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HO-01: Effect of *Juniperus phoenicea* essential oil on toxicity and energy reserves of *Culiseta longiareolata* (Diptera: Culicidae) from Tebessa (Algeria)

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Subject description: Diptera insects are considered dangerous medicinal and veterinary insects worldwide, especially mosquitoes (Culicidae). These insects negatively affect human and animal health. *Culiseta longiareolata* is one of mosquito species responsible for the transmission of avian Plasmodium and West Nile virus. Worldwide, several synthetic insecticides have been used to eradicate this population. Unfortunately, insecticide resistance among mosquito populations has been reported. In this context, it is necessary to propose new specific alternatives. Among the alternatives, natural products derived from plants.

Objectives: In this context, the essential oil of the plant *Juniperus phoenicea* was tested in the laboratory on fourth instar larvae of the species *Culiseta longiareolata*. Their action has been evaluated on several aspects: Toxicological and biochemical.

Methods: The essential oil was isolated by hydrodistillation using a Clevenger-type hydrodistillator for 3 h for extraction. The principle of the toxicity test is to treat fourth stage *Culiseta longiareolata* larvae with *Juniperus phoenicea* essential oil preparations. These preparations have increasing concentrations (5- 15 μ l), dissolved in 1 ml of ethanol. For each concentration did made three repetitions each comprise 20 larvae. The treatment was applied for 24 h. The quantification of proteins was carried following the Bradford (1976) method, Carbohydrates were determined following the Duchateau and Florkin (1959) method and Lipids were measured by the Goldsworthy et al. (1972) method.

Results and discussion: The toxicological tests made it possible to determine the lethal concentrations (LC25, LC50 and LC90) of oil extracted from *Juniperus phoenicea* on the newly exuviated larvae. In a second series of experiments the essential oil significantly reduces the energy reserves (protein, lipid and carbohydrate) of the larvae.

Conclusion: These results would be useful for replacing chemical insecticides with bioactive compounds of plant origin such as new mosquito repellents.

Keywords: *Juniperus phoenicea*, *Culiseta longiareolata*, Essential oil, Energy reserves.



HO-02 : Etude phytochimique et l'activité biologique de l'extrait aqueux des racines de *costus speciosus*

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Une des originalités majeures des végétaux réside dans leur capacité à produire des substances naturelles très diversifiées. Ils accumulent des métabolites secondaires dont la fonction physiologique n'est pas toujours évidente, mais qui représentent une source importante de molécules utilisables par l'homme dans des domaines aussi différents que la pharmacologie ou l'agroalimentaire.

Ce travail a pour but d'identifier les composés phénoliques de l'extrait aqueux de *costus speciosus* par la chromatographie liquide à haute performance (HPLC) et d'évaluer leurs activités anticoagulante, Antidiabétique et Anti-alzheimer.

Les composés phénoliques ont été obtenus par macération pendant 36 h sous agitation. Les polyphénols et les flavonoïdes totaux ont été déterminés par colorimétrie à l'aide du réactif de Folin ciocalteu et du chlorure d'aluminium respectivement. L'effet anticoagulant de l'extrait a été examiné *in vitro* sur des échantillons de sang d'individus normaux en mesurant le temps de prothrombine (PT), du temps de céphaline kaolin (TCK) et le temps de thrombine (TT) à l'aide d'un coagulomètre semi-automatique. En plus, nous avons évalué l'activité antidiabétique via l'inhibition de l' α -amylase et l'activité anti-Alzheimer via l'inhibition de l'acétylcholinestérase et de butyrylcholinestérase.

L'analyse chromatographique par l'HPLC a permis d'identifier 10 composés appartenant à la classe des acides phénoliques et des flavonoïdes. Les temps des coagulations obtenus (secondes) en présence de l'extrait aux doses utilisées indiquent qu'il exerce une activité anticoagulante notable sur les deux voies de la coagulation TP et le TT et un effet mitigé sur temps de prothrombine TCK. D'autre part, l'activité inhibitrice des enzymes a montré que l'extrait étudié a inhibé d'une manière faible à modérée de l' α -amylase. Tandis que, l'extrait a un faible pouvoir d'inhibition de l'acétylcholinestérase et du butyrylcholinestérase.

Les résultats obtenus confirment l'usage traditionnel de la plante sélectionnée en Algérie. Ils ouvrent également des perspectives multiples qui permettent d'approfondir nos études dans ce domaine.

Keywords: *costus speciosus*, anticoagulant, Antidiabétique, Anti-alzheimer, les polyphénols.



HO-03 : Etude de l'effet antibactérien des extraits poly phénoliques d'une plante médicinale: *Diplotaxis erucoïdes*

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Résumé :

Depuis des siècles, les plantes médicinales sont considérées comme une source majeure des produits utilisés en médecine alternative. Des travaux scientifiques ont été réalisés pour déterminer la composition chimique et les propriétés pharmacologiques des extraits qui constituent une bonne source d'antimicrobiens naturels.

Dans l'objectif de valoriser les plantes médicinales de la flore Algérienne et nord-africaine, nous avons eu recours à l'étude biologique de l'espèce *Diplotaxis erucoïdes*, en mettant en évidence l'activité antibactérienne d'un extrait brut hydrométhanoliques (70%) et de deux fractions de Diéthyl-éther (FDe) et d'Acétate d'éthyle (FAe) préalablement séparées. L'activité antimicrobienne a été évaluée par la méthode de diffusion des disques

(aromatogramme) sur quatre bactéries pathogènes : *Escherichia coli* ATCC (25922), *Pseudomonas aeruginosa* ATCC (27853), *Acinetobacter baumannii* (204196), *Klebsiella pneumoniae* (carbapénémase). L'extrait brut de cette plante est presque inactif sur l'ensemble des souches bactériennes testées, tandis que pour les fractions, les diamètres des zones d'inhibition varient entre 14 et 50 mm, exerçant un meilleur effet sur *K. pneumoniae* et *E. coli*.

L'utilisation de cette plante présente de nouvelles perspectives pour une thérapie aussi bien curative que préventive face à la pathogénicité de plusieurs souches microbiennes.

Mots clés: *Diplotaxis erucoïdes*, extraits, activité antibactérienne



HO-04: Efficacy of Catechin, Quercetin and Gallic Acid On Oxidative Stress Induced By Etoposide On Human Red Blood Cells

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Abstract

Cancer progression, as well as the side effects of chemotherapy, have been associated with an imbalance between ROS and the antioxidant defense system. Chemotherapeutic agents used in the treatment of cancer are known to increase levels of ROS, free radicals and lipid peroxidation. Oxidative stress considered as a crucial mechanism in cell injury attack and subsequent peroxidative. As a result, the appearance of often irreversible cell and tissue toxicity and loss of the integrity of cell membranes. Thus, antioxidant compounds are seen as a promising remedy to neutralize ROS and ensure the protection of tissues against toxicities that could suppress the development of oxidative stress and cancers. This study aimed to evaluate the cytoprotective effect of three antioxidants, namely CAT (catechin), Q (quercetin), and GA (gallic acid), against oxidative stress (OS) induced by etoposide. Human red blood cells (RBCs) and hemoglobin (Hb) were pretreated with these antioxidants and then exposed to etoposide. Several measurements were performed to assess the protective effects. The inhibition of RBCs membrane cytotoxicity induced by etoposide by measuring cell turbidity, Hb release, methemoglobin (metHb) generation, and intracellular Hb content. The inhibition of Hb oxidation using CAT, Q, and GA was also evaluated by measuring Hb levels. Furthermore, this study explore the inhibition of membrane lipid peroxidation by these antioxidants to mitigate oxidative stress induced by VP16. The results indicated that at a concentration of 1 mM, CAT, Q, and GA enhanced cytoprotection against OS induced by VP16. Pretreatment with Q protected human RBCs against VP16 cytotoxicity, resulting in high cellular concentration (1.068 ± 0.021). GA also improved the cytoprotective effect against VP16. Similarly, Hb release significantly decreased in RBCs exposed to VP16 when pretreated with CAT, GA, and Q with Hb rates about (0.233 ± 0.04), (0.675 ± 0.061) and (1.376 ± 0.016), respectively. Moreover, the antioxidants Q, GA, and CAT exerted a highly significant inhibition of metHb generation against VP16. The inhibition rates were 63.15%, 33.43%, and 20.68% for Q, GA, and CAT, respectively. The intracellular Hb content was about (2.020 ± 0.009) Q, (1.242 ± 0.022) GA and (0.911 ± 0.007) CAT, it was significantly higher in RBCs pretreated with these antioxidants, indicating significant cytoprotection against VP16. CAT, Q, and GA also protected Hb molecules against VP16-induced damage, as evidenced by high Hb levels. Furthermore, CAT, Q, and GA exhibited inhibition of lipid peroxidation against VP16, resulting in low levels of malondialdehyde (MDA) ranging from (0.002 ± 0.017) to (0.054 ± 0.002), which is a marker of lipid peroxidation. In conclusion, the three antioxidants (CAT, Q, and GA) demonstrated the ability to inhibit oxidative stress induced in human RBCs by VP16, a chemotherapy agent. They exerted a strong protective effect on RBC membranes, as well as on Hb molecules, potentially mitigating the side effects of chemotherapy-induced oxidative stress.

Keywords : Human red blood cells, etoposide, oxidative stress, antioxidants, cytoprotection.



HO-05 : Activité anti-hémolytique des extraits des fruits de *Pistacia Lentiscus*

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Abstract

Les biotechnologies appliquées à la santé concernent la santé humaine, que ce soit pour la prévention, la thérapie ou le diagnostic ; rester en bonne santé le plus longtemps possible est devenu la nouvelle idéologie de l'Homme occidental. Le stress oxydant est une circonstance anormale que traversent parfois nos cellules ou un de nos tissus lorsqu'ils sont soumis à une production, de radicaux libres oxygénés qui dépasse leurs capacités antioxydantes. De nombreuses affections humaines ou animales incluent donc un stress oxydant, local ou général, dans leur pathogénèse au même titre que l'inflammation, le vieillissement et le cancer à laquelle il est souvent associé.

Dans ce contexte le présent travail porte sur l'étude de l'activité antioxydante de l'extrait méthanolique d'une plante médicinale ; *Pistacia lentiscus* appartenant à la famille des anacardiées, connue sous le nom de tidekt. L'activité antioxydante *in vitro* a été évaluée en utilisant le test de l'activité scavenger du radical libre DPPH et ABTS^{°+} ; l'extrait méthanolique présente un meilleur effet anti-radicalaire avec une IC50 de $24,21 \pm 0,14$ ($\mu\text{g/ml}$) et de $1,541 \pm$

$0,36$ ($\mu\text{g/ml}$) respectivement. Ensuite un test vis-à-vis d'une agression oxydante des érythrocytes par deux agents ; le NaCl et la chaleur.

Le test de cytotoxicité réalisé à différentes concentrations a montré que l'extrait méthanolique représente un faible effet toxique. Le test anti hémolytique indique que l'extrait méthanolique des fruits de *Pistacia lentiscus* exerce un effet protecteur sur la membrane érythrocytaire contre le stress oxydant induit par hypotonie et le stress thermique.

En conclusion, nous pouvons dire ainsi que l'extrait méthanolique de *Pistacia lentiscus* est doté d'un pouvoir antioxydant et exprime un effet stabilisateur de la membrane du globule rouge, donc cette plante peut être une source très importante dans le domaine thérapeutique et pharmacologique.

Mots clés : *Pistacia lentiscus*, activité anti-hémolytique, stress thermique, hypotonie, cytotoxicité



HO-06: A comparative study between *Argas persicus* found in eastern Algeria and China

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Subject description: *Argas persicus* (the fowl tick) is a soft tick, often found in and around the nesting areas of birds, particularly in poultry farms with a worldwide distribution.

Objectives: In the current study, we performed morphological and molecular analyses to identify ticks collected in poultry farms from Algeria and East China.

Methods: Ticks were collected from farms sites including walls, nests, cracks and crevices. All these sites were searched for finding of all ticks stages including nymph, larvae and adult. All the collected tick specimens were identified morphologically by microscope and then confirmed by molecular and phylogenetic analysis.

Results and discussion: In total 30 ticks from poultry in Algeria, comprising 5 larvae, 12 nymphs, 12 adults, and 14 ticks comprising 12 Larvae and 2 adults from Gansu province in China were morphologically identified as *A. persicus*.

Molecular analysis of 30 ticks from Algeria and the 14 Chinese samples based on PCR, sequencing, and phylogenetic analysis of the gene 16S rRNA confirmed morphological results. However, through phylogenetic analysis, it was revealed that all Algerian samples, along with two Chinese samples, were classified under *Argas persicus sensu stricto* (s.s.). Meanwhile, the remaining Chinese samples were identified as part of *Argas persicus sensu lato* (s.l.), constituting a distinct lineage due to their genetic divergence.

Conclusion: The current research affirms the presence of *A. persicus* s.s. in both Algeria and China. Additionally, it presents new molecular data regarding a separate Chinese lineage of *A. persicus*.

Keywords: *Argas persicus*, Fowl tick, Morphology, Molecular analysis, 16s rRNA, Algeria.



HO-07: Prevalence and resistance profile of *Acinetobacter baumannii* isolated in the microbiology laboratory of the Regional Military University-Hospital of Constantine (HMRUC)

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Subject description: *Acinetobacter baumannii*, an opportunistic pathogen, emerged in the early 20th century. Over time, it has evolved by deploying antibiotic resistance mechanisms, making it a striking example of the evolution of microbial resistance. *A. baumannii* is identified as one of the nosocomial pathogens of greatest concern. In fact, in France, *Acinetobacter baumannii* is responsible for more than 90% of clinical isolates.

Objectives: The fundamental objective of this study is to isolate strains of *Acinetobacter baumannii* from samples received from different departments of a hospital in Constantine, identify them and then determine their resistance profiles to various antibiotics.

Methods: A comparative study (retrospective and prospective) was carried out on a sample of 86 strains of the *Acinetobacter* genus, including in particular 46 strains of the *Acinetobacter baumannii* species. These samples were collected between 2019 and 2023 from different samples, the majority of which were received from the intensive care unit (61.62%). The strains were isolated and identified by conventional methods in the microbiology laboratory. The resistance profile was established according to the CLCI recommendations.

Results and discussion: All bacteria present significant resistance to the majority of antibiotics such as β -lactams, aminoglycosides and fluoroquinolones, however, they remain sensitive to colistin with a percentage of 97.8%. These results obtained support the multiresistance nature of *Acinetobacter baumannii*.

Conclusion: *Acinetobacter baumannii* has become a global threat and poses enormous therapeutic problems for treating carrier patients. It is therefore essential to strengthen surveillance and apply good hospital hygiene practices as well as the rational use of antibiotics.

Keywords: *Acinetobacter baumannii*, multi-resistance, antibiotics, nosocomial, epidemiology.



Poster Communications: Biotechnology and Health

**VBRRB'23
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HP-01: Adsorption capacity of raw pomegranate peel biosorbent for copper removal: Thermodynamic studies

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Abstract

The removal of Cu(II) is an important issue for the treatment of industrial wastewater, due to its serious consequences on environment and human health. In this study describes the removal of Cu(II) ions from an aqueous solution using raw pomegranate peel (RPP), a cheap biosorbent. The biosorbent's three primary functional groups are hydroxyl (OH), carboxyl (COOH), and amine (NH₂). The pH at zero point charge (pH_{pzc}) demonstrate RPP's mildly acidic nature. Reduced RPP particle size results in an increase in adsorption capacity of 80 mg/g in 30 min, 86.13 mg/g in 60 min of contact, and an 86% removal rate for starting Cu(II) ions concentration of 200 mg/L and a 2 g/L biosorbent dose. Data from experimental isotherms for biosorption match the Temkin model well. The spontaneous, exothermic, and described pseudo-second order adsorption of Cu(II) ions onto RPP was found to match the kinetic data. With the multiple reuse promising application in environmental wastewater recycling with RPP, the adsorption mechanism of Cu(II) ions onto RPP was suggested.

Keywords: Environmental depollution, Heavy metals, Biosorption, Thermodynamic studies.

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HP-02: Total polyphenols, total flavonoid contents, antioxidant activity of Algerian natural and spice plant

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Subject description: Spice plants have a great influence on world history. For centuries, different civilizations have used them to condiment the foods of kings and nobles and applied them as embalming preservatives, perfumes, cosmetics, and medicines in different regions of the world. In general, these Spice plants have formed the basis of traditional medicine and some of their derived substances have been utilized to treat different human diseases.

Objectives: Carry out a comparative extraction of bay leaf, in terms of total polyphenol content and antioxidant activity, using two pieces of equipment: Ultrasonic bath and ultrasound probe.

Methods: This work uses two types of ultrasound-based extraction equipment: with bath and with probe, ethanol was used as solvent. The comparative study was based on a comparison of the content of phenolic compounds and the antioxidant properties (DPPH, FRAP, ABTS) between the two extracts generated.

Results and discussion: The highest TFC and antioxidant activity was detected in extracts obtained by ultrasound bath assisted extraction as an extraction medium and the lowest in extracts obtained by ultrasound probe extraction with 152.6 mg gallic acid equivalent (GAE) g⁻¹ for the TPC and a scavenging effect on the DPPH radical, with IC₅₀ values of 58.3 µg mL⁻¹.

Conclusion: This study proves that ultrasound bath extraction could successfully be used for extraction of polyphenols and as an alternative to the traditional method.

Keywords: Laurus Nobilis, Ultrasound bath, ultrasound probe, Antioxidant activity.



HP-03: Virological and epidemiological studies of Hepatitis B at Tobal's Brothers Hospital Mila- Algeria

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Subject description: Hepatitis B virus (HBV) is a major viral infection that causes inflammation of the liver which represents a major public health problem worldwide. Complications related to HBV infection, such as fibrosis, cirrhosis, and hepatocellular carcinoma, are major concerns.

Objectives: In our study, we investigated the disease at Tobal's Brothers hospital in Mila. We also carried out a retrospective statistical study, between January 20, 2021 and May 12, 2023.

Methods: Diagnosis of the disease is largely based on the immunoenzymatic ELISA technique. The retrospective study was based on the age, sex and seroprevalence.

Results and discussion: On several tested serums (for 3 months), only one case showed a positive result with the presence of anti-HBV antibodies.

The results of the study indicate that the seroprevalence of the disease reached 1.52% at the Public Establishment Hospital. In addition, it has been noticed that adults aged 15 to 40 are the most affected by HBV with a male predominance. On the other hand, the infectious diseases department was identified as being the most affected by the infection at the same establishment.

Conclusion: This observation highlights the importance of appropriate management of hepatitis B within this service and highlights its crucial role in the fight against this disease.

Keywords: Seroprevalence, Hepatitis B, ELISA test, diagnosis, Tobal's Brothers hospital - Mila.



HP-04: The beneficial effect of gallic acid against lung and liver toxicity induced *in vivo* by carcinogenic benzopyrene.

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Subject description: Polycyclic aromatic hydrocarbons are pollutants, the most dangerous of which is benzo(a)pyrene, a known carcinogen to humans. Among the bioactive substances, gallic acid has anti-oxidant, anti-inflammatory and anti-cancer properties.

Objectives: The aim of our study is to evaluate acute, sub-acute and chronic toxicity induced by benzo(a)pyrene in lungs and liver of mice and rats, as well as the protective effect of gallic acid.

Methods: Benzo(a)pyrene is administered to animals at doses of 50 mg / kg and 100 mg / kg IP; From each toxicity model, the biochemical parameters relating to oxidative stress, serum transaminase assay, histopathological analysis are evaluated on the one hand and the study of the expression of galectin 3 and 8 in the liver and lungs on the other hand.

Results and discussion: The results reveal the modification of the cellular antioxidant potential in favor of oxidative stress, the increase of lipid peroxidation, the appearance of necroses and hepatocellular lesions as well as the modulation of the genetic expression of galectins.

Conclusion: Gallic acid manages to reverse the aforementioned effects offering a protective effect against the toxic effects induced by benzo(a)pyrene, as well as galectin 3 can constitute a means of diagnosis if supported by other tests including clinical ones.

Keywords: Benzo(a)pyrene, Gallic acid, Toxicity, Galectins, Oxidative stress.



HP-05: The potentiel therapeutic effects of Arba alba oil against *Toxoplasma gondi*

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Objectives: The objective of this study was to analyze the effect of experimental infection by toxoplasmosis on the immune response and to evaluate the potential therapeutic effect of Artemisia herba-alba oil.

Methods: Mice were infected with the Prugnauud cystogenic strain of *Toxoplasma*, the cysts were collected from the brains of mice and was prepared for intraperitoneal infection of mice two groups were administered the Artemisia herba-alba oil. while other group received treatment with Pyrimethamine + Clindamycin. The immune response was assessed by measuring the concentrations of pro-inflammatory cytokines (IFN- γ , TNF- α , IL-12) in mouse serum using ELISA. The activation of CD4+ and CD8+ T lymphocytes was analyzed by flow cytometry, quantifying the percentages of cells positive for IFN- γ . Granuloma formation was evaluated by histological examination of infected tissues. The levels of IL-10, an immune regulatory cytokine, were measured in the serum of infected mice.

Results and discussion: The mice treated with Artemisia herba-alba oil showed a significant decrease in parasitic burden compared to the infected control group. Similarly, those treated with Pyrimethamine + Clindamycin, exhibited a significant reduction in parasitic burden. Both groups showed a significant decrease in pro-inflammatory cytokine concentrations compared to the infected control group. The activation of CD4+ and CD8+ T cells was significantly higher than in the infected control. Histological analysis revealed a decrease in granuloma formation in the tissues of oil-treated and Pyrimethamine + Clindamycin-treated mice compared to the infected control group. Furthermore, both treatments indicate a modulatory effect on the immune response.

Conclusion: Our findings demonstrate that the administration of Artemisia herba-alba oil at a concentration of 5 mg/kg have high effency than and Pyrimethamine + Clindamycin treatment at concentrations of 25 mg/kg and 12.5 mg/kg, respectively, against toxoplasmosis.

Keywords: toxoplasmosis, immune response, therapeutic effect



HP-06: Evaluation des propriétés anti-inflammatoires de la cellulose chez la rate wistar obèse

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Résumé

Déterminant de nombreuses maladies, l'obésité est l'un des problèmes de santé publique majeurs identifiés par l'OMS. L'obésité est désormais reconnue comme étant une pathologie à caractère inflammatoire. Les relations entre inflammation du tissu adipeux et les complications métaboliques de l'obésité ont été évoquées il y a une quinzaine d'années.

L'objectif de la présente étude est de déterminer les effets in vivo de la supplémentation d'un régime hyperlipidique et hypercalorique nommé régime cafeteria en cellulose à 10% sur le l'état inflammatoire chez les rates wistar obèses et ceci pour mieux cerner les effets régulateurs et/ou préventifs de la cellulose contre le développement de l'obésité.

Les taux sériques de facteur alpha de nécrose tumorale (TNF- α) et d'interleukine(IL6) ont été mesurés à l'aide de kits ELISA (Enzyme Linked Immuno sorbant Assay) (Sigma-Aldrich, St. Louis, MO, USA) selon les protocoles d'instructions du fabricant.

Les sécrétions des cytokines (TNF- α et IL-6) sont significativement augmentées chez les rates obèses (HFD comparées aux témoins (C). Par contre, une réduction de la sécrétion des cytokines est observée chez les rates qui consomment le régime HFDC par rapport aux rates obèses.

On peut donc suggérer que la cellulose peut constituer une thérapie nutritionnelle efficace pour prévenir et combattre les complications associées à l'obésité.

En conclusion, nous avons montré que la supplémentation du régime cafeteria par la cellulose réduit l'inflammation induite par le régime cafeteria. Ceci peut être une cible thérapeutique prometteuse dans la régulation des altérations inflammatoires liées à l'obésité.

Mots clefs : Obésité, inflammation, cellulose, TNF- α , IL6.



HP-07: Deciphering Gut Microbiota Changes in Hashimoto's Disease via 16S rRNA Analysis

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Subject description: Gut microbiota research has gained global prominence, revealing its critical role in diverse health conditions, including autoimmune diseases. This study focuses on evaluating the gut microbiota composition in Hashimoto's disease, a significant autoimmune thyroid disorder.

Objectives: Our objective is to investigate the composition of gut; microbiota to determine if there is dysbiosis or alteration in Hashimoto's patients.

Methods: We recruited 20 participants diagnosed with Hashimoto's disease and 20 healthy controls. Demographic and medical information was acquired through structured questionnaires, and informed consent was obtained from all participants. Fecal samples were collected aseptically, stored at -20°C, and subjected to DNA extraction using a two-step phenol-chloroform method. The amplified V3V4 region of the 16S rRNA gene was then targeted using PCR, a recognized bacterial marker. The subsequent amplicons were purified and subsequently sequenced using the Sanger method.

Results and discussion: Our study employs bioinformatics tools to analyze raw sequencing data, enabling the identification of operational taxonomic units (OTUs) based on sequence similarity and taxonomic classifications. Statistical analyses will compare gut microbiota composition and diversity indices between the Hashimoto's disease group and healthy controls.

Conclusion: This study has the potential to offer valuable insights into the role of gut microbiota in Hashimoto's disease, fostering personalized interventions and deeper understanding of autoimmune thyroid disorders, while also suggesting promising avenues for future research.

Keywords: Gut microbiota; Hashimoto's disease; 16S rRNA gene; PCR; operational taxonomic units.



HP-08: Study of the effect of *Bifidobacterium animalis* subsp. *Lactis* BB-12 and *Lactobacillus plantarum* 299v® on some biochemical parameters and body mass index of obese rabbits

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Obesity and metabolic syndrome have become a real public health problem in the world. Thus, the prevention of obesity and the promotion of a healthy and balanced diet are the priority of health organizations.

The objective of this study is to evaluate the consequences of obesity on biochemical and morphometric parameters and to determine the effect of probiotics on obese rabbits and their offspring.

The first experiment was performed on 40 rabbits of the ITELV2006 line. These rabbits were divided into two groups, control and obese, and were fed a high-calorie, high-fat diet called "cafeteria" for 14 weeks to induce an experimental model of obesity and metabolic syndrome (MetS). Results revealed a significant increase in fasting blood glucose and OGTT ($p < 0.001$), as well as an altered lipid profile ($p < 0.001$) and an increase in BMI ($p < 0.01$), weight ($p < 0.001$), and abdominal circumference ($p < 0.001$).

The second experiment involved 18 rabbits from the "Obese" group of the first experiment, divided into three subgroups of six rabbits each (control (TO), *Bifidobacterium animalis* subsp. *lactis* BB-12®(OB) and *Lactobacillus plantarum* 299v®(OL), for 30 days. The results demonstrated improvement in both groups (OB and OL) compared to the control group, including significant decreases in fasting blood glucose ($p < 0.001$), OGTT ($p < 0.05$), total cholesterol ($p < 0, 001$), triglycerides ($p < 0.01$) and LDL ($p < 0.001$), significant increase in HDL ($p < 0.05$) and significant decrease in weight ($p < 0.05$), abdominal circumference ($p < 0.05$) and BMI ($p < 0.05$).

Finally, future studies are needed and have to be considered with the use of other probiotics or a mixture of several probiotic strains and extending the duration of administration in order to confirm the total safety of using probiotics to prevent obesity and MetS.

Key words: Rabbits, cafeteria, obesity, metabolic syndrome, probiotics, gut microbiota.



HP-09: Performance optimization of hyaluronic acid production

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Abstract

Hyaluronic acid (HA) is a natural biopolymer belonging to the family of glycosaminoglycans. It promotes the healing process, inhibits inflammation, and stimulates osteoinduction. It finds applications in various therapeutic fields, including ophthalmology, urology, rheumatology, and aesthetics.

In the context of our PNR project, we aim to produce Algerian hyaluronic acid and by fine-tuning the production process, we can ensure the efficient and cost-effective synthesis of this valuable molecule. Through systematic experimentation and analysis, we enhance the yield and quality of Algerian HA, contributing to both scientific advancements and the development of locally sourced biomedical materials.

Fermentation trials were conducted in the laboratory to optimize culture conditions and enhance the performance of the strain used for HA production. The optimization of HA production from *Streptococcus equi* subsp. *zooepidemicus* was achieved by formulating a reference culture medium. The concentrations of various components in the medium, such as carbon and nitrogen sources, vitamins, minerals, and certain amino acids, were optimized through batch cultures in Erlenmeyer flasks.

Determining the optimal conditions for the production process through discontinuous culture significantly improved fermentation performance. Several factors, such as pH, temperature, ionic strength, and agitation speed, were optimized through fermentation experiments.

HA quantification was based on turbidity measurements (insoluble complexes formed between hyaluronic acid and cetyltrimethylammonium bromide) at 600 nm. The study led to a substantial improvement in the final concentration of produced HA.

Large-scale industrial trials, following an industrial operation plan, will soon be conducted at Pharmaceutical Industry SALEM (Laboratoires SALEM), economic partner in our PNR. These trials aim to evaluate the production process of our HA on a larger scale.

Keywords: *Streptococcus equi* subsp. *zooepidemicus*, Hyaluronic Acid, culture medium, optimization, performance, fermentations, industrial trials.



HP-10: Ferric Reducing power and DPPH free-radical scavenging activity of the greenly synthesized manganese oxide nanoparticles by using *Ocimum basilicum* L. leaves

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ABSTRACT

Plant-based NP green synthesis is now regarded as a gold standard among these green biological techniques owing to its ease of use and the diversity of plants. However, (MnO NPs) have gained importance in the synthesis and manufacturing processes because of their lower toxicity. The aim of this study was to quantify the phytochemical *Ocimum basilicum* L. compounds and to greenly synthesize of manganese oxide nanoparticles (MnO NPs) using basil leaves aqueous extract and their *in vitro* antioxidant power assessment. Bioactive molecules extraction and qualitative analysis of some phytochemical compounds were released by using standard protocols. Moreover, green synthesis of manganese oxide nanoparticles was carried up. *In vitro* anti-oxidant power was studied by DPPH freeradical scavenging activity and ferric reducing antioxidant power FRAP. Results of phytochemical essays showed that aqueous extract of *Ocimum basilicum* L. is very rich on different chemical compounds such as saponins phenols, flavonoids, catechic tannins, saponins, reducing sugars, alkaloids and terpenes. The UV-Vis absorption of NPs presenting the maximum absorption peak at the wavelength of 405 nm that confirm the MnO NPs' green synthesis. IC₅₀ values in the DPPH and FRAP assays indicate that this plant has a high anti-oxidant activity. In conclusion, this study confirmed that aqueous extract of *Ocimum basilicum* L. is rich of important bioactives compounds that have potential properties as biocatalyst for the biosynthesis of manganese oxide nanoparticles (MnO NPs). In addition, MnO NPs was able to induce highly effective anti-oxidant power which qualify to protect against oxidative stress.

Key word: *Ocimum basilicum* L.; MnO NPs; anti-oxidant power; DPPH; FRAP.



HP-11: Nephrotoxicity of TiO₂-NPs on Wistar rats

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Subject description: Nanotoxicology was proposed as a new branch of toxicology to address the adverse health effects caused by the exposure of nanoparticles. Titanium dioxide nanoparticles (TiO₂ NPs) are among the most widely used nanomaterials in the consumer products, agriculture, and energy sectors. Their great demand and widespread applications will inevitably cause damage to organisms and ecosystems (Christina L.W et al.,2015).

Moreover, when the scale comes to nanomaterials, TiO₂ nanoparticles (nano-TiO₂) exhibit multiple specific characteristics coupled with unknown risks to health.

Objectives: The purpose of this study was to systematically research the influence of nephrotoxicity of TiO₂-NPs on Wistar rats.

Methods: The study was looking for administering rats with two doses of titanium dioxide (TiO₂) for 90 days at the renal level The experiment was conducted on a sample of 21 Wistar rats (males) divided into three groups.

the results determined the toxic effects of TiO₂ showed that titanium dioxide due to harmful effects on the body by increasing the activity of biological indicators of oxidation, a significant increase in the activity of antioxidants in renal cells compared to biological characteristics and the severity of toxicity increases with increased dose, and this is shown by results between the two doses all the indicators are signs of potential nephrotoxicity.

Results and discussion:

The variation in the activity of GST treated with TiO₂ NPs compared to the controls, in our work we observe that there is a highly significant increase ($P < 0.01$) in the batch treated with TiO₂ NPs at a dose (2.5 ml/kg/day) and a significant increase ($p < 0.05$) in the batch treated with TiO₂ NPs at a dose (1.25 ml/kg/day) by intake or control group.

Conclusion: This study showed that TiO₂ NPs exposure following oral administration led to ROS accumulation in the kidney. Our findings suggest the need for caution in workers and consumers when handling nanomaterials.

Keywords: Oxidative Stress, Wister rats, TiO₂ NPs, MDA, Nephrotoxicity, Nanotoxicity.



HP-12 : Evaluation of antioxidant activity of *Aspergillus* genus' three fungal species producing bioactive metabolites

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Subject description: *Aspergillus* are a valuable source of therapeutically active compounds. Thus, the activities of various species of this genus deserve to be studied in order to establish other more potent fungal substances that can be reliable therapies for humans.

Objectives: This work aims to evaluate the antioxidant activity of three fungal species of the *Aspergillus* genus.

Methods: Fungal strains (*A. quadrilineatus*, *A. niveus* and *A. wentii*) were seeded on Czapek-dox medium, after 14 days of fermentation, the extraction of metabolites was carried out by chloroform, then the fungal extracts were tested for their antioxidant activity according to four methods: the trapping of the free radical DPPH, the trapping of the radical ABTS, the reduction by the formation of the ferrous complex Fe^{2+} phenanthroline and the power of reduction of ferric ions (FRAP).

Results and discussion: The combination of the different procedures showed that the extract of *A. wentii* has the most important antioxidant activity with 83% trapping effect on DPPH radicals. Trapping of the ABTS radical by the same extract showed inhibition of 90% of the radicals. It also showed an absorbance of 1.36% of ferrous ion chelation. In addition, the three extracts are able to reduce iron and form the Fe^{+2} -phenanthroline complex. However, all species showed low ferric ion reduction activity based on the FRAP test.

Conclusion: This work shows the ability of the three fungal strains to produce bioactive molecules that have antioxidant activity, whose most significant effect is revealed by the species *A. wentii* which is due to its richness in phenolic compounds commonly known for their antioxidant properties.

Keywords: *Aspergillus*, secondary metabolites, antioxidant activity.



HP-13: Cyclodextrin- Vitamin E improves human spermatozoa motility and attenuates diabetes-mediated oxidative in high HbA_{1c} conditions

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Subject description: Hyperglycemia is known to cause male reproductive impairment through diverse mechanisms. Indeed, the development of oxidative stress in parallel to the wide distribution of advanced glycation end products in the reproductive tract of diabetic men may be a key role in male infertility. However, one of the rational strategies to prevent this effect is to increase the scavenging capacity of antioxidants in sperm.

Objectives: The aim of the current study is to evaluate the protective effect of Vitamin E loaded in cyclodextrin (CD-Vit E) on human mature spermatozoa exposed *in vitro* to diabetic plasma with high HbA_{1c} levels.

Methods: Blood plasma from diabetic patients (N= 10) with high HbA_{1c} levels ($\geq 10\%$) was co-incubated with ten normozoospermic semen samples pre-treated with CD-Vit E. The sperm quality was determined by the assessment of sperm motility using Computer Assisted Semen Analysis (CASA), and the oxidative status was determined by measuring malondialdehyde (MDA) levels, using the thiobarbituric acid reactive substances assay.

Results and discussion: The results showed that all of the sperm progressive movements (moderate progressive: $13.29 \pm 1.79\%$ and rapid progressive: $3.58 \pm 0.58\%$) decreased considerably after 30 min of incubation with diabetic plasma. Interestingly, the pre-treatment with CD-Vit E (0.25 mg/ml) reported an effective improvement in all sperm motility ($27.86 \pm 1.71\%$ and $11.21 \pm 1.88\%$ for moderate and rapid progressivity, respectively). Also, an outstanding decrease in immobile cells was observed in CD-Vit E group ($30.54 \pm 3.72\%$). In parallel, lipid peroxidation increased dramatically in the diabetic group (0.91 ± 0.04 nmol MDA/ 10^8 SPZ) and reduced after treatment with CD-Vit E (0.16 ± 0.02 nmol MDA/ 10^8 SPZ).

Conclusion: these data indicated that diabetic plasma at high HbA_{1c} levels impaired mature spermatozoa motility by the increase of its oxidative status. While CD-Vit E has a potent protective effect as an antioxidant agent in the improvement of sperm quality in diabetic men.

Keywords: cyclodextrin-vitamin E, hyperglycemia, high HbA_{1c} levels, sperm motility.



HP-14: Screening of diseases transmitted through blood and their preventions

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Subject description: Blood transfusion is a life saving intervention and plays a vital role in the management of patients in the health care system. Medical interview is the first barrier to select at-risk individuals.

Objectives: The objective of this work was to determine the prevalence of human immunodeficiency virus (HIV), hepatitis B virus (HBV), C (HCV) and syphilis on blood donations collected at the blood transfusion center CTS/EHS DAKSI.

Methods: blood test data was collected over a period of three years

Results and discussion: A retrospective study of 10949 samples revealed that the majority of donors were less than 36 years (62.11%) in both sexes. In addition, a male predominance was noted, with a value of 71%. Occasional donors are largely in favor compared to regular donors. The total number of blood donors from fixed and mobile collect is almost equal (47% and 53% respectively). In general, the prevalence assessment shows low levels for the studied infectious markers, with the highest value noted for HBV (0.14%) followed by that of syphilis (0.13%). On the other hand, the seroprevalence of HCV is much lower with an average of 0.013%, and that of HIV is zero (0%).

Conclusion: The low rates of seroprevalence observed in this study show the improvement of preventive measures with regard to donor selection and screening tests.

Keywords: Biological screening, ELISA, blood donations, blood-borne disease.



HP-15: *Laurus nobilis* essential oil as a new strategy against bacterial resistance

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Subject description: This work focused on an essential oil (EO) of a plant species, *Laurus nobilis* (*L. nobilis*) which belongs to the Lauraceae family, one of the families most used in traditional therapy.

Objectives: The main objectives of this study were phytochemical screening and biological activities; antioxidant, antibacterial and mainly antibiofilm; of the EO of *L. nobilis* harvested from the region of Constantine.

Methods: The phytochemical screening was based on specific tests for each metabolite. Besides, the antioxidant activity of the EO was tested using two methods, DPPH and FRAP. The antibacterial activity by the well diffusion method of the EO was additionally tested on four strains; *S. aureus*, *B. cereus*, *E. coli*, and *P. aeruginosa*. The antibiofilm activity of the EO was also conducted on *S. aureus*.

Results and discussion: It was highlighted the presence of the main bioactive metabolites like polyphenols, flavonoids, tannins, and EO which were the most dominant. In addition, the EO recorded lower IC₅₀ and EC₅₀ (0.14 mg/ml and 0.13 mg/ml, respectively) having the most relevant antioxidant potency. As well as, very interesting inhibition zone diameters were recorded. The obtained results revealed that Gram + bacteria are the most sensitive to EO; where the highest inhibition value was recorded on *S. aureus* (32±0.23 mm) at a concentration of 100%. The EO also exhibited a very high antibiofilm activity on *S. aureus* with a percentage reduction of 76.1% at 100%; moderately high to that of chloramphenicol (70.3%).

Conclusion: These results can be considered as a starting point for the use of *L. nobilis* EO in the field of health as a natural ATB against *S. aureus* biofilm infections to avoid the successive use of synthetic ATBs, and therefore the reduction of bacterial resistance.

Keywords: *Laurus nobilis*, essential oil, biological activities, antibiofilm, bacterial resistance, *S. aureus*.



HP-16: Biochemical Characterization of anti-leukemic L-Asparaginase produced by *Streptomyces hydrogenans* CA04 isolated in Algeria

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Abstract

Purpose: L-asparaginase is anticancer enzyme which used in chemotherapeutic protocol against leukemia. In order to search for a new molecule of L-asparaginase with interesting industrial and analytical characteristics, we explored Lake Agulmim, located at 1700 meters' altitude in Mount Tikjda, part of Mountain range of Djurdjura (Algeria), for the isolation of actinomycete producing strain CA04.

Methods: After the molecular identification based in sequencing of 16S rDNA gene of our strain as *Streptomyces hydrogenans* CA04 and the demonstration of L-asparaginase activity, we extracted the extracellular interest enzyme at 90% ammonium sulphate followed by dialysis and separation by chromatography on Sephacryl S-200 gel.

Results and interpretation: We detected, therefore, two isoforms A and B of MW of 86 and 108KDa, eluted at 32min and 33min respectively, with a total protein level of 0.32mg/ml. An SDS-PAGE control was made showing the existence of the two isoforms with molecular weight mentioned. The L-asparaginase activity was maximal between pH 7 and 8, a temperature of 37°C, for 10min of reaction, with a specific activity of 7.28 IU/mg. On the other hand, the activity is stable in the presence of Mg²⁺, Cu²⁺, Zn⁺ and EDTA, decreased by Fe³⁺ and inhibited by Mn⁺. Finally, the L-asparaginase activity produced by *Streptomyces hydrogenans* CA04 has a high degree of specificity to the L-Asparagin substrate, with very weak relative activities, against the other nearby substrates, L-Glutamine and L-Aspartic Acid..

Keywords: Chromatography; L-Asparaginase; lake Agulmim in Algeria; SDS-PAGE; *Streptomyces*.



HP-17: LC-MS analysis of *Centaurea papposa* extract

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The main sources of polyphenols are medicinal herbs, vegetables and fruits. Numerous analytical procedures have been developed for the quantification of phenolic compounds in herbs. High-performance liquid chromatography method coupled with mass spectrometry (LC–MS) is one of the most used techniques.

This work aimed to ascertain the phenolic compounds of ethyl acetate extract of *Centaurea papposa*, in order to find new sources of polyphenols.

Phenolic compounds were appraised using LC-MS technique, à l'aide d'une UHPLC Shimadzu de modèle Nexera couplée à un instrument MS en tandem.

LC-MS analysis revealed the presence of 21 compounds among which 13 were phenolic acids, 6 flavonoids, 1 phenolic aldehyde and 1 benzo-pyrone.

The results show that ethyl acetate extract of *Centaurea papposa* can be used as a herbal drug, In view of the beneficial effects on health identified for phenolic compounds .

Keywords: *Centaurea papposa*; LC-MS analysis ; polyphenols ; ethyl acetate extract.

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HP-18: Green Synthesis of SeNPs Using Leaves of *Sonchus maritimus* aqueous extract and their *invitro* Biological Applications

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Abstract

This investigation aimed to characterize of selenium nanoparticles synthesized by green approaches using *Sonchus maritimus* L. extract and evaluate their antioxidant and antibacterial properties. Moreover, acute toxicity of nanoparticles was performed in Wistar rats. The synthesis of SeNPs was confirmed by Scanning Electron Microscopy and Energy Dispersive X-ray analysis. Antioxidant activities of *S. maritimus* and SmE-SeNPs were determined by DPPH and FRAP assays. Antibacterial activities were tested against Gram positive and negative pathogen bacteria. The SEM results showed that SeNPs had a spherule-like structure reaching up to 26.48 nm. In addition, *S. maritimus* extract and SmE-SeNPs had DPPH scavenging activity and reducing power. SeNPs exhibited activities against *Escherichia coli* and *Staphylococcus aureus*. In conclusion, *S. maritimus* can be considered as biocatalyst stabilizers for the biosynthesis of SeNPs which might be used in several pharmaceutical and medical applications due to their biological efficiency.

Keywords: SeNPs, *Sonchus maritimus*, characterization, DPPH, FRAP.



HP-19: Anticholinesterase, antioxidant and antihemolytic effects of the aqueous leaf extract of *Pistacia Lentiscus*

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Subject description: *Pistacia lentiscus* (Anacardiaceae) known as mastic tree, one of the many evergreen bushes found in the eastern Mediterranean region. It has been used for a long time in human food and in the pharmaceutical industry.

Objectives: This study aims to evaluate the anticholinesterase, antioxidant and antihemolytic activities of the aqueous leaf extract of *Pistacia Lentiscus* (AELPL) from the Jijel region.

Methods: The contents of phenolic compounds and flavonoids were quantified by the Folin-Ciocalteu and trichloroaluminum methods, respectively. The inhibition activity of acetylcholinesterase (AChE) is evaluated by a spectrophotometric method. The in vitro antioxidant activity was determined by the reducing power assay, the hydroxyl radical scavenging capacity OH[•] and the DPPH radical scavenging capacity. The antihemolytic activity was evaluated by a spectrophotometric assay on human erythrocytes.

Results and discussion: The results obtained show that EAPL has a high content of polyphenols and flavonoids. The study of the anti-AChE activity shows that the extract exhibits an inhibitory effect on AChE, with IC₅₀ value of 45.6 µg/ml. The in vitro antioxidant activity of the extract demonstrated its ability to effectively scavenge hydroxyl radicals (OH[•]) and DPPH radicals, as well as a significant reducing power with IC₅₀ values of 32.62±5.32 µg/ml, 4.30±0.27 µg/ml, and 13.64±0.51 µg/ml, respectively. The findings also show that the maximum hemolytic activity of EAFPL is 3.907±1.75% at a concentration of 400 µg/ml.

Conclusion: These results suggest that EAPL can be considered as a source of natural bioactive principles for pharmacological, dietary and medicinal applications

Keywords: *Pistacia Lentiscus*, phenolic compounds, Antioxidant activity, Anticholinesterase activity,



HP-20: Chemical composition, antibacterial and anti-biofilm activities of selected essential oils produced by medicinal plants in Algeria.

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Abstract

The resistance of bacterial biofilms to antibiotics has led to the search for alternative approaches for bioactive molecules of plant origin capable of destroying the biofilm. Essential oils are natural compounds with important biological activities. This work aims to study the chemical composition, and to evaluate the antibacterial and antibiofilm activities of 3 Essential oils extracted from plants from Souk Al-Ahras. The antibacterial activities were assessed against 5 isolated clinical pathogens. The essential oils were extracted by hydrodistillation *Rosmarinus officinalis*, *Aloysia citrodora* and *Artemisia herba alba* oils provided a yield of (0.93%), (0.24%) and (0.87%), respectively. The study of the antibacterial activities by the method of micro-dilution showed MICs values from 5 to 20 μ l/ml. The antibiofilm activity showed that essential oils exhibited antibiofilm activities even at sub-MIC concentrations. This study illustrates the great potential for natural compounds from plants to be used in the development of future phytotherapeutic antibiofilm agents.

Keywords: *Rosmarinus officinalis*, *Aloysia citrodora*, *Artemisia herba alba*, bioactive molecule, essential oil, antibiofilm



HP-21: Evaluation of some biological activities of *Phragmites australis* rhizomes extract and phytosynthesized copper nanoparticles

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Abstract

This study intends to use the rhizomes of the Algerian *Phragmites australis* aqueous extract to phytosynthesize copper nanoparticles (CuNPs) and to investigate the anti-oxidant and anti-inflammatory activities of the plant and the nanoparticles. The new nanoparticles have been characterized using different techniques , for instance : UV-Vis spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), X- ray diffraction (XRD) and Scanning Electron Microscopy (SEM).Both rhizomes extract and CuNPs demonstrated noteworthy antioxidant properties, as evidenced by the results of the DPPH radical scavenging and FRAP essays. Regarding the anti-inflammatory activity,protein denaturation inhibition was measured in presence of our extract and CuNPs. The IC₅₀ levels showed an important anti-inflammatory properties compared to the Diclofenac that was used as a standard. To conclude, *P.australis* rhizomes extract and its phytosynthesized copper NPs are a valuable natural resource that can be used as a potential source of bio-active compounds which is directed against inflammatory and oxidative stress diseases.

Keywords: *Phragmites australis* ,phytosynthesized copper NPs, Antioxidant, anti-inflammatory activity.



HP-22: Synergistic effect of mint infusion on the survival and antioxidant activity of *Lactiplantibacillus plantarum* strains in simulated gastrointestinal conditions

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Subject description: Exploring the synergistic potential of medicinal plant-mediated enhancement for probiotic viability and antioxidant activity.

Objectives: This study aims to evaluate the viability and antioxidant capacity of two strains of *Lactiplantibacillus plantarum* (S10 and BCX1) during a simulated oral-gastrointestinal digestion process. Moreover, the combined effect of these strains with a medicinal plant (mint infusion), acting as a prebiotic matrix, on their viability and antioxidant efficacy is investigated.

Methods: The digestion of the samples (probiotic, probiotic-mint) was carried out in solutions simulated to those of digestion (solution equivalent to salivary fluid, gastric fluid and intestinal fluid). Viability of probiotic bacteria was determined using the standard plate count method after each digestion phase, and the antioxidant activity was assessed post each stage through DPPH, TAC, TPC, and TFC assays.

Results and discussion: The *in vitro* findings showed that our probiotic strains are resistant to simulated digestion conditions. In contrast, the added plant matrix used (mint infusion) has markedly improved the antioxidant activity and the survival rate to around 50% of the strains with a loss of phenolic and flavonoid compounds of the matrix during passage through the different digestion compartments. This decline could be because the probiotic cells were utilizing these compounds as a source of nutrition. On the other hand, the rise in antioxidant activity corresponds to the recognized antioxidant properties of various plants, such as mint. The natural components of mint, like polyphenols and flavonoids, are likely contributors to this stronger antioxidant effect.

Conclusion: The study implies the potential of this specific medicinal plant, to act as an effective vehicle for enhancing probiotic viability and augmenting antioxidant activity, thereby opening up new avenues for functional food development.

Keywords: Survival, antioxidant activity, *Lactiplantibacillus plantarum*, digestion, mint infusion.



HP-23: The modulation of the intestinal microbiota and its anti-obesity effects: a systematic review and meta-analysis of clinical trials

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Subject description: The prevalence of obesity has taken an upward trend in the last decades, the World Health Organization has declared a pandemic and its projections indicate that by 2035 more than 39% of the world population will be affected. However, in the fight against obesity there is no one cure because obesity is a multifactorial disease and as such it needs a multifactorial approach. Recent breakthroughs in the field of microbiota research have uncovered a correlation between the composition of the intestinal microbiota and obesity and opened a new avenue for treatment.

Objectives: Our objective is to evaluate the knowledge concerning the impact of probiotics, prebiotics, and synbiotics on the modulation of the intestinal microbiota and its anti-obesity effects.

Methods: A systematic search was undertaken using science direct, Google Scholar databases, PubMed and Scopus by limiting the publication period from 2017 to 2023 (with emphasis on the most recent papers). The following combinations of keywords were used: “obesity”, “Probiotics”, “Prebiotics” “Synbiotics”, with “gut microbiome, microbiota, the study was carried out on 21 articles, of which 8 were randomized clinical trials and 13 meta-analyses.

Results and Discussion: In all the articles reviewed, probiotics had a significant effect on reducing body weight, body mass index (BMI) compared to the control group, however the effects were both strain-specific and dose-related or dose-dependent, as for the doses used, they were higher than 10⁹ and 10¹⁰ CFU/ml per day. Further, probiotics express their greatest potential when they are used in the form of synbiotics by combining probiotics and prebiotics, the results may indicate that synbiotics effect on body weight is superior to both probiotics and prebiotics groups and control groups

Conclusion: Probiotics, prebiotics and synbiotics can be effective as anti-obesity agents. However, their effectiveness depends on the type used, their quantity and the duration of the treatment.

Keywords: Microbiota, Obesity, Prebiotics, Probiotics, Synbiotics



HP-24: STUDY OF THE THERAPEUTIC EFFECTS OF LIQUORICE *Glycyrrhiza glabra L*

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Subject description: Licorice, *Glycyrrhiza glabra L.*, is an herbaceous plant of the Fabaceae family. Its root has been used since ancient times to calm coughs, thirst, sore throats, stomachaches... Currently, this drug is attributed expectorant, anti-ulcer, anti-inflammatory properties, anti-viral, anti-bacterial, anti-fungal, immunostimulant.

Objectives: The objective of the present study is the evaluation of the biological activities namely the antioxidant, anti-inflammatory and antimicrobial activity of licorice extract.

Methods: The active metabolites of licorice were extracted by cold maceration in vegetable oil. The antimicrobial activity of liquorice macerate was carried out by the well method, against five bacteria, five molds and the yeast *Candida albicans*. The evaluation of the antioxidant activity of the ethanolic extracts was carried out by the scavenging test of the hydroxyl radical (OH●), and by inhibition of the thermal denaturation of proteins Bovine serum albumin (BSA) for the evaluation of the anti-inflammatory activity.

Results and discussion: The results obtained show that the oily liquorice macerate has a moderate inhibition towards the two Gram+ strains (*Staphylococcus aureus*, *Bacillus subtilis*) and the *Candida albicans* yeast, with resistance from the other strains. In addition, that the hydroethanolic liquorice extract has good antioxidant activity, with an IC50 value of 0.109 mg/ml, and good anti-inflammatory activity with a percentage inhibition of BSA denaturation of 79.86%.

Conclusion: The richness of *Glycyrrhiza glabra* in different biologically active compounds has meant that this plant has been and is still used in different fields. As an anti-inflammatory agent, as a laxative, contraceptive, galactagogue, antiasthmatic and antiviral agent

Keywords: Licorice, *Glycyrrhiza Glabra L*, Antioxidant activity, Anti-inflammatory activity, Hydrodistillation, Maceration.



HP-25: Validation d'une nouvelle technique basée sur la LAMP pour le dépistage du SARS-COV2

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Résumé :

La pandémie de SRAS-CoV-2 a contraint tous les pays du monde à développer et à mettre en œuvre rapidement des tests à grande échelle pour contrôler et gérer la maladie à coronavirus 2019. La transcription inverse RT-qPCR est la méthode de diagnostic moléculaire de référence pour le COVID-19, Ces systèmes sont précis et efficaces, mais aussi coûteux, chronophages, de haute technologie. L'amplification isotherme par boucle (LAMP) peut être utilisée comme méthode de test alternative en termes de sensibilité, de spécificité, de rapidité, de robustesse et de coût, pour amplifier des quantités infimes l'ADN et l'ARN à une température constante en moins d'une heure. Dans cette étude, on essaie l'efficacité diagnostique du test LAMP pour le diagnostic moléculaire de SARS-COV-2 par Le kits WarmStart LAMP qui contient une ADN polymérase (Bst 2.0) et une transcriptase inverse nécessaires pour la rétro-transcription et l'amplification de l'ARN viral. Nous avons exploré trois méthodes de détection dans notre étude : Méthodes de détection par turbidité (visuelle), méthodes de détection en temps réel par mesure de la fluorescence et une méthode de détection sur gel agarose " Electrophorèse sur gel d'agarose " à températures 65°C pendant 30 minutes. Les résultats montrent que LAMP peut être considéré comme un test efficace il pourrait être facilement appliqué à la fois pour le diagnostic, mais également pour le dépistage et la surveillance, donnant des résultats rapides et fiables.

Mots clés : SARS-CoV-2, LAMP, RT-qPCR, diagnostic moléculaire



HP-26: Methods of screening and biotechnological diagnosis of pancreatic cancer: epidemiological study in eastern Algeria

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Subject description: Even the huge advancements in diagnostic modalities and treatment, pancreatic cancer is still the most lethal common solid tumor, with an overall 5 years survival rate of less than 10%. Its poor prognosis is due mainly to difficulties in detection and its late appearance.

Objectives: Our purpose is to evaluate the place of diagnostic tools in screening of pancreatic cancer in the East of Algeria.

Methods: To achieve this objective, we conducted a retrospective epidemiological study of 57 patients diagnosed with pancreatic cancer between 2013/2022 in the department of surgery of Constantine.

Results and discussion: The study indicates a male predominance with sex ratio of 1.59, with an average age of 61.88 years. Median body mass index was 22.57 kg/m². 74% of patients had Computed Tomography (CT) scan and 26% of a Bili-Magnetic resonance imaging (MRI) in addition to an abdominal ultrasound. Thus, a dose of Carcinoembryonic Antigen (CA 19-9) was performed for 51% of patients.

The use of Carcinoembryonic Antigen levels and imaging techniques is not optimal for detecting early stages pancreatic cancer and small metastases of peritoneal lesions. Having knowledge about novel biomarkers of pancreatic cancer can be very helpful for early detection and better intervention.

Conclusion: In fact, recent advances in biotechnology such as Next generation sequencing (NGS) have broken such restrictions and have created new hopes in early diagnosis and identifying high risk pancreatic cancer patients. Also, it has opened new opportunities to investigate pivotal events essential pancreatic tumorigenesis and to identify large number of gene mutations seen in pancreatic cancer.

Keywords: Pancreatic cancer, Diagnostic tools, Biotechnology, Next Generation Sequencing.



HP-27: Sustainable bioindustry: biomaterial synthesis for environmental decontamination

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Subject description: "Water, vital for life, faces growing threats like synthetic dye pollution, notably in textile industries. This extensive use has adverse impacts on health and the environment, emphasizing the need to understand, prevent, and remove this pollution."

Objectives: This study aims to assess the efficacy of pomegranate peel as a novel biosorbent for detoxifying textile wastewater from harmful dyes. Pomegranate peel, an underused natural material, exhibits significant dye adsorption potential. The primary goal is to provide an eco-friendly and sustainable solution for addressing the pressing concern of textile wastewater contamination.

Methods: The peel of pomegranate fruits, undergoes a sequence of ecologically sound procedures. These include washing, drying, crushing, and sieving. The resulting product is then thoroughly scrutinized through a series of precise tests, including FTIR, XRF, and SEM analysis, which reveal its detailed properties.

Results and discussion: In this work, the effects of various conditions such as sorbent dosage, pH value, and contact time were investigated. Using 0.05g of pomegranate peel powder mixed with 50ml of dye solution, the removal efficiency at natural pH was almost 96%, and the retention time was 60 minutes.

Conclusion: This study provides a cost-effective and environmentally friendly dye removal process for textile wastewater treatment.

Keywords: Bioindustry, Biomaterial, Biosorption, Decontamination, Sustainable, Synthesis.



HP-28: Incidence of nosocomial infections in intensive care unit of the Regional Military University Hospital of Constantine

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Subject description: Nosocomial infections are particularly common in patients hospitalized in reanimation, compared to other areas of care.

Objectives: The objective of this study is to estimate the incidence of patients with nosocomial infection, identify the main microorganisms, determine the influence of the main risk factors, and the antibiotic resistance profile of the germs most often implicated in the reanimation.

Methods: This study is a descriptive, retrospective and prospective; started from 01 January 2020 to 5 May 2023.

Results and discussion: During the study period, 661 patients was hospitalized over 48 hours, 56 had a nosocomial infection, with an overall incidence of 08.47%. The average age of infected patients is 58.73 years and the H/F sex ratio is 02.29. The significant risk factors for NI acquisition are chronic pathologies (diabetes, Hypertension, hypothyroidism, etc.), with a rate of 62.5% ($p = 0.045$) and surgical interventions with a rate of 08.9% ($p = 0.018$). Three types of NIs are identified, with NP occupying the first place (30.59%), followed by NB (25.89%) and NUI (22.35%). The rate of patients with polyinfection is 15.29%.

The germs responsible are mainly Gram-negative bacteria, with 61.8% dominance. Identification of these bacteria revealed the presence of *A. baumannii*, *E. coli*, *K. pneumoniae*, *P. aeruginosa*, *C. freundii*, *M. morgani*, *B. cepacia*, *A. salmonicida*, *E. cloacae*, *P. mirabilis* and *H. influenzae*. Gram-positive bacteria account for only 36.7% and the palm is back to *Staphylococcus*, *Enterococcus* and *Streptococcus*. *Candida glabrata* is the only isolated yeast. Two types of resistance profile are observed, ESBL (63.63%) and MRB (36.36%).

Conclusion: Epidemiological surveillance of infections in resuscitation and the application of hygiene measures are priorities to be included in any nosocomial infection prevention program.

Keywords: risk factors, incidence, nosocomial infections, multidrug resistant bacteria.



HP-29: Evaluation of the antibacterial activity of extracts from two species of the *Acacia* genus

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Subject description: *Acacia* species plants of the Fabaceae family, have been utilized as medicinal plants since ancient civilizations. They have been employed in the treatment of a broad spectrum of disorders, including gastrointestinal, respiratory, ocular, and uterine ailments.

Objective: The objective of the present study is the evaluation of antibacterial activity of extracts from two species of the *Acacia* genus against four strains: *Staphylococcus aureus* ATCC 25923, *Pseudomonas aeruginosa* ATCC 9027, *Bacillus subtilis* ATCC 6633 and *Escherichia coli* ATCC 25922 by the disk diffusion method.

Methods: The three extracts (chloroform, ethyl acetate, and butanol) were obtained by macerating the leaves of both species in a hydro-alcoholic mixture (Methanol-Water, Me-OH/H₂O), followed by liquid-liquid extraction. Discs with a diameter of 6mm, saturated with 10µl of the extract, were placed on the surface of Petri dishes containing Muller Hinton medium inoculated with the test bacteria. The Petri dishes were then placed in a refrigerator at 4°C for 2 hours to allow for extract diffusion, after which they were incubated at 37°C for 24 hours.

Results and discussion: The obtained results indicate that the ethyl acetate and butanol extracts from both plants exhibit moderate antibacterial activity (average diameter of inhibition zones ranging from 7 to 10 mm) against both *Bacillus subtilis* and *Staphylococcus aureus* strains, while the dichloromethane extracts show no activity against all strains.

Conclusion: Based on the obtained results, it would be interesting to extend our research to try to isolate, purify and identify the active compounds responsible for this effect with the aim of developing new antibiotic molecules.

Keywords: Antibacterial activity, *Acacia*, Extracts, ATCC strains.



HP-30: Préparation des extraits allergéniques pour le diagnostic et la valorisation des bioresources en Algérie

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Introduction : Les maladies allergiques occupent la quatrième position en terme de mortalité dans le monde, l'amélioration de la prise en charge des patients atopiques exige un diagnostic et un traitement satisfaisant de l'allergie, qui s'appuie sur des outils de recherche technologiquement innovants.

Matériels et méthodes : Par conséquent, ce travail vise à optimiser la production des extraits allergéniques standardisés pour une éventuelle utilisation en diagnostic. Concernant les réparations d'extraits d'allergènes pour les tests cutanés ou sérologiques, un panel de test cutané standard pour notre population algérienne est donc proposé par nos médecins allergologues (hôpitaux universitaires) en Algérie, et comprendra les allergènes alimentaires et respiratoires les plus répandus en Algérie et dont notre population est exposé.

Résultats : Pour l'extraction des protéines, plusieurs protocoles ont été optimisés, en effet, selon la nature de l'échantillon, des modifications de protocole peuvent être apportées. On procède à une étape de purification à l'aide de résine Diethylamine DE 52, après élution et dialyse l'échantillon est à nouveau concentré à l'aide de tubes Amicon Ultra (Millipore cut-off 3000) ; et par dosage colorimétrique, nous avons déterminé une concentration finale de 0,15 mg/mL. 30 µg ont été déposés sur gel SDS-PAGE 15%. les tests biochimiques confirment la présence des allergènes majeurs pour les extraits ainsi préparés à des concentrations importantes. Sur la base de la littérature, généralement une concentration en protéines de 0,2 mg/mL est préparée ; l'échantillon traité est préparé pour les tests cutanés.

Conclusion : La biochimie des protéines est une approche impotente pour la préparation et la caractérisation des extraits allergéniques, qui peuvent être utilisés en diagnostic des maladies allergiques.

Mots-clés: allergie, diagnostic moléculaire, biodiversité, valorisation des bioresources



HP-31: Study of the cytoprotective effect of vitamin c on chlorpyrifos induced toxicity on spermatozoa

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Subject description: Exposure to pesticides has raised significant apprehensions regarding their potential risks to human health. Chlorpyrifos (CPF) caused a potential s male reproductive injuries in mammal.

Objectives: The aim of this study was to evaluate the reproductive damage caused by CPF on male Capra spermatozoa and to evaluate the protective effect of vitamin C.

Methods: Sperm from the cauda epididymidis was cultured in vitro to confirm the deleterious effects of CPF (50ug/ml). Semen samples of Capra were divided into three aliquots at room temperature. The first aliquot served as control not exposed to treatments, and the second was exposed to CPF for 1h30. The last one was incubated with 0.1mg/ml of vitamin C after treatment with CPF. The sperm quality was determined by the assessment of sperm motility using Computer Assisted Semen Analysis (CASA).

Results: The results demonstrated a significant decrease in sperm motility after treatment with CPF. However, the pretreatment with vitamin C exhibited a significant improvement on sperm motility.

Conclusion: These data indicated that, CPF can alter the motility of spermatozoa in Capra male spermatozoa, which is improved after using vitamin C.

Keywords: Chlorpyrifos, sperm, vitamin C, in vitro, motility, Capra male.



HP-32: Rhizospheric soil as source of bioactive compounds

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Streptomycetes from the semi arid rhizospheric soils are a rich resource of novel secondary metabolites with various biological activities.

The aims of the present study are to identify culturable streptomycetes from the rhizospheric soil by 16S rRNA gene, evaluate the antimicrobial activities of isolates and detect the bioactive secondary metabolites from selected streptomycetes, extraction and identification of the bioactive compounds.

A total of 65 strains were isolated from rhizospheric soil sample. Two of them (SFKH10 and SFKH4) were analyzed by 16S rRNA gene sequencing. The crude cell extracts out of the two strains showed antibacterial and antifungal activities. Ethyl acetate crude extract of cultured SFKH10 strain was subjected to online high-performance liquid chromatography (HPLC)-electrospray mass spectrometry (ESI-MS) for metabolite profile analyses as well as molecular weight determination. The extract was dissolved in methanol (1 mg/ ml) and then analysed by a Hewlett–Packard HP1100 HPLC-UV Diode Array detector (DAD), online coupled to an Esquire-Bruker–Daltonics ion trap mass spectrometer using a reversed-phase column on the analytical scale. Finally, a compound dinactine was isolated from *Streptomyces coeruleorubidus* SFKH10 strain by using chromatography techniques, UV, HR-ESI-MS and NMR, and their antimicrobial activities against the test bacteria and fungus were also evaluated. In addition, the partial characterization of the molecules secreted by *S. spororaveus* SFKH4 strain has shown its capacity to produce a large variety of complex compounds having high molecular weight.

In conclusion, the present study has revealed the potential of semi-arid Algerian ecosystems as a good source for bioactive molecules-producing actinobacteria.

Keywords : rhizospheric soil, Streptomyces, bioactive compounds.



HP-33: Safety Evaluation and Colonisation Abilities of *Lactiplantibacillus plantarum* as Future Probiotic

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Subject description: *Lactiplantibacillus plantarum* R10 isolated from *Bouhezza cheese* identified using the MALDI TOF-MS biotyper system and molecular tests was screened *in vitro* for selected aspects correlated with safety and colonization.

Objectives: The aim of this study was to evaluate the safety profile of *Lactobacillus plantarum* R10 and assess its ability to colonize the gastrointestinal tract as a potential probiotic strain candidate.

Methods: The safety of *Lactiplantibacillus plantarum* R10 was assessed by determining its antibiotic resistance to ampicillin, erythromycin, tetracycline, streptomycin, and ciprofloxacin using the broth microdilution method. Additionally, total DNA extracted from R10 was examined for the presence of genes associated with biogenic amine production and virulence factors using specific PCR assays. Colonization potential was evaluated by assessing cell hydrophobicity and aggregation abilities.

Results and discussion: In this study, the isolate is sensitive to all tested antibiotics. This sensitivity has been reported in numerous studies with lactobacillus. PCR results showed no amplification for virulence genes or genes involved in biogenic amine production. Regarding colonization, the isolate displayed high hydrophobicity and autoaggregation percentages.

Conclusion: *Lactiplantibacillus plantarum* R10, isolated from Bouhezza cheese, exhibited a safe profile and promising colonization properties, positioning it as a potential probiotic candidate.

Keywords: Probiotics, *Lactobacillus plantarum* R10, safety, Auto-aggregation, Hydrophobicity .



HP-34: Genomic characterization of *Lactiplantibacillus plantarum* R10 isolated from Bouhezza, a Traditional Algerian Cheese, as promising probiotic candidates.

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Subject description: In this study, *Lactiplantibacillus plantarum* R10 isolated from *Bouhezza* was evaluated for their probiotic properties, bacteriocin production and safety profile using Genomics analyses.

Objectives: The present work aims to study the whole genome sequence of R10 strain isolated from *Bouhezza* to characterize the bacteriocin producing gene and evaluation of its probiotic properties.

Methods: In the present study, *Lactiplantibacillus plantarum* named R10 isolated from an Algerian traditional goatskin bag cheese named *Bouhezza* was investigated for their probiotic characteristics using genomics analyses. The genome of the isolate was sequenced, and bioinformatic analyses were conducted to identify probiotic-related genes in addition to the screening of virulence and antibioresistance genes, to assess their safety.

Results and discussion: Whole genome sequencing results demonstrate the presence of various genes involved in gastrointestinal stress tolerance, adhesion to host epithelial cells, indicating bacterial adaptation of strains to the gastrointestinal environment. We also detected genes involved in the antimicrobial activity (i.e. bacteriocin). No virulence or antibioresistant determinant were found in the genome sequence. The strain R10 fulfils all the qualities of being a probiotic and the genome insights have given more information into the molecular machinery potentially involved in the probiotic effects.

Conclusion: These results suggest that *Lactiplantibacillus plantarum* R10 strain could be considered as promising probiotic candidate. Therefore, technological performances should be explored in order to promote their application in cheeses and other functional foods as a bio-protective or starter culture.

Keywords:, *Lactobacillus plantarum* R10, Probiotics genes, Genome sequencing



HP-35: Extraction and Incorporation of Spirulina Extract into a Mayonnaise Product

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Subject description: Spirulina is characterized by its exceptional richness in phenolic compounds, which gives it several exploitable biological activities to improve the nutritional and the organoleptic quality of different types of food.

Objectives: The objective of this study is to evaluate the antibacterial activity of spirulina extract against two pathogenic strains; *E.coli* and *S. aureus*, as well as , it evaluates the effect of its incorporation on the organoleptic quality of mayonnaise product.

Methods: The analysis of phenolic compounds in spirulina is performed, followed by the evaluation of its antibacterial effects in both pathogenic strains; *E.coli* and *S. aureus*. Subsequently, the spirulina is integrated into the mayonnaise to assess its organoleptic quality and to measure its pH.

Results and discussion: The results obtained show that the total polyphenols dose has a non-negligible content of 70 g EAG / mg of spirulina. In addition, the spirulina extract exerts a small inhibitory activity against *E. coli* and *Staphylococcus aureus* compared to the antibiotic Tetracycline with inhibition diameters of 8 mm and 7 mm respectively. The incorporation of spirulina powder in mayonnaise with a proportion of 1% and 2% maintains the stability of product acidity, yet it has no effect on its consistency and acceptability. However, it has a significant effect on organoleptic parameters such as color, taste and aroma.

Conclusion: This study illuminates the valuable contributions of spirulina's phenolic compounds in both antibacterial activity and the organoleptic enhancement of food products, paving the way for potential applications in human nutrition and culinary experiences.

Keywords: spirulina, polyphenols, antibacterial activity, mayonnaise, organoleptic quality.



HP-36: Effect of chemical elicitor AgNO₃ on biomass and pharmaceutical secondary metabolites of three *Datura* transgenic hairy roots induced by *Agrobacterium rhizogenes*

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Subject description: Biotechnological ways of pharmaceutical compounds production has become important through the in vitro cultures of plant parts and organs for their high growth rate and large molecule profile. This is why we have chosen transgenic hairy roots of *Datura stramonium*, *Datura innoxia* and *Datura tatula* to produce hyoscyamine and scopolamine which are used in many drugs as analgesic and antispasmodic agents.

Objectives: This study aims to investigate the effect of AgNO₃ as chemical elicitor used in two different time of contact of 24 hours and 48 hours on biomass, hyoscyamine and scopolamine yield in transgenic hairy roots of three lines of *Datura* previously induced using A4 strain of *Agrobacterium rhizogenes*.

Methods: To study the effect of AgNO₃ on biomass and tropane alkaloids of the hairy roots 100ml of 1mMol of AgNO₃ liquid solution. For elicitation 5 ml of the sterilized solution is used for 24 and 48 hours elicitation time. Hairy roots are harvested after 21 days of culture

Results and discussion: AgNO₃ did not optimize the biomass of the two root lines DS and DT. However, 74% increase in biomass was obtained in the line DI line after 48 hours of treatment with a 1mM AgNO₃ solution. The average hyoscyamine concentration of the DS and DT root lines is optimized after 48 hours of elicitation with silver nitrate, yielding the optimum outcome. 7.89 mg/g DW in the DT line. Scopolamine content increases in both lines compared to controls following 24 and 48 hours of silver nitrate elicitation, with the best scopolamine result achieved in the DT line elicited for 24h (0.539 mg/g DW).

Conclusion: The use of AgNO₃ as chemical elicitor can be used to produce Scopolamine in *Datura* species but not for the improvement of biomass or hyoscyamine because of enzymatic pathways influence.

Keywords: *Datura*, Hyoscyamine, extraction, LC-MS-MS, tropane Alkaloid, Biomass, hairy root.



HP-37: Capacity of *Enterococcus durans* isolated from the intestinal microflora of infants to produce exopolysaccharides with a beneficial effect on health

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Subject description: In recent decades, natural polymers have attracted the attention of scientific communities due to their therapeutic potential. In particular, EPS extracted from probiotic bacteria with varied carbohydrate compositions has many beneficial properties.

Objectives: This study aims to evaluate the probiotic abilities of the *Enterococcus durans* strain isolated from the infant faeces samples, and their capacity to produce exopolysaccharides and antimicrobial compounds which include bacteriocins, diacetyl, organic acid, dioxide of carbon in vitro.

Methods: Infant faeces samples were used to isolate *Enterococcus durans* colonies; they were then screened using the spread plate technique on agar media (De Man, Rogosa, and Sharpe). The extrapolsaccharide (EPS) was extracted from the culture free supernatant and assayed for its radical scavenging activity.

Results and discussion: *Enterococcus durans* showed the highest production of extrapolsaccharide and had better probiotic properties, capacity of antibacterial activity. The selected strain had good autoaggregation characteristic and a high surface hydrophobicity that enhanced its adhesion ability to epithelial cells.

Conclusion: Our results reveal the probiotic potential of the strain tested and a good capacity for EPS production which showed strong bacterial anti-activity against the pathogenic strains *E.coli* and *S. aureus*.

Keywords: *Enterococcus durans*, probiotics, lactic acid bacteria, exopolysaccharides,



HP-38: Isolation and identification of cadmium resistant lactic acid bacteria for application as metal removing probiotic

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Subject description: One of the useful properties of probiotic bacteria is their capacity to bind different targets, thus eliminating them through feces. It is supposed that one of these targets could be cadmium, a widespread environmental toxicant that causes various disturbances in biological systems.

Objectives: The purpose of the present study was to isolate and identify the metalresistant lactic acid bacteria from Infant faeces samples to remove cadmium in order to highlight the importance of some probiotic LAB in the detoxification of these pollutants at the level of the digestive tract or in fermented foods.

Methods: Collected sediment,samples were used to isolate the cadmium resistant bacterial colonies by spread plate technique using agar media (De Man, Rogosa and Sharpe) supplemented with cadmium at 50 mg/l. Isolates were identified by sequencing of 16S ribosomal deoxyribonucleic acid. . Metal removing probiotic was determined by using flame atomic absorption spectrophotometry (Shimadzu AA-6200).

Results and discussion: Further study was conducted using the strain E1T1 identified as *Enterococcus durans* since it showed the highest cadmium (MIC 600 mg/l) and other heavy metals resistance capacity and better probiotic properties. The selected strain had good auto-aggregation characteristic and a high surface hydrophobicity that enhanced its adhesion ability to epithelial cells Furthermore, it had excellent cadmium removal efficiencies, with rates of 65.94% after 96 hours in living cells with high cadmium accumulation efficiencies, with an estimated value of 11.47 mg Cd/g of cells (wet weight).

Conclusion: From the viability and metal removal points of view, it can be concluded that isolated metal-resistant *E. durans* E1T1 strains might be used as potential probiotic strains for removing heavy metals.

Keywords: *Enterococcus durans*, Probiotic, Heavy metal, Removal efficiency, Cadmium



HP-39: A comparative study between *Argas persicus* found in eastern Algeria and China

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Subject description: *Argas persicus* (the fowl tick) is a soft tick, often found in and around the nesting areas of birds, particularly in poultry farms with a worldwide distribution.

Objectives: In the current study, we performed morphological and molecular analyses to identify ticks collected in poultry farms from Algeria and East China.

Methods: Ticks were collected from farms sites including walls, nests, cracks and crevices. All these sites were searched for finding of all ticks stages including nymph, larvae and adult. All the collected tick specimens were identified morphologically by microscope and then confirmed by molecular and phylogenetic analysis.

Results and discussion: In total 30 ticks from poultry in Algeria, comprising 5 larvae, 12 nymphs, 12 adults, and 14 ticks comprising 12 Larvae and 2 adults from Gansu province in China were morphologically identified as *A. persicus*.

Molecular analysis of 30 ticks from Algeria and the 14 Chinese samples based on PCR, sequencing, and phylogenetic analysis of the gene 16S rRNA confirmed morphological results. However, through phylogenetic analysis, it was revealed that all Algerian samples, along with two Chinese samples, were classified under *Argas persicus sensu stricto* (s.s.). Meanwhile, the remaining Chinese samples were identified as part of *Argas persicus sensu lato* (s.l.), constituting a distinct lineage due to their genetic divergence.

Conclusion: The current research affirms the presence of *A. persicus* s.s. in both Algeria and China. Additionally, it presents new molecular data regarding a separate Chinese lineage of *A. persicus*.

Keywords: *Argas persicus*, Fowl tick, Morphology, Molecular analysis, 16s rRNA, Algeria.



HP-40: Large-scale chromatographic method to purify camel α -lactalbumin: A biotechnological approach in dietary therapy

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Subject description: An increased interest is in the camel milk as functional food to prevent or manage many human diseases. Its biofunctional properties are attributed mainly to its contents in bioactives proteins where α -Lactalbumin is the major whey soluble protein in *Camelus dromedarius* milk possessing antioxidant, antidiabetic, anti-obesity and anticancer effects. Therefore, there is a need to use the industrial applicability of biotechnology advances for the valorisation of this protein as natural pharmaceutical molecule.

Objectives: Large-scale method based on anion exchange chromatography (AIEX) was performed to purify α -Lactalbumin from camel whey.

Methods: The procedure was designed to selectively bind the other whey proteins onto the anion exchanger so that α -Lactalbumin could be collected in the run-through from the column. Purity of the eluted α -Lac was evaluated by SDS-PAGE.

Results and discussion: The results of the purification are presented by the chromatogram that showed one peak. The results of electrophoresis analysis of the collected fraction showed that the peak corresponded to α -Lac that was fully eluted in the run-through with some residual amount of CWBP.

Conclusion: Thus, by AIEX chromatography a highly pure camel α -Lactalbumin was obtained providing its application in dietary therapy to prevent human diseases and achieve optimal health.

Keywords: α -Lactalbumin, AIEX chromatography, Purification, Biotechnology, Health.

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HP-41: Antimicrobial activity of marine and telluric actinobacteria identified in eastern Algeria

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Subject description: Extreme ecosystems can be a source of untapped microorganisms to produce new bioactive compounds of industrial interest. Actinobacteria are at the forefront due to their versatile production of secondary metabolites that exhibit various biological activities. Algerian marine and terrestrial environments remain largely unexplored and may represent an important source for the discovery of bioactive molecules.

Objectives: The aim of this research is to study the identification and antimicrobial activity of actinobacteria isolated from various samples of forest (Constantine) and thermal soils (Guelma), marine sediments and seawater (Skikda and El-Kala).

Methods: Actinobacteria were isolated using the suspension-dilution method on different culture media: Benett, CSPY-ME, SCA and ISP2. Morphological identification (macroscopic and microscopic) of isolates was carried out on ISP2 medium by the slide culture technique. All isolates were then subjected to antimicrobial screening using the agar plug technique against five bacteria and three pathogenic fungi: *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Bacillus subtilis*, *Aspergillus niger*, *Fusarium oxysporum* and *Candida albicans*.

Results and discussion: Consequently, in this work, 18 phenotypically different actinobacterial isolates were collected from the various ecosystems studied. On the basis of morphological characteristics, the isolates were assigned to the genera *Streptomyces*, *Saccharopolyspora*, *Nocardioopsis*, *Oerskovia*, *Jonesia*, *Streptoalloteichus* and *Dactylosporangium*. The antibacterial activity of actinobacteria showed that around 61% of isolates possessed strong activity against at least one of the test bacteria. Antifungal activity revealed that 55.55% of isolates were active on at least one of the test fungi. In addition, three isolates from forest soil (SF₂², SF₆² et SF₉²) possess a broad spectrum of inhibition against the majority of test microorganisms (Garm+ bacteria and fungi).

Conclusion: Most of actinobacterial isolates studied of marine and terrestrial origin are very useful microorganisms for the production of bioactive natural products of industrial and biotechnological interest.

Keywords: Actinobacteria, sea, soil, antimicrobial activity.



HP-42: Phytochemical study and anti-hemolytic activity from a local plant (*Ecballium elaterium*)

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Subject description: Despite advancements in living conditions, anemia persists as a complex health concern, necessitating specialized investigations for effective treatment. Pathological hemolysis, often presenting as anemia, involves the exaggerated breakdown of red blood cells, with potential hereditary or acquired origins.

Objectives: This study aimed to accomplish two main objectives: firstly, to analyze the phytochemical composition of distinct parts of *Ecballium elaterium* (including stem, leaf, root, and fruit); secondly, to investigate the effects of extracts derived from these various plant parts within three induced hemolysis models – specifically, hemolysis induced by salicylic acid, sodium chloride, and the synthetic detergent triton X-100.

Methods: the total polyphenols, flavonoids, and tannins of different parts extracts were estimated by colorimetric assays. Hemolysis induction tests were performed at different concentrations with salicylic acid, sodium chloride and triton X-100, these latter have the ability to cause hemolysis of red blood cells. In addition, studies are being conducted the anti-hemolytic activity of *Ecballium elaterium* extracts against hemolysis induced by different agents.

Results and discussion: The results showed that fruit extract was the richest in phenolic compound. The level of polyphenols total was about 2.66 ± 0.04 g EAG/ 100g DM, that of flavonoids was 4.84 ± 0.08 g EQ/100 g DM, and that of tannins was 0.70 ± 0.05 g EAT/100 g DM. He is followed by leaf and stem extracts. The root extract was the poorest in terms of phenolic compound. The three hemolytic models used in this study, namely salicylic acid, sodium chloride and triton X100, have been shown to be very effective, since they have proven capable of causing damage to the plasma membrane of blood cells red and induce almost total hemolysis rates. In the case of hemolysis induced by salicylic acid, the leaf extract gave the best anti-hemolytic effect with an $IC_{50} = 0.418$ mg/ml. When hemolysis was induced by sodium chloride, it was the fruit extract that gave the best anti-hemolytic activity, since its IC_{50} was around 0.418 mg/mL. Finally, when the hemolysis inducer was triton X-100, the tested extracts showed almost no anti-hemolytic activity.

Conclusion: The anti-hemolytic effects of the different extracts of *Ecballium elaterium* produced *ex vivo* on human erythrocytes have given good results for hemolysis induction by salicylic acid and sodium chloride, and no anti-hemolytic activity for hemolysis induced by triton X-100.

Keywords: *Ecballium elaterium*, hemolysis, phenolic compound, anti-hemolytic



HP-43: Stimulation of insulin secretion, protective and restorative effect of thymoquinone on β -cell line

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Subject description: Our study elucidates the protective and restorative effect of thymoquinone on β -cell line, and its potential impact on the stimulation of insulin secretion, and its effect on oxidative stress.

Objectives: Study the effect of Thymoquinone on viability and stimulation of insulin secretion of β -cell line and its protective and restorative effect on these cells, in order to find a solution to type 1 diabetes.

Methods: A cytotoxic study was conducted on EMT6 and NIT-1 cell lines using the XTT kit. To reveal the insulin stimulation potential, NIT-1 cells were incubated for 24h, then Thymoquinone was added at different concentrations, the insulin level was measured using the Mouse Ins1/Insulin-1 ELISA. Then to determine the protective effect of Thymoquinone, NIT-1 culture was performed, and Thymoquinone was added for 24 h. After that, the STZ was added for 24h. To measure the cell viability the XTT reagent was added. The oxidative stress markers (MDA, SOD, and GSH) assay was performed in a supernatant of beta cells treated with Thymoquinone. Finally, the STZ was added before Thymoquinone for the restorative effect, and cell viability was determined.

Results and discussion: The results show low cytotoxicity of Thymoquinone, on both EMT6 and NIT-1 cell lines, a highly significant difference (around 100%) of insulin secretion between the cells of control and the cells treated with Thymoquinone was mentioned. The results indicate that STZ caused cell death of approximately 45% of untreated β NIT-1line cells. However, the cells treated with TQ then exposed to STZ were protected against its cytotoxicity because we only noted the death of about 15% of cells. The results of the restorative effect demonstrate that there is an 12-14% improvement in viability of cells treated with thymoquinone compared with cells treated only with STZ.

Conclusion: Thymoquinone has demonstrated a strong stimulation of insulin secretion by β -cell line with low cytotoxicity. Thymoquinone can be suggested as a solution for type 1 diabetes.

Keywords: Thymoquinone, Type 1 Diabetes, β cell line, Streptozotocin, protective effect, insulin secretion.

Abbreviations: EMT-6: Experimental Mammary Tumour-6, NIT-1: Non-Obese Diabetic (NOD) Insulinoma Transgenic 1, GSH: Reduced glutathione, MDA: Malondialdehyde, SOD: superoxide dismutase, STZ: streptozocin, XTT: sodium 3'-bis (4-methoxy6-nitro) benzene sulfonic acid hydrate.



HP-44: An immunosuppressive agent in immunopotented rats

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Subject description: The central role of the neuroimmuno-endocrine regulation loop in cyclosporine-related disorders suggests that this pathway could be targeted to reduce the side effects of the drug.

Objectives: We investigated the potential of sound conditioning to mimic the effects of cyclosporine on male rats immunostimulated with Bacillus Calmette-Guérin (BCG).

Methods: Animals were administered cyclosporine (20 mg/kg) alone or associated with sound noise for eight days, followed by injections of BCG on day 9 and a reminder on day 27.

Results and discussion: Our results show that intraperitoneal injection of cyclosporine alone caused a significant decrease in testosterone associated with a drop in body weight, as previously reported. Interestingly, sound conditioning alone also caused a significant decrease in testosterone and body weight, mimicking the effects of cyclosporine. However, cyclosporine and sound conditioning combined did not enhance this effect. Conversely, both cyclosporine and sound conditioning caused a significant increase in adrenocorticotrophic hormone (ACTH), suggesting that sound conditioning could be used as a non-pharmacological alternative to cyclosporine.

Conclusion: This study provides a proof of concept that sound conditioning could be used to modulate the neuroimmuno-endocrine regulation loop and reduce the side effects of immunosuppressive drugs.

Keywords: sound conditioning, cyclosporine, side effects, neuroimmuno-endocrine regulation loop, BCG



Hp-45: Gas chromatography analysis and insecticidal activity of *eucalyptus radiata* essential oil against *culex pipiens* larvae

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Abstract

Culex pipiens L. (Diptera: Culicidae) constitute a mosquito vector of important diseases such as the West Nile virus. For the control of *Cx. pipiens* larvae, different types of insecticide groups are widely used but this mosquito developed resistance to many of these insecticides.

The present study aimed to evaluate the larvicidal effect of *Eucalyptus radiata* (*E. radiata*) essential oil (EO) against mosquito larvae *Cx pipiens*. The EO was extracted by steam distillation method. Chemical composition of essential oil was analyzed by gas chromatography (GC), and the *E. radiata* EO toxicity was tested against fourth-instar of *Cx pipiens* larvae following the procedure of the World Health Organization under laboratory conditions.

The EO yield was 1.12%. GC analyses revealed thirty compounds in *E. radiata* EO, only five of them were identified which are viridiflorol (5.20%), globulol (0.74%), piperitone (0.37%), and Guaiol (0.27%).

The larvicidal assay showed that the *E. radiata* EO exhibited insecticidal activity against the fourth instar larvae of *C. pipiens* (LC₅₀ = 95.2 ppm and LC₉₀ = 164.9 ppm at 24 hour exposure). The investigation confirmed the toxicological effects of *E. radiata* EO against mosquito larvae ; consequently, it could be considered as a potent source for producing natural larvicidal agents and bioinsecticides for pest and insect vector control.

Key Words : toxicity, plant essential oil, larvicidal activity, *Eucalyptus radiata*



HP-46: The improvement solubility of propolis extract/cyclodextrins inclusion complex

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Subject description: Propolis is a resinous, gummy, sticky substance made by bees from various parts of the plant (bark, leaves, buds...), then mixed with wax, pollen and their enzymatic secretions. It has numerous biological activities against inflammatory, cardiovascular, digestive, cancer and oxidative diseases... to protect its bioactive compounds and improve their bioavailability, it is necessary to encapsulate them with different vectors.

Objectives: The aim of this work is to determine the chemical composition of propolis from the Melbou-Bejaia region, using two extraction methods: agitation and ultrasound, by spectrophotometric assay and the phase solubility diagram was studied.

Methods: Polyphenol content was determined spectrophotometrically, using the colorimetric Folin-Ciocalteu method. Condensed tannin content was determined using the vanillin method, which forms a red complex with flavonoids and the antioxidant activity of propolis extract is assessed using the DPPH free radical, by a phase solubility diagram with alpha and β -cyclodextrin.

Results and discussion: The results of tannins are expressed in mg catechin/g propolis dry extract, ranging from 71 to 406 mg CA/g. Total polyphenols are expressed in terms of gallic acid equivalent and range from 335 to 490 mg GA/g of dry extract.

Conclusion: In this study, we determined the phenolic compound of propolis extract from the Melbou region, and assessed its antioxidant effect using the solubility diagram.

Keywords: propolis extract, phenolics compound, antioxidant activity, solubility diagram.



HP-47: Optimization of protease production from an antifungal *Bacillus subtilis* under different culture conditions

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Subject description: Protease is one of the enzymes which find wide industrial and pharmaceutical applications.

Objectives: The soil bacterium *Bacillus subtilis* (accession number KC341751) was investigated in the optimization of protease production under different culture conditions. This strain was first, screened and evaluated for its antifungal activity against *Candida albicans*, one of the most important human fungal pathogens.

Methods: The capacity of *B. subtilis* to produce protease was shown by *In vitro* assay with the antagonist and its cell-free culture supernatant, on agar plates. The identification of this strain was then done based on its morphological as well as biochemical characteristics, later confirmed by 16s rDNA sequencing and BLAST analysis. Besides, the screening of protease activity by *B. subtilis* was checked by growing it on specific agar medium; by spot inoculation method. Moreover, in order to optimize the production of this enzyme, *B. subtilis* was grown under different values of pH, Temperature, and diverse concentrations of glucose.

Results and discussion: The results revealed that *B. subtilis* inhibited the growth of *C. albicans*, by developing a hydrolysis zone of 25 mm. Furthermore, the screening of protease activity showed a high zone of activity (34 mm) after 24h of incubation at 30°C. In addition, the optimization of the protease production under various conditions exhibited that the optimal pH and temperature were 7 and 50°C, with a proteolytic activity of 45.24U/ ml and 17.86U/ml respectively. However, the cultivation of *B. Subtilis* on different concentrations of glucose showed that the proteolytic activity increases as a function of the increase of the glucose concentration in the culture medium namely; 13.69U/ml for 0.4% glucose.

Conclusion: These results express that the protease produced in the present study is neutral and thermostable. The presence of glucose in the medium with pH 7 and temperature 50°C enhanced enzyme production. Thus, such conditions were able to acts as a promoter for better protease activity; wich is very interesting in various industries especially pharmaceutical one.

Keywords: *Bacillus subtilis*, Antifungal activity, *Candida albicans*, Protease, proteolytic assay, optimization.



HP-48: Probiotics and Multi-Drug Resistant Urinary Tract Infection

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Subject description: Probiotics are beneficial microorganisms that can have a positive impact on gut health and potentially influence various aspects of the body's immune and inflammatory responses. Multi-drug resistant urinary tract infections (MDR-UTIs) are a concerning health issue, as they are more challenging to treat due to the limited effectiveness of antibiotics. Probiotics have been studied for their potential role in preventing and managing UTIs, including MDR-UTIs, although the research in this area is still evolving

Objectives: This study was performed to determine the prevalence of uropathogens causing urinary tract infections (UTIs), their pattern of antimicrobial resistance and evaluating the recurrence of urinary tract infections after taking probiotics

Methods: This research was conducted in Oran and involved the examination of 182 urine specimens, of patients suffering from recurrent urinary tract infections, obtained from a private laboratory. Fully automated VITEK 2 compact system was used in the identification and antimicrobial susceptibility testing of causative microorganisms. To assess the recurrence of these infections, 91 patients took oral probiotics for one month, and the others did not.

Results and discussion: Antimicrobial resistance was seen both in Gram-positive and Gram-negative bacteria. Multiple resistances were high among the isolated urinary pathogens. Particularly, *E. coli*, *Enterobacter cloacae* and *Staphylococcus aureus*, which had very high resistance rate to the tested antimicrobial agents. The recurrence of urinary tract infections in patients who took probiotics in addition to antibiotics decreased by 40%, unlike those who only took antibiotics.

Conclusion: Although prophylactic antibiotics remain the preferred preventive treatment in recurrent UTIs, the emergence of antimicrobial resistance worldwide has made the development of non-antibiotics strategies a priority. The idea is that probiotics may help maintain a balanced and healthy urinary tract microbiota, making it less susceptible to infection.

Keywords: urinary tract infection, antibiotic resistance, multi-drug resistance, microbiota, probiotics.



HP-49: A Simple Fluorescent Aptasensor Based on MXene for Amoxicillin detection

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Subject description: In this study, our focus was on the development of a sensitive and a selective biosensor based on FAM labelled aptamer and FRET process using 2D nanosheet MXene as a quencher of fluorescence for amoxicillin detection.

Objectives: The use of amoxicillin in human and veterinary medicine can result in the appearance of residues in food and the aquatic environment, which poses undesirable health risks for consumers. To help overcome this problem, it may be advantageous to detect and measure the levels of amoxicillin residues. Therefore, we propose a simple, sensitive and selective aptasensor for amoxicillin detection.

Methods: to realize the fluorescent aptasensor, MXene was used as agent of fluorescence quenching. Firstly, the MXene concentration and quenching time were optimized. Then the detection of amoxicillin was realized in a 96-well black microplate, for which an appropriate volume of FAM-Apt was incubated with different concentrations of AMOX, then MXene solution was added to the mixture and stirred. Finally, the fluorescence intensity was measured.

Results and discussion: Fluorescence measurements showed a wide linear range from 100 to 2400 ng/ml and a low detection limit of 1.53 ng/ml which was lower than those reported amoxicillin detection assays. The selectivity of this detection system was tested and the result confirms that the developed aptasensor has excellent specificity for the detection of AMOX, indicating its potential application in complex matrices.

Conclusion: The developed aptasensor is excellent for the detection of AMOX, this detection system based on two-dimensional MXene nanosheets, has the potential to be expanded in order to target other antibiotics. Thus widening the method's scope and offering potential for more comprehensive monitoring of various antibiotics.

Keywords: Amoxicillin, Aptamer, Aptasensor, Fluorescence, MXene



HP-50: Alternative Therapeutic Strategy to Antibiotics for the Treatment of Urinary Tract Infections

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Subject description: Essential oils (EOs) are currently being recognized for enhancing the quality of life and alleviating a variety of illnesses. Multiple antibacterial properties of plants that contribute in suppressing uropathogenic invasion are one of the main strategies to decrease or eliminate bacterial progression.

Objectives: The objectives of this investigation were the extraction and the study of the antimicrobial activity of the EOs from plants against uropathogenic bacteria, in order to evaluate their potential as alternative products of synthetic antibiotics.

Methods: EOs from *Petroselinum crispum*, *Thymus vulgaris* and *Cinnamomum cassia* were obtained by hydrodistillation method. Where their antibacterial activity against uropathogenic bacteria; *Escherichia coli*, *Staphylococcus sp*, *Pseudomonas sp* and *Klebsiella sp* were qualitatively and quantitatively assessed.

Results and discussion: The yields of the three EOs are respectively 0.49% for parsley, 2.25% for thyme, and 2.35% for cinnamon. The tested EOs exhibit an interesting antibacterial activity compared with that of the antibiotics; cotrimoxazole, fluoroquinolones, and β -lactams. Cinnamon and thyme oils have a good activity against *Escherichia coli*, *Staphylococcus sp*, and *Klebsiella sp*, but a moderate activity against *Pseudomonas sp*. However, parsley oil showed a weak antibacterial activity.

Conclusion: The increasing rates of uropathogens resistance against the tested antibiotics which cannot be used for empiric therapy. For that, to counteract the increasing resistance rates, alternative treatment options, such as phytotherapeutic approaches, need to be investigated.

Keywords: essential oils, uropathogens, phytotherapy, urinary tract infection, antimicrobial resistance.



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AO-01: Biodégradation du phénol dans des conditions hypersalines par la souche Archéhalophile *Haloarcula* sp. D21

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Résumé

Le phénol est un composé aromatique toxique utilisé ou produit dans de nombreuses industries et, par conséquent, un composant courant des eaux usées industrielles. Les eaux usées contenant du phénol sont souvent hypersalines et nécessitent donc des micro-organismes halophiles pour un biotraitement efficace sans dilution. Dans cette étude, la capacité des isolats d'archées halophiles à dégrader le phénol a été étudiée. Parmi les 23 isolats testés, la souche D21 a été identifiée comme ayant la plus grande capacité de dégradation du phénol sur des milieux solides et liquides contenant 20% (p/v) de NaCl et du phénol comme seule source de carbone et d'énergie.

\Pour une concentration initiale de 300 mg/L de phénol (plus élevées que les concentrations trouvées dans la plupart des eaux usées), la biodégradation par la souche D21 s'est avérée optimale à pH 7,5, 40°C et 120 rpm lorsque la culture contenait 20% (p/v) de NaCl, 0,2 % d'extrait de levure. Un criblage enzymatique préliminaire a montré que la dégradation du phénol s'effectue par une voie d'ortho-clivage impliquant la catéchol 1,2-dioxygénase. La catéchol 1,2-dioxygénase a montré son activité catalytique la plus élevée à 40 °C, 2,5 M NaCl et pH 8. La souche D21 s'est révélée très efficace dans la dégradation du phénol et elle peut être utilisée pour la biorestauration commerciale et industrielle du phénol sur des sites pollués.

Mots clés: phénol, biodégradation, archées halophiles, catéchol 1,2 dioxygénase.



AO-02: Kinetics of production of a neutral protease by *Aspergillus oryzae* Ahlburg (Cohen) 1042.72 on optimized medium based on orange waste

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Subject description: In order to improve the conduct of fermentation in enzyme manufacturing processes, it is essential to realize the kinetics of growth of the microorganism and the kinetics of production of the enzyme for determine where the maximum production of enzyme is obtained.

Objectives: The objectif is to define the type of association between these two parameters.

Methods: The kinetic of the production of a neutral protease was monitored on a medium based on orange waste. Sampling every 4 hours over a period of three days made it possible to establish the growth curve of the mould and the evolution of enzymatic activity.

Results and discussion: The microbial biomass in four phases, a first latency phase which lasts 8 hours. From the 8th hour until the 36th hour the growth becomes rapid, it is the exponential phase where the dry weight of the biomass reaches its maximum value (15.42g/l), the synthesis of the protease begins. From the 36th hour to the 56th hour it is the stationary phase during which we observe the cessation of growth, the weight of the mycelium is constant but we note an increase in proteolytic activity (2635 U). It is during the stationary phase that the increases in activity are greatest.

Conclusion: The production of proteases is therefore of the “partially associated” type with growth. The decay phase begins from the 56th hour. It is characterized by a decrease in dry weight which goes from 14.26g/l to 6.70g/l and corresponds to the decrease in viable cells following their autolysis under the action of the enzymes of the cells themselves.

Key words: neutral protease, *Aspergillus oryzae*, orange waste, kinetics, fermentation



AO-03: Exploring Plant Extracts for Uric Acid Dissolution : Potential for Gout Treatment

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Subject description: The subject of the study revolves around the historical use of natural products in traditional medicine for treating various diseases and health conditions. The focus is on exploring the bioactive properties of plant extracts, particularly in relation to uric acid dissolution, and their potential role in preventing diseases like hyperuricemia and gout.

Objectives: The main objectives of the study are to investigate the effects of different extracts from four local plants on uric acid dissolution. Additionally, the study aims to quantify calcium, sodium, and potassium ions in the extracts and assess their haemolytic effects on human red blood cells.

Methods: The study employed a reflux method using a Soxhlet apparatus with four solvents of varying polarity (n-hexane, acetone, methanol, and water) to prepare the extracts. The researchers then assessed the effects of these extracts on uric acid dissolution and conducted quantitative analysis of calcium, sodium, and potassium ions. Haemolytic effects on human red blood cells were also evaluated.

Results and discussion: The results of the study indicate that the majority of the studied extracts demonstrated a significant ability to dissolve uric acid, outperforming the positive control (58.36±0.024 mg/mL distilled water). Furthermore, the capacity of the extracts to dissolve uric acid was found to be strongly correlated with their calcium content ($r = 0.765$; $p = 0.001$). Among the extracts, the aqueous extracts from *Cistus creticus* and *Plantago ciliata* showed the highest uric acid dissolving properties, with solubilities exceeding 450 mg uric acid/L. Importantly, these extracts exhibited no toxic effects on isolated human erythrocytes, suggesting their potential in enhancing new therapies for gouty arthritis.

Conclusion: The study concludes that the investigated plant extracts possess a significant ability to dissolve uric acid, which may have implications for the treatment of conditions like hyperuricemia and gout. Specifically, the aqueous extracts from *Cistus creticus* and *Plantago ciliata* show promise in this regard and warrant further exploration for potential therapeutic applications in gouty arthritis.

Keywords: Natural products, Uric acid dissolution, Plant extracts, Gout treatment, bioactive properties.



AO-04: Development of gluten-free couscous with rice-legumes supplementation

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Abstract

Couscous is a traditional cereal product usually prepared using semolina; however, couscous may be produced with different flours as well as gluten-free flours. In this study, gluten-free couscous was prepared by supplementing rice flour with flours of field bean, chickpea and lentil (90/10 or 70/30 %, w/w). The objective of this study was to develop gluten-free couscous and determine the quality, texture, microstructure and sensory properties, which these properties were used for characterization.

The different gluten-free couscous were developed according to a manufacture diagram in North East Algeria (Benatallah *et al.*, 2008) and then a determination of the quality (grain size, yield, bulk density, color, water absorption capacity, disintegration degree and swelling index), texture profile (TPA), microstructure (SEM) and sensory properties was carried out, these properties being used for the characterisation of gluten-free couscous.

The results revealed that the gluten-free couscous had low water absorption capacity, low swelling and cohesion, and slightly high disintegration degree compared to the control couscous. Protein, lipid and ash contents were improved following the supplementation while lightness and hardness were negatively affected. Even though there was no gluten, the significant yield was obtained during production. Moreover, the quality, texture and sensory properties of gluten-free couscous were close to those of the control couscous.

Gluten-free couscous production was successfully achieved for whom wants to consume gluten-free products as a lifestyle.

Keywords: Couscous; Gluten-free; Legumes; Supplementation; Rice; Traditional.



AO-05: Technological Applications of Fungal Protease Produced by Solid State Fermentation on Tomato waste

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Abstract

Agro-industrial residues are rich in organic matter. This makes such wastes very appropriate for transformation by biotechnological processes. Among these, the solid-state fermentation (SSF) have renewed interest worldwide because they provide significant production of various substances compared to submerged cultures. Thus, the objective of this work is the use of tomato waste in SSF for production of fungal protease and its applications. Fermentation performed on a pilot scale by *Aspergillus oryzae* strain 2220, at 50 % initial moisture of substrate is achieved after 42 hours. Culture, with tomato pomace without additional enrichment, allows proteolytic activity of 13.55 U / gds. This enzyme is stable in the presence of commercial detergents: ISIS and OMO, and provides excellent cleaning results especially with the first type. It can be considered as a potential biomolecule for the formulation of laundry. This protease reacts as an anticoagulant and a keratinase; so, it can be used in pharmacy and tannery as a dehairing agent. Also, it can be used for the production of bioactive peptides with physiological benefits. These results show the potential of tomato pomace as a culture substrate for protease production by SSF. This would make it very economical synthesis and could meet the demand of growing market for this group of hydrolases which has several technological interests.

Keywords: Agro-industrial residues, Bioactive peptides, Solid-state fermentation (SSF), Proteases, Protease applications.



AO-06: Assessment of the antioxidant potential, physicochemical stabilities, and sensory Analysis of mayonnaise enriched with algae (*Ulva lactuca*) phenolic extracts.

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Subject description: The seaweed extracts, abundant in compounds with well-documented antioxidant properties, are increasingly utilized as natural food additives in the food production industry.

Objectives: This investigation focuses on the potential uses of algae phenolic extracts as natural additives in mayonnaise formulation after 15, 30, and 45 days of storage period.

Methods: Physicochemical analysis was conducted on the prepared mayonnaise, and the content of total phenolics and flavonoids was assessed. Additionally, the free radical scavenging activity (DPPH) and ferric reducing power (FRP) were evaluated. All these parameters were measured at intervals of 15, 30, and 45 days during the storage period.

Results and discussion: The results show that incorporating seaweed phenolic extracts in mayonnaise production yields a product with good physicochemical quality for a limited duration (45 days of storage). The values of moisture content, pH, and acidity are consistent with standard mayonnaise, ranging from 4.80 ± 0.06 to 7.08 ± 0.09 for pH and from 0.134 ± 0.003 to 1.286 ± 0.03 for acidity. There were variations in these values during storage. Additionally, the mayonnaise enriched with algae phenolic extracts exhibited high levels of phenolics (107.04 mg GAE/100g) and flavonoids (25/225 mg QE/100g) content with strong antioxidant activity, (70.674% for DPPH and 125.709 mg AAE/100g for FRP). After 45 days of storage, there was a significant decrease in phenolic compounds and antioxidant activity for the three types of mayonnaise prepared (with natural additives, synthetic additives, and without additives). Regarding sensory analysis, color, odor, and texture significantly influenced the overall acceptability of mayonnaises. Even after 45 days of storage, the mayonnaise enriched with seaweed extract maintained their color, odor, and overall acceptability at a moderate level.

Conclusion: The addition of algae to food products not only enhances the quality but also increases their nutritional properties. As a result, the natural additives investigated in this study were derived using an environmentally friendly and safe aqueous extraction process.

Keywords: Algae, mayonnaise, formulation, physicochemical, antioxidant potential, sensory analysis.



AO-07: Enriching essential Oils with Linalyl Acetate using bio-acylation of Linalool.

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Subject description: The essential oils of Lavender (*Lavandula angustifolia*) and Tropical Basil (*Ocimum basilicum*) are characteristically high in both linalool and linalyl acetate esters, key constituents determining essential oil (EO) quality and activity. The enrichment of these products in linalyl acetate has a great interest in the industry. In this study, we report the enzymatic modification of two EOs by direct bio-acylation.

Objectives: The main objective of this work is to investigate the enzymatic production of linalyl acetate using linalool and its application to essential oils, specifically *Lavandula angustifolia* and *Ocimum basilicum* to modify the chemical composition of these essential oils by enriching them with linalyl acetate.

Methods: production of linalyl acetate was conducted using the free lipase PPL as the catalyst within a solvent-free environment. At the optimized experimental conditions determined through the execution of experimental design, the bio-acylation was carried out for both linalool and essential oils as substrates.

Results and discussion: The enzymatic production of linalyl acetate in solvent-free medium was maximized using linalool as substrate by means the experimental design technique. Under these conditions, the enzymatic acylation was carried out for both pure linalool, *Lavandula angustifolia* and *O. basilicum* essential oils as substrates. 24.94% conversion of pure linalool to linalyl acetate was obtained, however essential oils gave lower conversions (conv=13%).

Conclusion: The exploration of enzymatic pathways and the optimization of the acylation process underline the promising possibilities for essential oil enrichment in industrial and scientific contexts.

Keywords: (R)-linalool, (R)-linalyl acetate, acylation, eco-friendly conditions, experimental design, *Lavandula angustifolia* EO, *Ocimum basilicum* EO.



AO-08: Effect of extraction conditions on the recovery of phenolic compounds and the *in vitro* antioxidant activity of algae (*Ulva lactuca*) extracts.

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Subject description: The procedure for the extraction of total polyphenols is influenced by several parameters such as the chemical nature of these compounds, the appropriate extraction method, the solvent used, particle size, extraction time, and temperature.

Objectives: The objective of this study is to study the effect extraction conditions on the recovery of phenolic compounds and *in vitro* antioxidant properties algae (*Ulva lactuca*)

Methods: The effects of solvent type (acetone, ethanol, methanol, and water), solvent concentration (20-100%), sample/solvent ratio (0.2/20 - 1 mg/20 g/ml), extraction time (30-150min), and temperature (25-90°C) on the extraction of total polyphenols and the antioxidant activity of algae were evaluated. The contents of total polyphenols (TP) and flavonoids were determined. While the ferric reducing power (FRP) and the free radical scavenging activity (DPPH) were used to evaluate the antioxidant activity of the extracts.

Results and discussion: The results obtained show that the extraction conditions have a significant effect ($p < 0.05$) on the content of total polyphenols, flavonoids, and the antioxidant activity of the extracts. The optimal extraction conditions are as follows: 60% acetone, 0.2 g/20ml, 90 min, and 90°C, with values of 11.89 g GAE/100 g for total phenolic contents, 90.43 g AAE/100 g for ferric reducing power, and 70.23 g % for free radical scavenging activity (DPPH). Ferric-reducing and free radical scavenging potentials were found to be positively significantly correlated with phenolic content under the influence of all extraction parameters.

Conclusion: Seaweeds are indeed a rich source of natural antioxidants with a strong antioxidant property. The one-factor method has limitations in optimizing the phenolic extract, the use of developed mathematical models like RSM (Response Surface Methodology) is recommended for more effective optimization processes.

Keywords: Algae (*Ulva lactuca*), extraction conditions, phenolics, antioxidant activity



AO-09: The effect of ammonium acetate on the productivity of lysine by an auxotrophic mutant of *corynebacterium glutamicum* homoserine (-)

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Subject description: Amongst the main global food crops, many cereal species have a relatively low concentration of the essential amino acid lysine. Many countries, try to develop new sources of proteins and that by the means of the culture of micro-organisms on a large scale to obtain microbial proteins.

Objectives: The aim of our work was to study the effect of ammonium acetate used as a source of carbon and nitrogen on the productivity of auxotrophic mutants of *corynebacterium glutamicum* homoserine (-), isolated and lyophilized locally by TRAD-KHODJA D.

Methods: Four media containing as carbon source (glucose; glucose and ammonium acetate; ammonium acetate; ammonium acetate and sodium acetate) were inoculated by a mutant of *Corynebacterium glutamicum* auxotroph homoserine (-) and incubated in a rotary shaker at 30 °C/220 r.p.m for 72 hours. During this fermentation, we collected samples of 12ml every 2 hours 30min, to monitor the production of biomass whose concentration is obtained by measuring the optical density at 650 nm using a spectrophotometer; the production of lysine by the strain according to the method of CHINARD (1952) at 479nm; the dosage of glucose by the method "phenol-sulfuric acid" and the concentration of ammonium acetate consumed

Results and discussion: We found that in a medium based on ammonium acetate, the fermentation is characterized by a remarkable production of lysine (11.45 g/l) and a low biomass production (20.77g/l). However, the highest production of the biomass and lysine was noted in the medium containing both glucose and ammonium acetate with 86.06 and 16.3 g/l respectively compared to the medium based on glucose (54.78 and 12.7 g/l respectively).

Conclusion: It can be concluded that the production of lysine and biomass by *C. glutamicum* was proportional to the consumption of glucose and that the production of lysine has no relationship with microbial growth.

Keywords: *Corynebacterium glutamicum*, lysine, mutant, auxotrophic, ammonium acetate.



AO-10: Hydrolytic enzymes production using solid state fermentation

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Subject description: In this study, hydrolase enzymes (alpha-amylase, cellulase, and protease) production from *Trichoderma longibrachiatum* by solid fermentation was evaluated.

Objectives: The present work focuses on the possibility of using industrial wastes for fermentation to produce fungal enzymes.

Methods: Two medium containing orange and tomato waste, moistened by two different agents, distilled water and tweened physiological water, were tested as carbon sources. The influence of the nature of the substrate and the wetting agent is established.

Results and discussion: The tomato waste gave the maximum production of cellulase and protease activities, 13.6 U/gds of FPA when they are moistened with tweened physiological water. 316,6 U/gds of endoglucanase and 13,3 U/gds of protease on this substrate moistened with distilled water. Whereas, the orange waste moistened with distilled water makes it possible to obtain the maximum alpha-amylase activity of 93.6 U/gds.

Conclusion: Based on these results, there appears to be the potential for upgrading this abandoned food processing waste for the production of enzymes (alpha-amylase, cellulase and protease) of industrial interest. Also, the possibility of moistening these substrates with distilled water for good enzyme yield, seems an interesting alternative for the industry. This is why, there is need to find cost effective medium for enzyme production. Utilization of industrial waste will certainly reduce production cost and solve pollution problems.

Keywords: enzyme production, *Trichoderma longibrachiatum*, orange waste, tomato waste, solid state fermentation.



AO-11: Phytochemical Screening And Recovery Of Sigoise Table Olive Brine Water

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Subject description: The table olives industry produces an immense wastewater volume, and its characteristics have revealed elevated organics and polyphenol concentrations which are harmful to the environment.

Objectives: Recovery of process water produced from black and green table olive of the Sigoise variety from Bejaia and Mascara.

Methods: The phytochemistry was determined by HPLC-DAD. Antioxidant potential was determined by DPPH and ABTS. Anti-inflammatory activity was quantified by protein denaturation.

Results and discussion: Chemical screening by HPLC-DAD identified a high concentration of hydroxytyrosol (69.67 mg/100 mg) for Mascara green and tyrosol (28.8 mg/100 mg) for Bejaia black. DPPH and ABTS assays exhibited a significantly elevated potential for radical scavenging compared with standard (ascorbic acid and trolox). Mascara olive extracts evaluated the highest anti-oxidant capacity with IC₅₀ (0.133±0.014 µg/mL and 1.015±0.087 µg/ml), which might be attributed to high phenolic compound concentrations, particularly of hydroxytyrosol (69.67±2.16 mg/100 g). As regards anti-inflammatory activity, Bejaia black and Mascara green scored 20.06 and 20.21 µg/ml respectively, indicating the anti-inflammatory impact of the extracts on the human system.

Conclusion: This investigation enabled us to identify the value added of these wastes as a potential for new natural compounds and bioactive compounds, such as hydroxytyrosol, and their applications in the pharmaceutical and agri-food industries. It is imperative, therefore, to change the current production style from a linear economy causing severe environmental effects to a circular economy to reduce waste and natural resources to a minimum.

Keywords: table olives, HPLC DAD, DPPH, Hydroxytyrosol, environment.



AO-12: Biofertilizer Production for Sustainable Agriculture: A Biotechnological and Ecological Perspective

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The industrialization of agriculture through excessive mechanization and the massive, irrational use of chemical inputs (chemical fertilizers and plant protection products) has led to a significant increase in agricultural yields, but above all it has caused major damage to the environment, particularly to soil and groundwater.

This situation poses two key problems: one relating to economic aspects and health repercussions on the public, the other much more to ecological considerations (dysfunction of agro-ecosystems).

The concept of sustainable agriculture needs to combine all these elements in a more environmentally-friendly approach, by exploiting the rhizosphere space of plants to improve soil fertility. Indeed, the use of rhizobacteria represents an alternative that could find a sustainable agronomic application in the face of the many constraints limiting plant production, the most important of which is certainly salinity. To mitigate the effects of salinity, appropriate crop management techniques as Bio-fertilization, single or mixed inoculation of PGPR will be needed.

It is in this context that the soil biology team is proposing to contribute by adopting bio-fertilization of certain economically important legumes and cereals to produce bio-fertilizers. The aims of our team were to determine the effect of salinity and drought stress on germination and seedling growth and to determine if this biofertilization with appropriate PGPR could mitigate the adverse effects of soil salinity on germination, seedling growth and establishment in arids areas. The results obtained showed that salt damage and biofertilization success depend on species, variety, growth stage, environmental factors, stress severity and the nature of the salts. Germination and early seedling stages are crucial for the establishment of species in the saline environment.

The results obtained showed that salt damage and biofertilization success depend on species, variety, growth stage, environmental factors, stress severity and the nature of the salts. Germination and early seedling stages are crucial for the establishment of species in the saline environment. Participating in this scientific event will give us an opportunity to present our key findings, update our knowledge and develop collaborations with other research teams across Algeria.

Mots-clés : Biofertilisation .Salt stress. Plant growth. PGPR



AO-13: Phenolic Compounds of algae (*Ulva lactuca*): Optimization of extraction by response surface methodology and *in vitro* antioxidant properties

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Subject description: Seaweeds are a rich source of natural antioxidants with potent antioxidant properties. While the one-factor method has limitations in optimizing the phenolic extract, the use of developed mathematical models such as Response Surface Methodology (RSM) is recommended for more effective optimization processes.

Objectives: Given the highly bioactive nature of phenolics and their numerous therapeutic applications, the primary objective of this investigation is to optimize their recovery using Response Surface Methodology (RSM).

Methods: Prior to RSM, the single-factor method was applied to reveal the main factors influencing the extraction (solvent type and concentration, sample-to-solvent ratio, temperature, and time of extraction). The contents of total polyphenols (TP) and flavonoids were determined. While the ferric reducing power (FRP) and the free radical scavenging activity (DPPH) were used to evaluate the antioxidant activity of the extracts.

Results and discussion: The results of the preliminary optimization step through sequential methodology revealed that solvent concentration, extraction duration, and temperature were the main influencing factors. All these tested extraction parameters significantly influenced total phenolic contents (TPC) and DPPH-free radical scavenging activity (FRSA) and ferric reducing power (FRP). RSM analysis using Box-Behnken design showed that the optimal extraction conditions of total phenolic contents of algae were 23.07% acetone, 51.82 °C, and 118.02 min with values of 29.44 mg GAE/g for total phenolic extracts, 59.48% and FRSA, and 123.45 mg AAE/100g for FRP. The results obtained show that the extraction conditions have a significant effect ($p < 0.05$) on the content of total polyphenols, flavonoids, and the antioxidant activity of the extracts.

Conclusion: The developed mathematical models have demonstrated a high level of significance through sequential and RSM optimization processes for phenolic antioxidants of *Ficus carica* leaves. This method allows us to observe the effects of different extraction conditions on the phenolic antioxidants.

Keywords: Algae (*Ulva lactuca*), optimization, RSM, phenolic, antioxidant activity.



AO-14: Insects oil a promising ingredient for cosmetic formulations: Fatty acid profile, antioxidant and antibacterial activity of pressed *Locusta migratoria* oil.

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Subject description: Edible insects represent an interesting alternative source of proteins and lipids for human and animal consumption and have the potential to play a significant role in a circular economy to meet current societal challenges. There is growing interest in the use of insects in the manufacture of biomaterials and the valorization of secondary waste products.

Objectives: The potential of locust (*Locusta migratoria*) oil, adapted to intensive breeding using by-products as feed, for incorporation as an ingredient in cosmetic formulations is investigated.

Methods: Locusts are mass-reared under controlled conditions. Firstly, techniques for obtaining good oil extraction yields from dried locust biomass were tested. Extraction using hexane as a solvent (soxhlet) and traditional pressing. Fatty acid composition (%) and profile (%) and the major groups of fatty acids of the migratory locust were determined (gas chromatography-mass spectrometry (GC-MS)). For antioxidant capacity, two different methodologies were used (DPPH, FRAP), and agar diffusion tests were performed for antibacterial activity.

Results and discussion: Migratory locust is rich in lipids ($\approx 33\%$ of dry weight), and traditional pressing was found to be the best system for maximizing oil yield (26.90g/100g vs. 24.75g/100g for hexane). The most abundant saturated fatty acid was palmitic acid, 16:0 (30.5%) followed by stearic acid, 18:0 (9.3% TFA), while oleic acid, C18:1n9c (40.53%), was the main monounsaturated fatty acid, and linolenic acid, C18:3n3 (13.7%) was the most abundant polyunsaturated fatty acid. Unsaturated fatty acids (UFAs) make up 59% of TFA. MUFA are the most predominant fatty acids in locust tissues, accounting for 41.2% of TFA, followed by SFA, which make up 41% of TFAs, and PUFA, which make up 17.8% of TFA. The proportion of saturated/unsaturated fatty acids was (0.7). Omega-6 content was (11.5mg/g) and omega-3 (24.8mg/g), representing (5.6% TFA) and (12.1% TFA). The N-3/N-6 ratio was 2.2. Regarding antioxidant activity, *Locusta migratoria* showed values of 2.03, and 4.93 mg TE/g of oil for DPPH and FRAP tests. Interestingly, agar diffusion tests demonstrated the sensitivity of Gram-positive *Bacillus subtilis* and *Staphylococcus aureus* to the oil, while the growth of Gram-negative *Pseudomonas aeruginosa* and *Escherichia coli* was unaffected. This study confirms that fat and other active compounds in pressed oil could be effective antimicrobials against bacteria.

Conclusion: The fatty acid profile indicates a high proportion of unsaturated fatty acids, and the antioxidant and antibacterial activity of pressed *Locusta migratoria* oil is promising for use in cosmetic applications.

Keywords: insects oil extraction, antioxidant, fatty acids, antibacterial activity, cosmetic industry



AO-15: Comparative study of the chemical and biological aspects of spend coffee grounds recovered by the filtration and decoction methods

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Subject description: Two types of coffee grounds has been studied; the first type was extracted by pressure, while the second was obtained by decoction.

Objectives: The aim of our work is to compare the recovered ground using these two methods on both, chemical and biological scales.

Methods: The chemical study concerns primary compounds (dry, mineral and fatty matter) and secondary compounds (phenols, flavonoïds), the biological study however, is about assessing the antioxidant potential (DPPH, CUPRAC, FRAP, Phenanthroline) as well as the enzymatic one (Anti-Alzheimer's and Anti-diabetic) of the two samples. For valuation purposes, and by choosing the most active coffee ground, we simultaneously elaborate the effect of the preparation method on the quality of the recovered coffee ground.

Results and discussion: The results show a difference between the two extracts in the primary composition (DM, MM, FM) and a similarity in the secondary composition for phenols and flavonoids' levels. The evaluation of the antioxidant activity shows that the two extracts have a low and similar antioxidant potential; and that both had no activity against Alzheimer's disease. In return, the two substrates possess a detectable activity against the therapeutic enzyme responsible for the development of diabetes.

Conclusion: Espresso coffee grounds seem to be richer in fat source than decoction grounds. Therefore, the two beverage preparation methods discussed herein did not greatly influence the quality of the coffee grounds. In addition, given its phenolic and chemical composition, the coffee ground presents an important source of natural compounds of biological and therapeutic interest.

Keywords: Spent coffee grounds, Pressure, Decoction, Phenols, Flavonoids, Antioxidant potential.



AO-16: Study of Camel Milk Coagulation Induced by Cardosins: Enzymes Purified from Wild Cardoon Flowers

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Subject description: Camel milk transformation poses significant challenges due to its unique composition and perceived difficulties in coagulation. This research explores the feasibility of coagulating camel milk using proteases derived from wild cardoon flowers, *Cynara cardunculus* Var. *sylvestris*.

Objectives: The primary objective of this study is to investigate the potential of cardoon flower proteases for coagulating camel milk and compare their performance to a recombinant chymosin enzyme designed specifically for camel milk coagulation.

Methods: Our methodology consisted of several key steps. Initially, cardosins were extracted, purified, and characterized using chromatographic and electrophoretic techniques. Subsequently, we measured their coagulating and proteolytic activities, cheese yields, and syneresis ability using camel milk as the substrate. Additionally, we assessed the textural properties of the coagulum obtained with the Optigraph by measuring firmness parameters (A20, A30, A40) and coagulation velocity (R and OK20). The study was conducted by comparing the cardoon-derived proteases with a commercially available recombinant enzyme developed specifically for camel milk coagulation.

Results and discussion: Our purification protocol allowed us to obtain three types of cardosins: Cardosins A0, A, and B. All three are heterodimeric proteins composed of two chains, large and small, with molecular weights ranging from 42 to 36 kDa for the large chains and 16 to 13 kDa for the small chains. The analysis of coagulation properties and theoretical cheese yields demonstrated that the purified cardosins exhibit promising coagulation potential for camel milk. Cardosins A and B displayed activities similar to those of the commercial recombinant chymosin (23 ± 2 IUMC and 21 ± 1 for cardosins A and B, respectively, compared to 25 ± 2 for the commercial enzyme). However, cardosin A0 exhibited lower activity (9 ± 2 IUMC). Regarding textural properties assessed with the Optigraph, no significant differences were observed between cardosins A and B and the commercial enzyme, whereas cardosin A0 generated a friable and less firm coagulum.

Conclusion: Based on these findings, we believe that proteases from cardoon flowers can be applied as coagulation agents for camel milk transformation into cheese. The cardoon-derived proteases, particularly cardosins A and B, exhibit coagulation capabilities comparable to those of the commercially available recombinant chymosin. This research contributes to the potential development of more sustainable and cost-effective methods for camel milk processing in the cheese industry.

Keywords: Camel milk, Cardosines, Coagulation, Proteases, Cheese production



Poster Communications: Agrifood Biotechnology, Bioindustry and Environment

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AP-01: Insect visitors of checkpea (*Cicer arietinum*): comparison of quantitative and qualitative interactions of the plant with its main pollinators

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Abstract

An inventory of insects visiting Checkpea (*Cicer arietinum*) flowers was established during three years (2021) in a plot in the Constantine region (Baaraouia). Four orders of insects were recorded on the flowers: Hymenoptera, Lepidoptera, Diptera and Coleoptera. The majority of the identified taxa were bees and included the honeybee, *Apis mellifera*, Megachilidae, *Rhodanthidium sticticum* including two species *Anthidium florentinum* and *A. manicatum*. The bees had higher visitation rates than Lepidopterans. The 'quantitative' interaction of the plant with its main visitors, determined by the abundance and the visitation rate, showed that *R. sticticum* and *A. mellifera* are the most dominant pollinators of the plant. Analysis of the 'qualitative' component of the interaction of *C. arietinum* with the four major bees by counting pollen grains transported on their bodies revealed that *R. sticticum*, in addition to its dominance, was also the most efficient pollinator of the plant.

Key words: pollinator abundance, foraging behaviour, pollinating efficiency, Fabaceous crop.

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AP-02: Enhancing Mechanical and Thermal Performance of PLA Biopolymer through Innovative PBS Blendin

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Abstract

Plastics are ubiquitous in our daily lives, and unfortunately, they have also made their way into our natural environment. Their chemical stability, or lack thereof, is a significant concern. Biodegradable polymers have emerged as a crucial area for material innovation[1]. They are anticipated to play a pivotal role in waste reduction, leading to biopolymers with properties akin to conventional polymer materials. However, the inherent fragility of biopolymers and their susceptibility to uncontrolled degradation, as well as their potential for thermosetting, pose substantial and pivotal challenges. These challenges constitute vital scientific issues that polymer researchers grapple with.

In this context, biobased polymers like poly(lactic acid) (PLA) have the potential to offer favorable properties and the ability to biodegrade when dispersed in air, soil, or water[2]. However, they remain brittle (rigid and prone to fracture), susceptible to thermal degradation, and crystallize slowly[3]. To overcome these limitations, the option of blending them with another preferably biodegradable polymer is considered to enhance their properties[4].

In this study, our focus centers on the blending of PLA with poly(butylene succinate) (PBS), achieved through the melt blending method with various compositions. The aim is to select the appropriate composition that exhibits specific improvements. Polybutylene succinate (PBS), a biodegradable aliphatic polyester produced through the polycondensation reaction of 1,4-butanediol with succinic acid[5], is often combined with PLA to address different strength-related shortcomings. It boasts high flexibility, excellent impact resistance, and good thermal and chemical durability[6].

The impact of PBS on PLA's properties has been investigated using Fourier-transform infrared spectroscopy (FTIR), rheology, dynamic mechanical analysis (DMA), and differential scanning calorimetry (DSC). DSC analysis revealed miscibility in the PLA/PBS blend with the addition of 10% weight of PBS, whereas other PBS concentrations induced phase separation in the blends. Rheological results highlighted that the 80/20 blend exhibits the highest thermal stability. Tensile tests also demonstrated that the 80/20 blend had good elongation at the break at 35°C, whereas the 90/10 blend exhibited favorable compatibility compared to other ratios. The compatibility of PLA/PBS blends was confirmed through DSC and DMA by an increase in the glass transition temperature (T_g), potentially enhancing crystallinity speed and thermal resistance of PLA.

In conclusion, addressing the challenges of compatibility, miscibility, and temperature effects in the PLA/PBS blend is pivotal for achieving a consistent, high-quality homogeneous mixture. These findings hold the potential to not only advance industrial applications but also enhance the efficiency and effectiveness of processes like blow molding, showcasing the significance of continued research in this field.

Keywords: PLA, PBS, PLA/PBS blend, Crystallinity, Mechanical properties, Thermal proprieties.



AP-03: Valorization of tomato wastes in a solid stat fermentation for protease production by new Algerian fungal isolates

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Abstract

Agro-industrial wastes are of increasing interest due to their potential applications as cheap substrates for production of bioactive compounds. To obtain valuable new products, new microbial strains have been screened from nature. Advantages of fungi producers are as they are Generally Recognized As Safe and produce a wide range of extracellular enzymes.

The aim of this study is to determine the capacity of new fungal isolates to use at different temperatures tomato pomace for protease production.

For this, fungal isolates from soil samples of a hydrothermal spring in Algeria were screened for their proteolytic activities by the ability to form clear zones around colonies on milk agar plates. Further morphological identifications were investigated for the selected isolates. They were inoculated on a solid medium based on tomato pomace moistened with distilled water in 250ml shake flasks, then statically incubated at four temperatures 30°C, 35°C, 40°C and 45°C for 96 h. Strains showing high activities were cultivated on tomato pomace moistened by a solution with optimum components of a previous study.

Among fifty proteolytic isolates, nine revealed large diameters of halos surrounding their colonies. They were selected to be identified in the following genera: *Aspergillus*, *Trichoderma*, *Penicillium* and *Scopulariopsis*. Fungi belonging to the *Aspergillus* genus exhibited the best proteolytic activities using tomato wastes as a sole source of carbon and nitrogen, where the best activity (3840 U) was observed by *Aspergillus sp.* 6 at 35°C. About 25% of increase in protease activity was reported by *Aspergillus sp.* 6 when employing the optimum formulation of the humidification solution.

From the present work, our results confirm the value of tomato pomace as an alternative cheap substrate in the fermentation media for protease production as given its high protein content. We can also conclude that these microorganisms could be promising source of bioactive compounds.

Keywords: Proteases, molds, tomato pomace, hydrothermal sources, SSF.



AP-04: *Aspergillus niveus* Protease as coagulant agent. Extraction and characterization of milk clotting activity

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Subject description: In the cheese industry, aspartyl proteases are used as a coagulating agent and rennet was the first to be used. It is an enzyme extracted from the stomach of young ruminants. Indeed, it is relatively expensive and faces the constraint of sacrificing these animals. This situation has given impetus to research in order to replace this clotting agent with other less expensive proteases such as microbial one.

Objectives: An acid protease produced by a fungal species isolated from an extreme environment, a thermal soil in the region of Teleghma (Mila), is studied as a source of enzymes to be used in cheese making.

Methods: Phenotypic and molecular identification showed that it is *Aspergillus niveus*. This strain of fungus exhibited significant proteolytic activity on milk agar. A fermentation is carried out on a liquid medium based on wheat bran enriched with the composition gram per liter 5g of (NH₄)₂SO₄; 2g of KH₂PO₄; 1g of K₂HPO₄ and 0.5g MgSO₄, at 30°C and pH 6 with stirring at 150rpm/min). After 7 days of incubation, the partially purified enzymatic extract is recovered by simple filtration followed by fractionated precipitation with ammonium sulphate.

Results and discussion: The partial purification shows a proteolytic activity of 2598UI with a coagulant activity of 0.221 UP/ml under standard conditions. This activity was strongly dependent on the pH and temperature of the milk; it showed optimal milk coagulation at pH 5 and 60°C. The RS rennet strength of this extract increased hyperbolically with increasing calcium concentrations and the concentration was saturated at 50 mM. Indeed, a concentration of 50mM NaCl is accompanied by a decrease in coagulant activity.

Conclusion: these results are encouraging; the use of a cheap and available substrate such as wheat bran saves the cost price of the production of a milk coagulating protease on an industrial scale.

Keywords: coagulant protease; *Aspergillus niveus*; milk clotting activity, characterization.



AP-05: Alginate/montmorillonite beads for efficient removal of malachite green dye from aqueous solutions

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Abstract

The release of dyes into aquatic environments is a serious environmental and health problem in recent years. Therefore, the development of potential adsorbents for the effective removal of malachite green (MG) of aqueous media is of great importance. In this study, new alginate beads were successfully prepared by encapsulation of montmorillonite (Na-Mt) and Nickel oxide modified montmorillonite (NiO-Mt) in alginate using CaCl₂ solution (Alg/Na-Mt and Alg/NiO-Mt). The obtained beads were utilized as a well adsorbents for the removal of MG dye from aqueous solutions by batch adsorption procedure. The characteristics of the synthesized beads were investigated using FTIR and pH_{PZC}. The effects of various operation factors such as adsorbent dose, pH of the solution, contact time, dye initial concentration and temperature on the removal of MG were studied. Moreover, adsorption isotherm results showed that the Freundlich model fitted well for the adsorption of MG onto Alg/Na-Mt and Alg/NiO-Mt beads. Kinetic and thermodynamic studies also indicated that the MG adsorption were found to be well fitted with a pseudo-second-order kinetic model, feasible, endothermic, and spontaneous in nature. In addition, the Alg/Na-Mt and Alg/NiO-Mt beads showed excellent reusability for the removal of the dye after seven adsorption cycles. Overall, the obtained results suggest that Alg/Na-Mt and Alg/NiO-Mt beads could be considered as a low-cost and eco-friendly adsorbents for dye contaminants removal from aquatic media.

Keywords: Alginate, Montmorillonite, NiO, Beads, Malachite green, Adsorption.



AP-06: Gluten-Free Bread based on Rice-Field Bean formula for celiac patients: Effect of vacuum on the proofing kinetics and on the technological quality.

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Abstract

Bread is the basic consumed food in the world. However, its manufacture based on gluten-free ingredients is a great challenge for cereal researchers, due to the absence of the gluten.

This work aims to investigate the effect of vacuum on the proofing kinetics of Gluten-Free Dough (GFD) based on Rice-Field Bean Formula (RFBF) and on the technological quality of Gluten-Free Bread (GFB) for celiac patients.

The proofing kinetic of GFD was controlled at atmospheric pressure and under vacuum (400, 600 and 800 mbar) and it was carried out in a vacuum oven. A bread-making at atmospheric pressure and under vacuum was carried out. The quality assessment of the bread obtained was carried out through the specific volume (V_{sp}) measurement and the crumb structure analysis.

The GFD fermented under vacuum at 600 mbar gave the highest volume (14.00 ± 0.63 mL at 15 min) compared to the GFD control fermented at atmospheric pressure, followed by the dough fermented at 800 mbar (13.88 ± 0.63 mL at 10 min), then the dough fermented at 400 mbar (10 ± 0.72 mL at 30 min). After baking, the optimum of our study was the GFB obtained from the RFBF fermented under vacuum at 400 mbar. It presented the highest V_{sp} (3.37 ± 0.31 cm³ / g) with a gain of 134% compared to the GFB fermented at atmospheric pressure. The crumb gain showed a great total number of alveoli and the percentage of the area of cells of our GFB optimum than those of GFB control with a relatively circular shape.

Consequently, our study showed the considerable contribution of vacuum (400 mbar) during GFD fermentation based on Rice-Field bean formula and on the improvement of the technological quality of GFB for celiac patients.

Keywords: Rice-Field Bean Formula, Vacuum fermentation, Gluten Free Bread, Specific Volume, Crumb.



AP-07: Parameter's improvement and kinetics study of amylase production by *Geotrichum* sp. newly isolated from industrial waste

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Subject description: Microbial enzymes are widely applied in various biotechnological and industrial sectors. Today, amylases are one of the most requested enzymes for their productivity and thermostability. The potential use of *Geotrichum* sp. for α - amylase production was investigated for their ability to secrete extracellular proteins.

Objectives: The purpose of this study was to determine the influence of medium composition and growth conditions on α -amylase production in solid-state fermentation by the thermostable *Geotrichum* sp. —a strain newly isolated from olive oil cake.

Methods: The production of extracellular α -amylase by *Geotrichum* sp. was studied using olive oil cake as a carbon source. To maximize enzyme production, the effect on α -amylase production of different medium ingredients and additives was examined. The kinetics of the optimal medium for amylase production, protein estimation, sugar concentrations, and pH were evaluated.

Results and discussion: Among the different additives tested, the greatest amylase production was obtained with malt extract and CaCl₂ moisture with citrate phosphate buffer pH 4 at 60°C. Applying these culture conditions, α -amylase production increased by ~1.20 fold. A study of the kinetics of extracellular amylase production revealed that the best amylase production was achieved after 40 hours of culture. The pH varied from 6.59 to 5.33 at 5,53 and the sugar concentrations ranged from 10,87mg/ml to 6,53 in 40 h of culture.

Conclusion: A short incubation period and cheaper substrate cost offer the possibility of inexpensive amylase production, making the process industrially and economically viable.

Keywords: α -Amylase, *Geotrichum* sp., Olive oil cake, Solid state fermentation, Kinetics.



AP-08: Phenolic compounds analysis and *in vitro* antioxidant activity of petals extracts from some Algerian plants

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Subject description: Algeria's wealth of plant cover and diversity provides an opportunity to develop new investment in this natural resource in divers sectors.

Objectives: The object of this study is to highlight certain species used in traditional food and traditional medicine in north-east of Algeria.

Methods: Flower petals of *Asphodelus microcarpus*, *Cytisus villosus*, *Narcissus tazetta*, *Borago officinalis*, *Malva sylvestris*, *Sinapis arvensis*, and *Calendula officinallis*, were used as raw material for this study. The aim was to apply the same extraction conditions, and deduce their effect on the total phenolic content (TPC), total flavonoids content (TFC) and on the antioxidant activity (DPPH) for the different plant species.

Results and discussion: The results shown a significant difference ($p < 0.05$) between samples in terms of TPC, TFC, and antioxidant activity. The best result revealed was for *N. tazetta* (5837.7mg of GAE/100g, 9701.34mg of QE/100g, and 73.79% for TPC, TFC, and antioxidant activity (DPPH), respectively). A significant positive correlation was observed between antioxidant activity and TPC ($R^2 = 0.77$), and TFC ($R^2 = 0.74$).

Conclusion: The results obtained were justified by the difference in molecular composition between the plants, as well as their different colours characteristic of their flower petals. Optimization of extraction using experimental design can be realized, with eventual use in the food industries as natural additives.

Keywords: plants, extraction, total phenols, total flavonoids, antioxidant activity.



AP-09: Extraction et purification du flavonol quercétine de oignon

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Resumé

En 2019, lorsque la pandémie de COVID-19 a éclaté, la médecine traditionnelle chinoise (MTC) s'est avérée être utilisée pour prévenir et atténuer la maladie. En tant que principaux composants actifs de la MTC, une série de composés flavonoïdes, dont la quercétine, ont été confirmés comme étant responsables des effets thérapeutiques de la MTC.¹ La quercétine appartient à la classe des bioflavonoïdes, est un flavonoïde important, qui est également un composant indispensable de l'alimentation humaine. La quercétine a été détectée dans de nombreux fruits et légumes à des concentrations variées

Nous avons choisi l'oignon (*Allium cepa* L.) pour l'extraction de la quercétine et nous suivons les différentes étapes d'extraction jusqu'à l'obtention des extraits bruts, nous avons optimisé les paramètres expérimentaux d'extraction de la quercétine à partir de l'oignon rouge (*Allium cepa*) avec différentes méthodes d'extraction (soxhlet, reflux, macération, ultra-son), afin d'obtenir un extrait qui contient une quantité importante de la quercétine.

Dans ce contexte nous sommes utilisés la macération comme méthode d'extraction (optimiser le solvant, le temps, et l'état de la matière végétale), nous avons par la suite fait la séparation par MPLC et confirmé sa présence par HPLC, RMN et GC/MS.

Mots clé : Quercétine, Oignon *Allium cepa*, Macération, Soxhlet,



AP-10: A physicochemical study of some varieties of quinoa seeds (*Chenopodium quinoa Willd*) recently cultivated in Algeria.

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Subject description: In this work, we conducted a physicochemical study of some varieties of quinoa seeds recently grown in Algeria.

Objectives: This study aims to determine the biochemical and morphological study of seven varieties of quinoa seeds, newly cultivated in Algeria. This study allowed us to identify the difference that exists between individuals.

Methods: We touched on conducting several laboratory experiments, namely estimating the amount of starch and cellulose in two types of quinoa seeds. We also estimated the amount of fatty substance present in two types of quinoa seeds.

Results and discussion: The results obtained from the biochemical study showed that individuals Q101, Qgiza02, Qrouge, Qnoir. It is the most special for me the values of the biochemical analyzes. It is clear to us that the fat content is high in two varieties in quinoa seeds and the percentage of cellulose is high in the two varieties, as well as a high percentage of starch in the two varieties. The morphological study showed that individuals are the most distinguished with respect to the majority of morphological measurements, which recorded the most important values of length, width and weight. Moreover, revealed to us information that distinguished between the 07 individuals studied through the values we obtained.

Conclusion: We can deduce from the morphological study that it determines the genetic diversity of the studied taxa. It also shows us the genetic diversity and the chemical content is very important for the studied individuals.

Keywords: Diversity, Physicochemical, Quinoa, Varieties.



AP-11: Quantity measuring of phycobiliproteins from the algal biomass of spirulina platensis

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Subject description: Spirulina platensis is a blue-green alga that contains about 70% of dry weight of proteins, 15-25% of carbohydrates and 11% of lipids, as well as vitamins and trace elements and especially phycobiliproteins which in this study we have focused on phycocyanin extraction.

Objectives: the objective of our study is to follow the evolution of spirulina cultivation and to optimize the production of phycocyanin to take advantage of its miraculous benefits.

Methods: We first started with the culture of spirulina and then we made the extraction by water of phycocyanin and the reading of absorbance was made by a spectrophotometer.

Results and discussion: The work carried out in the laboratory showed that for an algal growth and development a quantity of spirulina is required at seeding in order to maximize the chances of success of the cultures as well as a favorable environment; thus we found that the percentage of phycocyanin varied by changing the environment conditions such as: PH, temperature, intensity and light color.

Conclusion: Environmental stress and culture conditions influence phycocyanin production. The ideal conditions where we obtained a high percentage of phycocyanin are a temperature of 30°, Ph between 9-10 and white light.

Keywords: spirulina platensis, phycobiliproteins, optimization, phycocyanin



AP-12: Ecotoxicological Impacts of Glyphosate on the *Palaemon Adspersus* Shrimp: Comprehensive Analysis of Effects and Risks

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Subject description: Glyphosate (GLY) [N-(phosphonomethyl) glycine] is one of the world's most widely used agricultural herbicides with the risk of aquatic contamination. In this study, the acute toxicity of Gly in shrimp *Palaemon adspersus* (Decapoda, Palaemonidae) was assessed by estimating sublethal (LC₁₀, LC₂₅) and lethal (LC₅₀, LC₉₀) concentrations after 96-h exposure.

Objectives: In this study, the acute toxicity of Gly in shrimp *Palaemon adspersus* (Decapoda, Palaemonidae) was assessed by estimating sublethal (LC₁₀, LC₂₅) and lethal (LC₅₀, LC₉₀) concentrations after 96-h exposure.

Methods: The compound was added to the rearing water at LC₂₅ and LC₅₀-96h (as determined previously), and treatments were performed during the exposure phase (24, 48, 72 and 96-h) after which the shrimp were transferred to clean seawater and collected after the recovery period (24, 48, 72 and 96-h). Enzymatic activities were measured in shrimp heads and flesh fragments to quantify AChE, GST, and MDA activity, followed by lipid quantification.

Results and discussion: Overall, the toxicity tests showed significant variation ($p < 0.05$) in *P. adspersus* mortality rates, with a dose-response effect. The LC₁₀, LC₂₅, LC₅₀, and LC₉₀ after 96-h of exposure. During the exposure phase, two-way ANOVA revealed significant effects of Gly concentration and exposure time on all studied biomarkers.

Conclusion: It presented oxidative stress and neurotoxic effects at sublethal concentrations. This suggests that they should be carefully controlled to minimise negative impacts on non-target aquatic organisms.

Keywords: Herbicide, Glyphosate, Shrimp, Toxicity tests, Biomarker.



AP-13: Identification of patulin molecule produced *in vitro* by three *penicillium expansum* strains through gc-ms technique

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Objectives: Among post-harvest pathogens of apples, *Penicillium expansum* is considered one of the most common fungal pathogens worldwide. It is the causal agent of blue rot, the main post-harvest disease of apples. This pathogen is also the main producer of patulin; the mycotoxin commonly found in fruit in general and apples and apple products in particular. Because of its high resistance to chemical treatment at high temperatures and its stability in acidic environments, patulin persists throughout the production chain right up to the finished product, and presents a real danger to human and animal health. The aim of this project is therefore to characterize and identify the patulin molecule produced *in vitro* by three strains of *Penicillium expansum*, isolated from apples grown in eastern Algeria, using gas chromatography-mass spectrometry.

Methods: *In vitro* patulin production was achieved by liquid fermentation on YES medium at 25°C. Liquid-liquid extraction of secondary metabolites with ethyl acetate yielded various crude extracts.

Results and discussion: Following GC-MS analysis, the presence of patulin was indicated by chromatograms appearing at the same retention time as the patulin standard. This technique also provided structural information on this mycotoxin. GC-MS results confirmed the ability of all three *Penicillium expansum* strains to produce patulin in YES liquid culture media.

Conclusion: According to these results, it was concluded that apples produced in eastern Algeria are contaminated with mycotoxigenic *Penicillium expansum* strains able to produce Patuline, which represents a real risk of mycotoxicosis caused by the ingestion of apples- based food contaminated by this mycotoxin.

Key words: *Penicillium expansum*, patulin, GC-MS, apples



AP-14: *In vitro* antimycotic activity of a *Pichia kluyveri* killer protein against spoilage yeasts

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Abstract

The control of spoilage yeasts in food and beverage manufacturing is managed mainly by using commercial chemical additives. However, some yeasts are resistant to many chemical preservatives. In this context, some recent studies proposed yeast killer proteins as novel compounds that could be used against food and beverage spoilage yeasts as an alternative to chemical preservatives. The present work aimed to purify and to characterize a novel killer toxin produced by a strain of *Pichia kluyveri* in order to study its *in vitro* activity against food and beverage spoilage yeasts and to check its efficacy in beverages.

In this study, the assay medium for checking killer activity was YEPG-MB agar (pH 4.5) using agar diffusion well bioassay method. The production of crude toxin by the killer strain was performed in YEPG broth medium (pH 4.0). The obtained toxin was applied to a gel filtration column and then analysed in SDS-PAGE. The minimum inhibitory concentrations MICs of the killer toxin was determined in flat-bottom 96-well microtiter plates by the microdilution method. Commercial pear juice and a soft drink were used for the evaluation of killer toxin activity and stability in beverages. Our results showed that the killer protein of *P. kluyveri* was active against food and beverage spoilage yeasts of the genera *Dekkera*, *Kluyveromyces*, *Pichia*, *Saccharomyces*, *Torulasporea*, *Wickerhamomyces* and *Zygosaccharomyces*. After purification by gel filtration chromatography the killer toxin revealed a molecular mass of 54 kDa with SDS-PAGE. MICs of purified toxin exhibited a high *in vitro* activity against *D. bruxellensis* and *S. cerevisiae*. The killer toxin exhibited a dose–response effect against *D. bruxellensis* and *S. cerevisiae* in a soft drink and fruit juice, respectively.

In conclusion, we suggest that *P. kluyveri* killer toxin could be a novel food-grade compound for the control of food and beverage spoilage yeasts.

Keywords: *Pichia kluyveri*, Killer protein, Antimycotic activity, *In vitro* susceptibility, Spoilage yeasts.



AP-15: Carob tree (*Ceratonia siliqua* L.) bioactive compounds characterization

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Subject description: The carob tree (*Ceratonia siliqua* L.) is an evergreen agro- forestry-pastoral species typical to the Mediterranean basin with significant socio-economic interests, mainly exploited for its fruit (pod) that has long served as a source for human and animal nutrition. Nowadays carob pulp which is a constituent of the fruit knows many applications in food industry including as a Cocoa substitute in various products and preparations.

Objectives: In this context and in the aim to highlight some of the biochemical compounds of carob pulp that might be at the origin of its nutritional value, we were interested in a quantitative and qualitative phytochemical characterization of carob pulp extract.

Methods: Carob pods are dried and decorticated of their seeds in order to obtain the pulp, and then ground into fine powder. Spectrophotometric assays to determine the Total flavonoids content according to the colorimetric methods using Aluminum trichloride and HPLC analysis for Quercetin quantification, were carried out on a methanolic extract of carob pulp powder prepared by maceration.

Results and discussion: The content of total flavonoids was found to be (11,26 U_g QE/Mg DE), and the HPLC analysis identified the presence of Quercetin in the pulp powder extract with (0.35 mg/ml) concentration. These bioactive compounds based on many advanced researches have proven to be of a great nutritional and biological importance as antioxidant, antiproliferative ...etc. agents.

Conclusion: Given the results of this current study we may justify the significant value of the carob tree by its variability in term of natural bioactive constituents and we may encourage its exploitation and application in food and different industries.

Keywords: Carob, pulp powder, HPLC, Spectrophotometry, Total flavonoids, Quercetin.



AP-16: Characterization of fungal proteases produced from organic waste

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Abstract

Protease is an enzyme that carries out the proteolysis of proteins. The global market for industrial enzyme sales exceeds 3 billion dollars, and proteases account for around 60% of total sales. This class of enzymes finds applications in waste treatment, bio-remediation processes, detergents and the leather industry. However, the search for microbial sources of proteases is arousing the curiosity of researchers, but fungal proteases remain the key tools of biotechnology and increasingly reflect the importance and infinite role of molds in different applications, presenting many advantages such as: substrate specificity, ease of genetic manipulation, stability under unfavorable conditions, separation of mycelium by simple filtration. The aim of this research work is to characterize the crude extract of fungal proteases in terms of temperature, PH, metal ions, substrate specificity, inhibitors and surfactants. Filamentous fungi were isolated from soil samples taken from various locations in the Adekar wilaya region of Bejaia. The strains identified and isolated were tested for their ability to produce proteases, then various waste products such as wheat bran, soybean meal, poultry feathers, orange peel and potato peel were tested by solid and submerged fermentation. Significant results were achieved with wheat bran, poultry feather and potato peel. Preliminary tests, however, were carried out on wheat bran, as the best yields were obtained with the latter. Experiments were carried out on two fungal strains A₀₅ et A₂₂. Thanks to the results of the enzymatic extract characterization, we were able to set a temperature of 45°C - 40°C respectively, and a pH of 7 for strain A₀₅ and 12 for strain A₂₂. Both stimulating and non-stimulating effects were recorded at metal ion level for the strains. With regard to substrate specificity, strong proteolytic activities were reported with casein for both filamentous fungi. Positive and negative effects were observed for inhibitors and surfactants.

Key words: Characterization, proteases, filamentous fungi, organic waste



AP-17: Effect of Vacuum Storage on the Shelf Life and Microbiological Quality of Gluten-Free Baguette

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Subject description: Gluten Free Breads are characterized by a shorter shelf life than wheat bread so maintaining the freshness and extending the shelf life of gluten-free bread is a crucial topic. Fungal development, staling, and moisture loss reduce the shelf life of baked goods.

Objectives: In order to reduce staling and increase shelf life, vacuum storage was performed on GFB baguette in this study.

Methods: To evaluate the quality of breads, technological (water, loss during baking, specific volume, color, texture) and microbiological analysis were performed. The GFB was stored for 21 days (analysis at 7, 14, and 21 days).

Results and discussion: During storage, GFB retains significantly more water than bread without storage. This shows that the storage of the bread under vacuum preserves its water content, which may affect the microbiological stability. For specific volume, results show that there is a stability between the 7th day and 21st day of storage. The appearance of GFB was more red and yellow, with a significant increase in the color comparing with bread vacuum storage. In terms of texture, the number of alveoli significantly lower ($p < 0.05$) for the GFB under vacuum, with rounder and circular alveoli. No significant difference in crust thickness was observed. Microbiological analysis confirmed the good stability and quality of GFB. Yeast and mold contamination appeared after the 15th day of vacuum storage so vacuum storage helped to prevent the growth of bacteria and mold, which can also contribute to staleness.

Conclusion: The results showed that vacuum packaging reduced moisture loss and slowed down the aging process. The results also indicated that the bread had a softer and more pleasant texture due to the lower moisture loss.

Keywords: under vacuum; staling; microbiological quality; texture; color



AP-18: Investigation of the Adsorption of Methylene Blue from aqueous solution by untreated pine tree bark: Kinetics and Equilibrium Analysis

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Subject description: The accumulation of synthetic dyes in the industrial effluent of several industrial sectors poses significant risks to both human health and the environment. Methylene blue (MB), a commonly employed dye, has been identified as one of the chemicals implicated in this context. The utilization of adsorption as a method for water treatment has proven to be highly efficient. However, due to the cost of the adsorbent material, there has been an increasing focus on investigating economically feasible and environmentally friendly sorbents. This necessitates the exploration of locally accessible alternative resources, including organic materials and agricultural wastes.

Objectives: This study aims to explore the potential of untreated pine tree bark (UPTB), an abundant agricultural waste in Algeria, as an adsorbent for removing methylene blue (MB) from aqueous solutions commonly used in various industries. The study seeks to investigate the adsorption kinetics and isotherm models to understand the mechanism of adsorption, and to evaluate the feasibility of utilizing untreated pine tree bark as a cost-effective and sustainable adsorbent for methylene blue removal.

Methods: The effects of initial dye concentration, contact time, adsorbent dosage, pH and temperature were investigated and optimized for maximum dye recovery during the batch mode experiment. A variety of MB concentrations were studied at initial values of 15-150 mg/L. Various pH values were evaluated, the adsorption temperatures of the adsorbent used were changed at 25-55 °C to assess the efficiency of MB removal by the agricultural waste. The investigation focused on the reaction kinetics of the process and the examination of Langmuir and Freundlich adsorption isotherms.

Results and discussion: The results indicate that approximately 60 minutes of contact time is sufficient for the adsorption of MB to reach equilibrium. The highest percentage of MB removal achieved was 99%. The experimental data fitted well with the pseudo-second-order kinetic model. The MB adsorption onto UPTB fit well with the Freundlich isotherm model. The maximum MB uptake capacity of the UPTB adsorbent was 35.36 mg/g.

Conclusion: The findings of this study suggest that utilizing untreated pine bark tree could be a promising, effective, and cost-efficient approach for removing methylene blue from aqueous solutions. This highlights the potential of agricultural waste materials in developing sustainable solutions for treating industrial waste, with the aim of protecting the environment and promoting efficiency.

Keywords: untreated pine tree bark 1, methylene blue 2, adsorption 3, kinetic 4, isotherm 5.



AP-19: Enzymatic activities of the different pumpkin cultivars from Algeria

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Abstract

Pumpkin is a healthy, versatile vegetable that's loaded with a variety of nutrients, including fiber, vitamins, minerals, and antioxidants. Most of the health benefits of pumpkin are focused on its fiber content and micronutrients, including beta carotene and vitamin A.

The enzymatic inhibition activity of dry samples was performed on three raw cultivars that are popular in Algeria: V1 *Cucurbita maxima* (Gold nugget Pumpkin), V2 *Cucurbita moschata* (Butternut Squash), and V3 *Cucurbita moschata* (Musquée de Provençal Squash), by using various fruit parts (peel, pulp, fibers, and seeds).

The enzymatic inhibition activities were evaluated by three methods: Phenanthroline assay, α -amylase inhibition and antibrowning assay.

The results showed considerable differences in the enzymatic inhibition activities amongst the cultivars and the fruit parts. The internal part of the pumpkin fruit (seeds) is the one that revealed the lowest IC50 and the *Cucurbita moschata* (butternut squash) cultivar is the best in terms of the recorded activities.

Key Words: Pumpkin cultivars, enzymatic activity, phenanthroline assay, α -amylase inhibition, antibrowning assay, fruit parts.



AP-20: Effet des métabolites bactériens des bactéries lactiques isolées à partir des nauplius d'*Artémia* sp sur les vibrios provoquant la mortalité des juvéniles des poissons d'élevage.

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Objectifs : Utilisation des métabolites des bactéries lactiques isolées à partir des *Artémia* (exactement les nauplius) prisent des deux lacs celle de Bethioua Oran et lac d'Oued Eldjemaa Relizane dans le traitement des eaux d'élevage des juvéniles des poissons alimenté par les nauplius de ce crustacé.

Méthodes : Isolement des bactéries lactiques à partir des nauplius de l'artémia, faire un dénombrement des germes pathogènes généralement sont des vibrios qui sont en accès le moment de l'éclosion des cystes d'artémia et qui provoque une mortalité chez les alevins des poissons d'élevage.

Résultats & discussion : Certains isolats lactiques ont un effet important sur les vibrios prise le moment de l'éclosion des cystes, ces dernier leur nombre diminue à chaque qu'on ajoute une quantité d'une solution bactérienne.

Conclusion : Le traitement biologique des alevins des poissons d'élevage pourrait être facile dans une station aquacole contenant des éclosiers des nauplius de l'artémia

Mots clés : Bactéries lactiques, poissons d'élevage, métabolites, vibrio.



AP-21: The Crucial Importance of Rapid and Effective Fire Blight Detection

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Abstract

Fire blight is a highly contagious bacterial disease that poses a significant threat to Algeria's agricultural sector, particularly fruit trees like apples and pears. unchecked spread of fire blight can devastate entire orchards and spread from one orchard to another, potentially causing regional epidemics with far-reaching consequences for the national economy. Moreover, unchecked fire blight often leads to indiscriminate use of antibiotics and harmful chemical treatments, negatively impacting the environment and human health.

Effective and rapid detection methods of infected trees is crucial to minimize economic losses and protect the livelihoods of countless fruit cultivators and the entire agricultural sector and aligning with Algeria's commitment to sustainable agriculture and providing a proactive solution to this contagious bacterial threat.

To achieve rapid and effective fire blight detection in Algeria's agricultural sector, substantial investments in cutting-edge technologies are necessary. Here we discuss Modern diagnostic tools such as PCR tests which can significantly expedite the identification of infected trees. Rapid diagnostic tests enable the quick identification of fire blight bacteria or their genetic material in plant samples. Once detected, farmers and agricultural authorities can take timely action to quarantine infected plants, apply appropriate treatments, and implement control measures to prevent further dissemination.

In conclusion, the vital importance of rapid and effective fire blight detection in Algeria's agricultural sector cannot be overstated. It impacts the economy, food security, and sustainability of the nation's agricultural industry.

Keywords: fire blight, *Erwinia amylovora*, Diagnostic



AP-22: One-Step Chemiluminescent Assay for Hydrogen Peroxide Analysis in Water

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Subject description: In the recent decades, biosensors have emerged as valuable tools in various fields: healthcare, environmental monitoring, food safety, agriculture, and biosecurity. In this context, the detection of hydrogen peroxide is of great importance in the environmental field.

Objectives: In this work, we aim to develop a simple, and rapid, nonenzymatic and homogeneous biosensor for sensitive and rapid quantification of hydrogen peroxide.

Methods: In this technique, hemoglobin was used as a bioreceptor, where heme groups act as electroactive centers to catalyze hydrogen peroxide reduction. The chemiluminescence reagent; luminol is also a peroxidase substrate and can be oxidized by hemoglobin thus generating a CL signal. The working principle was based on the competition between hydrogen peroxide and luminol towards hemoglobin. A 96-well microplate was used to perform this assay. For that, 25 μL of Hb solution ($3 \mu\text{g mL}^{-1}$) was added to each well, followed by 25 μL of different concentrations of H_2O_2 . After incubation, 25 μL of luminol solution was also added. Then, the chemiluminescence intensity was measured at an emission wavelength of 425 nm.

Results and discussion: The detection principle is mainly based on the chemiluminescence signal diminution in the presence of H_2O_2 . Because this latter will react with Hb that is essential for luminol reaction, thus leading to a lower chemiluminescence signal. Also Under optimized conditions, the chemiluminescent signal decreased with increasing hydrogen peroxide concentrations within the linear range of 0.5 to 12 mM, with a correlation coefficient R^2 of 0.99762. The limit of detection was calculated to be as low as 0.308 mM. The selectivity of the biosensor was successfully demonstrated against different interferents.

Conclusion: In this work, an homogenous chemiluminescent assay was developed using Hb as a bioreceptor. The developed strategy provides a one step, simple, and low-cost bioanalytical method which can be applied for the monitoring of hydrogen peroxide.

Keywords: chemiluminescence; hydrogen peroxide; hemoglobin; one-step analysis; environmental monitoring.



AP-23: Caractérisation environnementale des métaux lourds issus des rejets phosphatiers de Djbel Onek, Tébessa – Algérie

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Resumé

Dans l'industrie minière, tous les procédés de séparation et d'enrichissement génèrent non seulement un concentré riche de l'espèce minérale, mais aussi une quantité importante des rejets sous forme de liquide ou de solide. Leur stockage à l'air libre dans des parcs à résidus peuvent provoquer plusieurs impacts environnementaux.

Les métaux lourds sont les micropolluants métalliques qui peuvent contaminer l'environnement. Ces derniers constituent un problème préoccupant lorsqu'ils sont impliqués dans la pollution de l'eau et le sol, leur toxicité peut être forte dommageable pour le milieu, mais leur accumulation au fil de la chaîne alimentaire pourrait avoir des effets néfastes sur la santé humaine, la faune et la flore.

Notre travail porte sur la caractérisation des rejets phosphatiers de Djbel Onek, Tébessa – Algérie qui confirme une contamination des sols et des plantes de la région essentiellement par le Pb, Zn et Cd. L'évaluation des risques liés aux métaux lourds a montré que les phosphates bruts et leurs rejets miniers produisent des éléments traces métalliques ETM dangereux dépassant les normes pour les sols (par exemple, U, Cd, Cr, Mo, V et Tl). Par conséquent, en raison de l'exposition aux rejets miniers et de la mobilisation des particules les plus fines par le vent et les pluies, ces métaux dangereux pourraient avoir des effets néfastes sur l'environnement et la santé humaine.

Mots Clés: Industrie minière, Rejets miniers, Métaux lourds, Impacts environnementaux, Toxicité.



AP-24: Characterization of the Trypsin Protease Gene from *plantarum* VF3

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Subject description: Trypsin protease is a crucial enzyme with diverse applications across various industries, including food, pharmaceuticals, and biotechnology. While extensively studied in eukaryotes, the trypsin from *Lactobacillus plantarum* VF3 presents intriguing differences in its structural and functional properties.

Objectives: This study aims to identify and characterize the gene encoding trypsin protease in *L. Plantarum* VF3, highlighting its distinct enzymatic features.

Methods: The *L. plantarum* VF3 strain, isolated from cow milk, was identified using the 16S rRNA gene method. Specific primers were employed for PCR analysis of the *tlp* gene, and the resulting products were sequenced using the BigDye™ Terminator v3.1 Cycle Sequencing Kit. The I-TASSER server was utilized for protein structure prediction and functional analysis.

Results and discussion: The investigation confirmed the presence of the *tlp* gene within the genome of *L. plantarum* VF3, highlighting a notable difference in its amino acid sequence compared to human trypsin. This divergence in sequence correlates with distinct catalytic properties, where *Lactobacillus* trypsin displays enhanced specificity for substrates. These findings emphasize the distinctiveness of *L. plantarum* VF3 trypsin in its potential applications within the biotechnology and food industries, paving the way for novel enzymatic solutions with tailored properties.

Conclusion: This study elucidates trypsin protease's genetic basis and distinctive characteristics in *L. plantarum* VF3. The observed differences in sequence and catalytic properties compared to eukaryotic trypsin open exciting possibilities for exploiting this enzyme in various industrial applications, ranging from food processing to biotechnology. Further research in harnessing these unique features promises innovative solutions in enzyme technology.

Keywords: Trypsin, *Lactobacillus plantarum*, 16S rRNA, PCR, I-TASSER, enzymetechnology.



Oral Communication: Bioinformatics

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BO-01 : Docking of nitrovinylfuran derivatives against SARS CoV-2 main protease for the treatment of covid-19

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Subject description: Covid-19 has become one of the most known pandemics in the world wide, it was appeared in late of December 2019 from Wuhan city of China. The research to fight covid19 is ongoing without finding any efficient treatment still now.

Objectives: This work aims to identify new anticovid19 agents by a virtual screening of the nitrovinylfuran derivatives as new inhibitors of the SARS CoV-2 main protease (Mpro), implicated in the replication of the virus.

Methods: A set of nitrovinylfuran derivatives were docked in the structure of Mpro (downloaded from PDB), and then filtered according to their good ADME-T profile using two web servers.

Results and discussion: Two nitrovinylfuran derivatives PubChem-57392921 and PubChem-88580143 showed good interaction energy scores with the binding site of SARS CoV-2 Mpro. In addition, they were found having good pharmacokinetic properties and a low toxicity.

Conclusion: Our research proposed two nitrovinylfuran derivatives as potential inhibitors of SARS CoV2 Mpro, other practical investigations on the nitrovinylfuran derivatives could enrich the treatment of covid19 by new antiviral agents.

Keywords: Covid-19, SARS CoV-2 main protease (Mpro), virtual screening, ADME-T profile.

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Poster Communications: Bioinformatics

**VBRRB'23
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BP-01: Artificial Intelligence-Based Classification of Cereal Species Using ITS Sequences

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Subject description: This study explores the application of artificial intelligence (AI) in classifying cereal species by utilizing Internal Transcribed Spacer (ITS) sequences. Cereals like wheat, barley, oats, and rice are vital components of global agriculture, making accurate classification crucial for crop management and genetic research.

Objectives: The primary objective of this research is to utilize AI techniques for precise cereal species classification based on ITS sequences. We aimed to:

- Develop a machine-learning model using the Random Forest classifier (RF).
- Evaluate the model's accuracy in predicting cereals based on ITS sequences.

Methods: Morphological characteristics of cereal species were analyzed to establish initial parameters. ITS sequences were collected and aligned. A Random Forest classifier was employed to build a classification model. The model was rigorously tested and its accuracy assessed.

Results and discussion: The developed AI model achieved an exceptional accuracy rate of 98% in predicting the genera of cereals based on ITS sequences. This indicates the capability of AI in discriminating between closely related species, such as different cereal genera. Such precision can significantly benefit agriculture by aiding in crop management and breeding programs.

Conclusion: This study highlights the potential of AI in cereal species classification. The high accuracy achieved proves its practicality for real-world applications. Moreover, this research contributes to a better understanding of cereal diversity, which is vital for ensuring global food security.

Keywords: Artificial Intelligence, Cereal Species Classification, Internal Transcribed Spacer (ITS), Random Forest Classifier (RF), Genetic Diversity



BP-02: Artificial intelligence annotation of gene variants linked to rare

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Subject description: Rare diseases, also referred to as orphan diseases, are medical conditions characterized by their low prevalence within a specific population (generally 1 in 10,000).

The rarity of these diseases presents challenges in terms of accurate diagnosis, availability of effective treatments, and adequate research funding. These conditions encompass a diverse range of complex disorders caused by genetic mutations.

Artificial intelligence (AI) plays a vital role in rare disease annotation using its data analysis, pattern recognition and knowledge integration capabilities

Objectives: Develop or use an AI-powered tool to accurately annotate and prioritize genetic variants associated with a particular rare disease, aiding researchers, clinicians, and geneticists in understanding the disease's genetic basis and potential treatment options.

Methods: Collect and integrate relevant genetic databases, medical literature, and clinical trial data related to the specific rare disease.

Implement machine learning algorithms to identify and classify genetic variants from patient data and reference genomes

Results and discussion: The use of these tools accelerates the identification and prioritization of relevant genetic variants, reducing the time needed for manual analysis.

Conclusion: Having observed the positive outcomes resulting from the use of AI approach, it prompts us to develop our work further and try to create an advanced AI solution that significantly contributes to annotating genetic variants responsible for specific rare diseases.

Keywords: Artificial intelligence, Rare diseases, Genetic database.



BP-03: The effect of Y chromosome microdeletions in male infertility by using artificial intelligence

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Subject description: The couple's infertility has been proclaimed by the WHO as a pathology in its own right. It is currently accepted that 15 to 20% of couples will consult at some point for a difficulties to conceiving.

The Y-chromosome (**Yq**), known to contain repetitive sequences with different sizes, genomic structures, contents and evolutionary trajectories regarding other chromosomes. The Y chromosome is play a great importance for the development and function of the testes without forgetting that the genes of the Yq are also involved in the occurrence of cancers of thereproductive system.

The SSR are highly informative simple sequence repeat mapped to specific human Y chromosome. The polymorphisms of SSR are suitable for application in linkage studies and men infertility.

Objectives: We will developing a Python program based on artificial intelligence (**AI**) used for finding Yq SSR disorder, which can explain men infertility.

Methods: In the first place, we collect the necessary data from the public databases, through which the model is being trained to make it able to predict the impact of the SSR in male infertility.

Results and discussion: From the initial results obtained, it appears that the prevalence of a small deletion of the Y chromosome in infertile men varies from one genome to another, depending on the population and country, as well as with some genetic sequencing problems.

Conclusion: The results obtained, which are considered acceptable largely, after studying the sensitivity and specificity of our program with its available counterparts, prompt us to complete more developmental steps to be more robustness and effective.

Keywords: Artificial intelligence, Male infertility, SSR, Y-chromosome.



BP-04: An automatic system for diabetes and thyroid screening

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Abstract

Screening is the first step in detecting the presence of a disease at an early stage in people who are apparently healthy and who do not yet show any apparent symptoms. Screening has become more faster and automatic thanks to the use of Bioinformatics. This later is a set of IT resources (hardware and software) and artificial intelligence techniques for the automatic processing of biological data.

This project presents an automatic screening system for the two autoimmune diseases diabetes and thyroid in order to self-diagnose diseases as soon as possible in order to treat it quickly and thus slow down or stop its progression. We have choosing these two diseases for several reasons; Diabetes is one of the most common autoimmune diseases today. In addition, this disease increases the risk of developing other diseases such as Hashimoto's thyroiditis.

Our system is an inference engine composed of three different complementary modules, a fact base and a knowledge base. It is fully implemented in JAVA programming language using php Myadmin as a database system.

Our system is based on an epidemiological study established on diabetic and Hashimoto's thyroiditis patients.

Key words: Bioinformatics, artificial intelligence, screening, diabetes, thyroid.



BP-05: In vitro biological activity and molecular docking study of *Ammadaucus leucotrichus*

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Abstract

One plant species from Algeria's Saharan region, *Ammadaucus leucotrichus*, is well recognized for its use in traditional medicine. Gas chromatography-mass spectrometry (GC-MS) was used in the current work to examine methanol extracts of *A. leucotrichus* in order to identify significant functional groups and phytochemical constituents. With an IC₅₀ of 966.48 ± 9.95 µg/ml, GC-MS analysis of the methanol extract of *A. leucotrichus* revealed the presence of 62 phytochemical components and shown impressive anti-inflammatory activity. These 62 substances were then examined for their bioactivity using in silico molecular docking techniques. The findings showed that one of the discovered phytochemical compounds may have trypsin inhibiting action.

Keywords: GC_MS- anti-inflammatory -in silico-molecular docking- trypsin.



BP-06: Metagenomics: A strategy to study complex microbiota

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Abstract

The development of genome-sequencing technologies, especially the application of next-generation sequencing (NGS), has accelerated the study of complex microbiota.

Metagenomics plays a crucial role in expanding our knowledge of the microbial world, has numerous applications across various fields, and holds the potential to address pressing global challenges in health, the environment, and biotechnology.

This new approach has the potential to uncover novel enzymes, pathways, and molecules with industrial applications. Furthermore, by analyzing metagenomic data, researchers can identify new natural products with therapeutic potential. Many antibiotics, antivirals, and other pharmaceuticals have been discovered through metagenomic approaches.

This work is intended to introduce different research methods to study complex microbiota, with a specific focus on the current progress and application of metagenomics.

We discuss here computer programs used in metagenomics such as MEGAN, Kraken and MePIC that allow analysis of large data sets by a single scientist.

We also highlight the necessity to begin studying complex infections using metagenomics approach, which is essential for better understand the host–bacterial interactions.

Keywords: Metagenomics, microbiota, next-generation, bioinformatic



BP-07: The application of machine learning techniques in rare diseases.

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Subject description: Emerging machine learning (ML) techniques have the potential to greatly improve rare disease (RDs) research and treatment. The use of artificial intelligence (AI) technologies can be especially advantageous for the study of RDs, which are a diverse group of diseases that impact a small percentage of the whole population and significantly underrepresented in basic and clinical research. The difficulties faced by RDs (such as small patient population, geographical dispersion, low diagnostic rates, etc.) can be overcome by using ML techniques.

Objectives: This review aims to highlight the accomplishments of AI algorithms in the study of rare diseases and to guide researchers on which strategies have proven to be the most beneficial.

Methods: The study will focus on a few rare diseases. The Orphanet categorization was used, and only RDs with Orpha codes were considered. And will look at which AI methodologies have been most successful in their research.

Results and discussion: ML techniques demonstrate that no single strategy excels universally; success is dependent on unique tasks and resources. The complexity, interpretability, and data requirements of models differ. While deep learning can capture complicated patterns, it may be difficult to interpret, as opposed to simpler models such as logistic regression. There is a clear trade-off between model complexity and performance. Ensemble learning, like random forests, is resistant to noisy data. Deep learning necessitates enormous computational resources. Tuning hyperparameters is crucial, and technique selection should be guided by domain-specific factors.

Conclusion: In conclusion, from the standpoint of precision medicine, AI algorithms can help to design individualized treatment plans by finding biomarkers linked with a specific rare disease. AI systems that discover, forecast, and classify mutations can advance RDs diagnosis, raising these figures and uncovering new disease causes and therapeutic targets.

The AI-mediated knowledge of RDs could considerably accelerate therapeutic development.

Keywords: artificial intelligence; machine learning; rare diseases; diagnosis; precision medicine.



BP-08: Exploring the Impact of Some Parameters and Their Interactions on the MAFFT MSA Tool Using the Design of Experiments

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Abstract

Multiple Sequence Alignment (MSA) is essential in bioinformatics for identifying conserved regions and evolutionary relationships among biological sequences. Due to its efficiency and precision, the MAFFT algorithm is a popular tool for conducting MSA. However, the effect of numerous parameters and their interactions on some performance metrics remains relatively underexplored.

In this study, we investigate the effects and interactions of four important parameters: number of sequences, sequence length, insertion rate, and deletion rate, on four performance metrics of the MAFFT tool.

By generating a diverse dataset of biological sequences, we carried out a comprehensive analysis of MAFFT's performance in terms of Sum of Pairs Score (SPS), Column Score (CS), and Delay. Through a series of controlled experiments using the design of experiments, we assessed the impact of parameters' variation and their interactions on these performance metrics.

Our findings indicate that the considered parameters and their interactions significantly influence the MAFFT's performance across all the metrics. Specifically, the most influential parameter in terms of SPS and CS quality is the number of sequences. However, the sequence length parameter has a greater impact on the delay metric. Additionally, insertion and deletion rates, has a relatively lower impact on all alignment quality metrics.

These results emphasize the importance of parameter impact and their interactions on the MAFFT tool. The study provides insights into the interplay between MAFFT's parameter settings and its performance, enabling researchers and practitioners to make informed decisions when applying the tool to biological sequence alignment tasks.

Keywords: Multiple Sequence Alignment, MAFFT, Parameter interaction, Performance metrics, Design of experiments



BP-09: Decoding the Genome: Advancing Anomaly Detection through Machine Learning

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Subject description: This presentation explores the fusion of genomic analysis and machine learning with the aim of revolutionizing anomaly detection in genetics. This advancement is seen as propelling precision medicine and enhancing advanced diagnostics.

Objectives: The objectives include the investigation of the application of machine learning in the detection of genetic anomalies. This aims to elucidate its potential in early disease identification and the provision of personalized healthcare.

Methods: The presentation begins with an introduction to genomics, highlighting the necessity of artificial intelligence in dealing with the vast amount of genomic big data. It then proceeds to delve into various machine learning tools, such as DeepVariant, VarSome Clinical, and Deep SEA. Throughout this exploration, the presentation unveils the data sources, predictive capabilities, and the profound impact these tools have on the interpretation of genomics.

Results and discussion: During this segment, it is demonstrated that by harnessing the prowess of artificial intelligence, enhanced accuracy in the identification of genetic anomalies can be showcased. This results in the faster analysis of vast genomic datasets, opening the door to potential groundbreaking biomedical discoveries.

Conclusion: In conclusion, the amalgamation of genomics and machine learning heralds a paradigm shift in the domains of disease detection and treatment, ushering in a new era characterized by tailored healthcare.

Keywords: Genomic Anomalies, Machine Learning, Precision Medicine, Early Disease Detection, Genomic Interpretation

