% were non-hemolytic (γ-hemolysis). Biofilm formation was evaluated using three phenotypic methods. The Congo Red Agar method identified only six strains (37.5%) as adherent biofilm producers. In contrast, the tube method revealed that the majority of isolates (n = 13) produced a violet ring, indicating biofilm formation. Furthermore, the quantitative polystyrene microplate assay demonstrated that all 16 *E. coli* isolates were strong biofilm producers (OD570 > 1). The excessive use of antibiotics in both hospital and community settings contributes to the emergence of new bacterial resistance profiles. Therefore, continuous surveillance of antimicrobial resistance is essential in hospitals and private laboratories to limit the spread of resistant and virulent *E. coli* strains.

Keywords *: Escherichia coli; Antimicrobial resistance; ESBL; Biofilm formation; Virulence factors; Hemolysis; Urinary tract infections; Multidrug resistance.*

POSTER N° :165 .

FROM ISOLATION TO SELECTION: A MULTICRITERIA FRAMEWORK FOR LACTIC ACID BACTERIA FROM TUNISIAN FERMENTED FOODS

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Abstract: Traditional fermented food products harbor diverse lactic acid bacteria (LAB) with potential technological and functional applications, however, systematic approaches for prioritizing strains remain limited. In our study, we developed and applied a polyphasic sequential in vitro screening framework to select LAB isolates from olive brine and dairy products (Jben, Mozzarella, Gouta) collected from multiple Tunisian regions. An initial isolate pool was sequentially evaluated through: (i) technological robustness criteria under food-relevant applications (salt and temperature tolerance, proteolytic and lipolytic activity, antimicrobial activity), (ii) in vitro functional stress tolerance commonly used as preliminary host-relevant indicators (acid and bile salt resistance, as well as auto- and coaggregation), and (iii) preliminary safety-related exclusion criteria integrating hemolytic activity, antibiotic susceptibility, and gelatin degradation. A total of 35 LAB isolates were progressively filtered through successive screening assays, resulting in a substantial reduction in isolates numbers to eight LAB strains while maintaining diversity across sampled matrices and geographic origins. This selective process was further supported through molecular characterization, which identified the retained isolates as members of two LAB genera; *Lactobacillus* and *Leuconostoc*, taxa commonly associated with traditional fermented foods and spontaneous fermentation ecosystems.

KEYWORDS: *Lactic acid bacteria, antimicrobial activity, probiotic activity*

POSTER N° : 166.

CLIMATE CHANGE AS A FACTOR CONTRIBUTING TO THE EMERGENCE OF MULTIDRUG-RESISTANT *CAMPYLOBACTER JEJUNI* AND *CAMPYLOBACTER COLI* IN TUNISIAN POULTRY FARMS (2013–2025): AN INTEGRATED APPROACH COMBINING MACHINE LEARNING, BIOINFORMATICS AND STATISTICS WITHIN THE FRAMEWORK OF THE 'ONE HEALTH' APPROACH

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Abstract : In Tunisia, the spread of multidrug-resistant (MDR) *Campylobacter* spp. to fluoroquinolones, macrolides, and tetracyclines poses a major public health problem. Beyond antibiotic pressure, the influence of environmental factors on these pathogens remains poorly understood in North Africa. Using an integrated "One Health" approach, this study aimed to investigate the role of climate variability (precipitation and seasonality) in the epidemiological and molecular dynamics of *Campylobacter* in northern Tunisia. Long-term surveillance (2013–2025) was conducted in poultry farms across Ariana, Nabeul, and Ben Arous on broilers, laying hens, and their environment. Molecular typing of 200 MDR isolates was performed using multiplex PCR and MLST, while interactions with meteorological data were deciphered using *Random Forest*, logistic regressions, and SARIMA time-series models. MLST typing revealed 25 STs, dominated by CC21 in *C. jejuni* (62%) and CC206 in *C. coli* (70%). The *Random Forest* model ranked precipitation (28.4) and seasonality (20.1) as the primary predictors of multidrug resistance. Autumn emerged as the critical period, with prevalences of 50–56% in broilers and up to 100% in laying hens, strongly correlated with a rainfall threshold > 28mm ($p < 0.001$). Multivariable logistic regression confirmed that autumn (OR= 4.5) and cumulative rainfall of 50 mm (OR = 3.2) significantly predicted MDR status. Notably, an emerging clone exclusive to autumn rains, ST1345, co-expressed the tet(O) and bla_OXA-61 genes alongside the 23S rRNA point mutation. Furthermore, SARIMA projections predicted an 18% to 35% increase in MDR prevalence by 2040 in the face of ongoing climate anomalies. Through *machine learning*, this work demonstrates that autumn rainfall fluctuations dictate clonal dynamics and the emergence of highly resistant strains in poultry farming. These results advocate for the urgent integration of climate-adaptive indicators into national "One Health" global surveillance plans.

Keywords: *Campylobacter*, Multidrug resistance, Climate, Tunisia, Machine Learning, One Health.

POSTER N° : 167.

EXPLORATION OF ACTINOBACTERIAL DIVERSITY FROM TUNISIAN ECOSYSTEMS FOR POTENTIAL PHARMACEUTICAL USE

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Abstract:

The research for new antibiotics has become essential to combat the development of drug-resistant pathogens, the evolution of new diseases and the toxicity of certain existing compounds. Significant progress has been made in chemical synthesis and artificial biosynthesis of biomolecules, but nature remains an incredibly rich and diverse source of potential new antimicrobial compounds. Actinomycetes are among the most common producers of specialized metabolites compared to other bacteria. Actinomycetes are Gram-positive bacteria belonging to the phylum *Actinobacteria*. This phylum is well-suited to a wide variety of environments such as soil, water, and air. The objectives of this research work involve isolating and screening actinomycete strains from unexplored Tunisian ecosystems and studying various activities with pharmaceutical interest, such as antibacterial and antifungal activities. The results of the present study highlight the isolation of 143 strains from various ecosystems in Tunisia belonging to three different genera, namely *Streptomyces*, *Nocardia*, and *Micromonospora*. Unidentified strains at the genus level are referred to as non-*Streptomyces*. The study of antimicrobial activity showed that 84.96% of the strains are active against at least one test organism. The broad-spectrum antibacterial activity demonstrated that 83,33% are active against *Staphylococcus aureus* ATCC 29213, *Staphylococcus aureus* ATCC 6538, *Streptococcus salivarius* ATCC 13419, respectively, and that 94.44% are active against *Enterococcus faecalis* ATCC 29212. Additionally, 100% of the tested strains are active against *Salmonella enterica* CIP 80.39, 91.66% are active against *Pseudomonas aeruginosa* ATCC 9027, *Salmonella typhimurium* LT2 DT104 and *Escherichia coli* ATCC 28922, while 66.66% are active against *Escherichia coli* ATCC 8739. The analysis of antifungal activity revealed that 35.46% of the strains are active against *Candida albicans* ATCC 30031.

KEYWORDS: *Actinomycetes, extreme ecosystems, antibacterial activity, antifungal activity.*

POSTER N° : 168.

STUDY OF QUORUM SENSING INHIBITION BY ESSENTIAL OILS AGAINST THE BIOFILM-FORMING METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS*

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Abstract : This study aimed to investigate the inhibitory effects of four selected essential oils (EOs) on methicillin-resistant *Staphylococcus aureus* (MRSA), with a specific focus on their potential to disrupt quorum sensing (QS)-mediated virulence and biofilm formation. The essential oils evaluated were Geranium (*Pelargonium graveolens*, PgEO), Tea Tree (*Melaleuca alternifolia*, MaEO), Lemon peel (*Citrus limon*, ClEO), and Peppermint (*Mentha piperita*, MpEO). Their antibacterial activity against planktonic MRSA (ATCC 33591) showed MIC values ranging from 1.56 to 12.5 µl/ml.

The EOs demonstrated significant anti-biofilm properties. Notably, MpEO exhibited 60% inhibition of initial cell adhesion at 3.12 µl/ml, while both PgEO and MpEO achieved up to 80% eradication of pre-formed MRSA biofilms at the same concentration. Mechanistically, these effects were linked to the interference with QS-related regulatory pathways. Molecular docking analysis suggested that key bioactive compounds from the EOs bind to the SarA protein, a central QS regulator controlling biofilm formation in S. aureus.
Furthermore, PgEO at sub-inhibitory concentration (MIC/2) significantly suppressed the production of the QS-associated virulence pigment staphyloxanthin. *In silico* studies indicated that this inhibition likely occurs through the binding of major PgEO components (β-citronellol and geraniol) to the CrtM enzyme, a key player in the staphyloxanthin biosynthesis pathway regulated by QS signals.
These findings suggest that the selected essential oils act as promising quorum sensing inhibitors (QSIs), capable of attenuating virulence and biofilm formation in MRSA without relying solely on bactericidal activity. They represent potential candidates for developing anti-virulence strategies against drug-resistant staphylococcal infections.

KEYWORDS : *Staphylococcus; Biofilm; CrTM; Docking; EOs; Geranium; SarA; Staphyloxanthin.*

POSTER N° : 169.

PROBIOTIC POTENTIAL OF OLIVE BRINE MICROORGANISMS: *IN VITRO* GASTROINTESTINAL EVALUATION AND FUNCTIONAL TRAITS OF LACTIC ACID BACTERIA

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Abstract : Probiotics are known for their health benefits and are considered as beneficial microorganisms. Their isolation has been widely practiced from dairy products. Nevertheless, the investigation of alternative sources, including fermented vegetable by-products, remains underexplored in Tunisia.
Therefore, this study aims to evaluate the gastrointestinal resistance and adhesion capacity of lactic acid bacteria isolated from different brines of seasoned Chétoui olives, in order to assess their probiotic potential.
The bacteria (n=16) were isolated from seasoned olive brines on MRS agar and preserved for subsequent analyses. Their probiotic functional properties were assessed through resistance to acidic and alkaline pH (2.5 and 7.5) as well as bile salts at two concentrations (0.5% and 2%). Hydrophobicity tests using chloroform and ethyl acetate, auto-aggregation and co-aggregation with $F18^+$ *E. coli* were performed to evaluate adhesion to intestinal cells. The results obtained from the different assays were confirmed by *In vitro* analysis.
The current findings showed that the strains were significantly able to survive during the digestion process, which is considered an essential criterion for probiotic potential. Thus, a significant resistant was confirmed to both acidic and alkaline pH conditions, as well as to 0.5% of bile salts. Regarding auto-aggregation, the highest percentage was observed for two strains (37%) and only one strain showed no activity (0%). Co-aggregation results revealed different behavioral patterns among the tested groups. Hydrophobicity assays also revealed different trends toward the two solvents, where some strains exhibiting high affinity to chloroform showed low affinity to ethyl-acetate. Finally, the INFOGEST assay confirmed gastrointestinal tolerance, with an overall survival rate of 80%.
Overall, this study highlights the importance of the sustainable valorization of olive brines as a promising source of probiotic microorganisms with potential health and wellness benefits.
KEYWORDS: *Olive fermentation, seasoning, microorganisms, probiotic potential, gastrointestinal proprieties.*

POSTER N° : 170.

GENETIC DIVERSITY AND SURFACE GENE MUTATIONAL PROFILING OF HEPATITIS B VIRUS USING WHOLE-GENOME SEQUENCING

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Abstract: Hepatitis B virus (HBV) vaccination has been included in Tunisia's national immunization program since 1995. Despite this, HBV infection remains an important public health issue, partly due to viral mutations that may compromise control strategies. This study aimed to characterize the genetic variability of HBV strains circulating in Tunisian patients and to analyze mutational profiles within the surface (S) gene. Blood samples were collected from 23 patients referred to the Clinical Virology Laboratory at the Pasteur Institute of Tunis for diagnostic purposes between 2020 and 2026. Whole-genome sequencing was performed using Oxford Nanopore technology. HBV genotyping was determined by phylogenetic analysis, and S gene mutation profiling was performed using the Geno2Pheno HBV online tool. Phylogenetic analysis revealed co-circulation of HBV subgenotypes D7 (47.83%), D1 (39.13%), D3 (8.70%), and E (4.35%), with D7 being the predominant subgenotype. Mutational analysis showed marked genetic diversity within the S gene. A total of 32 amino acid substitutions with clinical relevance were identified. These mutations associated with immune and vaccine escape (N3S, I68T, T113S, T114S, K122R, G130N, N131T, M133K, F134Y, D144A, A159G, V168A, V184A, S204R, S207R), diagnostic escape (I110L, S193L), and occult HBV infection (I68T, C69*, E164G, T125M).Additional mutations such as L49R and Y206C were associated with progression to cirrhosis and hepatocellular carcinoma, while I195M and L216Stop were linked to potential diagnostic misinterpretation. Several other substitutions (N3T, Q30K, S45T, L42R, P46T, C76Y, P211R) were detected but remain poorly characterized or of unknown clinical significance. These findings highlight the importance of continuous surveillance of HBV S gene mutations, as they may impact vaccine efficacy, diagnostic accuracy, and disease progression. This study provides valuable insights for strengthening HBV monitoring and improving management strategies in Tunisia.
KEYWORDS: *Hepatitis B virus, genetic diversity, surface gene (S), mutational profiling, whole-genome sequencing, Oxford Nanopore technology*

POSTER N° : 171.

SCREENING OF ENZYME-PRODUCING MARINE BACTERIA FROM THE WESTERN ALGERIAN MEDITERRANEAN COAST

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Abstract: The Mediterranean Sea represents an important reservoir of marine microorganisms with promising biotechnological potential. This study aimed to isolate and screen enzyme-producing marine bacteria from seawater samples collected along the western Algerian coast (Kristel, Oran, and Arzew). Eight bacterial isolates were obtained using selective marine media and evaluated for the production of amylases, cellulases, chitinases, proteases, and lipases under different salinity and pH conditions.

The isolates exhibited diverse enzymatic profiles. Strain S1 showed significant cellulase activity (EI = 1.90 ± 0.25), while strain S3 demonstrated strong protease activity (EI = 2.07 ± 0.18) under alkaline conditions. Strain S4 displayed broad enzymatic potential, including high lipase production (EI = 2.15 ± 0.19) with optimal activity at 10 g/L NaCl. These findings highlight the potential of Mediterranean marine bacteria as sources of stable and extremotolerant enzymes for sustainable industrial and blue biotechnology applications.

KEYWORDS: *Marine bacteria, Mediterranean Sea, Enzymes, Screening*

POSTER N° : 172.

AIR-LEISH: A DATASET OF GIEMSA STAINED MICROSCOPY IMAGES FOR AI-BASED LEISHMANIA AMASTIGOTES DETECTION

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Abstract: Leishmaniases are a neglected parasitic diseases caused by *Leishmania* spp., with the intracellular amastigote stage representing the clinically relevant form in mammalian hosts. Microscopic examination remains the standard method for detecting and quantifying intracellular parasite burden in leishmaniases research and Drug Discovery. However, it is time-consuming, operator-dependent, and limits large-scale experimental studies. To address this gap, we generated **AIR-LEISH**, an expert-annotated dataset of Giemsa-stained microscopy images designed for AI-based detection, segmentation, and quantification of intracellular *Leishmania* amastigotes. The dataset was generated using two biologically distinct *in vitro* infection models. The first consisted of THP-1-derived macrophages infected with *Leishmania major* (10:1 parasite-to-cell ratio), a standard model for drug screening, resulting in approximately 55% infected macrophages with variable intracellular parasite loads. The second model used primary human monocyte-derived macrophages infected with *Leishmania infantum* (15:1 parasite-to-cell ratio), resulting in a higher infection rate of approximately 69% infected cells and increased parasite burden per cell. Across both models, infected macrophages exhibited heterogeneous parasite loads, ranging from low infection (1–3 amastigotes per cell) to cells exhibiting high parasite burden containing more than 10 parasites. Uninfected macrophages were also included to ensure robust classification. In total, AIR-LEISH encompassed 180 expert-annotated images, comprising 8,140 amastigotes, 1,511 macrophages, and 1,731 nuclei, enabling both object detection and segmentation tasks. The dataset was manually annotated using Roboflow and validated to ensure high-quality ground truth for AI applications. We further demonstrate the utility of AIR-LEISH by training and evaluating two state-of-the-art architectures, YOLOv8 (object detection) and U-Net (semantic segmentation), both of which achieved promising performance for automated detection, classification, and counting of amastigotes. The dataset is freely available on Zenodo (https://doi.org/10.5281/zenodo.17384855) to accelerate the development of AI-based tools, advance leishmaniases research, and support collaborative initiatives in global health.

KEYWORDS: *Microscopy image dataset, Image annotation, Automated amastigotes quantification, Artificial Intelligence*

POSTER N° : 173.

TRANYLCYPROMINE AS A NOVEL CANDIDATE FOR ANTI-LEISHMANIAL THERAPY

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Abstract: Leishmaniases remain a major global health challenge due to limited and often toxic therapeutic options. Recent advances in artificial intelligence have enabled the identification of novel antileishmanial candidates through drug repurposing approaches. Among these, our team has previously predicted in silico the monoamine oxidase inhibitor Tranylcypromine as a potential drug candidate against Leishmaniases. In this study, we provided the first experimental evidence supporting its efficacy against *Leishmania major* using both promastigote and intracellular amastigote models. Tranylcypromine markedly decreased parasite viability in a concentration-dependent manner, displaying IC_{50} values of 83.6 and 31.6 µg/ml against promastigotes and amastigotes, respectively. Mechanistic investigations revealed that at concentrations ranging from 50 to 200 µg/ml, it induced an apoptotic death of *L. major* promastigotes leading to necrosis at higher concentrations. Viability and cytotoxicity assays on THP-1-derived macrophages highlighted that the compound, at the selected concentrations, was safe and did not induce a toxic effect on host cells with CC50 values exceeding 280 µg/ml. Altogether, these findings revealed Tranylcypromine as a selective and promising antileishmanial drug candidate, supporting the relevance of AI-assisted drug repurposing strategies to accelerate drug discovery of safe and affordable therapies for neglected tropical diseases.

KEYWORDS: *Tranylcypromine, Drug Discovery, Drug repurposing, in vitro validation, Leishmaniases*

POSTER N° : 174.

SURVEILLANCE OF ARBOVIRUSES IN PATIENTS WITH FEBRILE ILLNESSES OF UNEXPLAINED ETIOLOGY, TUNISIA

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Abstract: Conducted as part of the Surveillance of Acute Febrile Illness project, this study analyzed 181 clinical samples in Tunisia, revealing a 15.47% positivity rate for arboviruses. West Nile Virus (WNV) was confirmed as the dominant endemic pathogen with a prevalence of 21,36%, followed by Rift Valley fever virus (1.68%), and Dengue virus (0.84%). The detection of these arboviruses infecting humans highlights an evolving epidemiological landscape. Notably, Zika and Chikungunya were absent. These results highlight the crucial importance of an established active, integrated human/vector surveillance systems for the detection of arboviruses in Tunisia.

KEYWORDS: *Arboviruses, Acute Febrile Illness, Molecular Surveillance*

POSTER N° : 175.

ECO-FRIENDLY PHAGE THERAPY FOR THE CONTROL OF FOODBORNE *SALMONELLA ENTERITIDIS*

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Abstract: The increasing prevalence of antibiotic resistance has encouraged the search for sustainable alternatives to control foodborne pathogens. Among these alternatives, bacteriophages have emerged as highly specific and eco-friendly antimicrobial agents. This study focused on the isolation and characterization of bacteriophages targeting *Salmonella* spp. with the aim of evaluating their potential application in food biocontrol.

Bacteriophages were isolated from environmental sources and screened for their antibacterial activity against *Salmonella enterica* serovar Enteritidis. The isolated phages were characterized according to their lytic spectrum, environmental stability, and biological properties. Selected candidates were further investigated for their ability to reduce bacterial contamination under food-related conditions.

The results demonstrated that several isolated phages exhibited strong lytic activity and maintained stability under different physicochemical conditions. Their effectiveness in reducing *S. Enteritidis* populations highlights their promising potential as biocontrol tools for improving food safety and limiting the spread of foodborne pathogens in the agri-food industry.

KEYWORDS: *Bacteriophage – Salmonella Enteritidis – Foodborne Pathogens – Biocontrol – Food Safety*

POSTER N° : 176.

CHARACTERIZATION OF ENZYMATIC AND ANTIOXIDANT ACTIVITIES OF ACTINOBACTERIAL STRAINS ISOLATED FROM DIVERSE ECOSYSTEMS IN TUNISIA

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Abstract:

Nature is an incredibly rich and diverse source of novel biomolecules, with actinomycetes standing out as frequent producers of specialized metabolites compared to other bacteria. Actinomycetes are Gram-positive bacteria belonging to the phylum *Actinobacteria*. This phylum thrives in a wide variety of environments such as soil, water, and air. The objectives of this research work include isolating and screening actinomycete strains from underexplored or unexplored Tunisian ecosystems, for their enzymatic and antioxidant activities.

The results of this study highlight the isolation of 144 strains from different ecosystems in Tunisia, belonging to three different genera: *Streptomyces*, *Nocardia*, and *Micromonospora*. Strains not assigned to a specific genus were grouped as non-*Streptomyces*. The study of enzymatic activity revealed that all isolated strains produced gelatinase and esterase. Amylase, tyrosinase, and cellulase were identified with percentages of 90.97%, 84.72%, and 85.31%, respectively. Similar production percentages were reported for ammonia (64.33%) and caseinase (63.88%). Lipase (52.44%), lecithinase (49.65%), and lipoproteinase (47.55%) were found to be the least produced enzymes. Antioxidant activity, assessed by DPPH radical scavenging assay revealed that 6 out of 44 tested extracts showed significant antioxidant activity, with inhibition percentages exceeding 50%. Notably, extract ER6 demonstrated strong activity, displaying a DPPH inhibition percentage greater than 50% at the lowest tested concentration, which was approximately 0.33 mg/ml.

KEYWORDS: *Actinomycetes, extreme ecosystems, enzymatic activity, antioxidant activity.*

POSTER N° : 177.

EMERGING DISEASES INVOLVED IN THE DECLINE OF CYPRESS IN TUNISIA

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Abstract: Common cypress (*Cupressus sempervirens* L.) is a significant element in the Mediterranean region and Tunisia, present in both forest and agricultural windbreak for centuries. However, in recent decades, common cypresses in certain Tunisian areas have experienced dieback and mortality. Presently, many common cypress windbreaks display severe damage, possibly due to fungal pathogens. In the summer of 2022, a field survey was conducted in three regions of northern Tunisia (Menzel Bouzalfa, Morneg, El Alia) to investigate diseased common cypresses and identify the responsible pathogens: 935 trees belonging to 14 windbreaks were surveyed. Branches and twigs samples were collected from 47 affected trees showing symptoms such as yellowish-brown foliage, necrotic lesions, cankers, resin exudation and diebacks. Initially, isolates were morphologically characterized, and representative isolates were further analyzed using molecular methods. Using the traditional culture method, 41 fungal species associated with common cypress dieback were identified. Pathogenicity tests were performed on eight fungal species known as possible pathogens: *Phaeobotryon cupressi*, *Diplodia cupressi*, *D. olivarum*, *D. pseudoseriata*, *Seiridium cardinale*, *Pestalotiopsis funereoides*, *Neofusicoccum mediterraneum*, and *Didymosphaeria variabile*. *Phaeobotryon cupressi*, *D. cupressi*, and *S. cardinale* displayed the highest pathogenicity, followed by *P. funereoides* and *D. olivarum*, which caused smaller lesions. With the exception of *D. cupressi*, all of the identified fungal pathogens are being reported for the first time in Tunisia or in common cypress.The pathogenic action of most of the isolated fungi could have been enhanced by the prolonged droughts that have repeatedly occurred over recent years.

KEYWORDS: *Cupressus sempervirens, Seiridium cardinale, Diplodia olivarum, Phaeobotryon cupressi,* forest decline.

PHARMACOLOGY AND TOXICOLOGY

POSTER N° : 178.

AN AUTOMATED WEB PLATFORM FOR GENERATING MACHINE LEARNING-READY BIOACTIVITY DATASET FROM CHEMBL

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Abstract: The identification of bioactive compounds against therapeutic protein targets is essential for accelerating drug discovery and supporting experimental studies. Databases such as ChEMBL provide extensive curated information on compound-target interactions, including chemical structures, biological targets, and experimental activity values. However, ChEMBL does not directly deliver machine learning-ready datasets enriched with molecular descriptors, fingerprints, and interactive analytical tools.

To address this limitation, we developed an integrated platform for the extraction, processing, curation and transformation of ChEMBL bioactivity data focused on cancer-related drug-target interactions (DTI). The workflow was implemented using the KNIME Analytics Platform, enabling automated data retrieval, target filtering, activity processing, and molecular feature generation. Cancer-related targets were selected, and compound activity values were standardized to prepare structured datasets for machine learning (ML) applications. Molecular structures were converted into descriptors and fingerprint representations to ensure comprehensive chemical characterization. A React-based application was developed to display the results, allowing users to query protein targets and visualize structured datasets containing activity values, descriptors, fingerprints, and ML-ready labels with filtering and export options.
This platform is aimed to help researchers quickly identify potentially active compounds against cancer targets and support preliminary structure-activity relationship (SAR) analysis before experimental validation. It will in future work extend to other pathologies besides cancer.

KEYWORDS: *drug-target interaction, machine learning, automated workflows, structure-activity relationship*

POSTER N° : 179.

CUSCUTA AUSTRALIS MITIGATES ETHYLENE GLYCOL-INDUCED RENAL INJURY AND OXIDATIVE STRESS IN RATS

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Abstract: Urolithiasis is a common pathology characterized by the formation of crystals in the urinary tract and associated with impaired renal function. In this study, nephrocalcic lithiasis was induced in rats by the administration of 0.75% ethylene glycol to evaluate the protective effect of a *Cuscuta australis*, rich in phenolic compounds. Characterization by LCMS reveals a wide variety of phenolic compounds, particularly phenolic acids, flavonoids, organic acids, and hydroxycinnamic acids.
The induction of lithiasis caused a significant increase in renal biochemical parameters, notably urea, creatinine and uric acid, as well as a decrease in antioxidant enzymatic activities (SOD, CAT and GPx). Treatment with the extract, administered in preventive mode, significantly improved these alterations. Whose serum concentrations reached 5.10 mg/dL for uric acid, 8.45 mg/dL for urea and 4.37 mmol/L for creatinine. At the same time, enzymatic activities were restored with SOD values of 7.05 U/mg protein, CAT of 0.05 IU/mg protein and GPx of 0.28 µmol/mg protein/min.
Histological analysis confirmed a significant reduction in crystalline deposits and an improvement in renal architecture in the treated groups.

Key words: *Cuscuta australis, urinary lithiasis, ethylene glycol, Antioxidant activity, crystals, crystalluria*

POSTER N° : 180.

ESSENTIAL OILS FROM *CUPRESSUS ARIZONICA* GREENE: CHEMICAL COMPOSITION, ANTIMICROBIAL AND ANTIENZYMATIC ACTIVITY.

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Abstract: Natural compounds derived from medicinal and aromatic plants have gained increasing attention due to their important biological and therapeutic properties. Essential oils, in particular, represent a rich source of bioactive molecules with antimicrobial, antioxidant, and anti-enzymatic activities. Among conifer species, *Cupressus arizonica* Greene is known for its richness in terpenoid compounds and its potential pharmacological applications. Therefore, this study aimed to investigate the chemical composition and the biological activities of essential oils extracted from different parts of *C. arizonica* with the aim of valorizing this species as a promising natural source of bioactive compounds. The chemical composition was studied by GC-MS. The leaves EO had a high content of α-pinene (17.63%), umbellulone (8.21%), and limonene (7.03%). The cones EO were predominantly composed of α-pinene (23.10%) and α-cubebene (6.12%), while the stems EO were primarily composed of α-pinene (72.97%). The antibacterial and antibiofilm activities of the three EOs were evaluated against Gram-positive bacteria (*Staphylococcus aureus* and *Listeria monocytogenes*) and Gram-negative bacteria (*Pseudomonas aeruginosa*, *Escherichia coli*, and *Acinetobacter baumannii*). The results revealed strong bactericidal effects and significant inhibition of mature biofilm metabolic activity for all tested strains. Notably, the leaves essential oil exhibited the highest activity, achieving 53.32% inhibition of *L. monocytogenes* biofilm metabolic activity at the lowest tested concentration. The antioxidant and anti-enzymatic activities of the essential oils were assessed using spectrophotometric assays. The leaves essential oil exhibited the strongest radical scavenging activity and significant α-glucosidase inhibitory effect (IC50 = 1.88 mg/mL). Meanwhile, the cones essential oil showed the highest inhibitory activity against acetylcholinesterase (IC50 = 1.15 mg/mL) and α-glucosidase (IC50 = 0.85 mg/mL), highlighting its potential for applications in the management of diabetes and neurodegenerative diseases such as Alzheimer's and Parkinson's diseases. Furthermore, kinetic analysis revealed a competitive inhibition mode against α-glucosidase, similar to acarbose, suggesting a possible synergistic effect that may help reduce therapeutic doses. Overall, these results highlight the potential of *C. arizonica* essential oils as promising natural sources of bioactive compounds with possible applications in the pharmaceutical and biomedical fields.

KEYWORDS: *Cupressus arizonica, Essential oil, Antimicrobial activity, Anti-enzymatic activity, Kinetic study.*

POSTER N° : 181.

LC-MS PROFILING, NETWORK PHARMACOLOGY AND MOLECULAR DOCKING ANALYSIS OF *OROBANCHE CUMANA* EXTRACT AGAINST ISOPROTERENOL-INDUCED MYOCARDIAL INFARCTION

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Abstract: Myocardial infarction is a complex cardiovascular disorder associated with oxidative stress, lipid imbalance, inflammation, apoptosis, and myocardial tissue injury. Our study explored the cardioprotective potential of *Orobanche cumana* extract against isoproterenol-induced myocardial infarction through LC-MS profiling, network pharmacology, molecular docking, and *in vivo* validation. LC-MS analysis revealed a diverse phytochemical profile mainly represented by phenylethanoid glycosides, including plantamajoside, poliumoside, crenatoside, and orobanchoside. Network pharmacology connected these compounds with key molecular targets related to oxidative stress, hypertrophic response, inflammation, and extracellular matrix remodeling. Keap1/Nrf2, p38 MAPK, and MMP-2 appeared as major mechanistic nodes linking O. cumana metabolites to myocardial injury and cardiac remodeling. Molecular docking supported these findings by showing favorable interactions of plantamajoside, poliumoside, crenatoside, and orobanchoside with Keap1/Nrf2, p38 MAPK, and MMP-2. *In vivo,* isoproterenol caused increased cardiac weight index, lipid profile imbalance, electrocardiographic abnormalities, and evident cardiac lesions. Treatment with *O. cumana* extract (OCE) reduced cardiac weight index, improved lipid parameters, attenuated ECG disturbances, and limited histopathological myocardial damage. These findings suggest that OCE protects against isoproterenol-induced myocardial infarction through a multitarget mechanism involving lipid regulation, antioxidant defense, stress signaling modulation, remodeling control, and myocardial tissue preservation.

KEYWORDS: *Orobanche cumana; myocardial infarction; LC-MS; network pharmacology; molecular docking; isoproterenol.*

POSTER N° : 182.

ANTIDIABETIC POTENTIAL OF *MYRTUS COMMUNIS* FRUIT EXTRACT: *IN VIVO* EVALUATION AND MOLECULAR DOCKING STUDIES

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Abstract: *Myrtus communis L.*, a medicinal plant characteristic of the Mediterranean region, is garnering increasing interest due to its significant biological properties, such as antioxidant and anti-inflammatory activities. The present study assessed the therapeutic effects of ethanolic fruit extracts of *Myrtus communis* against alloxan-induced diabetes in rats. Alloxan injection caused a significant increase in serum glucose and glycated hemoglobin levels. Marked elevation in liver function parameters was also detected compared with the control group. Furthermore, changes in the lipid profile were observed characterized by a significant increase in total cholesterol and triglycerides along with marked changes in the histopathology of the kidney tissue. Treatment of diabetic rats with *Myrtus communis* at a dose of 150 mg/kg restored all alloxan induced biochemical, lipid, renal, hepatic, and histopathological changes in rats with type 2 diabetes mellitus.

Keywords: *Myrtus communis*, medicinal plant, diabetes, lipid profile, histopathological changes

POSTER N° : 183.

EFFECTS OF DIETARY EXTRA VIRGIN OLIVE OIL AND ITS FRACTIONS ON ANTIOXIDANT STATUS AND DNA DAMAGE IN THE HEART OF EXPOSED RATS TO GLYCIDAMIDE

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Abstract : Oxidative stress generated by an excessive production of free radicals has been linked to the development of several health problems such as cardiovascular diseases. Weinvestigated the protective efficacy of Extra Virgin Olive Oil (EVOO), its lipophilic fraction (OOLF) and hydrophilic fraction (OOHF) against cardiotoxicity and DNA damage induced by exposure rats to Glycidamide (GLY). Gly is a dietary contaminant derived from a wide range of foods through the Maillard-reaction during the cooking process.

Rats were divided into eight groups of six each: controls, GLY (40mg/ kg body weight) administered by gavage, GLY plus EVOO (300µl); GLY plus the hydrophilic fraction (1ml); GLY plus the lipophilic fraction (300µl); extra virgin olive oil (EVOO) and its fractions were administered daily by gavage for 21 days.

Exposure rats to GLY provoked oxidative stress objectified by an increase in MDA, AOPP and a decrease in GSH, NPSH and vitamin C levels. Activities of CAT, GPx and SOD were also decreased. EVOO, OOLF fraction exhibited a pronounced enhancement of antioxidant status while a partial recovery in antioxidant status was obtained with OOHF fraction. Plasma LDH and CK activities, TC, LDL-C levels, TC/HDL-C and LDL-C/HDL-C ratios were increased, while HDL-C and TG decreased in treated rats with GLY. Co-administration of EVOO, OOLF or OOHF to treated rats restored cardiac biomarkers and lipid profile to near-normal values. Histological studies and DNA damage confirmed biochemical parameters and the beneficial role of EVOO and its two fractions.

Our results suggest that extra virgin olive oil and its two fractions can decrease the frequency of cardiac complications and genotoxicity.

Keywords:*Glycidamide, Extra Virgin olive oil, Hydrophilic and lipophilic fraction.*

POSTER N° : 184.

EVALUATION OF THE HEPATO-PROTECTIVE EFFECT OF *PHELIPANCHE RAMOSA* AGAINST CCL4-INDUCED OXIDATIVE DAMAGE

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Abstract : Phelipanche ramosa is a parasitic medicinal plant belonging to the family Orobanchaceae, widely distributed and known for its richness in diverse bioactive compounds, particularly phenolic constituents with potential antioxidant and pharmacological properties. Despite its traditional uses, its hepatoprotective activity remains insufficiently explored. This study aimed to evaluate the hepatoprotective effect of aqueous extracts from different parts of Phelipanche ramosa against carbon tetrachloride (CCl_4)-induced liver injury in rats.
The study was conducted on five experimental groups, including a control group (untreated), a group treated with CCl_4 alone, and three groups receiving CCl_4 in combination with aqueous extracts of Phelipanche ramosa derived from the stem, flowers, and roots, respectively. Hepatic injury and oxidative stress were assessed by measuring alanine aminotransferase (ALT), aspartate aminotransferase (AST), malondialdehyde (MDA), reduced glutathione (GSH), catalase (CAT), and superoxide dismutase (SOD), in addition to histopathological examination of liver tissue.The results demonstrated that aqueous extracts of Phelipanche ramosa significantly attenuated CCl_4-induced hepatic damage by reducing ALT, AST, and MDA levels, while enhancing antioxidant defenses through increased GSH, CAT, and SOD activities. Histopathological analysis confirmed these protective effects. Among the tested extracts, those from flowers and roots showed the strongest hepatoprotective activity compared with the stem extract.These findings suggest that Phelipanche ramosa, particularly its flowers and roots, possesses significant hepatoprotective potential against oxidative liver damage, likely through antioxidant-mediated mechanisms.

Key words: *phelipanche ramosa*, oxidative stress, bioactive molecules, Hepato-Protective.

POSTER N° : 185.

ANTI-INFLAMMATORY EFFECTS OF PIN1 INHIBITORS IN A RAT MODEL OF LIPOPOLYSACCHARIDE-INDUCED LUNG INFLAMMATION

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Abstract: Peptidyl-prolyl cis/trans-isomerase NIMA-interacting 1 (Pin1) is involved in several cellular functions, including changing the conformation and activity of phosphorylated proteins. Pin1 is an appealing target to develop pharmacological agents to treat inflammatory diseases. Lung inflammation is an emerging disease resulting from the activation of immune cells and the disturbance of oxidative stress markers.
In this proposal, we examined the effects of two Pin1 inhibitors, PiB (a synthetic molecule) and juglone (a natural molecule extracted from the walnut tree), on lipopolysaccharide (LPS)-induced lung injury in rats.
Our findings demonstrate that the intraperitoneal administration of 3 mg/kg of PiB or juglone mitigates LPS-induced pulmonary inflammation by reducing haemorrhaging, vascular injury, pulmonary oedema, and immune cell accumulation in the bronchioles. Furthermore, these Pin1 inhibitors were found to protect rats against the overproduction of inflammatory markers by inhibiting myeloperoxidase (MPO) and reducing plasma C-reactive protein. Moreover, PiB and juglone protected the rats from nitric oxide synthase hyperactivity, thereby decreasing pro-oxidant markers while restoring antioxidant enzymes such as catalase, superoxide dismutase and glutathione peroxidase. Therefore, juglone and PiB can effectively alleviate acute respiratory inflammation by modulating inflammatory and oxidant pathways and preserving lung microstructure.

KEYWORDS: *Pin1 Inhibitors, Lung inflammation, lipopolysaccharide*

POSTER N° : 186.

MULTISYSTEMIC TOXIC EFFECTS OF ABAMECTIN IN WISTAR RATS: SEX-DEPENDENT NEUROBEHAVIORAL, HISTOPATHOLOGICAL AND OXIDATIVE ALTERATIONS

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Abstract: Abamectin, a widely used avermectin pesticide, may induce toxic effects in non-target organisms. This study investigated the subacute toxicity of abamectin in Wistar rats through behavioral, histopathological, and biochemical analyses. Twenty-four rats were divided into three groups: control males and females, intoxicated males, and intoxicated females. Animals received abamectin orally at 2.5 mg/kg body weight twice weekly for six weeks. Behavioral evaluation revealed sex-dependent neurobehavioral alterations, with hyperactivity observed in males and hypoactivity associated with anxiety-like behavior in females. Histopathological examination showed cortical vacuolization, neuronal degeneration, inflammatory infiltration, and severe pulmonary lesions including vascular congestion and alveolar damage, particularly in females. Biochemical analyses demonstrated increased TBARS levels and decreased CAT and SOD activities, indicating enhanced oxidative stress and impaired antioxidant defenses. These findings demonstrate that abamectin induces multisystemic toxicity in Wistar rats, with females showing greater susceptibility to oxidative and histopathological damage.

KEYWORDS: *Abamectin, oxidative stress, neurotoxicity, histopathology.*

POSTER N° : 187.

ANTIDIABETIC EFFECTS OF ARBUTUS UNEDO FRUIT EXTRACT IN AN ALLOXAN-INDUCED DIABETIC RAT MODEL

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Abstract: *Arbutus unedo* is a medicinal plant widely distributed across the Mediterranean basin, including North African countries such as Morocco, Algeria, and Tunisia. It has been traditionally used for the management of diabetes mellitus. The aim of the current study was to evaluate the efficacy of an ethanolic fruit extract of *Arbutus unedo* (AUFE) at a dose of 150 mg/kg for its hypoglycemic and hypolipidemic effects in alloxan-induced diabetic rats. Oral administration of AUFE exhibited a marked reduction in fasting blood glucose levels and glycated hemoglobin in diabetic rats compared to the untreated diabetic group. This was accompanied by a significant decrease in water and food consumption and an increase in body weight. Furthermore, the administration of AUFE for 28 consecutive days significantly improved altered hepatic enzyme activities, as well as renal biomarkers and lipid profiles. These findings were supported by histopathological investigations.

Keywords: *Arbutus unedo*, medicinal plant, histopathological findings, lipid profile

POSTER N° : 188.

ENDOCRINE EFFECTS OF NEONICOTINOID EXPOSURE IN MALE ALBINO WISTAR RATS: AN IN VIVO STUDY

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Abstract: Neonicotinoids are widely used pesticides that may interfere with endocrine regulation and male reproductive function. This study aimed to evaluate the hormonal effects of neonicotinoid exposure in male albino Wistar rats. Eight male rats were divided into two groups: a control group and a neonicotinoid-exposed group. The treated animals received the tested neonicotinoid compound for 21 consecutive days by intraperitoneal administration at a dose of 20 ppm body weight. At the end of the experimental period, blood samples were collected, and serum levels of follicle-stimulating hormone, luteinizing hormone, and testosterone were assessed. Neonicotinoid exposure increased follicle-stimulating hormone and luteinizing hormone levels, suggesting disruption of the hypothalamic–pituitary–gonadal axis. The effect on testosterone was moderate. These findings indicate that neonicotinoids may induce hormonal imbalance in male rats and highlight the need for further evaluation of their endocrine effects.

KEYWORDS : *Neonicotinoids; Endocrine disruption; Reproductive hormones; FSH; LH; Testosterone; Male Wistar rats; Hypothalamic–pituitary–gonadal axis.*

POSTER N° : 189.

HEPATOPROTECTIVE EFFECT OF EUPHORBIA RETUSA EXTRACT AGAINST THIACLOPRID-INDUCED LIVER INJURY IN RATS

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Abstract: Euphorbia retusa is traditionally used to treat several disorders. This study investigated the antioxidant, anti-inflammatory, anti-α-amylase, and hepatoprotective effects of its methanolic extract (ERE). Antioxidant activity was evaluated using the H_2O_2 scavenging assay, while anti-inflammatory and anti-α-amylase activities were assessed by albumin denaturation and DNS methods, respectively. Twenty-four male rats were divided into four groups: Control, ERE (200 mg/kg), THC (22.5 mg/kg), and THC+ERE. In vitro, ERE exhibited strong antioxidant, anti-inflammatory, and α-amylase inhibitory activities. In vivo, thiacloprid induced hepatotoxicity, dyslipidemia, oxidative stress, inflammation, and ATPase dysfunction. It also increased MDA, AOPP, CRP, ALT, AST, LDH, and ALP levels while reducing antioxidant enzymes (SOD, CAT, GPx). Co-treatment with ERE significantly attenuated these alterations and preserved normal hepatic histology. These findings suggest that ERE exerts hepatoprotective effects mainly through antioxidant and anti-inflammatory mechanisms.

KEYWORDS: *Thiacloprid, Euphorbia retusa, Hepatotoxicity, oxidative stress*

POSTER N° : 190.

PHYSICOCHEMICAL CHARACTERIZATION AND NUTRACEUTICAL POTENTIAL OF SEED OILS EXTRACTED FROM THREE *PHOENIX DACTYLIFERA* L. VARIETIES OF KÉBILI OASES

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Abstract: The present study examines the phytochemical composition and biological properties of seed oils derived from three date palm varieties (*Phoenix dactylifera* L.) Arechti, Deglet Ennour, and Ghars Souf harvested from the oases of Kébili (Errabta). Oils obtained by cold maceration and mechanical pressing yielded extraction rates ranging from 5.3 ± 0.2% to 8.43 ± 0.31%, with physicochemical parameters conforming to Codex Alimentarius standards, indicative of high nutritional quality. GC-MS fatty acid profiling identified lauric acid as the dominant saturated fatty acid (12.51–55.49%) and oleic acid as the principal unsaturated fatty acid (12.37–39.82%).

Quantification of phenolic metabolites revealed significant inter-varietal and inter-method variability ($p \leq 0.05$). Hexane extraction yielded the highest polyphenol (0.37 ± 0.04 mg GAE/g oil) and flavonoid (0.16 ± 0.02 mg CE/g oil) concentrations in Deglet Ennour, which consistently exhibited the greatest phenolic content across all extraction procedures. Mechanical pressing proved more effective for polyphenol recovery in Arechti (0.10 ± 0.01 mg GAE/g).

Antioxidant activity, assessed by DPPH and FRAP assays, showed moderate efficacy across all samples, with IC_{50} values of 4.7–14.5 mg/mL and 14.7–45.5 mg/mL, respectively substantially higher than those of BHT (0.0107 mg/mL). Mechanically pressed Arechti oil demonstrated the most favorable antioxidant performance (IC_{50} = 6.5 mg/mL, DPPH; 14.7 mg/mL, FRAP), though all samples remained less potent than the synthetic reference.

Furthermore, the seed oils exhibited notable inhibitory activity against α-amylase and pancreatic lipase, supporting potential antidiabetic and anti-obesity applications, albeit with lower potency relative to the reference compounds acarbose and orlistat. These findings collectively highlight the functional food and nutraceutical potential of *P. dactylifera* seed oils as natural bioactive ingredients.

Keywords: *Phoenix dactylifera L., seed oil, fatty acids, GC-MS, polyphenols, antioxidant activity, antidiabetic activity, anti-obesity activity.*

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BENGHALI	Sofiane Mohamed el Amine	41,197	CHATTI	Abdelwaheb	51
BENMANSOUR	BOUCHRA	17,23,60	CHATTI	Khaled	209
BENSAAD	Rabia	38,174	CHEBAANE	ASMA	43,214
BENYOUNES	Fayrouz	38,174,195	CHEBBI	Ons	41,199
BEZZINE	Sofiane	(*)	CHELBI	Ifhem	22,52,67
BLAITI	Afef	32,130	CHERIF	Molka	27,86,181,
BORGI	Mohamed Ali	198,204,224	CHERNI	Maroua	41,200
BOUAAZZI	Arij	25,71,75,160	CHINA	Aicha	41,103,200
BOUALLAGUI	HASSIB	196,200	CHOUIKHI	Marwa	25,73,160
BOUALLEGUE	Amal	35,36,81,155,160	CHOUROU	Mohamed Nour	32,49,129,132
BOUAZIZI	SOUHIR	41,178,190,197	DALHOUMI	wejden	36,140,157,163
BOUCHAREB	Noureddine	41,198,213	DALLALI	Dhouha	32,132
BOUGATEF	Hajer	27,85	DALLALI	Sana	38,131,176
BOUHAJJA	Khouloud	36,156	DAMERGI	bilel	27,87
BOUHLEL	Marwa	25,72	DAOUTHI	Mayssa	38,168,172,177

DARGHOUTHI	Malek	42,208	GADDOUR	Amor	42,209
DERBEL	HANA	38,88,177	GADHOUMI	hamza	27,84,89,192
DERBOUZ ROUIBATE	Amina	34,147	GAMAS	NAWRESS	36,158
DHAOUADI	Ferjani	27,87	GARGOURI	Rayhan	33,133
DHAOUADI	Aymen	38,178,190, 197	GASMI	Amal	39,180
DHAWEFI	Nourhene	35,148	GATRI	Emna	22,52
DJABRI	Yassine	23,60	GHALLEB	Siwar	33,134
DJEBALI	Wahbi	69,77,81,140,156	GHARBI	Manel	43,216
DRISS	Donia	43,214,219	GHARIANI	Oumayma	33,134,202
EL ABED	Hanen	39,101,178	GHARIANI	Mariem	42,202
EL HABLANI	Amine	29,104	GHAZOUANI	lakhdar	45,226,228
ELFALLEH	Walid	(*)	GHODBANE	Soumaya	35,53,146, 148
ELKHOUR	Djihan	33,133	GHORBEL	imen	45,226
ELLAFI	Ali	43,103,200,215	GORSANE	Faten	49,129,132, 141
ELLEUCH	Jihen	41,133,134,199, 201,202	GOUSSI	RAHMA	27,48,89,94, 97, 190
ELLEUCH	fatma	42,201	GUESMI	Maha	30,115,217
ELLOUMI	wiem	27,88	HADJ BRAHIM	Adel	25,74
ERROUISSI	Faiek	196	HAJ	Maroua	29,105
ETTEYEB	Sameh	39,184,171,179	HAJ MABROUK	Faten	33,135
EZZIDI	Intissar	42,208	HAJLAOUI	AZHAR	24,62
EZZINE	AYMEN	15,39,169,179	HAJLAOUI	Hafedh	27,49,70,90, 230
FAKHFAKH	faiza	2,112	HAJRI	Latifa	22,53,148, 152
FAKHFAKH	hatem	49,129,132,141	HAJRI	HAIFA	27,90
FATNASSI	Marwa	29,104	HAJRI	Sarra	35,149
FATNASSI	Chaima	36,137,157,218	HOSNI	Taoufik	25,75,81
FEKI	Kaouthar	25,73	HAMDENI	Sana	36,159
FERHI	jihen	36,158	HAMDI	MOKTAR	19,42,76,95, 178,190,197, 202
FERIANI	Anouar	23,48,61,108, 121,124,135, 144,146,151,160,224,225,226, 227,228,229	HAMMAMI	Nadia	31,121
FERJANI	Nouha	24,61	HAMMAMI	Majdi	36,159
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FRIKHA	Eya	27,39,79,88, 180,221	HARIGUA	Emna	104,117,214 219,220,224
GAALICHE	Badii	25,74	HASSAIRI	Ilem	169,193

HASSINE	MOUNA	44,217	KTARNI	NOURCHENE	44,218
HENCHIRI	selma	45,227	LAAFIF	Jaweher	39,184
HERCHI	Wahid	23,53	LABIDI	Sabrine	28,93
HMISSI	Manel	25,75,	LAHMAR	Imen	26,77
HMISSI	Soumaya	33,135	LAHMAR	Imen	36,161
HNICHIR	Sawsen	27,91,101,178	LAHOUEL	ZAKIA	45,219,228,229
HORCHANI	Faouzi	36,155,160	LAMINE	Myriam	39,90,185
IBRAHIM	Ibtissem	44,217	LARAFA	Amal	23,55
ILAHY	Riadh	36,73,160,164	LARBI	ESSIA	33,136
JABRI	Mohamed Amine	35,149	LASSOUED	Amal	29,106
JALLOULI	Wafa	39,86,93,181	LASSWED	Hania	39,185
JAMMELI	Linda	42,106,203	LEMOUI	REDOUANE	33,137
JAOUADI	Bassem	12,23,54	MAACHACH	Yassine	24,62,220
JELASSI	Awatef	39,181	MAAROUFI	Karima	31,122
JIHNAOUI	Nada	27,91	MAAROUFI	Aberrazak	168,218
JLAIEL	Lobna	114	MAHJOUB	Lobna	36,162
JLASSI	Oumayma	35,98,150	MAJOUL	Thouraya	30,107
JLASSI	Sarra	44,137,157, 218	MAKHLOUF	Ines	40,186
JLIDI	Hajer	28,92	MAKNI	Hanem	(*)
KADRI	Oumaima	25,76	MAKNI	Mohamed	(*)
KADRI	Karim	19,26,76,95	MALLEK	Rahma	(*)
KALLEL	Fatma	39,182	MANAA	Arafet	28,84,89,94, 97, 190
KHAIREDDINE	Leila	26,77,156	MANAI DJEBALI	Hedia	33,137,218
KHAZRI	Siwar	17,28,92	MANSOUR	Marwa	45,228
KHELIFI	Oumaima	35,136,	MARZOUK EP REFIFA	Belsem	37,162
KHELIFI	Nadia	39,176,182,184	MARZOUKI	Nejib	15
KHLIFI	Sarra	28,93	MARZOUKI	Hanen	26,78,162
KHOUNI	Imen	29,106,203	MAZOUK	Ibrahim	(*)
KOCHTI	Oumayma	39,183,191	MBIRKI	LINA	24,35,63,150
KOUIDHI	Bochra	30,115,213,	MECHETA	Asmaa	44,219,228
KOUKI	Ahmed	31,63,122,141, 150	MEJRI	Naceur	40,87,187
KOUKI	Habiba	39,183,191	MEJRI	Nahla	40,187
KOUKI	Ahmed	45,227	MELYANE	sana	40,188
KROUMA	Abdelmajid	36,161,164	MESSAOUD	Chokri	2,97,135, 168, 172
KROUMI	ranim	23,48,54	MHADHBI	Haythem	16,154,155, 163,171
KSOURI	Riadh	95	MHAMDI	Mariem	37,140,163
KTARI	Naourez	39,171,173,17, 184,192,212			

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MISSAOUI	Maissa	33,138	SAI	Afef	42,105,204
MKAOUAR REBAI	Emna	30,112	SAID	ZOUHOUR	26,44,79,88, 180,221
MLIKI	Abir	28,94	SMAOUI	Sirine	31,124
MOHAMMADI	Hasna	23,55	SMII	Hanen	30,109
MORJEN	MARAM	31,123	SMIRANI	Nadia	40,178,190
MOSBAHI	Nawfel	30,42,77,107, 203	SOUIAI	Oussama	20,31,117, 185
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NAILI	Rahma	24,63,119	TABEL HMIDI	OLFA	24,65,66
NAJAH	Amel	26,78,	TAKROUNI	Oumayma	34,142,
NAJAHI	Abir	35,151,226, 228	TALBI ZRIBI	Ons	28,89,94,97
NEFISSI OUERTANI	Rim	26,56,69,71, 79	TALEB	Ons	40,97,191
NEIFAR	Mohamed	42,182,204	TARCHI	Ibtissem	31,124
NEMICHE	Souhila	45,228,229	THEBTI	Siwar	26,75,81,155
NOUAIRI	Issam	16,37,154,	TIZAOUI	Haifa	30,109
OCHI	Naoures	35,144,151	TIZAOUI	kalthoum	30,210
OMAR	Mariem	40,188	TLILI	Imen	37,75,110, 160,164
OTHMANI	Ahmed	19,28,76,95	TOUNSI	Sana	42,73,205
OTMANE	Amel	33,139	TOUNSI	Moufida	89,159,192,
OUALHA	Rafeh	44,207,214, 219, 220	TRABELSI	Hiba	28,97,168, 172,177
OUERHANI	Slah	2,129	TRABELSI	Imen	40,171,173, 179,184,192
OUHIBI	Aroua	28,95	TRABELSI	INES	44,221
OUNIS	SABRINE	24,64	TRAKHNA	MOHAMED HABIB	23,56,
RAHMANI	Rafika	30,108	YAGOUBI	Amira	26,81,
REBHI	sabrine	24,64	YAKOUBI	Chaima	28,98,137,15 7
REJAIBI	Assya	23,56,69	YEDDES	Walid	40,89,141,19 2
REZIG	Leila	50	ZAGOUB	Rihab	37,164
RHOUMA	Soumaya	43,209	ZAIED	Abir	24,51,65,66
ROUIHEM	Wissal	30,116	ZAKRAOUI	Mariem	37,165
ROUIS	Souad	92	ZARKOUNA	Rahma	23,57,133
RTIBI	Kais	24,65	ZEHDI	Salwa	57,133
SAADA	Rihab	210	ZEMZEMI	yousra	24,66
SAHBANI	Nehed	35,152	ZHIOUA	Elyes	24,52,62,67, 150, 220
SAHBANI	Senda	44,220	ZITOUN	Adel	40,169,193

ZMANTAR	TAREK	31,115,117			
ZOGHLAMI	rahma Ines	30,110,160			
ZOUAOUI BOUTITI	Meriem	44,63,119,222			

(*) : Simple participation

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