



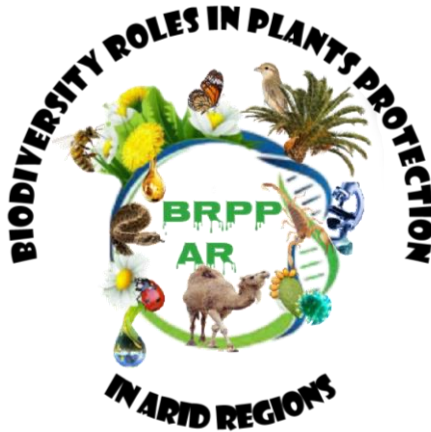
People's Democratic Republic of Algeria

The Ministry of Higher Education and Scientific Research

Scientific and Technical Research Center on Arid Regions

CRSTRA-Bsirka

# Abstract book



**1st International Webinar**

**Biodiversity Roles in Plants Protection in Arid Regions**

# BRPP-AR

**October 18-19th 2023**



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# Welcoming

Bismillah; hamdoullah wa salat wa salam ala rassoullileh (MSAS)

Salam Alaykum everyone

Warm greetings for the day, ladies and gentleman in the " Scientific and Technical Research Center on Arid Regions in Biskra " Queen of the Ziban "

On behalf of the Organizers; it gives me immense pleasure to extend a warm welcome to you all to the 1<sup>st</sup> International Webinar on Biodiversity Roles in Plant Protection in Arid Regions. We are extremely glad to greet every one of you: professors, researchers and participants from different institutions, universities and countries.

Special thanks are extended to speakers online from Jordan, Egypt, Tunisia, France and Malaysia, to my professors from Iraq Italy and Algeria (Ouargla and Biskra), and my colleagues from; Russia, Palestine, Iraq, Egypt, Tunisia ...Thank you so much for joining us.

We hope that this two-days meeting will be close to your expectations and an opportunity to discuss issues of mutual interest to share knowledge and insights

I would keep it short to say how grateful we are to you, for being present here to convene this meeting related biodiversity



# Introduction

**B**iodiversity encompasses all the genes, species, and ecosystems within a specific region and their interactions. Their potential represents a vast, largely unexplored realm of immense value, with its greatest worth lying in the opportunities it offers humanity to adapt to both local and global changes. We inhabit landscapes that have been significantly altered by human activity, whether in natural towns or urban areas. Even those living in cities rely on food supplies from nearby villages, which, in turn, depend on natural landscapes such as forests, grasslands, rivers, and coastlines for essential resources, medicinal plants, agricultural water, firewood, fodder and fish. Consequently, our daily lives are interconnected with our environment, and our actions inevitably impact it. We use water for drinking and various everyday tasks, breathe air, consume resources for food, and rely on the diverse community of plants and animals that create a web of life of which we are an integral part. Everything around us constitutes our environment, and our well-being hinges on maintaining its vital systems.

As part of Algeria's contribution to the United Nations Conference on Sustainable Development, several conservation actions have been addressed, the first being the conservation of biodiversity in arid and Saharan areas (850,000 ha), the protection and conservation of fragile ecosystems concerning the classification of wetlands (50 Ramsar sites), and the conservation of wildlife species and endemic species of the Saharan regions (such as Argan and Pistachio trees and other animals and insect species). In 2014, 13,318 species have been recorded in Algeria, including 4,250 marine species and 9,068 terrestrial species. Under the Convention on Biological Diversity (CBD) and according to Algeria's fifth national report in 2014, the total biodiversity in Algeria includes 895 protists comprising bacteria, protozoa, higher fungi, and actinomycetes; 4,185 algae, lichens, mosses, and seed plants; and vertebrates (fish, amphibians, reptiles, birds, mammals) representing 651 species. Insects and other invertebrates' number 3,337 that have an important role in plants protection and also to ensure pollination for multiplication and better production.

Thus, environmental studies highlight the crucial need for protecting and conserving our surroundings. Currently, many environmental issues are increasing in both scale and complexity, posing a significant threat to life on Earth.

Scientific meetings, exhibitions and discussions play a key role in delivering an updated assessment of ecosystem health and the advancements made in bioresource valorisation as well as developing new eco-friendly techniques for conserving ecosystems and their components.



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**Dr. DEGHICHE-DIAB  
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# Conferences



**Dr. Deghiche Diab Nacima**

Importance of biodiversity



**Pr. Jboory Ibrahim**

Highlights on the date palm pests and some IPM tools to manage them.



**Pr. Ahmed Hussein**

Risk assessment and pest behavior modelling.



**Pr. Braham Mohamed**

Monitoring the Mediterranean fruit fly, *Ceratitidis capitata*, toward the use of electronic traps.



**Dr. Guelmami Anis**

Zones humides méditerranéennes et développement agricole



**Dr. Mohamad Nor Azra Md Adib**

World's worst invasive species under changing climate



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# Plenaries

## IMPORTANCE OF BIODIVERSITY

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### Abstract

Biodiversity is the fruit of billion years of evolution, shaped by natural processes and increasingly by the influence of humans. It maintains and enhances multiple ecosystem functions such as primary production, decomposition, nutrient cycling and trophic interactions that support a range of ecosystem services. Humans use at least 40,000 species of plants and animals on a daily basis. Many people around the world still depend on wild species for most of their needs like food, shelter and clothing. Due to the rising global demand for food, biodiversity has been significantly altered. The net result of biodiversity simplification for agricultural purposes is an artificial ecosystem that requires constant human intervention. In Algeria, agricultural production faces major constraints in terms of land availability, as well as climatic, technical and practical factors. The main threats to biodiversity are driven by human activity and include the destruction or overexploitation of biological resources, extension of cultivated areas, urbanization and infrastructure development, pollution, tourism and hunting. Increased pressure on biodiversity is compounded by the effects of climate change. Producing food and non-food crops for a growing world population, while protecting and enhancing precious biodiversity resources is an important global challenge. All agricultural activities are a human invention to provide for people's needs. Conversion of land for agriculture therefore needs careful considerations to conserve biodiversity and to optimise agricultural production. In this context, it is necessary to consider the wider environmental landscape as a whole, and not just the "farm" or the "protected area" as separate entities.

**Keywords :** *Biodiversity, services, climate changes, human intervention, threats.*

## MONITORING THE MEDITERRANEAN FRUIT FLY, *CERATITIS CAPITATA*, TOWARD THE USE OF ELECTRONIC TRAPS

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### Abstract

The Mediterranean fruit fly, *Ceratitidis capitata* is the most economically important insect pest in Tunisia, causing significant fruit damage to soft fruits (e.g., citrus, stone fruits, pomegranates, figs, etc). Climatic conditions and diverse local cultivated and wild fruit species permitted the presence and infestation of the insect all year-round challenging its control, since formerly effective broad-spectrum and systemic-acting insecticides, mainly organophosphates and carbamates, were removed from the market. To decide when and how to control the insect, surveillance programs using a grid of traps are used. In general, in the best of cases, monitoring systems are serviced on a weekly-fortnightly interval, while most surveillance systems have longer delays in their frequency of service. Most of these surveillance systems are highly demanding in terms of investment in large amounts of resources and effort. The research project FruitFlynet- ii, financed by the ENI CBC MED program, was implemented in 2021 in order to develop smart techniques to monitor the MedFly and to electronically guide the insecticide sprays in peach orchards. This paper will present the concept of orchard digitization, the use of electronic traps and the establishment of the Decision Support System to control the insect. Thus, 25 traps (11 electronic traps and 14 conventional ones) were set up in an 18-hectare peach orchard in March 2023, baited with the male attractant, Trimedlure. Orchards and trees were digitized using Google satellite imagery and the open-source software, Qgis. Climatic data, harvesting times, cultivar risk according to phenological stages, and risk related to fly catches were collected. Sticky plates were photographed using Android smartphones, and captured adults were counted at a weekly interval. The effectiveness of electronic traps versus conventional ones was assessed and discussed.

**Keywords:** *electronic traps, field digitization, Ceratitidis capitata, Decision Support System, Peaches*

# Topic 1

## Biodiversity in ecosystems and agro-ecosystems

1st day : October 18th, 2023

Session President: Pr. Babahani S.

Moderators: Dr. Menasria , Pr. Saifi, Pr. Halis, Pr. Benaissa

### BIODIVERSITE DE LAMESO-FAUNE DE LA LITIERE DE PINUS HALEPENSIS DJEBEL BOUDJABER (EL MERIDJ- TEBESSA)

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#### Résumé

Le Pin d'Alep est une essence du genre *Pinus*, et du sous-groupe *halepensis*, il est un arbre vivace à feuilles persistantes qui atteint des hauteurs de 20 mètres, pousse à basse altitude dans les régions arides et semi-arides. Cette étude est réalisée à Djebel Boudjaber (El Meridj, Tébessa) au cours de la période Février -Mai 2023, La méthodologie consiste à récupérer la litière de *Pinus halepensis*, de cinq (05) stations choisies selon le gradient altitudinal de la placer dans l'extracteur de Berlese-Tullgren pour extraire les spécimens, qui sont identifiés puis comptabilisés. Les résultats obtenus ont montré la présence de 02 embranchements, Arthropoda et Mollusca qui regroupent 06 classes, 16 ordres, 38 familles et 52 espèces. L'embranchement le plus diversifié est: Arthropoda qui comprend 05 classes, la classe la plus

diversifiée est : Arachnida qui regroupe 07 ordres et l'ordre le plus diversifié est Trombidiforma qui compte 06 familles, et les familles les plus diversifiées sont *Hypogastruridae* et *Entomobryidae* avec chacune 3 espèces comme *Ceratophys ellagibbosa* et *Entomobrya multifasciata*. La plus grande richesse spécifique est constatée dans la station 02 (23 espèces), et la plus faible richesse dans la station 01 (10 espèces). Une seule espèce est commune entre dans les 5 stations *Rhizoglyphus sp.*, alors que d'autres sont spécifiques aux différentes stations comme *Pseudachorutes* (station 1) et *Ctenes sp* (station 2). La conclusion est que la méso- faune associée à la litière de *Pinus halepensis* est riche et que le facteur altitudinal agit positivement sur la richesse spécifique dans ce site.

**Mots-clés:** Méso-faune, litière, Altitude, *Pinus halepensis*, Djebel Boudjaber

### IMPACTS OF CLIMATE CHANGE ON ALGERIAN STEPPE PLANT COMMUNITIES: MODELING FUTURE DISTRIBUTIONS AND ASSESSING BIODIVERSITY CONSEQUENCES

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### Abstract:

As climate changes intensify, the plant species in the Algerian steppe respond diversely, with some experiencing reductions in distribution, others expanding, and some remaining stable. These distributional shifts have critical implications for species richness and composition, necessitating a comprehensive understanding and evaluation to guide management and conservation efforts for the Algerian steppe in the face of climate change. This study models the current and future distributions of 66 species across 830 sites, considering climatic factors, topographic moisture index, soil type, and occupation. Employing a consensus-based approach with seven statistical models, including the Hadley Centre Global Environmental Model (HADGEM-ES) and Representative Concentration Pathway (RCP 8.5) scenario, we quantify future species distribution changes and assess climate impacts on species distribution, richness, and composition by 2080. Results reveal a substantial (-65.38%) reduction in the distribution of thermophilic species, while tolerant or warm-preference species expand (65.21%). Species richness in the northern region is expected to increase significantly, while the southern region remains relatively stable. An approximately 52% shift in assemblage composition in the northern region is evident. Findings highlight varying responses of species based on thermal preferences, with some confined to refuges and others expanding their distribution. These changes are expected to reorganize assemblages and impact local diversity. This initial assessment guides biodiversity conservation and long-term management plans for the Algerian steppe by employing diversity measures and spatial planning tools to identify critical areas.

**Keywords:** *Climate change, Algerian steppe, species modeling, species richness, biodiversity.*

## INVERTEBRATE SOIL DIVERSITY: THEIR FOOD WEB INTERACTIONS, THE CURRENT FINDINGS AND FUTURE PROSPECTIVE

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### Abstract

Egypt is one of the underrepresented regions in the global soil biodiversity initiative. However, a huge number of studies have investigated different taxa of invertebrates individually. Yet, few data have carried out the diversity, distribution, food web interactions, and biogeographical modelling of soil invertebrates in the Egyptian Agro-ecosystems. In this presentation, we are targeting to *i*) present the achieved findings and *ii*) suggest the prospective soil biodiversity food webs in both national and regional Agro-ecosystems. Briefly, our findings, which are currently under publication, have investigated the arthropod-plant interactions in organic ecosystems and in controlled Rose ecosystems. Recently, our ongoing project has been studying the invertebrate communities in different Agro-ecosystems in a newly reclaimed Agro-ecosystem. In conclusion, we find that alpha, beta, and gamma diversity indices would increasingly impact biological and/or integrated pest

management tactics and other agricultural decision-making processes.

**Keywords:** *Arthropod-Arthropod interactions, Arthropod-Plant interactions, Mediterranean basin, Meso-invertebrates, Micro-invertebrates, Species richness.*

## UTILISATION DES SOLUTIONS FONDEES SUR LA NATURE POUR LA RESTAURATION ET LA PRESERVATION DES ECOSYSTEMES : CAS D'UNE STEPPE ARBOREE DE DJELFA (ALGER).

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### Résumé

Dans le cadre des efforts déployés pour restaurer les écosystèmes pr-éforestiers de la wilaya de Djelfa, notre étude propose une approche innovante, axée sur des solutions naturelles (solutions fondées sur la nature ou Sfn). Plutôt que de se tourner vers des interventions artificielles, nous préconisons de revenir à la nature elle-même, en exploitant ses mécanismes innés de réparation et de régénération. Au cœur de cette approche se trouve la plantation d'espèces endémiques et bien adaptées à la région de Djelfa. Ces espèces comprennent le Pin d'Alep (*Pinus halepensis*), le Chêne vert (*Quercus ilex*), le Romarin (*Rosmarinus officinalis*), et l'Armoise blanche (*Artemisia herba-alba*). Ces arbres et plantes ont été choisis non seulement pour leur capacité à prospérer dans le climat et le sol de Djelfa, mais aussi pour les services écosystémiques qu'ils offrent, tels que la prévention de l'érosion, l'offre d'habitats pour la faune locale, et le renforcement de la biodiversité. Mais la singularité de notre approche ne réside pas uniquement dans le choix des plantes. Nous intégrons également des techniques agricoles modernes pour renforcer la viabilité de ces plantations. Une de ces techniques consiste à utiliser des boues provenant de la station d'épuration locale. Ces boues, riches en nutriments,

peuvent servir d'amendements pour enrichir le sol, augmentant ainsi la fertilité et soutenant la croissance des plantations. De plus, plutôt que d'utiliser de l'eau brute, nous suggérons d'utiliser des eaux traitées, également issues de la station d'épuration, pour irriguer les plantations. Cette méthode non seulement économise l'eau potable, mais garantit également que l'eau utilisée est dépourvue de contaminants qui pourraient nuire à la croissance des plantes. En combinant le choix stratégique des espèces avec ces techniques agricoles modernes, nous visons à créer un équilibre entre la restauration de l'environnement et la durabilité des ressources. Cette approche holistique, si elle est mise en œuvre avec succès, pourrait servir de modèle pour d'autres régions cherchant à restaurer leurs écosystèmes tout en préservant leurs ressources naturelles.

**Mots-clés :** *restauration, steppe arborée, Djelfa, boues résiduelles, eaux traitées.*

## FLORISTIC AND PHYTOECOLOGICAL DIVERSITY OF THE *QUERCUS ILEX* OAK FORESTS OF THE BELEZMA FOREST MASSIF (KASSEROU AND OUM RKHAA) – NORTH-EASTERN ALGERIA.

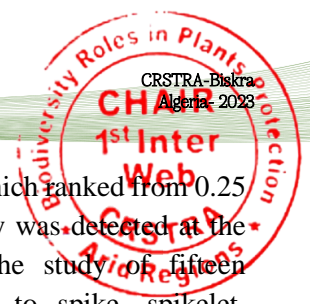
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### Abstract

The Holm oak (*Quercus ilex* L) is a species that can form interesting stands in the Belezma National Park, hence the interest in studying its ecological and phytoecological characteristics. However, despite the importance of this species, it remains exposed to threats due mainly to (overexploitation, overgrazing, fires...), and climate change. Surveys were carried out in the massifs of Kasserou and Oum Rekhaenab led us to carry out the floristic composition of the plant communities of Holm oak ecosystems. The study area is characterised by a





high floristic diversity, with 120 species belonging to 106 genera and 34 families, 46 of which are not included in the flora list of the Belezma National Park. The most dominant families are the Asteraceae with 32 species (27%) and the Fabaceae with 13 species (11%), which are also the families that are frequently found in Algeria, particularly in the Mediterranean regions. The study of the phytogeographical spectrum shows that the stations studied are dominated by the Mediterranean element (75% in Kasserou and 58% in Oum Rekhaa). The analysis of the biological types reveals the predominance of the hemicriptophytes with respectively percentages of 30 and 33%. Therophytes present a high rate with respectively percentages of 21% and 32%. The disturbance indices which amount with respectively to 46% and 50%, which testify to the strong anthropic pressure. it would be interesting to extend this type of survey, which would allow the necessary measures to be taken for the preservation and conservation of this precious heritage.

**Keywords :** *Holm oak, floristic diversity, Biological types, phytoecology, preservation, Belezma National Park.*

### USING MORPHOLOGICAL AND RAPD MARKERS TO ASSESS THE GENETIC DIVERSITY IN *AEGILOPS GENICULATA* FROM ALGERIA

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#### Abstract

Random amplified polymorphic DNA (RAPD) and morphological markers were used to estimate genetic variability and relationship between 35 *Aegilops geniculata* Roth accessions collected in Algeria. In the RAPD analysis, seven selected decamer primers yielded 145 bands ranging from 112 to 2513 bp. Based on the percentage of polymorphism (79.31%) and the dissimilarity

coefficient of Pearson (1-r) which ranked from 0.25 to 0.91, high genetic diversity was detected at the species level. In parallel, the study of fifteen morphological traits related to spike, spikelet, glume, lemma and awns have shown that Euclidean distances ranged between 0.92 and 6.41 indicating the high intraspecific morphological variation. Cluster method of RAPD separated the accessions into four groups whereas the collection was divided into three clusters using morphological characters. There was no significant correlation between RAPD and morphology. RAPD was not related to evident geographic origin however this latter was significantly associated with morphology. This study shows that data derived from RAPD markers and morphological traits work in different way to determine the relationships among accessions nonetheless they could be useful for breeding.

**Keywords:** *A. geniculata, RAPD, Morphology, Polymorphism, Relationships*

### ASSESSMENT OF CLIMATE CHANGE AND ASSOCIATED VEGETATION COVER CHANGE ON WATERSHED IN THE SEMI-ARID REGION OF TEBESSA

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#### Abstract

Vegetation is one of the most sensitive indicators of environmental changes Understanding the patterns of biodiversity distribution and what influences them is a fundamental pre-requisite for effective conservation and sustainable utilization of biodiversity. A study of floristic composition in various kinds of land use and habitat types plays a significant role in the environmental planning as plants are the primary producer of any ecosystem. In this work, we were interested in the study of the diversity of vegetation of semi-arid region of Tebessa, it belongs to the domain of the Eastern Saharan Atlas Algerian in semi-arid region of North Africa. The sampling of the plants is done by the

method of the quadrats of 10 m that is to say, a surface of 100 m<sup>2</sup>. Concerning the floristic characterization of the different stations of study was carried out by the realization of floristic surveys. The present work, brings its first contribution to the inventory and the knowledge of the flora of the forest Ezzeitouna. The results of inventory of the species obtained in the site of study, allowed to identify 59 species belonging to 24 families of which the most representative are the *Asteraceae*. The other families are poorly represented.

**Keywords:** Biodiversity Vegetation Cover, Watershed, Semi-arid, Tebessa

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### EVALUATION OF THE GENETIC DIVERSITY OF AUTOCHTHONOUS GRAPEVINE VARIETIES CONSERVED IN THE SKIKDA COLLECTION (ALGERIA)

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#### Abstract

Algeria has a very rich and diversified viticultural patrimony, consisting of a large number of old autochthonous varieties distributed mainly in mountainous areas. Unfortunately, this heritage has been severely degraded, with autochthonous varieties existing only in collections (germplasm), such as the Institut Technique de l'Arboriculture Fruitière et de la Vigne (ITAFV) in Skikda (Algeria). Nowadays, with the advent of biotechnology techniques, molecular markers appear to be a very powerful tool, offering a major advantage for the identification and assessment of genetic diversity in grapevines (*Vitis spp.*). The present study concerns the identification and molecular characterization of a series of 15 accessions held in the Skikda germplasm collection (Algeria). The accessions were genotyped with 12 highly polymorphic microsatellite markers (SSRs). The genetic data obtained were analyzed and

compared with the literature and with online databases, in order to identify varieties, determine genetic diversity and discover synonymy, homonymy and misnaming. Genetic analysis of the accessions studied revealed the existence of certain synonymies as well as certain differences with the published database in the collection, meaning that the records in the collection appear to be erroneous and need to be corrected. These results can be used to effectively guide future breeding programs, whether through traditional hybridization or new breeding technologies. The information provided will help to improve the management of grapevine germplasm by providing molecular data that will help to enrich existing information in databases and conservation in the collection, and by helping to reduce the costs of germplasm maintenance without the risk of losing valuable genetic resources.

**Keywords:** germplasm collection, identification, SSR, synonymy/homonymy.

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### IMPACT DES BANDES FLEURIES SUR LA RICHESSE QUANTITATIVE DES INSECTES : EXPLORER LES EFFETS DE LA BIODIVERSITE FONCTIONNELLE.

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#### Résumé

Dans l'objectif de progresser dans la gestion des ravageurs des cultures par la biodiversité fonctionnelle et d'acquérir des connaissances des effets de la diversité des milieux cultivés en plantes sur l'activité des insectes. Une expérimentation est menée dans la station expérimentale des Bio ressources d'El Outaya (CRSTRA-Biskra), afin d'analyser la capacité de bandes fleuries installées à l'intérieur de la parcelle de lentille (*Lens culinaris* Medik., 1787) durant deux saisons (2020-2021 et 2021-2022) de fournir des ressources alimentaires aux insectes. L'essai a exploré l'effet du nombre et de la composition en espèces des bandes fleuries sur la richesse quantitative des insectes. Les résultats obtenus ont montré qu'un nombre élevé de bandes fleuries et un mélange riche en espèces de plantes favorisent une diversité quantitative importante

d'insectes. Les ordres des Diptères, des Coléoptères, des Hémiptère, des Thysanoptères et des Hyménoptères sont les plus importants. Cependant, le mois de février est le plus favorable à l'activité des insectes pour les deux compagnes quelques soit les conditions environnementales et expérimentales.

**Mots-clés :** Biodiversité, bandes fleuries, insectes, ravageurs, Biskra.

### INVENTAIRE ET CARACTERISATION SYSTEMIQUE DES FOURMIS (HYMENOPTERA : FORMICIDAE) ASSOCIEES AUX ARBORICULTURES DE LA WILAYA D'EL BAYADH

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#### Abstract

Ce présent travail est effectué dans la région d'El Bayadh dans le cadre d'un inventaire des Formicidae. L'étude de la myrmécofaune est effectuée dans trois station à savoir : Brezina, Ghassoul et Arbaout dans des vergers arboricoles milieux différents en utilisant la méthode des pots Barber et la méthode de capture à vue dans une période qui s'étale de 15/03/2023 jusqu'à 15/05/2023. L'échantillonnage par l'utilisation de l'ensemble des méthodes, nous a permis de recenser 1579 individus représentés par 17 espèces, réparties en 9 genres et 3 sous-familles. Les Myrmicinae (S = 14 espèces), les Formicinae (S = 7 espèces) et les Dolichoderinae (S = 2 espèces). En termes d'abondance, la sous famille des Myrmicinae est la plus abondante (61,75%) suivie par la sous-famille

de Dolichoderinae (23,81%) et la sous-famille de Formicinae (14,50%). La station de Ghassoul est la station la plus riche avec 17 espèces suivie par la station d'Arbaout et Brezina avec des richesses de 15 et 14 espèces respectivement. Parmi les espèces récoltées dans ce travail, il y a 09 espèces de fourmis qui se présentent simultanément dans les trois stations d'études à savoir : *Tapinoma nigerrimum* ; *Cataglyphis bicolor*; *Cataglyphis sonctus*; *Camponotus sanctus* ; *Camponotus foreli*; *Messor barbarus* ; *Monomorium salamonis* ; *Crematogaster scutellaris*. Ce sont des espèces qui s'adaptent aux différents milieux.

**Keywords :** Myrmécofaune, El Bayadh, Formicidae, Inventaire, arboriculture.

### STUDY OF SPONTANEOUS PLANT RICHNESS AND DIVERSITY OF BISKRA

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#### Abstract

Arid regions are characterized by edapho-climatic conditions that are very difficult for the spontaneous survival of plants. Nevertheless, this ecosystem remains as a living area which characterized by high vegetation diversity. Thus, the knowledge of the floristic composition constitutes an important issue in terms of better management of this threatened natural Bioressource. However, the inventory conducted in the region of Biskra allowed us to indentify 145 species and 44 families which represented 34% of the total families cited in "Flora of Algeria" of QUEZEL and SANTA (1962/1963). The biological specter showed the predominance of thérophytes compared to other life forms with a range of about 38%, this predominance is a feature of the arid region vegetation. From the phytogeographical aspect, the distribution of species demonstrates the different chorotypes and confirms the Mediterranean affinity of the flora of our region.

Knowing that our zone is located in two great unites following a north-south gradient, the Saharan Atlas, in one part, where the Mediterranean elements are the dominant (35.86%) and in other part, the northern border of the Sahara where the Saharo-Sindien elements are the dominant (22.75%). This proves that our region is a result of inter-penetration of these two elements. Finally, the endemic element represents a rate of 17.91%. Among the detected species, seven species are considered as protected plants. (decree 93-285 of November 23, 1993.).

**Keywords:** *Biskra; Spontaneous plant; Floristic richness and diversity; Biological types, phytogeographical types.*

### WEED BIODIVERSITY IN NO-TILL CEREAL FIELDS IN SETIF (ALGERIA)

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#### Abstract

Weeds are an important component of agrosystems because they promote biological diversity within cereal crops. In fields, weeds are generally unevenly distributed, which requires the evaluation of ecological indicators of weed diversity at field level. In this study, we explored the distribution of weed diversity, over two campaign (2015-2017) in Setif, a Mediterranean semi-arid region in northeastern Algeria, on two fields, and estimate the response of weed species to cultural practices and weeds control. Among 40 species inventoried, dicotyledons are the best represented, with 85% of the species, belonging to 15 families, the Asteraceae have nearly 27.5% of the total inventoried flora. Monocotyledons are composed of just the Poaceae, comprising 15% of the total flora. Between the two fields, the diversity indices show controversial values and a great dissimilarity is

noted. The wheat-crop at the first foaled were distinguished by both high species diversity and low dominance, while the second site showed strong dominance with low diversity. The results indicate potential changes in the dominance of weed species between the two fields.

**Keywords:** *biodiversity, weed, diversity indices, no-till, cereal.*

### CHARACTERIZATION OF ALGERIAN CULTIVARS (PRUNUS ARMENIACA) USING MORPHOLOGICAL AND POMOLOGICAL MARKERS

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#### Abstract

*Prunus armeniaca* is a rosacea family stone fruit, spread in various parts of the world and cultivated for its economic and nutritional value. The aim of this study was to evaluate the diversity of the Algerian germplasm in arid, semi-arid and desertic climate. During 2019/2020, 56 quantitative and qualitative morphological and pomological characteristics were analysed for 54 accessions. Based on the traits assessed, there were substantial variations across the genotypes tested. High variability was observed in the characters that are targeted in the breeding program: flowering and repining time, fruit ground color of skin, fruit color of flesh, and fruit shape in lateral view. The Algerian cultivars was characterized by a green-yellow skin, a red ground color, and a light orange flesh color. In addition, a highly significant positive and negative correlation was shown between the characters studied. In addition, there was also a connection with other pomological or morphological characteristics. The principal component analysis explained 81% of the variability in the nine first components. The dimension of the fruit, stone, and leaves were the

features that explained the most variability. According to the Ward method, Cluster analysis divided the accessions into two groups; the clustering was mainly based on morphologic and pomological features. Those results were reliable, and the Algerian accessions selected in this study may have had the potential to be used in apricot breeding programs in the future.

**Keywords:** *Prunus armeniaca*, Principal component, Algerian accessions, morphology, pomology.

### EVALUATION DE LA RICHESSE FLORISTIQUE DU PARC NATIONAL DE BELEZMA (WILAYA DE BATNA).

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#### Résumé

Le but de l'étude est d'évaluer est la richesse floristique dans le parc national de Belezma (wilaya de Batna). Cette étude a été menée dans le parc national Belezma dans la wilaya de Batna (Le parc national Belezma a été créé par le décret 84-326 du 3 novembre 1984, se caractérise par la présence de grandes étendues de cèdre d'Atlas dans une zone de grandes influences méditerranée et sahariennes. Le parc est dans le massif montagneux de BELEZMA qui se trouve à l'extrémité ouest des montagnes des Aurès à environ 7 km au nord-ouest de la ville de BATNA.il est dans la partie orientale du Nord de L'Algérie ) de la fin du mars à la fin du juin 2022, et en raison du manque d'études récentes sur le parc, nous avons fait ce travail pour confirmer ce qui précède et rechercher ce qui est nouveau, et nous utilisons une combinaison de deux méthodes de travail ; méthode d'échantillonnage aléatoire et méthode d'échantillonnage systématique. Afin de réaliser ce travail, nous avons besoin de matériels suivants : une appareil photo numérique, les cartes, guide l'identification, GPS, Carnet de récolte, Presse. Les résultats obtenus, ont montré que, notre sortie sur terrain s'est appuyée sur la collecte de toutes les espèces présentes dans les stations visitées et avec une moyenne de 22 sorties sur

terrain et 18 stations visité, nous avons collecté 265 espèces identifié, de différentes familles. La réalisation d'un catalogue floristique. Nous avons inventorié les espèces suivantes : *Pistacia lentiscus* L., *Torilis arvensis* (Huds.) Link, *Seseli atlanticum* Boiss, *Pimpinella lutea* Desf, *Ferula communis* L., *Eryngium campestre* L., *Torilis nodosa* L. Geartn, *Bunium atlanticum* (Maire) Dobignard, *Daucus carota* L., *Muscari neglectum* Guss.ex ten , *Muscari comosum* (L.) Mill , *Artemisia herba-alba* Asso , *Carduus pycnocephalus subsp. pycnocephalus*, *Lomelosia stellata* (L.) Raf, *Sinapis arvensis subsp. arvensis*, *Helianthemum ruficomum* (Viv) Spreng , *Helianthemum cinereum* (Cav.)Pers , *Convolvulus althaeoides* L., *Trifolium campestre* Schreb, *Trifolium stellatum* L. *Ajuga iva* (L.) Schreb , *Catananche montana* Coss.& Durieu

**Mot clé :** la richesse floristique, parc national Belezma, catalogue floristique, espèces.

### EVALUATION OF THE DYNAMICS AND RICHNESS OF THE VEGETATION OF FIXED DUNE ENVIRONMENTS

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#### Abstract

The experimental dune fixing project was launched in 1982 by the I.N.R.F in El-Mesrane at the dune cord Djelfa, Boussaâda, its goal is to fix the dunes and limit the advance of sand towards the agglomerations and lands. agricultural crops under threat. Several materials and fixative species have been used for mechanical and biological fixation. In order to evaluate the dynamics and the richness of the vegetation of the mechanically and biologically fixed dune environments, we compared phytoecological statements of the planted environments and the non-planted environments (controls) of different stations (Boussaâda, Djelfa, Laghouat and Biskra) to refine as best as possible the information relating to the occupation of space and the biological recovery of these fragile and vulnerable environments. The spatio-temporal

quantitative study of the vegetation revealed that the density of plant species increases on dunes stabilized by mulching. The flora recorded in these planted environments is 2 to 3 times higher than the flora present outside plantations. This could be due to the humid microclimate generated by the clumps of plantations, which will positively influence the pedoclimate by improving the quality of the soil and reducing the action of the wind and consequently evapotranspiration.

**Keywords :** Rehabilitation; Dune fixation; Biological rise; dune cord.

### L'EFFET ANTHROPIQUE PAR L'INFRACTION DES AGROSYSTEMES, SUR LA STRUCTURE NATURELLE DES ESPACES SPONTANÉES DE PISTACHIER DE L'ATLAS AU SAHARA SEPTENTRIONAL –GHARDAÏA

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#### Résumé

Le Pistachier de l'Atlas (*Pistacia atlantica* Desf., 1799) connu sous le nom commun «Bétoum », est une espèce noble avec une croissance rapide, pouvant atteindre 20 m de hauteur dans les conditions favorables. Le houppier est généralement hémisphérique et volumineux ce couvre plus de 150 m<sup>2</sup>. Dans le Sahara septentrional dans la région de Gharđaia ou l'existence de ces formations d'arbres se développant naturellement est très rare. Ce travail a pour objet de connaître la modification de la structure naturelle de la (biodiversité) par l'effet anthropique (l'agriculture). Celle du concept de biodiversité, et celle des évolutions de l'agriculture. Notre travail consiste à étudier pendant deux périodes hivernale et estivale de 07 mois, et dans deux stations déférentes dans la commune de Berriane une station d'Oued soudan et autre d'Oued N'ssa, de présenter l'état actuel des peuplements de Pistachier de l'Atlas sous forme naturelle et mélange avec des plantations cultive dans un domaine agricole. On a ressorti que le cortège floristique naturelle du *Pistacia atlantica* d'oued N'ssale *Zizyphus lotus* et *Retama raetam*, est

déférents que celle d'oued Soudane, *Phoenix dactylifera* (Palmier dattier), *Olea europaea* (Olivier), *Punica granatum* (Grenadier) et autres ainsi le recouvrement d'oued N'ssa 69 % et 81.6% d'oued Soudane et les mesures dendrométriques la moyenne de 13.2m d'hauteur, 42.4cm de Diamètre et 260cm de Circonférence d'oued N'ssa et au oued Soudane la moyenne de 13.4m d'hauteur, 15.3cm de Diamètre et 112.6cm de Circonférence.

**Mots clé :** Le Pistachier de l'Atlas, effet anthropique, l'agriculture, Sahara septentrional,

### CAMEL RANGES SITUATION IN ARID REGION. WILAYA OF BISKRA- ALGERIA

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#### Abstract

The study of the conduct of camel breeding, in Biskra region (2019), with 30 breeders surveyed, highlighted the importance of small breeders (25 heads, 46.67%). They are all most sedentary (66.68%) men aged 40 to 60 (75%), whose level of education does not exceed the primary level (37%). According to the local population of the study region, this breeding is practiced in the majority of cases (80%) for multiplication reasons of the species among themselves. Reproduction occurs naturally during the period of struggle, which extends from November to April. The breeding age for females is 4 years old while it is more than 5 years old for males. A predominance of breeding camels (66.90%) of the El Hamra breed (85%) is noted, this breed is the most sought after because of its famous skilfully Algerian Bernous and Kachabia. In summer, the animal primarily consumes available perennial plants such as *Stipagrostis pungens*, *Anabasis articulata*, *Zizyphus lotus* and *Agathophora alopiciuroides*. During winter, spring, and autumn, its diet mainly consists of certain herbaceous plants (achebs) that

emerge following rainfall, including *Plantago lanceolata* and *Neurada procumbens*. Additionally, it may ingest other plants known to be toxic to camels, such as *Arnerium oleander*, *Thapsia garganica*, and *Artemesia campestris*.. Dairy production and that of camel meat is weak in the economy of the wilaya, it is practiced only for self-consumption because of the free conduct of the herds and the weakness of spontaneous plants and the natural sources in water as well as the constraining climatic conditions of the current year.

**Keywords:** livestock management, survey, camel, breeder, herd, route, arid zone.

### IMPACT OF NATIVE ARBUSCULAR MYCORRHIZAL FUNGI ON TAMARIX ARTICULATA GROWTH AND RHIZOSPHERIC MICROBIOTA BIODIVERSITY

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#### Abstract

Soil degradation is an increasingly important problem in many parts of the world, particularly in arid and semiarid areas. Arbuscular mycorrhizal fungi (AMF) isolated from arid soils are recognized to be better adapted to these edaphoclimatic conditions than exogenous ones. Nevertheless, little is known about the importance of AMF inoculum sources on *Tamarix articulata* development in natural saline soils. Therefore, the current study aims at investigating the efficiency of two AMF-mixed inoculums on *T. articulata* growth, with consideration of its rhizosphere microbiota. Indigenous inoculum made of strains originating from saline soils and a commercial one was used to inoculate *T. articulata* in four saline soils with different salinity levels under microcosm conditions with evaluation of rhizosphere microbial biomasses. Our findings showed that indigenous

inoculum outperforms the commercial one by 80% for the mycorrhizal rate and 40% for plant biomasses, which are correlated with increasing shoot phosphorus content. Soil microbial biomasses increased significantly with indigenous mycorrhizal inoculum in the most saline soil with 46% for AMF, 25% for saprotrophic fungi and 15% for bacterial biomasses. Present results open the way towards the preferential use of mycorrhizal inoculum, based on native AMF, to perform revegetation and to restore the saline soil microbiota.

**Keywords:** mycorrhizal inoculation; phospholipid fatty acids; ergosterol; soil salinity.

### THE MEDITERRANEAN PHYTODIVERSITY IN THE HAMMAM N'BAIL MOUNTAIN (GUELMA, NORTHEASTERN ALGERIA)

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#### Abstract

On one side, the floristic richness affects the environmental quality and resilience to human and natural impact, while the two fundamental characteristics of biodiversity govern the structure and operation of each ecosystem. The two districts of Guelma and Souk-Ahars are home to a phytodiversity of significant interest on a national and international scale in the northeastern Algeria. That is why a floristic inventory was conducted in 10 natural wetlands during the course of 2020–2021, and we participated each time with a specific data to demonstrate its importance in various contexts. There are 151 species belonging to 104 genera among the 39 botanical groups. According to the results of the spontaneous taxa presented in one of the Hammam N'Bail mountains (Guelma), 05 are indigenous to Algeria and Tunisia, 04 of which are rare species and 02 are protected by the



Algerian legislation. In both conventional and modern medicine, where the aerial section of the plant is most frequently used, about 85% of these Mediterranean hydrophytes offer medicinal potential and 60% of them are aromatic one. In order to develop and use this natural heritage sustainably through biotechnological innovation on natural chemicals, it requires special conservation and awareness raising.

**Keywords:** *Mediterranean hydrophytes, natural wetlands, north-eastern Algeria, spontaneous taxa.*



**2nd day : October 19th, 2023**

**Session President: Pr. Babahani S.**

**Moderators: Dr. Menasria , Pr. Saifi, Pr. Halis, Pr. Benaissa**

### **DPPH ASSAY AND ANTIPROLIFERATIVE EFFECT IN HELA CELL LINE OF GENISTAFEROX EXTRACTS**

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#### **Abstract**

Plants play an essential and effective role in biodiversity and the Earth's ecosystem, as they are a source of O<sub>2</sub> that we breathe by converting CO<sub>2</sub> in the atmosphere. It is also a source of food and medicine for humans since ancient times, according to the compounds it produces (primary and secondary metabolites). Therefore, many researchers focused their scientific studies on evaluating these resources. In this study we focused on the in-vitro biological activities of Genista ferox extracts, which belongs to Fabaceae, the third largest flowering plant family in the world with 730 genera and more than 19,400 species. 6 extracts from leaves and stems of the plant were subjected to determination of antioxidant activity using the DPPH assay and antiproliferative activity against HeLa cell lines using the xCELLigence system. The result showed that ethyl acetate stem extract had the highest antioxidant and anti-proliferative activity at the lowest concentration tested.

**Keywords :** *in-vitro; Genista ferox; Fabaceae; DPPH; antiproliferative.*

### **LES ESPECES RARES DANS LES REGIONS SEMI-ARIDE DE TLEMCCEN**

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#### **Résumé**

L'objectif de notre travail est une étude comparative entre les espèces rares existantes actuellement dans deux stations d'étude, béni Saf et Ghazaouet de la région semi-aride de Tlemcen de l'ouest algérien. Nous nous sommes basé sur les espèces rares selon la flore de Quézel & Santa (1962-63). L'étude floristique effectuée dans la station de Beni Saf a permis de recenser 40 espèces rares réparties sur 21 familles, dans la station de Ghazaouet d'après les inventaires effectués, nous avons recensé 21 espèces rares, sur 11 familles dominées surtout par les fabacées. Concernant les types biologiques, la végétation rare de la zone étudiée est dominée par les espèces chaméphytes, géophytes et thérophytes. L'étude des types morphologique montre que la strate ligneuse vivace domine cette région. Concernant la flore : se caractérise par type biologique: TH>CH> GE> HE> PH pour la station de ghazaouet: se caractérise par type biologique: CH> GE> TH>HE pour la station de beni saf: elle a type biologique comme suit: PH> CH >HE> GE Les thérophytes présentent un taux très élevé 49% et sont plus dominants dans la flore de Quezel et Santa, car ces thérophytes ont la faculté de résister dans un milieu instable, dans la station de Ghazaouet sont représentés seulement avec 20%, et totalement absent dans la station de Beni Saf.

**Mots-clé :** *espèce rare, relevé phytosociologique, type biologique, semi-aride, ouest algérien.*

### **PLANT COMMUNITIES AND ABUNDANCE OF DESERT LOCUST IN THE ALGERIAN SAHARA**

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### Abstract

The Algerian Desert occupies a huge part of the African Sahara. The corresponding information about the phytosociological context is the aim of this work doing to give insights into the classes and alliances hosting the Desert Locust throughout the Saharo-Sindian and Saharo-Sahelian area. Location: We investigated four regions in the center and in the southern parts of Algerian Sahara, with altitudes ranging from 300 to 1050 m a.s.l. We also considered six localities taken from literature, of which two and four were selected in the Saharo-Sindian and Saharo-Sahelian regions respectively. Methods: We sampled 300 sampling to record the abundance-dominance of plants, and the density of Desert Locust. Sampling dates were adjusted to insect presence. The plant assemblages were defined by Ward's clustering method to obtain a balanced number of samples. The link between Desert Locust density and different environmental parameters, including vegetation alliance proportions, was estimated through correlation analysis. Results: Hierarchical classification revealed 16 plant assemblages that do not clearly fit into the phytosociological system. Desert Locust abundance was positively linked to the percentages of Saharo-Sindian plants and of the Antirrhino-Pithurantion scopariae alliance, but negatively so to plants associated with saline-gypsum soils. As with the Acacio-Panicion, the Antirrhino-Pithurantion scopariae is a desert steppe developed on oued edges (temporary river) but with a slightly higher annual rainfall. There is a set of stations, particularly near Bordj-Badji-Mokhtar, where the density of Desert Locust is not linked to preferred plants, suggesting that they constitute only survival biotopes. We also provide a wider view on the requirements of the Desert Locust to enter a gregarious phase, by including several literature stations of tropical Africa, in order to compare the different vegetation types. Even where the dominant vegetation remains the Acacio-Panicion, the flora

is mainly Saharo-Sahelian and Sahelo-Sudanian, and not Mediterranean-Saharo-Sindian. Conclusions: The habitat of Desert Locust is clearly defined by plant assemblages linked to the Acacio-Panicion alliance. There are significant differences between the vegetation associated with solitary and gregarious individuals.

**Keywords:** *Acacio-Panicion, Antirrhino-Pithurantion scopariae, Sahara, vegetation.*

### RODENT STUDY IN DESERT WETLANDS AT OUED RIGH REGION (SEPTENTRIONAL SAHARA, ALGERIA)

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### Abstract

The present study was conducted in three wetlands situated at Oued Righ region (Septentrional Sahara, Algeria). This research was conducted in three lakes; (Ayata, Merdjadja and Sidi Slimane). One method was used in this study; it's about randomly sampling technic using 24 cages B.T.S. The species caught belonged to the family of Muridae. Murinae subfamily was dominated in Ayata, but the subfamily of Gerbillinae was mostly represented in Merdjadja (56,67%). Also, the same subfamily was abundant in Sidi Slimane lake with (82,34%). Using the diversity of the Shannon-Weaver index, the greatest diversity value (H') was recorded at Merdjadja Lake (1.51 bits) followed by that of Sidi Slimane (1.39 bits). However, we noted an equitability of (0.94) for the Ayata wetland, (0.93) in Merdjadja and (0.86) in Sidi Slimane.

**Keywords:** *Rodentia, Relative abundance, Lakes, Oued Righ, Sahara*

### VARIETAL BIODIVERSITY OF DATE PALM (PHOENIX DACTYLIFERA L.) IN THE GOURARA REGION: IGNORANCE AND CELEBRITY CHALLENGES

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### Abstract

Adrar region in southwestern Algeria is an arid region known for its oases, which shelter thousands of date palms, and is a very important heritage in the economy and culture of the region. With more than 18,320 hectares populated by more than 2.6 million palm trees, of which nearly 1.9 million are productive. This study focuses on the varietal diversity of date palm (*Phoenix dactylifera L*) in the oases of Gourara in the palm grove of Charouine (Adrar region). The varietal inventory carried out throughout the region allows the census of 28 cultivars, where the majority are sheltered by old plantations. Indeed, the region offers various main and secondary varieties, early and late, the most famous of which is the Tilimsou variety with 43.11% of the total existing heritage, followed by Teguezza, Tinasser, Aghamou, Takerboucht with 18.12%, 13.70%, 4.87%, 4.59% respectively. However, we note existence of varieties with high organoleptic quality such as Deglet-Talmine, Ahartan, Timdoul, timjouhrete, abed, tedmamma, adem Boula, very popular in the region of Gourara and others such as; The hmira, Bamekhlouf and Cheikh, less distributed because of the sensitivity of its fruits to conservation. The Deglet-Talmine variety is a real high quality terroir date, that deserves to be labeled in order to acquire notoriety (IG denomination) Of all the cultivars enumerated, only two or three of them are of proven economic importance, namely H'mira Teguezza, and Takerbouchet, the other varieties are rare whose dates are of low market value. Due to its very advanced age, which affects the production of new discards, more than 40% of the cultivars inventoried are threatened with extinction. This wealth remains even less known where varietal diversity is more important, however threatened by several erosion factors, including drought, phytosanitary problems, urbanization and climate change.

**Keywords:** *biodiversity, date-palm cultivation, Charouine, varietal inventory, erosion.*

### BIODIVERSITE MYRMECOLE DANS DEUX AGRO-ECOSYSTEMES DE LA REGION DE OUARGLA

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### Résumé :

Les fourmis sont parmi les insectes les plus communs et se rencontrent dans la majorité des écosystèmes terrestres. Notre objectif est d'étudier les fourmis associées aux cultures est effectuée dans deux stations à Institut Technique de Développement d'Agronomie Saharienne (Hassi Ben Abdallah) durant sept mois, suite à l'utilisation de trois méthodes d'échantillonnage (pots Barber, pièges jaunes et quadrats). Cette étude a permis de recenser 14 espèces appartenant à 3 sous familles: les Myrmicinae (S = 8 espèces), les Formicinae (S = 5 espèces) et les Dolichoderinae (S = 1 espèce). La richesse totale la plus élevée (S = 14 espèces) est notée pour les méthodes de pot Barber et des pièges jaunes. L'espèce *Monomorium arenophilum* (AR% = 42,4% ; ni = 712individus) est la plus capturée grâce aux pots Barber dans la palmeraie, par contre *Messor foreli* est la plus abondante pour les autres méthodes d'échantillonnages dans la culture du quinoa et du blé. L'étude des périodes d'essaimage montre que cinq espèces de fourmis ailées sont capturées la plupart des fourmis ailées apparaissent au printemps.

**Mots-clés :** *Ouargla, fourmis, palmeraie, quinoa, blé.*

### IMPORTANCE OF PSAMMOPHYTES IN THE WADIS OF THE NORTHERN ALGERIAN SAHARA (GHARDAIA REGION).

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### Abstract

The aim of this study is to investigate the significance of psammophytes in the sand-covered wadis of the northern Algerian Sahara. For this purpose, we selected six representative stations in the Ghardaïa region using a subjective sampling method. The results obtained allowed us to identify 18 plant species belonging to 13 botanical families, with a significant representation of Brassicaceae. The biological spectrum shows high percentages of Chamaephytes (50%) and Phanerophytes (33%). The biogeographical spectrum records a high rate of Saharo-Arabian species (40%). Psammophytes account for 10 species (55.55%) in the entire study area. The frequency of the recorded species varies from one station to another, with the dominance of the psammophyte *Retama retam* (100%). Indeed, psammophytes play a significant ecological role in stabilizing sandy soils and fixing dunes.

**Keywords:** *Phytodiversity, Wadis, Sand Encroachment, Psammophyte, Northern Sahara, Ghardaïa, Algeria.*

### PRELIMINARY DATA ON BIRD HABITAT PREFERENCE OF HOLM OAK WOODLANDS IN NORTH-EASTERN ALGERIA

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### Abstract

In order to investigate the biodiversity status of the Mount Tiffech, in the North-eastern of Algeria, this study was carried out in two habitat types on the mentioned Mount. A first study on bird habitat preferences in this study area was run using the point count method (IPA) to analyze both composition and spatial distribution of breeding birds across the different habitat types (pure holm oak (*Quercus ilex* L) forests and mixed forests). A total of 43 species were observed in 30 points count where the avian species richness at each point-count ranged between five and thirteen species. The most dominant families in number of pairs were Fringillidae (155.5 pairs), Muscicapidae (73 pairs), Columbidae (59 pairs), Sylviidae (55 pairs), Turdidae (26.5 pairs), Phylloscopidae (22.5 pairs), Paridae (21.5 pairs), Troglodytidae (19.5 pairs). These families occupied more than 92% of the total abundance of the entire community. We noted seven protected species, only one vulnerable species, two nearly threatened. The presence of these species with patrimonial value reinforces the importance of the Mount Tiffech avifauna and therefore, the importance of the Mount as a biodiversity reserve. According to the non-parametric Mann-Whitney test, species richness and diversity of bird communities were significantly higher in pure holm oak stands than in mixed forests.

**Keywords:** *Mount Tiffech, habitat preferences, breeding birds, habitat types, protected species.*

### SURVEY ON MOUNTAIN GROVES: CASE OF AIN ZAATOUT DISTRICT (WILAYA OF BISKRA)

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### Abstract

Mountain groves in Ain Zaatout is a specific agrosystem is characterized by an interesting

biodiversity but threatened by genetic erosion. Our study aimed at assessing the diversity of cultivated crops in this region. We conducted a survey during 2020. The results showed the typical oasis architecture with three layers. The artificial pollination was limited to the economically important date palm cultivars. An insufficient number of male was observed which would increase pollen requirements in the future. In total 25 cultivars were recorded with the dominance of Bouzarrou followed by Degla Beida and Ghars. Estimation of the age of the palms revealed that most of cultivar are (> 60 years). Most farmers use cultivars for fruit production in particular the dominant ones. The low value dates are processed. The main causes of genetic erosion of date palm in Ain Zaatout region are natural dryness and consequently drying of watering wells and springs, the rural exodus and the replacement of date palm cultivars par others fruit trees. Local cultivar (Bouzarrou) is selected for its advantages. Germplasm collection activities, in situ conservation and characterization programmes are urgently needed to improve the understanding and preservation of these ancient agro-ecosystem.

**Keywords:** *Ain Zaatout, Biodiversity, Phoenix dactylifera L, Genetic Erosion, mountain oasis.*

### AGROBIODIVERSITY, FUNCTIONING AND SUSTAINABILITY OF SAHARAN AGROSYSTEMS IN OUARGLA, SOUTH-EAST OF ALGERIA

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#### Abstract

The Saharan regions faces unique challenges in sustaining agricultural systems due to its extreme aridity and harsh climatic conditions. Ouargla, located in the heart of the Sahara desert, illustrates

these challenges. This study investigates the critical nexus between agrobiodiversity, functioning of agrosystems and its sustainability within the agricultural landscapes of Ouargla. Agrobiodiversity in Ouargla's agrosystems encompasses a wide range of crop varieties, traditional farming practices and local knowledge systems. The study uses a multidisciplinary approach, combining ethnobotanical surveys, statistical assessments and socio-economic analyses to comprehensively assess the agrobiodiversity present and its contributions to the functioning of the system. Results indicate a rich diversity of crops, palm-date cultivation, cereal cultivation, olives cultivation, and fodder crops including drought tolerant varieties, adapted to the arid conditions of the Sahara. The presence of various plant species provides resilience to agro-systems, providing opportunities for niche adaptation and increased system stability. In addition, traditional agricultural practices, such as family farming and water management techniques, contribute significantly to the sustainability of agriculture in Ouargla. However, the study also reveals emerging challenges, such as climate change, water scarcity and the erosion of traditional knowledge. These challenges threaten the agrosystems's sustainability and the preservation of agrobiodiversity. To enhance the sustainability of Saharan agrosystems in Ouargla, this research highlights the importance of preserving and promoting agrobiodiversity, integrate traditional and modern agricultural practices and develop climate resilience and management strategies. Ultimately, the findings emphasize the need for collaboration among local communities, agricultural agencies, and researchers to ensure the continued viability of agriculture in this challenging environment.

**Keywords:** *biodiversity, agrosystems, sustainability, climate change, Ouargla, preservation.*

### FORISTIC AND FAUNISTIC DIVERSITY IN SAHARAN AGRO-SYSTEMS (CASE OF THE PALM GROVE AND CEREAL GROWING UNDER PIVOT IN THE OUARGLA REGION)

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### Abstract

The aim of our study was to investigate the floristic and faunistic diversity in two agrosystems with different vocations, namely pivot cereal growing and palm groves in the Ouargla region. The results of our study of floristic biodiversity in the palm grove revealed 08 floristic species, with a high contribution from the monocotyledons class (67% of the dicotyledons). The Poaceae family dominated with 38%. The majority of plant species recorded belong to the therophyte biological type (33%). Only 03 plant species were inventoried in the cereal-growing perimeter. The fauna inventory recorded 96 species divided into 04 classes, 10 orders and 58 families. The Insect class was the most important in both study sites, with contributions of 97% and 87% respectively. 7 trophic classes were reported in the faunal composition of the palm grove, compared with 05 in the cereal grove. The phytophagous category represented the highest percentage in both study sites, at 57.53% and 42.86% respectively.

**Keywords:** Fauna, Flora, Agro-system, biodiversity, Ouargla.

### THE IMPORTANCE OF SAHARAN PLANTS IN ALGERIA

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### Abstract

Saharan medicinal plants have attracted considerable attention in recent years, because of

their wide variety and biological properties. Despite the fact that the Algerian Sahara is a relatively unfavorable zone for the growth and development of living beings, some plant species have the ability to adapt and survive in arid soils and on sand dunes. The study of Saharan vegetation has already been the subject of several works, including those by René Maire (1933), Pierre Quézel (1954) and Paul Ozenda. The pharmacological properties of Saharan plant extracts can be beneficial in curing certain microbial or proliferative diseases, and can also contribute to the development of some antioxidant activities. This study is a synthesis of several scientific works carried out on some Algerian Saharan species, namely *Ziziphus lotus*, *Salvia chudaei* Batt. & Trab., *Teucrium polium*, *Deverra scoparia* Coss. This work is a synthesis of certain studies previously carried out on plant species from the Sahara region of our country.

**Keywords:** medicinal plants, Algerian Sahara, biological activities.

### ENHANCING BIODIVERSITY IN ARID LANDS: EXPLORING THE SYNERGISTIC POTENTIAL OF BIOCHAR AND COMPOST APPLICATION

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### Abstract

Arid lands contain unique wealth of biological diversity which plays a vital role in maintaining the health and protection of plant life, and biodiversity loss in arid lands can have disproportionate impacts on their ecosystems, caused by various factors, including specific agricultural methods. However Agriculture and biodiversity can be complementary activities. If properly managed, agriculture should enhance and

not be the enemy of biodiversity in the drylands. In this study, we investigated the use of biochar 2% (20 g kg<sup>-1</sup> soil), compost 1% (10 g kg<sup>-1</sup> soil) and their mixture as options to improve the biodiversity and ecosystem services. Moreover, *Eisenia Andrei* was used as potential bioindicator after 7 and 14 days of exposure. Lysosomal membrane stability assay and Micronuclei frequency assay were applied to study their cytotoxic and genotoxic effects on earthworms. In addition, a set of biochemical biomarkers (CAT and GST enzymatic activities and the level of MDA) and neurotoxicity (AChE enzymatic activities) were analyzed. Results revealed an increase in lysosomal membrane stability (LMS) and a reduction in micronuclei (MNi) frequency in earthworms exposed to all treatments. Biochemical analysis revealed reducing in oxidative stress regarding catalase, MDA and GST, being very important in earthworms exposed to the mixture and for both soil types biological and conventional. Our findings indicate that the utilization of biochar and compost have significant impacts on earthworms,

**Keywords:** *biodiversity, biochar, compost, Eisenia Andrei, oxidative stress.*

### STATUT ACTUEL DES POPULATIONS NATURELLES DE *CERVUS ELAPHUS BARBARUS* (MAMMALIA CERVIDEA) EN ALGERIE

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#### Résumé

En Algérie, *Cervus elaphus barbarus*, est le seul représentant des cervidés sauvages. Sa répartition est désormais limitée à quelques régions de l'extrême nord Est Algérien de l'étage bioclimatique humide. L'espèce est menacée dans ces biotopes reliques en raison du braconnage, la destruction de l'habitat par les troupeaux d'ongulés domestiques, le dérangement et les incendies. Le cerf de barbarie est en voie

d'extinction dans toute cette région de son existence. Dans ce contexte, nous avons jugé nécessaire d'étendre les prospections au sud algérien afin de préciser sa distribution actuelle, d'évaluer son statut de conservation et d'identifier les menaces spécifiques qui pèsent sur cette espèce. Les informations récoltées vont servir à une meilleure connaissance de l'espèce mais surtout de définir les mesures urgentes et prioritaires en vue d'orienter un plan de conservation de l'espèce et de gestion de ses habitats.

**Mots-clés :** *Statut, menaces, Cervus elaphus barbarus, conservation.*

### HABITAT PREFERENCES OF BLACK RAT (*RATTUS RATTUS*) IN THE DATE PALM AGRO-SYSTEM (CASE OF OUARGLA'S REGION)

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#### Abstract

The present study explores the habitat use of the black rat (*Rattus rattus*), in North-east of Algerian. A total of 10 date palms were selected for the present study. A detailed survey was carried out in all vegetation alliances for any obvious signs of rats (tracks, faecal pellets, chewed vegetation, burrows, or nests) and their presence or absence was noted. Their presence was confirmed by the trapping operations applied at some localities. Our results showed that rats preferred habitats providing a dense vegetation cover. four rat's habitats were identified: dense date palm resulting from a lack of maintenance ( pruning dead leaves, offshoots separation, and collecting fallen fruits ), The weeds such as *Phragmites sp*, and *Juncus sp* that surrounding the irrigation canals and ponds as they were found in the ditches. We found that Date palms had the greatest capture rates (60.31%) of rats, followed by ditches and *Phragmites sp* with an

average (14.95) (14.43 ) respectively, whereas *Juncus sp* had the lowest capture rates.

**Keywords:** Black rat, habitat, preferences, *Phoenix dactylifera L*, Ouargla.

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### CONTRIBUTION TO THE STUDY OF THE IMPACT ON THE EVOLUTION OF ATLAS CEDAR (*CEDRUS ATLANTICA L.*) DECLINE IN THANIET EL HAD NATIONAL PARK, TISSEMSILT

Habib Ouabel<sup>1</sup>, Amine Taleb<sup>2</sup>, and Rabia Youcef<sup>2</sup>

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#### Abstract

The cedar forest of Thaniet al Had, which has been in decline since 1984, remains vulnerable to this dangerous scourge. In fact, over 3,000 affected cedars were reported in 1984, without identifying the true cause of the decline. The valuable Thaniet el Had National Park, rich in biodiversity, has experienced a significant decline in recent years due to this phenomenon of deterioration and lack of regeneration. Notably, this park is home to one of the distinct and nationally protected species. To delve into the research on the most significant causes, we conducted studies to address the mortality factors based on dendrochronology and to evaluate the impact of environmental factors. The climatic and biological factors influencing this phenomenon were examined.

**Keywords:** Atlas Cedar; Décline; Dendrochronology; Thaniet El Had National Park ; Forest ecosystem.

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### ADDRESSING THE VARROA DESTRUCTOR CHALLENGE IN BEEKEEPING: WHICH STRATEGIES TO CHOOSE FOR ERADICATION?

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#### Abstract:

The significance of honeybees is undeniable and invaluable; they are key engineers that sustain ecosystems, contribute to biodiversity conservation, boost the global economy, and enhance agricultural yields. Nevertheless, over the past decades, bee colonies have experienced a worldwide decline. Pesticides, climate change, viral, bacterial, and parasitic diseases are all factors that may explain this increased mortality. However, many researchers believe that *Varroa destructor* is the primary causal agent behind bee decline. This mite has the peculiar ability to parasitize both brood and adult bees, leading to a reduction in honey production, decreased adult bee weights at birth, occasional wing deformities, reduced bee immunity, and disruptions in their cognitive abilities. Considering the significant damage caused by this pest, it is urgent to implement suitable means of control to preserve the health of these pollinators. The objective of this presentation is to highlight all conceivable strategies for eradicating this parasite, whether they are chemical, biological, or mechanical, and to present the advantages and disadvantages of each control technique.

**Keywords :** Honeybees, *Varroa Destructor*, Fight Strategies.



## Topic 2

### Biotechnology and Biosafety

1st day : October 18th, 2023

Session President: Pr. Alatou

Moderators: Pr. Bensaleh M.K., Pr. Karoune S., Dr. Bazri K. Dr. Tahirine M.

#### PHYSICO-CHEMICAL PARAMETERS AND CORRELATION BETWEEN ANTIOXIDANT ACTIVITY AND TOTAL POLYPHENOL CONTENT OF HONEYS FROM EAST ALGERIA

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#### Abstract:

Honey is a natural product widely known and used in our country for its many nutritional and therapeutic properties. In recent years, scientific research has demonstrated the effectiveness of the biological activities of honey, particularly its antioxidant properties. In the present work, two samples of citrus honeybees collected from the east of Algeria, Annaba and Guelma, are analysed to evaluate their physico-chemical parameters, which made it possible to determine the qualitative side of our honeys and the correlation between their levels of antioxidants with the DPPH reagent and the total polyphenol content. The pH values are 3.91 and 3.93, and the acidity values are 22 m $\dot{e}$ q/kg 21 and m $\dot{e}$ q/kg for Guelma and Annaba honey samples respectively, the moisture values obtained are 16% for Guelma honey and 18.5% for Annaba honey and the electrical conductivity was 388 uS/cm for Guelma honey and 94.7 uS/cm for Annaba honey. The EC50 antioxidant activity obtained by DPPH is

239.75 ug/ml for Guelma honey and 808.77 ug/ml for Annaba honey, and the concentration of total polyphenols is 17.25 mgEAG for Guelma honey and 240.25 mgEAG for Annaba honey. In conclusion, the physicochemical results showed that there were differences from one honey sample to another and that they met the international standards according to the European Food Codex. For the antioxidant activity, both samples have considerable activity and it is directly proportional to the values of the total polyphenol content.

**Keywords:** honeybee, antioxydant, DPPH, polyphenol

#### FLAVONOIDS FROM *RETAMA SPHAEROCARPA* AND *R. RAETAM* EXERT ANTI-INFLAMMATORY ACTIVITY: MOLECULAR DOCKING, MM/GBSA CALCULATION AND *IN SILICO* ADME/T PROFILE

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#### Abstract

Non-steroidal anti-inflammatory drugs (NSAIDs) are commonly prescribed for their anti-inflammatory, antipyretic, and analgesic properties.

However, these medicines are associated with negative side effects, so new anti-inflammatory medicines are needed. To this end, the most promising source of new drug candidates is natural resources. The purpose of this study is to assess the ability of some flavonoids derived from *Retama sphaerocarpa* and *R. raetam* to inhibit cyclooxygenase-2 (COX 2) and to study the binding mode of these compounds into the active site of COX-2 by means of computational approaches. For this purpose, molecular docking and MM/GBSA binding free energies calculations were performed using Schrodinger molecular modeling software. In addition, SwissADME server and Pro-Tox II server were utilized to elucidate 'Drug-likeness', pharmacokinetic properties and the safety of the selected compounds. The results showed that top two compounds have affinity towards COX-2 active site which can further be explored as selective COX-2 inhibitors.

**Keywords:** COX-2 inhibitors, Flavonoids, Molecular docking, Binding mode, safety.

contaminants are of explant origin and some of the contamination may be due to handling. These contaminants are of bacterial or fungal origin. The fungal flora contaminating the vitro-plants consists essentially of species belonging to the genera *Penicillium*, *Aspergillus*, *Mucor* and other unidentified genera. In particular, sterile mycelia are abundant and frequently contaminate the vitro-plants. The species found are ubiquitous moulds.

**Keywords:** *in vitro* culture, *Phoenix dactylifera* L, microorganisms, sterilisation, epiphyte, endophyte.

### PHYTOCHEMICAL SCREENING AND ANTIMICROBIAL ACTIVITY OF *HALOXYLON SCOPARIUM POMEL*

- Setti Ahmed Kheira<sup>1,2</sup>, Tefiel Hakim<sup>1</sup>, Kharoubi Omar<sup>2</sup>, Zallel Malika, Mezaine Siham, Tergou Siham, Taleb Malika
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### CONTAMINATION OF DATE PALM VITROPLANTS: ORIGINS AND CONTAMINATING AGENTS

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#### Abstract

Contamination is one of the problems limiting the development and survival of explants during *in vitro* culture of date palms. The present study aims to determine the origin of contamination (epiphytic or endophytic), and the nature of the microorganisms responsible for contamination. If the source of contamination is epiphytic, drops of rinsed plant material (aliquots) sterilized with bleach over a period of time are deposited on the culture medium (PDA). If the fungus is endophytic, small fragments of plant material sterilized with bleach for various lengths of time are cut out and placed on the culture medium (PDA). The fungi can be identified on the Czapeck isolation medium, and the fragments and/or fungal spores are taken from already contaminated plant material. Based on the results of the microbial identification, most of the

#### Abstract

*Haloxylon scoparium Pomel* is a medicinal plant belonging to the Amaranthaceae family; it is widely distributed in the Saharan atlas and locally called "Remeth". The main objectives of this study were to evaluate phytochemical contents of *H.scoparium* and their anti-oxidant, and antimicrobial activities using Gram positive and Gram negative pathogenic bacteria and some species of fungi. The extracts are prepared by maceration in two solvents of different polarities (water, methanol). Phytochemical analysis of the aqueous and methanolic extract revealed the presence of secondary metabolites: alkaloids, flavonoids and tannins. The evaluation of the antiradical power of the extracts against DPPH showed that the extracts possess antioxidant activity. The highest antimicrobial activity of *Haloxylon scoparium* extracts was found to be against *Staphylococcus aureus* and *Escherichia coli*, with a mean zone of inhibition diameter of  $14.2 \pm 0.2$  and  $15 \pm 0.1$  mm respectively. No effect was observed against *Bacillus cereus* and

*Acenotobacter baumannii*. However methanolic extract showed maximum inhibition diameter (15 and 20 mm) against *Fusarium* and *Penicillium* respectively. In conclusion, these results warrant further investigation to standardize the antimicrobial effects of *H. scoparium* extracts.

**Keywords:** *Haloxylon scoparium* Pomel, Antioxidant activity, Antibacterial effect,

### ANTI-ALZHEIMER AND ANTI-OXIDANT PROPERTIES OF ALGERIAN POMACE OLIVE OIL

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#### Abstract

Oxidation processes are considered as major contributors to the induction and/or progress of many diseases such as cancer, Alzheimer's, Parkinson's, and heart diseases. Antioxidants can interfere with oxidative processes by reacting with free radicals, chelating catalytic metals, and also by acting as O<sub>2</sub> scavengers. In this study, in vitro antioxidant potential and anticholinesterase activity of pomace olive oil were investigated (Pomace olive coming from a different process for extraction of olive oil: Press process, continuous process two-phases and three-phases). The raw material used in this work was provided by different oil factories located in Batna (Eastern Algeria). The antioxidant potential was determined spectrophotometrically by the DPPH assay, ABTS scavenging, CUPRRAC assay and anticholinesterase activities of the Algerian pomace olive oils. Total contents of phenolics (13.47 - 21.25 mg GAE/100 g oil) and flavonoids (5.90 - 12.52 mg QE/100 g oil) were determined spectrophotometrically. The pomace olive oil "POO3" (Pomace olive coming from 3-phases system) presented the highest phenolic, flavonoid contents and showed the highest DPPH, ABTS scavenging, metal chelating activity. In vitro anticholinesterase activity, the olive pomace oils showed moderate inhibition against AChE and BChE which are the key enzymes taking place in pathogenesis of Alzheimer's disease. These results showed that the tested oils can be considered as

sources of natural antioxidant, as well as moderate anticholinesterase agents.

**Keywords:** Antioxidant, anticholinesterase, flavonoid, phenolic content, oil, pomace olive.

### PHYTOCHEMICAL ANALYSIS BY NMR AND HPLC-MS<sup>N</sup> APPROACH OF CLINOPODIUM CANDIDISSIMUM (MUNBY) KUNTZE AN ENDEMIC NATURAL SOURCE OF BIOACTIVE COMPOUNDS GROWING IN WESTERN ALGERIA

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#### Abstract

*Clinopodium candidissimum* (Munby) Kuntze is a strictly endemic species of Algeria, it is known as Zaater cheleuh and Nabta elbida and used in traditional medicine. In order to promote Algerian medicinal and edible plants, in this work we aimed to investigate the identification and quantification of polar constituents of *C. candidissimum* aerial parts harvested from Oran region using NMR and HPLC-MS<sup>n</sup> approaches. Qualitative <sup>1</sup>H-NMR and quantitative HPLC-MS<sup>n</sup> analyses of fractions obtained with solvents at different polarity revealed the presence of aglyconic and glycosylated flavonoids (3.1%), phenyl-propanoids (3.6%), gallic acid derivatives (0.76%), and triterpenoids (0.62%), among the others. Overall, results indicate that *C. candidissimum* represents an endemic natural source of bioactive compounds, and they will be useful for further studies on this species.

**Keywords:** *Clinopodium candidissimum*; Phytoconstituents; NMR; HPLC-MS<sup>n</sup>; Algeria.

## REVEALING INTENSE BIOSURFACTANT SYNTHESIS IN ACTINOMYCETAL STRAINS: BIOTECHNOLOGICAL INSIGHTS AND PROSPECTS FOR MICROBIAL ENHANCED OIL RECOVERY

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### Abstract:

A screening was undertaken to identify bacteria capable of producing biosurfactants, involving 25 strains of actinomycetes isolated from surfaces contaminated by oil spills within the February 24<sup>th</sup> production division of SONATRACH. Actinomycetes were specifically chosen for this inquiry due to their untapped chemical potential and significant capacity for generating bioactive secondary metabolites. Amidst the array of potentially promising biosurfactant producers uncovered, strain 7SDS, recognized as *Streptomyces thinghirensis* through molecular methodologies, garnered attention due to its secretion of a highly active compound that exhibited notable emulsification prowess of 59.66%. Of particular interest was this compound's substantial reduction of surface tension (27.96 mN/m) within the Bushnell-Hass medium, enriched with chicken skin waste serving as the solitary carbon source. The growth dynamics of strain 7SDS and its biosurfactant synthesis were subjected to an array of distinct physical and chemical conditions, with the intention of comprehensively evaluating its biotechnological potential. Under optimized conditions, the resultant biosurfactant underwent rigorous characterization using Fourier-transform infrared (FT-IR) spectroscopy and gas chromatography-mass spectrometry (GC-MS), affirming its constitution as a phospholipid. This phospholipid was successful in a test to simulate microbial enhanced oil recovery (MEOR). The strain's consistent ability to yield a high-efficiency biosurfactant across varying physical and chemical conditions akin to those encountered within an oil production reservoir—characterized by heightened salinity and temperature levels positions it as an exceptionally auspicious candidate. These

attributes thereby engender sanguine expectations concerning its applicability within the realm of MEOR.

**Keywords:** biosurfactant, MEOR, actinomycete, phospholipid

## CHARACTERISTICS OF ESSENTIAL OIL FROM CULTIVATED ALGERIAN VITEX

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### Abstract

*Vitex agnus-castus* also called gattilier or pepper tree. It belongs to the Verbenaceae family and it is native to the Mediterranean regions. Furthermore, it may assist in protecting humans from microbial contamination and it can be utilized as an antimicrobial agent to preserve processed foods. This study aimed to examine the chemical composition and antibacterial activity of Algerian *Vitex agnus-castus* essential oil. The oil was extracted by Clevenger steam distillation, and it was analyzed using Gas Chromatography (GC). Aromatogramme was used to assess the antimicrobial activity against four ATCC strains of *Staphylococcus aureus*. The essential oil yield ranged from 0.4-0.5% (w/w). We identified eighteen components with constituting 84% of the oil. The most abundant chemical was Bicyclogermacrene (14%). The essential oil of *Vitex agnus-castus* was discovered to be a substantial antimicrobial against *Staphylococcus*. The findings support the use of *Vitex* species containing beneficial chemicals in future culinary applications.

**Keywords:** *Vitex agnus-castus*, Algérie Essential oil, Antimicrobial activity, Food preservation

## CHARACTERIZATION OF HONEYS PRODUCED IN THE REGION OF MILA (NORTHEAST ALGERIA)

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### Abstract

Honey is a natural product known for its beneficial properties which depend on its composition. This composition of honey is linked to its botanical and geographical origin as well as to its environmental and cultivation conditions. The origin of the different types of honey is important in society; They are particularly relevant in the honey market as they provide knowledge to ensure the authenticity of honey. The purpose of this work was to characterize and compare the physical and chemical quality of honeys and to determine their pollen composition according to their geographical origin in the areas of Mila region of Algeria. For this, nine honey samples were harvested in 2021 and 2022. The Pollen analyses were performed and the following properties of the honey samples were determined: water content, pH level, relative density, protein and color. The results revealed that among the studied samples, five are monofloral and four multifloral. The analysis of the physicochemical parameters of the honey studied showed that most of the parameters analyzed meet the standards required by the Codex Alimentarius. In effect; the pH, acid and color of these honeys have shown that most of the samples come from nectar. Moreover; the water content and relative density values confirmed that the honeys analyzed have not undergone fermentation. The physicochemical parameters of the honey samples examined correspond to European and international quality standards, which opens up prospects for their valorization.

**Keywords:** *honeys, Melissopalynology, physico-chemical characteristics, Algeria.*

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### PHYTOCHEMICAL SCREENING AND EVALUATION OF THE ANTIOXIDANT POWER OF THE ETHANOLIC EXTRACT OF MORINGA OLEIFERA LEAVES

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### Abstract

We conducted a study with the aim of determining the phytochemical composition of *Moringa oleifera*, harvested in the province of Menaia, while evaluating its antioxidant and anti-inflammatory activities. Phytochemical tests were carried out on various extracts as well as the plant powder, revealing the presence of major secondary metabolites, namely gallic tannins, flavonoids, and coumarins, confirming the various therapeutic virtues attributed to the plant. We also observed the presence of tannins and saponins in moderate amounts, whereas anthocyanins, leucoanthocyanins, catechic tannins, quinones, and alkaloids are absent in our plant. The moisture content of the plant material was measured at 7.6%, and its purity at 1.8%. Furthermore, it is noteworthy that the yield of dry ethanolic extract of phenolic compounds resulting from the sonication of *M. oleifera* reached 3.9%. The ethanolic extract is quantified using UV-Vis spectrophotometry, revealing a polyphenol content of 83.3 mg GAE/g of plant material. The organic extracts of *M. oleifera* leaves demonstrate strong antioxidant activity, with an IC<sub>50</sub> of approximately 0.008 mg/ml. However, this activity is lower than that of ascorbic acid, the reference antioxidant, which has an IC<sub>50</sub> of 0.003 mg/ml. The anti-inflammatory activity was evaluated in vivo using the ethanolic extract of *M. oleifera* polyphenols. Pharmacotoxicological examination revealed a moderate anti-inflammatory activity with an edema inhibition percentage of 35.3%, compared to 50.3% for the reference product, Diclofenac sodium.

**Keywords:** *Moringa oleifera, phytochemical, polyphenols, antioxidant activity, anti-inflammatory activity.*

## ANALYSE BIOCHIMIQUE ET ETUDE DE LA TOXICITE AIGUE DE *CISTANCHE VIOLACEE* (DESF.) BECK

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### Résumé

Ce travail est consacré à la valorisation d'une plante endémique de la willaya de Ghardaïa, il s'agit bien de *Cistanche violacea* (Desf.) Beck appartenant à la famille des Orobanchaceae parasite des Chénopodiacées par une étude phytochimique quantitative et qualitative des composés phénoliques et un test de toxicité aigue afin de sécuriser son emploi. Les résultats du dosage des polyphénols totaux et de flavonoïdes totaux indiquent la richesse de cette plante en ces composés. Les concentrations les plus élevées ont été mesurées dans l'extrait butanolique Le dosage des différentes fractions montre la dominance des C-glycosides suivie de celle des anthocyanidines. Les profils chromatographiques obtenus montrent la présence de 21 acides phénoliques, 11 acides phénols de la série benzoïque et 10 acides de la série cinnamique, trois flavonols, deux flavones, deux flavanones, un acide organique et trois autres composés organiques, sept molécules appartenant aux C-glycosides et un seul alcaloïde identifié. Le test de toxicité aigüe a montré que l'infusé de *Cistanche violacée* est non toxique la DL 50 est donc supérieure à 6g/kg de pc.

**Mots-clés :** *Cistanche violacée*, CLHP, polyphénols, toxicité aigue

### IN VITRO EVALUATION OF THE ANTIMITOTIC AND GENOTOXIC EFFECT BY THE *ALLIUM CEPA* L. TEST OF THE AQUEOUS EXTRACT OF *PEGANUM HARMALA* L. LEAVES (LAGHOUEAT, ALGERIA)

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### Abstract

Medicinal plants are an important source of bioactive molecules with biological activities such as anticancer, antioxidant, anti-inflammatory, antibacterial, antimitotic.... These molecules include alkaloids, polyphenols and terpenes. The latter can be extracted by different solvents, namely: water, ethanol, methanol, butanol, acetone... This is why it seemed interesting to us to evaluate *in vitro* the antimitotic and genotoxic effect of these secondary metabolites contained in the aqueous extract of the leaves of *Peganum harmala* L. by the *Allium cepa* L. test on meristematic cells by calculating the mitotic parameters (The mitotic index, the aberration index and the limit value of cytotoxicity). A spectrophotometric determination of secondary metabolites namely alkaloids and flavonoids in the aqueous extract of this essence was performed. As a result, the alkaloid content is estimated to be 28.42 µg EC/mg extract and the flavonoid content is 12.52 µg EQ/mg extract. The determination of the mitotic index revealed disturbances in cell division with a highly significant difference between the negative control (distilled water) and the different samples (aqueous extracts, colchicine and quecetin). The exposure of meristematic cells to our samples resulted in a large number of chromosomal, nuclear and cellular aberrations with an aberration index reaching 16.21±1.28% for the 4mg/ml aqueous extract and 11.71±3.32% for the 10mg/ml aqueous extract. The limit value of cytotoxicity revealed that our samples ubletethal on *Allium cepa* L. meristematic cells.

**Keywords:** *Peganum harmala* L., aqueous leaf extract, *Allium cepa* L., antimitotic and genotoxic effect, Laghouat (Algeria).

### CHEMICAL COMPOSITION, SAFETY AND BIOLOGICAL ACTIVITIES OF

## ESSENTIAL OIL FROM LAVANDULA STOECHAS L.

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### Abstract

*Lavandula stoechas* L. is an essential oil-bearing plant widely used in traditional medicine to treat burn wound infections and has healing properties. The aim of the present study is to determine the chemical composition, antioxidant, antibacterial, healing activities and acute toxicity of *Lavandula stoechas* L. essential oils (EOs). The GC-MS analysis of the EOs revealed the presence of 68 components (93.51%), with Fenchone (50.29%), Camphor (14.02%), Bornyl acetate (5.60%) and Myrtenyl acetate (4.99%) as major compounds. The antioxidant activity of EOs was estimated by total antioxidant capacity, DPPH and ABTS radical scavenging, ferric-reducing power and  $\beta$ -carotene bleaching assays. The EOs exhibited moderate antioxidant activity. Antibacterial study showed good activity against two Gram-positive bacteria: *Staphylococcus aureus* (MIC=0.78±0.01 mg/mL) and *Bacillus subtilis* (MIC=0.10±0.01 mg/mL). The acute toxicity study showed that the LD50 value was greater than 2000 mg/kg, which did not exhibit any acute toxicity effect or alteration of biochemical parameters. However, *Lavandula stoechas* L. EOs ointments significantly accelerated the wound healing process (90.43±4.11%), which was greater than that of commercial healing cream (84.52%)

(Cicatryl®). In conclusion, *Lavandula stoechas* L. has potent antioxidant effects both *in vitro* and *in vivo*, antimicrobial and healing effects that support its use in traditional medicine.

**Keywords:** *Lavandula stoechas* L., toxicity, antioxidant activity, antibacterial activity and wound-healing activity.

## IDENTIFICATION AND RECOVERY OF HIGH VALUE-ADDED COMPOUNDS FROM TABLE OLIVE BRINE WATER FROM EASTERN ALGERIA

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### Abstract

In the Mediterranean, most agro-industrial wastewater is produced by the olive oil and table olive crushing industry. This sector represents a considerable source of socio-economic and environmental benefits for the region. The table olive industry produces an enormous quantity of wastewater, a major environmental problem and a source of post-processing costs. However, this liquid effluent does not comply with the standards-setting specific limit values for fruit and vegetable canning industries before discharge into the natural environment. Characterization of the effluent at the plant outlet indicates that it is highly charged with organic matter and polyphenols, which are harmful to the environment. This research aimed to investigate the phytochemical value of extracts from the brine water of Sigoise table olives from El Taref in eastern Algeria. The various results revealed that these ethyl acetate brine extracts had a high phenolic compound value. Assessments of antioxidant activity highlighted that the sections were capable of scavenging the DPPH radical and reducing the ferric complex, with IC50 values of

68.1µg/ml and 148.5µg/ml respectively for green olive brines, and 51.41µg/ml and 167.2µg/ml for black olive brines. Furthermore, the green olive brine extract showed highly significant high concentrations of hydroxytyrosol and tyrosol, illustrated by hydroxytyrosol (135.65±1.84 mg/100mg -83.74±2.76mg/100mg) and tyrosol (154.75±2.35 mg/100mg- 96.32±2.1 mg/100mg). Screening based on table olive extracts has proved useful for identifying promising drug candidates, including hydroxytyrosol and other applications in sustainable organic agriculture. Change the current style of production corresponding to a linear economy that evokes environmental severe effects to a circular economy to minimize waste and rejection and prevent the waste of natural resources.

**Keywords:** table olives, *Sigoise*, DPPH, Hydroxytyrosol, environment.

Chromatography-Mass Spectrometry and the results showed dominance in palmitic acid (32.56%), linolenic acid (21.34%) and linoleic acid (11.24%). The methanolic extract showed an antioxidant activity for DPPH, ABTS, reducing power and phenanthroline assays. The strongest antioxidant activity was obtained with phenanthroline assay (value of  $A_{0.5} < 3.125 \mu\text{g/mL}$ ). The antimicrobial investigation on thirteen microbial strains revealed that the methanolic extract showed low to moderate antibacterial activity against the Gram-positive and negative tested bacteria and no antifungal activity on all the tested fungi. This work suggests the use of leaves from *H. muticus* L. as a source of bioactive compounds with applications in the pharmaceutical, cosmetic and food industries.

**Keywords:** *Hyoscyamus muticus* L., phytoconstituents, antioxidant potential, Antagonistic properties, HPLC, GC-MS.

## PHYTOCHEMICAL PROFILES AND BIOLOGICAL ACTIVITIES OF *HYOSCYAMUS MUTICUS* L.

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### Abstract

This research work aims to determine the chemical composition and evaluate the biological activities of the methanolic extract obtained from *Hyoscyamus muticus* L. leaves of Timimoun region. Methanolic extract of the plant contained the highest quantity of phenolics (148.00 ± 3.07 µg GAE/mg extract) and flavonoids (41.43 ± 0.90 µg QE/mg extract). The High-Performance Liquid Chromatography analysis revealed that orientin, vitexin 2-O-rhamnoside and n-OH-cinnamic acid were the three major components. Eight metabolites were identified and quantified by the Gas

## IN VIVO ANALGESIC AND ANTI-INFLAMMATORY EFFECTS OF THE ESSENTIAL OIL D'ORIGANUM VULGARE

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### Abstract

Plants play a vital role in the discovery of novel chemical compounds of botanical origin that possess significant therapeutic effects. Due to the traditional use of d'Origanum vulgare leaves as a natural remedy for pain and as an anti-inflammatory agent, we were driven to investigate the in vivo anti-inflammatory and analgesic properties of oregano



essential oil (EO). The extraction of oregano EO was carried out through hydrodistillation. Analgesic effects were assessed using the Writhing test, while the anti-inflammatory properties were evaluated through a method involving the induction of plantar edema by injecting carrageenan into the left hind paw of mice, with respective doses of 62.5, 125, and 250 mg/kg, and 250, 500, and 750 mg/kg for each mouse. Reference groups were administered either Spasfon (8 mg/kg) or Diclofenac (2.5 mg/kg) for the Writhing and carrageenan tests, respectively. The obtained results reveal a significant inhibition of paw inflammation following oral administration of oregano EO, with a reduction of 48.96% at the concentration of 750 mg/kg. Similarly, our results demonstrate that oregano EO reduces acetic acid-induced pain in mice, with a reduction rate of 80.77% at a concentration of 150 mg/kg. In conclusion, these findings clearly suggest that this plant exhibits inhibitory capacity towards both acute inflammation and pain perception. Consequently, oregano EO could be considered a promising alternative as an anti-inflammatory agent for treating inflammation-related conditions.

**Keywords:** Essential oil, Analgesic activity, Anti-inflammatory activity, *Oreganum vulgare*.

### EFFET DU STRESS SALIN SUR L'EXPRESSION DES CARACTÈRES MORPHO-PHYSIOLOGIQUE ET BIOCHIMIQUE *IN VITRO* DU FIGUIER DE BARBARIE

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#### Résumé :

Le présent travail se propose d'étudier l'effet du stress salin au stade de germination sur le comportement morpho-physiologique de figuier de barbarie existante dans les zones arides et semi arides Algériennes. L'étude a été réalisée dans une chambre de culture à température et à photopériode contrôlées. Les graines sont mises à germer dans

des boîtes de Pétri contenant des concentrations croissantes en sel (NaCl) allant de 0 témoin à 600 mM. Les résultats obtenus montrent que la germination *in vitro* des axes embryonnaires n'a pas été affectée par la concentration du sel. Cependant, le taux de survie des embryons germés passe de 95% pour le témoin à 42,9% pour la plus forte concentration saline (600 mM). D'autre part, l'estimation des caractères morpho-physiologique (longueur de la partie aérienne et racinaire, nombre de racines produites par embryon développé, la production des biomasses totales des matières fraîches et sèches de la partie aérienne et racinaire et la teneur en chlorophylle) a décelé des différences très hautement significatives pour les différentes concentrations du sel. La salinité a entraîné des modifications morpho-physiologiques. Le degré de sensibilité au sel dépend de l'intensité du stress et de type d'organe (racine, feuille). La sélection du matériel végétal tolérant au sel est, par conséquent, tributaire d'une connaissance approfondie des mécanismes physiologiques.

**Mots-clés :** *Figuier de barbarie, stress salin, in vitro, caractères morpho-physiologiques.*

### VARIATIONS IN THE ENZYMATIC ACTIVITY OF THE LIVER IN ALPINE GOATS UNDER THE INFLUENCE OF THE PHYSIOLOGICAL STAGE IN THE "ITDAS" STATION .BISKRA.

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#### Abstract

In Algeria, the distribution of the goat population according to geographical areas shows that this

breeding is mainly a speculation of difficult regions (scarce vegetation, bad climatic conditions, etc.). The well-being and productivity of the goat depend in a large measure of a diet that meets his needs. The aim of this study is to evaluate the impact of the physiological stage through the analysis of some enzymatic parameters, in order to assess the physiological state of the liver function of alpine goats in the I.T.I.D.A.S station. This work is focused on 20 alpine goats belonging to a state farm at the "Ain Ben Naoui" station, known as the Technological Institute for the Development of Saharan Agriculture "I.T.D.A.S", located in the town of El hajeb in west of the capital of the wilaya of Biskra, 7 km on the National Biskra-Algiers road. Samples were taken from clinically healthy goats (pregnant goats, lactating goats), each animal retained underwent a blood sample from the jugular vein at (08:30 a.m.) before food intake in EDTA tubes, then centrifuged at 400 rpm for 15 min to measure the circulating concentrations of hepatic enzymes (TGO, TGP, alkaline phosphatase). The results obtained make it possible to mark a non-significant decrease in the rate of TGO in goats at the start of lactation compared to pregnant goats. With regard to the rate of TGP, the results recorded a significant increase in pregnant goats compared to goats at the start of lactation. The alkaline phosphatase level indicates a significant increase in goats at the beginning of lactation compared to pregnant goats.

**Keywords:** goats, alpine race, physiological stage, liver, enzymatic parameters

### BIOCHEMICAL STUDY OF FOOD ALLERGENS IN COW'S MILK.

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#### Abstract

In Algeria, milk occupies an important place in everyone's diet and is the basic food for infants. It

provides high-quality proteins and a multitude of micronutrients, which makes its consumption a marker of the quality of the diet. Despite its importance, cow's milk protein can play a role in certain diseases. In infants and children, food allergy to cow's milk proteins is well known and constitute antigens triggering an allergic type reaction, the most incriminated of which are caseins, beta-lactoglobulin and alpha-lactalbumin, hence the interest of this study. The selective extraction of  $\alpha$ -lactalbumin,  $\beta$ -lactoglobulin and caseins was carried out without the use of toxic products as well as the determination of some biochemical parameters: carbohydrates, proteins; denaturation temperature hydrogen potential (PH) and humidity. The results obtained reveal that the denaturation temperature of these trophallergens is relatively high which explains their ability to trigger hypersensitivity reactions even after cooking the food. These food allergens are glycoprotein in nature, with a percentage of 1.6 to 2.6 % of the glycan portion. The isoelectric PH value of these macromolecules is acidic. Emphasis should be placed on the great need for further research and work on the nutritional components of this foodstuff which is in great demand by the consumer.

**Keywords :** cow's milk, food allergens, proteins, biochemical parameters

### EFFECT OF MARGINE ON THE GROWTH OF PHASEOLUS VULGARIS L.

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#### Abstract

Nowadays, with the promotion of the health benefits of olive oil, demand is constantly increasing and, as a result, the production of margines is constantly growing, causing serious environmental damage. The application of margines as a biofertiliser is at an experimental

stage and can be considered a suitable solution for recycling oil mill waste. Our experiment consists of demonstrating the effect of spreading margins on the development of beans (*Phaseolus vulgaris* L.). To this end, a complete randomised block design was divided into two blocks: T1: 15 pots filled with soil and spread with 50m<sup>3</sup>/ha of margine, and T2: 15 control pots with natural soil. After 70 days of cultivation under glass, a total of 120 de-potted bean plants were measured for stem height, neck diameter, total fresh weight, total dry matter and number of nodules. The results showed that the dose of 50 m<sup>3</sup> ha<sup>-1</sup> of margines significantly improved all the parameters assessed in the treated plants compared with the control plants by twice the fresh weight, dry matter and number of nodules. The use of margines by spreading would be an interesting alternative in the ecosystemic balance and the conservation of agricultural land.

**Keywords:** *margines, Phaseolus vulgaris* L., *spreading*.

#### ANTIFUNGAL ACTIVITY OF CELL WALL PHENOLIC COMPOUNDS OF DATE PALM LEAVES ON *FUSARIUM OXYSPORUM* F. SP. *ALBEDINIS*, THE CAUSATIVE AGENT OF BAYOUD.

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#### Abstract

The Bayoud disease caused by *Fusarium oxysporum* f. sp. *albedinis* (*Foa*) is the most serious disease of date palms. Plant extracts can be alternative strategies to the currently used fungicides to combat parasitic plant diseases. This study was undertaken to evaluate the antifungal activities of phenolic compounds extracted from the cell walls of leaflets from two cultivars, Deglet-Nour (susceptible) and Takerboucht (resistant), against this fungus. Tests of the antifungal activity of these phenolic compounds on PDA (Potato Dextrose Agar) and PDL (Potato Dextrose Liquid) media showed a very significant inhibitory effect at

a concentration of 50 µg.mL<sup>-1</sup>, on the mycelial growth, sporulation, and fungal biomass of *Foa*. The production of fusaric acid is inhibited at different tested concentrations (10, 20, and 50 µg.mL<sup>-1</sup>), with an inhibition of 99.40% for TK extracts and 99.20% for DN extracts at a concentration of 50µg/mL. The cellulase activity of *Foa* is less affected, with an inhibitory effect of 49.30% and 53.28%, respectively, for TK and DN extracts at concentrations of 10 and 20 µg.mL<sup>-1</sup>. These results should open up perspectives for integrating the fight against Bayoud through the use of plant extracts as a new strategy to combat this major constraint of date palm cultivation.

**Keywords:** *Phoenix dactylifera* L, *Fusarium oxysporum* f.sp *albedinis*, *Bayoud*, *cell wall phenolic compounds*, *Fusaric acid*, *cellulase activity*.

#### EXPLORATION OF BIOTECHNOLOGICAL POTENTIAL OF OLIVE MILL WASTE

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#### Abstract

As most countries of the Mediterranean basin, Algeria's oil industry annually generates large amounts of olive pomace; these effluents are often discharged and can generate environmental problems due to its high content of organic compounds. This by-product contains a diverse bioactive compounds which is considered as a natural bioresource with interesting microbiological potential, particularly microorganisms that use this material to break it down and/or produce diverse metabolites. Consequently, the extraction of such molecules from these natural matrices is a crucial step. Hence the aim of this study is to determine the levels of various bioactive substances, and to assess the biotechnological potential of olive pomace extracts

for the production of some enzymes (lipase and cellulase). The studied samples include fresh and dried olive pomace, and spectrophotometric methods were performed for analysis, and obtained olive pomace extract has been used as a substrate by a strain of actinobacteria to produce metabolites of interest. The results indicate that the levels of various bioactive substances are notable and differ significantly between the olive pomace analyzed. The biotechnological potential of these matrices using the S2 strain showed high lipase activity, moderate cellulase activity, and a higher biomass was noted in the dried pomace. This confirms the diverse prospects for using these matrices to produce a multitude of compounds served as ingredient for food industry and to contribute to reducing environmental problems.

**Keywords:** olive pomace, bioactive compounds, biotechnological potential

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### LA BIODIVERSITE ET L'ACTIVITE ANTIMICROBIENNE DES PLANTES MEDICINALES CONTRE LES BACTERIES PATHOGENES.

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#### Abstract

L'utilisation des plantes médicinales comme une approche potentielle pour lutter contre le phénomène de l'antibiorésistance est de plus en plus considéré, étant donné que les antibiotiques deviennent moins efficaces en raison de leur utilisation quotidienne et irrégulière. Les composés des plantes médicinales peuvent être exploités pour développer de nouvelles stratégies thérapeutiques et réduire la dépendance aux antibiotiques traditionnels. L'objectif de notre étude était d'identifier la composition de l'huile essentielle d'*Origanum majorana* et d'évaluer leur activité

antimicrobienne. L'extraction des huiles essentielles a été réalisée par hydrodistillation. L'identification des biomolécules a été effectuée par la technique de GC-MS. L'effet de l'huile essentielle sur les souches testées, notamment *Klebsiella pneumoniae*, a été déterminé en utilisant la méthode de diffusion sur gélose Mueller-Hinton. De plus, nous avons évalué l'impact de l'huile essentielle sur différents types de motilité en inoculant les souches dans divers milieux contenant différentes concentrations d'agar. L'analyse par GC-MS a révélé la présence de différents composants tels que l' $\alpha$ -Pinène, le  $\beta$ -Pinène, le 4-Terpèneol, etc. L'huile essentielle d'*Origanum majorana* a démontré un effet inhibiteur contre la bactérie *Klebsiella pneumoniae*, ainsi qu'une action contre les deux types de motilité, à savoir « swimming » et « swarming ». Nos résultats mettent en évidence le fort potentiel d'activité antibactérienne de l'huile essentielle d'*Origanum majorana* contre la bactérie *Klebsiella pneumoniae*.

**Mots-clés :** Antibiorésistance ; *Origanum majorana* ; *klebsiella pneumoniae*

**2nd day : October 19th, 2023**

**Session President: Pr. Alatou**

**Moderators: Pr. Bensaleh M.K., Pr. Karoune S., Dr. Bazri K. Dr. Tahirine M.**

### **STUDY OF THE ANTIOXIDANT AND ANTIBACTERIAL PROPERTIES OF POMEGRANATE (PUNICA GRANATUM )**

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#### **Abstract**

*Punica granatum* L. (pomegranate) is a widely consumed fruit. The antioxidant and antibacterial properties of hydroalcoholic extracts from different parts of the plant were the subject of this study. We were interested in this work in the study of phenolic compounds and the evaluation of the antioxidant and antimicrobial properties of the extracts of the pomegranate peel. The extracts of the peel of the fruit were obtained by maceration in methanol, ethanol and acetone for 24 hours. The extraction yields are 60.82, 37.45 and 6.51% respectively. The results obtained for the quantification of phenolic compounds showed that these extracts contain total polyphenols and flavonoids. The comparison of the antioxidant activity between the different parts of pomegranate and between the seven regions of South Africa highlighted in the two selected articles is made by the DPPH radical scavenging method. The Agar Diffusion method and the following three microbial strains: *Bacillus subtilis*, *E.coli* and *Staphylococcus aureus*; were used to determine antimicrobial activity. Results obtained in the articles showed that pomegranate possesses antioxidant and antimicrobial activity which varies from one extract to another and from one region to another.

**Keywords:** *pomegranate, extract, antioxidant activity, antimicrobial activity*

### **CARACTERISATION DES PENNES ET DU POLLEN DE DIFFERENTS CULTIVARS ALGERIENS DU PALMIER DATTIER (PHOENIX DACTYLIFERA) PAR LA CHROMATOGRAPHIE LIQUIDE 2D**

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#### **Abstract**

La composition polyphénolique des pennes de palmier dattier algérien (*Phoenix dactylifera* L.) des cultivars Hamray, Safray, Ghars, Horra, Deglet Nour (DN) et du pollen (chez les cultivars DN) a été étudiés pour la première fois chez ces cultivars. Les fractions polyphénoliques ont été extraites à l'aide de trois solvants (acétone, méthanol et éthanol) et caractérisées en termes d'activité antioxydante et de teneurs en polyphénols totaux (PPT), en flavonoïdes (TF) et en tanins condensés (TTC). Tous les extraits présentaient une activité antioxydante et des valeurs TPC, TF et TTC élevées, DN étant le cultivar qui a fourni les meilleurs résultats sans différences significatives entre les trois solvants. Lorsque les extraits ont été analysés par HPLC-MS, 21 et 23 phénols ont été identifiés dans les extraits de pennes et de pollen, respectivement. De plus, les empreintes polyphénoliques d'extraits de pennes ont été obtenues par chromatographie liquide bidimensionnelle complète (LC · LC), ce qui a permis de discriminer les échantillons en fonction de leur cultivar par analyse discriminante linéaire (LDA).

**Mots-clés:** *Pennes de palmier dattier, pollen de palmier dattier, les composés polyphénoliques, 2D chromatographie liquid, analysis discriminant Linear.*

### **ETUDE PHYTOCHIMIQUE ET VALORISATION DE L'ACTIVITE ANTI-INFLAMMATOIRE DE LAUNAEA NUDICAULIS**

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## QUANTITATIVE ASSESSMENT OF MEDICINAL PLANT DIVERSITY AND UTILIZATION IN THE SEMI-ARID REGION OF SOUK AHRAS

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### Résumé

L'objectif principal de ce travail est l'étude phytochimique et biologique des différents extraits d'une plante médicinale Algérienne de la région de Biskra *Launaea nudicaulis* (Asteraceae) utilisée en médecine traditionnelle. L'analyse quantitative a été achevée en mesurant le contenu en phénols et flavonoïdes totaux des différents extraits. L'infusé de la partie aérienne donne les meilleurs teneurs en ces composés. L'évaluation de l'activité anti-inflammatoire a été réalisée sur le modèle de l'oedème aiguë de la patte de souris induit par la carragénine à 1%. Les résultats obtenus à l'issue des tests anti-inflammatoires montrent que l'injection de la carragénine entraîne une augmentation remarquable du poids de la patte des souris témoins de 45.38%. L'injection intra-péritonéale de différents extraits de *L. nudicaulis* inhibent la formation d'oedème, présentant ainsi un effet anti-inflammatoire contre l'inflammation aiguë. Cette efficacité des différents extraits de cette plante pourrait être liée à leur profil chimique, particulièrement à la présence de composés phénoliques. Effectivement, les analyses qualitatives par CLHP ont permis de révéler des acides phénols, des flavonols et des flavones. Ces résultats affirment que cette plante présente de très bonnes propriétés médicinales ce qui ouvre de nouvelles perspectives dans le domaine des applications naturelles qui peuvent être une alternative valable pour remplacer les produits chimiques.

**Mots-clés:** *Launaea nudicaulis*, Acute inflammation, Alternative, Phénols.

### Abstract

In the semi-arid region of Souk Ahras, our comprehensive study conducted during 2021-2022 aimed to quantitatively assess the diversity of medicinal plants and their utilization practices. We meticulously documented 45 distinct species of medicinal plants, representing 25 diverse plant families. Among these, the Asteraceae family emerged as the dominant one, featuring eight distinct species, closely followed by the Lamiaceae family. Notably, leaves constituted the most frequently used plant part for medicinal purposes, accounting for 45% of utilization, while decoction (30%) and infusion (22%) were the predominant methods of preparation. Our quantitative analysis revealed the cultural significance of specific plant species, exemplified by notably high Relative Frequency Citation (RFC) values for *Ruta chalepensis* L. (RFC: 33%), *Origanum glandulosum* Desf (RFC: 31%), and *Pistacia lentiscus* L. (RFC: 28%). Moreover, *Pistacia lentiscus* L. (UV: 0.85) and *Marrubium vulgare* L. (UV: 0.57) exhibited versatile medicinal uses, as indicated by their elevated Use Value (UV) scores. These findings underscore the pivotal role of medicinal plants in addressing healthcare needs within the semi-arid context of Souk Ahras and provide invaluable insights into conservation and healthcare practices tailored specifically to the region's distinctive requirements. This quantitative assessment enhances our understanding of the cultural and therapeutic significance of medicinal flora and contributes to informed decision-making in conservation and healthcare strategies for semi-arid environments.

**Keywords:** *Semi-arid; Medicinal plant; Quantitative analysis; Healthcare.*

### OPTIMIZATION OF MICROWAVE-ASSISTED EXTRACTION OF BIOACTIVE COMPOUNDS FROM ROSMARY LEAVES: ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES

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#### Abstract

This study based on the optimization of operational conditions of microwave assisted extraction (MAE) for extraction of total phenolic compounds (TPC) from *Rosmarinus officinalis* L. leaves, using response surface methodology (RSM) coupled with a Box–Behnken design (BBD). The optimal conditions were as follows: ethanol concentration 78.162%, microwave power 351.825W, ratio of solvent to raw material 101.623:1 and extraction time 122.648s. It was confirmed that rosemary leaves can be used as a good source of valuable compounds since it was possible to obtain up to 15.01% (on dry weight basis) of TPC. UHPLC-DAD-ESI-MS<sup>n</sup> analysis revealed the major presence of rosmarinic acid (RA), rosmanol (R), carnosic acid (CA), carnosol (C) and methyl carnosic acid (MCA) in rosemary extract. Oxidative stress has been implicated in numerous pathologic conditions, such as inflammation, diabetes, cardiovascular diseases, cancer, and ageing, while natural fractions are potential sources of bioactive compounds able to counteract such events. To provide evidence of the antioxidant potential of the rosemary ethanolic extract, three in vitro essays (DPPH, NO, SO) were conducted. The effects of ethanolic extract of *Rosmarinus officinalis* on  $\alpha$ -Glucosidase and Anti-lipase activities were

investigated. It was concluded that the rosemary ethanolic extract had powerful antioxidant and antidiabetic effects comparable with some standards.

**Keywords:** *Rosmarinus officinalis* L., microwave assisted extraction (MAE), antioxidant capacity.

### ACTIVITE ANTI-INFLAMMATOIRE ET ANTIOXYDANTE DE L'EXTRAIT AQUEUX DES FEUILLES DE LAURUS NOBILIS.

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#### Résumé

*Laurus nobilis*, plante médicinale de la pharmacopée traditionnelle de l'Algérie, largement consommé en Algérie, reste malheureusement confinée dans le cadre alimentaire. C'est pour cela que dans cette étude nous nous sommes proposé d'évaluer certaines des activités biologiques de l'extrait aqueux des feuilles de *Laurus nobilis* L, est une plante d'intérêt médicinal au regard des nombreuses études rapportées par la littérature spécialisée et de nombreuses molécules bioactives qui rentrent dans la composition des différentes parties de cette plante. Le présent travail vise à explorer l'activité anti-inflammatoire, antioxydante et antibactérienne de l'extrait aqueux des feuilles de *Laurus nobilis* L. qui renferme des composés phytochimiques. L'analyse de ces derniers a révélé que notre extrait présente une forte teneur en polyphénols totaux (139.66±6.16 mg EAG/g). D'une part, l'évaluation de l'activité anti-inflammatoire est effectuée par la méthode de l'inhibition de la dénaturation thermique de la BSA et le test de protection de la membrane des globules rouges vis-à-vis d'un stress osmotique et thermique. Cette étude a montré que l'extrait aqueux possède un effet protecteur significatif et les résultats obtenus sont respectivement de 72.430±0.010 %, 96.5±0.007% et 88.74±0.007 %. D'autre part, une évaluation de l'activité antioxydante donne des valeurs d'IC50 de 674.6±29.21 µg/ml pour la capacité antioxydante totale et une IC50 de 836.16±27.68 µg/ml pour le pouvoir réducteur

ferrique. De même, l'activité antibactérienne a été évaluée par la méthode de diffusion en milieu gélosé, l'extrait a montré une inhibition de croissance de *Bacillus cereus* et *Staphylococcus aureus*. D'après les résultats obtenus au cours de cette étude, nous pouvons conclure que l'extrait aqueux de feuilles de *Laurus nobilis* L. possède un potentiel relativement important pour les activités étudiées. De ce fait, les feuilles de *Laurus nobilis* constituent une véritable source de molécules bioactives qui peuvent constituer une alternative dans le traitement de nombreuses pathologies.

**Mots-clés:** *Laurus nobilis* L / feuilles / érythrocyte/ anti-inflammatoire/antioxydant/ antibactérienne.

### **ANALYSE PHYTOCHIMIQUE ET EVALUATION DE L'ACTIVITE ANTIOXYDANTE DES EXTRAITS HYDROALCOOLIQUES DE *PISTACIA LENTISCUS* ET DE *PHLOMIS BOVEI***

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#### **Abstract**

*Phlomis bovei* and *Pistacia lentiscus* are Mediterranean plants widely used in traditional medicine for their biological and therapeutic properties. Within the framework of the valorization of medicinal plants of pharmaceutical interest from Algeria, we were interested in the characterization and phytochemical identification as well as the study of the antioxidant activity of the hydro-ethanol extract of the aerial part (leaves of both plants) harvested in June 2022 in Tizi-ouzou. To identify the different chemical families contained in the leaves of the two plants, we carried out phytochemical tests based on coloring reactions. Anti-oxidant properties were assessed using the iron reduction method (FRAP). Phytochemical identification tests confirmed the presence of alkaloids, flavonoids, tannins, sterols and triterpenes, as well as reducing compounds. The FRAP antioxidant test showed a significant reduction in iron with an IC50 of 159.481 µg/ml for *Phlomis bovei* and 56.654 µg/ml for *Pistacia lentiscus*. Phytochemical screening confirms the richness of these two species in secondary

metabolites, which may confer on them their therapeutic virtues.

**Keywords:** *Pistacia lentiscus*; *Phlomis bovei*; phytochemical analysis; antioxidant activity; FRAP test

### **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 µl/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

### **COMPARATIVE STUDY OF PHENOLIC COMPOUNDS CONTENT AND ANTIOXIDANT EFFECTS OF SOME MEDICINAL PLANTS**

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## Abstract

Phenolic compounds have known a great interest by researchers due to their roles in the prevention of various pathologies associated with oxidative stress. The aim of this work is to compare the levels of phenolic compounds and to evaluate the antioxidant activity of hydroethanolic and aqueous extracts obtained from four plants: *Myrtus communis* L., *Laurus nobilis* L., *Rosmarinus officinalis* and *Thymus numidicus* without and after delipidation, these species are collected in Mila region. The extraction was carried out with maceration, TPC and TFC of all extracts were determined using different methods, the antioxidant effect was evaluated using 2, 2-diphenyl-1-picrylhydrazyl method (DPPH). Among all extracts, the hydroethanolic extract without delipidation of *Laurus nobilis* L. represented the highest yield with 12.08%. The extracts of *Myrtus communis* L. showed great solubility in the solvents tested, however, the hydroethanolic extract without delipidation of the same species seemed to be rich in phenolic and flavonoid compounds compared to other extracts, i.e., 89.83 µg EAG/mg and 6.16 µg EQ/mg respectively. This extraction fraction showed better antioxidant activity with an IC<sub>50</sub> = 28.78 µg/ml. We can conclude that *Myrtus communis* L. is a good source of bioactive substances that could be used as natural alternative source for different sectors such as medicine, pharmacology and food.

**Keywords:** Medicinal plants, Phenolic contents, Flavonoids contents, Extraction, Solubility, Antioxidant activity.

## EXPLORING ETHNOBOTANY AND INDIGENOUS PLANT-BASED DIABETES TREATMENTS IN THE NORTHERN ALGERIAN REGION OF BOUMERDES

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## Abstract

In an effort to enhance our understanding of medicinal plants used in diabetes treatment, an ethnobotanical survey was conducted involving herbalists, traditional healers, botanists, experienced healers, and pharmacists within the study area. The results of this survey have led to the compilation of 75 medicinal plant species from 36 botanical families, utilized in the formulation of 43 traditional therapeutic recipes for managing diabetes in the local population. Among these species, the Lamiaceae family stands out with eight represented species. Leaves are the most commonly employed plant parts in remedy preparation. Decoction emerges as the primary mode of preparation, with oral administration being the prevalent method. Remarkably, out of the 75 medicinal species utilized, 25 (33.33%) are collected directly from the Boumerdes forest, reflecting their spontaneous occurrence. However, the excessive collection of certain species, such as *Centaurium Erythraea*, *Crataegus* Spp., *Alchemilla Vulgaris*, and *Myrtus Communis* L., poses a threat to their existence and contributes to the depletion of the Boumerdes forest. This highlights the urgent necessity to implement sustainable management practices for the conservation and safeguarding of these valuable species. Furthermore, this research serves as a valuable resource for phytochemists and pharmacologists interested in investigating the antidiabetic properties of these plants.

**Keywords:** Medicinal plants, Boumerdes region, Ethnobotany, Diabetes.

## TRADITIONAL USES AND BIOLOGICAL EFFECTS OF MORINGA OLEIFERA LAM. GROWN IN ALGERIAN ARIDES REGIONS

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### Abstract

This present study aims to identify and enhance *Moringa oleifera*, a medicinal plant used by the Algerian population in traditional treatments. The ethnobotanical study carried out in several regions of Algeria revealed the uses of this plant by the local population in traditional medicine. The qualitative phytochemical study showed the richness of *Moringa oleifera* studied in secondary metabolites with dominance of polyphenols. On the other hand, the quantitative analysis carried out with spectrophotometry showed variable levels of bioactive phenolic compounds, depending on the extracts and the plants studied. Finally, the study of the antibacterial biological activity carried out by agar diffusion-paper disc, showed sensitivities of the bacterial strains vis-à-vis the extracts of plants tested; this effect is related to the chemical composition of these extracts. It emerges that *Moringa* confer a various biological, therapeutic, food and cosmetic virtues seen their wealth of bioactive substances with powerful therapeutic virtues, which opens up prospects for the search for bioactive molecules of interest for its valorization in pharmacology.

**Keywords:** *Moringa oleifera* Lam, ethnobotanical study, antibacterial biological activity, phytochemical study

## BIODIVERSITY AND VALUE OF MEDICINAL PLANTS IN PHYTOTHERAPY IN EASTERN ALGERIA

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### Abstract

The number of medicinal plant species used by 80% of the world's population in traditional medicines is estimated to be between 53,000 and 72,000. However, already 21% of medicinal species identified in the world, or 15,000, are threatened by different factors. In Algeria, in recent years the effects of drought associated with climate change as well as the rapid reduction of natural habitats and biodiversity have contributed to the loss of cultural and natural wealth linked to traditional medicinal knowledge. The use and increased importance of medicinal biodiversity, both for natural health products and for pharmaceutical development, should however require greater protection and valorization of the fruits of this biodiversity. Paradoxically, there is still no complete inventory of native natural and wild medicinal species used in the different regions of Algeria. It is to try to begin to fill this gap that we have produced a list of indigenous medicinal plants in Algeria that we present in the context of this study. A series of surveys was carried out in the study areas of Jijel, Constantine, Mila, Oum Elbouaghi, Batna, Biskra and Oued Souf among herbalists and phytotherapists. The analysis of the results obtained allowed us to identify more than 95 species. 95.09% of medicinal plants are harvested manually because they are generally located in the wild. Indeed, wild spontaneous plants are used with (67.83%) of the total species, unlike cultivated plants which only

represent (32.16%). The conservation of plants is done away from light (52.08%). Furthermore, the survey indicates a high frequency of use of leaves with a percentage of (39.59%), fruits (13.06%), rhizome (11.42%) and flowers (8.97%). In conclusion, our ethnobotanical survey revealed a multitude of results on the distribution and use of medicinal plants, the parts used as well as the symptoms treated.

**Keywords:** health, environment, medicinal plant, biodiversity, traditional knowledge.

### USE OF *MALVA SYLVESTRIS L.*, IN BIOTECHNOLOGY AND BIOSAFETY SECTOR

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#### Abstract

Medicinal plants represent an inexhaustible source of bioactive natural substances, and remain the predominant source of medicines for the majority of the world's population. In the present work, we have studied the evaluation of the biological and functional properties of the dry plant *Malva sylvestris L.* for their use in the in biotechnology and biosafety sector. In the materials and methods section, we produced extracts by maceration in methanol and distilled water of powders from the leaves and stems of dry *Malva sylvestris L.* plants, and tested their biological activities. The antibacterial activity of both extracts was assessed *in vitro* by the well diffusion method on Gram-positive and Gram-negative bacteria. In terms of yield, the methanolic extract was the most important with a percentage of 4.9 (%), 3.9 (%) for both leaf and stem parts respectively. Aqueous extract followed with a percentage of 3.7 (%), 3.4 (%) for both leaf and stem parts respectively. The strain sensitivity test showed that the methanolic extract of *Malva sylvestris* had significant antibacterial activity. The *Escherichia coli* strain was the most sensitive to the extract, with inhibition

diameters varying according to concentration. However, *Staphylococcus aureus subsp aureus* was the least sensitive. The inhibitory activity obtained with our extracts can be explained by the presence of a high phenolic compound content. Finally, this work has demonstrated the importance of the *Malva sylvestris L.* plant in the field of biotechnology and biosafety.

**Keywords:** Tiaret (Algeria), *Malva sylvestris L.*, extraction, biotechnology and biosafety sector.

### COMPUTATIONAL SCRUTINY OF QUERCETIN'S PHARMACOLOGICAL EFFECTS

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#### Abstract

Quercetin, a natural flavonoid abundant in fruits and vegetables, exhibits remarkable pharmacological effects. In this computational study, we subjected Quercetin to thorough scrutiny using advanced computational techniques. Through molecular docking simulations and molecular dynamics simulations, we elucidated its binding interactions with key target proteins associated with various cellular pathways. Our computational analysis provides insights into the potential therapeutic applications of Quercetin, shedding light on its ability to modulate specific molecular targets. This study not only advances our understanding of Quercetin's pharmacological effects but also lays the groundwork for future experimental investigations and the development of innovative therapeutic interventions.

**Keywords:** Quercetin, Pharmacological effects, Computational study, Binding interactions.

### EVALUATION DE L'EFFET ANTI-INFLAMMATOIRE D'HUILE ESSENTIELLE D'*ORIGANUM FLORIBUDUM* IN VIVO.

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## Abstract

Oregano, a medicinal plant known for its anti-inflammatory, antimicrobial, and antioxidant properties, represents a promising alternative to chemical compounds, offering safer and environmentally friendly treatments for inflammation. This study focuses on evaluating the anti-inflammatory effect of *Origanum floribudum* essential oil to highlight its potential in traditional medicine. The extraction of this oil was performed using the hydrodistillation technique. The anti-inflammatory effect of the essential oil was assessed *in vivo* using a model of acute inflammatory paw edema in male albino IMRI mice induced by carrageenan injection. The anti-inflammatory effect was achieved by administering different doses of oregano essential oil, with injections performed 30 minutes before inducing acute inflammation with 1% carrageenan. The results were compared to those of Diclofenac® and the physiological control. Carrageenan injection resulted in a significant increase in paw volume. The results demonstrated that the anti-inflammatory activity was dose-dependent. *Origanum floribudum* essential oil exhibited anti-inflammatory activity, resulting in a 66.32% reduction in edema.

**Keywords:** Inflammatory activity, essential oil, *Origanum floribudum*.

## POTENTIAL CYTOGENOTOXIC IMPACT OF TRIBULUS TERRESTRIS ON MERISTEMATIC CELLS OF ALLIUM CEPA L. AND VICIA FABA L.

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## Abstract

*Tribulus terrestris*, a plant belonging to the Zygophyllaceae family, is well-known globally for its medicinal properties in treating various diseases. This study aimed to investigate the potential cytotoxic and genotoxic effects of *T. terrestris* on two plant models, *Allium cepa* and *Vicia faba*. Different concentrations of *T. terrestris* extracts

(ranging from 0.00625 to 0.1 mg/mL) were applied to the meristematic cells of *A. cepa* and *V. faba* roots. This study examined root growth, structure, and coloration, and measured the mitotic index (MI) and chromosomal aberrations (CAs) as indicators of toxicity. The results revealed a significant decrease in the average length of roots treated with concentrations of 0.025, 0.05, and 0.1 mg/ml for *A. cepa* and 0.1 mg/ml for *V. faba*. The assessment of cytotoxicity and genotoxicity showed a notable reduction in MI starting from the 0.025 mg/ml concentration in *A. cepa* and from 0.05 mg/ml in *V. faba*. The decrease in MI was found to be proportional to the increase in *T. terrestris* concentration and treatment duration. Additionally, a considerable increase in chromosomal aberrations was observed in both *A. cepa* and *V. faba* at the 0.025 mg/ml concentration. These findings indicate the potential genotoxic effects of *T. terrestris*. Considering the results, caution should be exercised when using *T. terrestris* as a medicinal plant, ensuring it is employed appropriately and only for essential therapeutic needs.

**Keywords:** *Tribulus terrestris*; *Allium cepa*; *Vicia faba*; Cytotoxicity, Genotoxicity

## LCMS UNTARGETED METABOLOMICS PROFILING OF CADMIUM CONTAMINATED MECH-DEGLA DATE PALM CULTIVAR AND THE DETOXIFYING EFFECT OF PHLOROGLUCINOL

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## Abstract

The three main components of this work are: (i) Date palm, which is one of the most stress-resistant plants given the hostility of its evolutionary environment, (ii) Phloroglucinol, a phenolic compound well known for its stress resistant

virtues, and (iii) cadmium, a heavy metal representing the applied abiotic stress. Thus, this work is an attempt to study the resulting equation using biotechnological and bioinformatics tools to identify the metabolic mechanisms involved in tolerance to applied toxicity. In-vitro germination of Mech-Degla cultivar seeds (*Phoenix dactylifera* L. var Mech-Degla) was carried out under sterile conditions. A sugar-free reduced MS medium was used as the germination medium. The seedling roots, which had grown for three months, were co-treated with Phloroglucinol one week before the addition of 50  $\mu$ M of Cd. Metabolites were extracted from the roots and leaves using high-performance liquid chromatography coupled with an mass spectrometer (UPLC-MS) in positive (ESI+) and negative (ESI-) ionization modes. The LC-MS spectra workflow was performed on the XCMS platform, and the resulting peak intensity tables were normalized to the median and transformed logarithmically for functional and statistical analysis in the MetaboAnalyst 5.0 platform. This untargeted metabolomics approach will elucidate, through functional enrichment analysis, the metabolic and lipidomic biosynthesis pathways altered by cadmium stress, as well as those conserved and/or activated by the Phloroglucinol.

**Keywords :** Cadmium, Date palm, Phloroglucinol, Metabolomics.

### ETUDE DE COMPORTEMENT GERMINATIF DE QUATRE VARIETES DU QUINOA CULTIVEE SOUS CONDITIONS SALINES DANS LA REGION DE HODNA

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#### Résumé

Cette étude vise à comparer le comportement germinatif de quelques variétés de quinoa (*Chenopodium quinoa* Willd.), soumises à des

conditions de stress salin. Quatre variétés de quinoa cultivées en Algérie ont été testées. Les mesures effectuées ont concerné le taux de viabilité des graines et le taux de germinations finales. Les résultats obtenus montrent que le sel a un effet dépressif sur le taux de germination. Cependant, cet effet varie en fonction de l'intensité du stress et de la variété en question. La capacité germinative des variétés n'est pas affectée au niveau de témoin et au niveau de traitement 100 mM de NaCl. Par contre, la germination est complètement inhibée au niveau des traitements : 150 mM, 200 mM, 250 mM, 300 mM, 350 mM et 400 mM de NaCl pour toutes les variétés. La variabilité intra-spécifique vis-à-vis de la salinité est relativement importante. Mais, en présence de 100 mM de sel, les variétés « Q102, Q101 et Noir » a montré le meilleur comportement germinatif. Suivi par la variété « Giza 2 ».

**Mots clé :** Quinoa, Stress salin, Taux de germination, Tolérance

### TRICHODERMA ORIENTALE AS A BIOCONTROL AGENT AGAINST FUSARIUM OXYSPORUM F. SP. CICERIS CAUSING FUSARIUM WILT ON CHICKPEA

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#### Abstract

A study was conducted to evaluate the antagonistic activity, plant growth promoters (PGP) potential and in vivo efficacy of *Trichoderma orientale* T1 as a biocontrol agent against *Fusarium oxysporum* f. sp. *ciceris* (FOC) causing Fusarium wilt on chickpea (*Cicer arietinum* L.). Results showed that *T. orientale* T1 strain displayed antagonistic activity in dual culture and where significantly reduced the mycelial growth of pathogen FOC with inhibition percentage of 89%. Coiling of T1 hyphae around that of pathogen and the vacuolization and disintegration of the host hyphae was observed, revealing its mycoparasitic potential. *T. orientale*

T1 has shown enzymatic activities (chitinolytic, cellulolytic, proteolytic, amylolytic, ligninolytic and lipolytic). Strain T1 also has the ability to solubilize phosphate, as well as the production of AIA and nitrogen fixation. These characteristics as they are called PGPF. The identity of the strain T1 was confirmed by molecular identification based on sequencing of the ITS region of the *tef1* rDNA gene and have been submitted to NCBI GenBank under both numbers accession MF410328 (ITS) and OR449362 (*TEF1- $\alpha$* ). In pot trials, this specie has significantly reduced the incidence of vascular wilt after treatments of susceptible cultivar ILC 482 seeds of 92%. This study revealed that *Trichoderma orientale* T1 can be used as biological control agents for the management of the plant diseases.

**Keywords:** *biological control, Trichoderma orientale, Fusarium wilt, chickpea, Algeria*

#### PHYTOTOXICITY OF BIOCHAR DERIVED FROM RESIDUES OF THE DATE PALM TREE

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#### Abstract:

Algerian date production will exceed 1.1 million tonnes in 2021 and is increasing every year. Date palm should be pruned and each tree produces 34 kg of residues per year and it can be strongly said that at least 10 kg of residues are produced by each tree, which means that theoretically more than 600 thousand tonnes of residues are produced annually in cultivated areas. One of the most used ways to valorise the huge biomass resulting from pruning the date palms, is to turn it into biocompost, however this biomass has a C/N ratio of 200, far above the target of 35 for rapid composting, in this context biochar has a rapid degradation of biomass while having a low carbon fingerprint. In this study we will investigate the phytotoxicity of biochar produced from date palm. The experiment was carried out on lettuce seeds, as this plant is known to have a low level of tolerance to phytotoxins. The biochar was prepared at 3 temperatures (400; 550

and 700°C) with pyrolysis rates (fast and slow), resulting in 6 types of biochar. Each type was used at 5 different concentrations. In terms of germination kinetics, germination was affected differently by the 6 types of biochar. The phytotoxicity of biochar seems to be influenced by the three parameters studied (pyrolysis temperature and rate and concentration of the resulting biochar in the substrate), although in some cases this by-product can have an improving effect on soil fertility. 400°C and 700°C slow pyrolysis improved substrate fertility at 2% and 0.5% respectively (63% and 52% after 20 hours) while a fast one was toxic. 550°C pyrolysis was the most favourable biochar to the germination at 0.5% concentration (with both methods: fast and slow). The pH was not affected by the concentration of biochar in the substrate, nor by the temperature or rate of pyrolysis. Electrical conductivity varies almost linearly with biochar concentration. This can be explained by the mineral salt content of the raw material. This study has made it possible to identify the phytotoxicity of biochar, which is becoming increasingly important in both scientific research and applied projects.

**Keywords:** *date palm, biochar, phytotoxicity, lettuce, germination, pyrolysis rate*

## Topic 3

### Pest, predation and parasitism in agro-ecosystem

1st day : October 18th, 2023

Session President: Pr. SiBachir A.

Moderators: Pr. Benzohra, Dr. Foughalia, Dr. Tahar Chaouach, Pr.Marniche

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#### CHICKPEA(CICER ARIETINUM), A NEW HOST OF FUSARIUM REDOLENS CAUSING FUSARIUM YELLOWSIN ALGERIA

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#### Abstract

Chickpea (*Cicer arietinum* L.) crop fields located in the Mascara region of Northwestern Algeria were surveyed in June 2019. The most frequently observed symptoms in the visited fields were plants displaying leaf yellowing or necrosis. The symptoms originated from the bottom shoots and progressed gradually, with a disease incidence of approximately 75%. To identify the cause, stem tissues were collected from symptomatic plants, which were then surface disinfected and cultured on potato dextrose agar (PDA) at 25 °C. After five days of incubation, a fungal culture was purified using the single hyphal tip technique. Aerial mycelial morphotypes with white to pink pigmentation were showed when fungal isolates grown on PDA. Microconidia were abundant, mostly single-celled. Macroconidia were occasionally present.

Chlamydospores, mostly globose, were also presented intercalary or terminal to hyphae. Based on the cultural and morphological characteristics, all strains were tentatively identified as *Fusarium redolens* Wollenw. Identification of one representative isolate (FRC) was further confirmed by DNA sequences which were submitted to GenBank with accession numbers MW519908 for ITS and MZ151166 for TEF1- $\alpha$ . The pathogenicity test of FRC was carried on seedlings lines ILC482 of chickpea at the four-leaf stage. Forty days after inoculation, up to 100% disease incidence occurred on chickpea lines ILC482. The typical symptoms of wilt-like disease of chickpea were similar to those observed in the field. Since 2011, *F. redolens* was reported inducing a disease syndrome in chickpea similar to that caused by *Fusarium oxysporum* f. sp. *ciceris* in Spain, Lebanon, Morocco, Pakistan, Tunis, Turkey and Iran. It was only in 2022 that *F. redolens*, for the first time, was identified and reported in Algeria through our study as causal agent of Fusarium Yellows on chickpea.

**Keywords:** Wilt-like disease, chickpea, *Fusarium redolens*, pathogenicity, Algeria.

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#### DÉTECTION DE SOUCHES MULTI-RÉSISTANTES D'ESCHERICHIA COLI CHEZ LA VOLAILLE DANS LA WILAYA DE SOUK-AHRAS.

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## Résumé

Les animaux dont les denrées sont destinées à l'alimentation humaine sont devenus un réservoir croissant de bactéries résistantes aux antibiotiques qui peuvent se transmettre à l'homme et à l'environnement. L'objectif de cette étude est d'évaluer le niveau d'antibiorésistance chez les souches *E. coli* isolées et de rechercher les souches BLSE à partir d'élevages avicoles situés dans la région de Souk Ahras. Soixante prélèvements de matières fécales (écouvillonnage cloacal) ont été effectués sur des poulets de chair. Les souches prélevées ont été isolées et identifiées comme étant des souches *Escherichia coli*, dont 03 souches sont productrices de BLSE. La sensibilité aux antibiotiques a été déterminée par la méthode de diffusion en milieu gélosé. Les taux de résistance les plus élevés ont été enregistrés pour l'Érythromycine (100 %), l'Ampicilline (96,43 %), la Ciprofloxacine (94,64 %), le Triméthoprime sulfaméthoxazole (91,07 %), la Doxycycline (87,50 %) et la Kanamycine (78,57 %). Une faible résistance est observée pour l'Amoxicilline acide clavulanique (37,50 %), la Cefotaxime (10,71 %) et le Céfotaxime (8,93 %). Aucune souche n'est résistante à un antibiotique, mais il existe 21 souches résistantes à 6 antibiotiques (37,50 %), 15 souches résistantes à 7 antibiotiques (26,78 %) et 9 souches résistantes à 5 antibiotiques (16,07 %). Ces résultats montrent des taux de résistance importants à différentes classes d'antibiotiques, ce qui pousse à prendre des mesures de lutte contre le phénomène

d'antibiorésistance pour protéger la santé animale et publique.

**Mots-clés :** Antibiorésistance, *Escherichia coli*, BLSE, Volaille, Souk Ahras.

## STUDY OF VARIATION IN THE SEVERITY OF FIG MOSAIC DISEASE OF SOME FIG CULTIVARS GROWN IN IRAQ.

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## Abstract

Successful disease management requires accurately identifying the causative agent and knowing the most resistant plant variety to a disease. Plant viruses cause substantial economic losses and pose a danger. Symptoms of fig mosaic disease were observed on Fig leaves *Ficus carica* in Iraq in 2019, and taking into account that the production of figs is constantly increasing, because it has an increasing economic importance in the fruit market in Iraq, this led to an increase in research and studies focusing on this disease. leaf samples (140) were collected from the fig trees. 4 varieties of figs (Asyod Diyala, Sultani, Wizere, Shankly), from different geographical regions of Iraq to study the disease FMD, after RNA isolation, RT-PCR tested the samples to detect six viruses associated with Fig mosaic disease, *FMV* Fig mosaic virus, *FCV* Fig cryptic virus, *FFkaV* Fig fleck-associated virus, *FLMaV-1*, *FLMaV-2* Fig leaf mottle-associated virus 1 and 2, *FMMaV* Fig mild mottle-associated virus, Most viruses were present in mixed infections, the symptoms varied Various groups of detected viruses have been shown. Shankly variety had the fewest symptoms, and With a total infection rate of 23%, of which 7.6% had overlapping infection with more than one virus, followed by Wizere variety with a total infection rate of 54% and 29% overlapping infection with more than one virus, then the Asyod Diyala variety with a rate of 60% and an overlapping infection of 44.4%. The



Sultani variety was the most sensitive cultivar to the disease, as the total infection intensity reached 72.5%. The overlapping infection with more than one virus increased by 35%, knowing that the Shankli variety and the Wizere variety had a yellow fig color. The variety Sultani and Asyod Diyala varieties had a black color, which indicates That figs with yellow fruits are more resistant to FMD. The results indicate that more attention and focus should be given to cultivating resistant varieties to improve the health status of fig trees in the country.

**Keywords:** *Ficus carica* ,FMD, varieties, Iraq

### BIODEVERSITE ET REPARTITION DE LA FAUNE SOUTERRAINE DANS LA REGION D'OUM EL-BOUAGHI (NORD-EST DE L'ALGERIE)

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#### Résumé

Les eaux souterraines sont des ressources cachées, discrètes et mal connues. Au cours de ces dernières années, il y'a eu plusieurs recherches sur la faune souterraine. Les recherches écologiques sur la faune aquatique souterraine et plus particulièrement sur celle des nappes phréatiques accessibles au niveau des puits et des sources, représente un des aspects de la phréatobiologie appliquée qui a connu depuis la mise au point des méthodes appropriées un développement important. Cette étude concerne la faune aquatique des puits et des sources dans une régions semi-aride du Nord-Est Algérien (Les régions d'Oum El-Bouaghi ). 16 puits et 2 sources ont été choisis et un échantillonnage saisonnier de la faune aquatique et de l'eau depuis le mois de Septembre 2022 au mois de Mai 2023, couvrant des périodes de hautes et de basse eau. L'objectif visé est donc est Compléter les résultats déjà obtenus dans le Nord-Ouest / Nord Est d'Algérie, en élargissement le secteur d'étude, Nous essayons

d'exposer les résultats d'une recherche stygobiologique de la région d'Oum El Bouaghi par la prospection des puits creusés, et des sources, d'évaluer la qualité physico-chimique de ces sites et la relation entre la composition faunistique et les caractéristiques physico-chimiques des eaux des puits et source prospectés. Deux types de pièges ont été utilisés : le filet phréatobiologique et les nasses appâtées. Les analyses physico-chimiques de l'eau des puits ont montré que la majorité des eaux souterraines dans cette région sont de mauvaise qualité, sous-saturées en oxygènes et très minéralisées. La faune est composée de 26 taxons et 7966 individus, domine par les les Crustacés 47% , Insectes 24 %. Seulement 2 espèces ont été identifiées comme espèces stygobies *Echinogammarus haraktis* et *Pseudoniphargus* sp.

**Mots-clés :** Biodiversité, Eau Souterraine, Physico-chimie, Faune Stygobie,

### LE POTENTIEL PARASITAIRES DES PARASITES HYMENOPTERES APHELINIDAE DANS LA LIMITATION DES POPULATIONS DE *LEPIDOSAPHES BECKII* N. (HOMOPTERA : DIASPIDIDAE)

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#### Abstract

Le présent travail met en évidence l'étude de la dynamique des populations de *Lepidosaphes beckii*, ainsi que l'étude de l'impact des parasites Hyménoptères Aphelinidae dans la limitation des

populations de cette cochenille dans un verger d'oranger à Rouiba. Cette diaspine développe trois générations annuelles durant l'année d'étude : une première automno-hivernale, une deuxième printanière et une troisième estivale. Quant à l'incidence des ennemis naturelle, elle est le résultat de l'action des espèces hyménoptères ectoparasites : *A.lepidosaphes* sur les femelles (23,89%) et les mâles (19,11%), *A.chrysomphali* et *A.proclia* sur les larves du 2<sup>ème</sup> stade mâle (7,01%), et d'une seule espèce endoparasite, *Aspidiotiphagus citrinus* sur les larves de 2<sup>ème</sup> stade femelle (24,82%). Notons que c'est la première fois en Algérie, que l'on observe la présence de ces parasitoïdes sur les formes larvaires de la cochenille. Le taux global du parasitisme est (23,24 %). il est relativement plus important en automne et en été. L'activité des parasitoïdes de la cochenille passe par deux périodes : automno-hivernale et printano-estivale. En revanche, L'activité et la distribution spatio-temporelle des parasites est une conséquence directe à la fois à l'existence de conditions climatiques favorables et à la densité d'une bonne proportion du stade cible. Chez ces larves, la fluctuation du parasitisme passe par deux principales périodes : automno-hivernale et printano-estivale et la fluctuation de l'incidence parasitaire chez les adultes est marquée par trois périodes d'activité intense : automno-hivernale, printanière et estivale.

**Keywords :** *Citrus, Rouiba, Parasitoïdes, Lepidosaphes beckii, Aphytis, Aspidiotiphagus*

#### PRELIMINARY IDENTIFICATION OF CELLULASE ACTIVITY PRODUCED BY *STREPTOMYCES PAULUS* CA01 ISOLATED FROM SOFT WHEAT BRAN IN ALGERIA

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#### Abstract

Cellulase is an enzyme from the hydrolase class responsible for the hydrolysis of cellulose. Throughout our work, we have been interested in cellulases of Actinobacteria which represent a potentially producing antibiotics and enzymes. To do so, we isolated from Algerian wheat bran the strain *Streptomyces paulus* CA01 identified by sequencing of the 16s rRNA gene. The Cellulase activity was demonstrated on ISP9 agar with the appearance of clear zones which attest, a degradation of cellulose polymer. The absence of the same activity against carboxymethylcellulose (CMC) precludes endoglucanase-like activity. This result was confirmed by the well diffusion method by using supernatant of culture in broth as crude extract, where clear areas with a diameter of 37mm appeared on an agar containing microcrystalline cellulose. By the same token, the absence of degradation of CMC suggests that the activity of our strain is either cellobiohydrolase or  $\beta$ -glucosidase. The total enzymatic activity of our strain was measured by the assay of the level of glucose released, by the DNS reagent, was 28IU/mL.

**Keywords:** *Streptomyces paulus; Cellulase; enzyme activity; well diffusion method.*

#### THE DIVERSITY OF LICES OF TWO SEDENTARY DOVES' SPECIES (*STREPTOPELIA DECAOCTO* AND *STREPTOPELIA SENEGALENSIS*) IN BISKRA OASES (ALGERIA).

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#### Abstract

The oasis is an indigenous habitat of arid regions, characterized by specific ecological conditions. Its role in attracting, receiving and providing refuge for a wide variety of birds is well recognized. This study was carried out in the oases of Biskra for two years (2017 and 2018), on 300 doves consisting of Three species, *Streptopelia senegalensis* (Linné, 1766), *Streptopelia decaocto* (Fridvaldszky, 1838). A total of 901 ectoparasite specimens were identified. On *Streptopelia decaocto*, five lice (Phthiraptera order contains three families and five species of ectoparasites) species recorded for the first time in Biskra (Algeria) were detected and the population was dominated by *Columbicola bacillus* (82.67%  $\pm$  3.92) followed by *Coloceras piageti* (22%  $\pm$  3.35), *Hohorsteilla* spp (9.33%  $\pm$  2.93), *Hohorsteilla modesta* (8%  $\pm$  2.66), and *Bonomiella concii* (3.33%  $\pm$  3.12). On *S. senegalensis*, two lice species were recorded (Phthiraptera order contains two families) *Columbicola bacillus* (87.33  $\pm$  2.76) and *Coloceras chinensis* (31.33  $\pm$  4.14). Higher prevalence of single infestation was observed on *S. decaocto* (50%), compared with double (36.66%), triple (9.33%) and quadruple (1.33%). However, the difference of single and mixed infestation between male and female was statistically significant ( $p < 0.05$ ), on the other hand, a non-significant difference ( $p = 0.738$ ) in the prevalence of single and mixed ectoparasites infestations between the two sexes of the host species *S. senegalensis* is recorded. The different types of infestations are almost similar in both sexes of *S. senegalensis* had higher prevalence of single infestations (63.33%), compared with double (26%) and triple infestation (5.33%), and quadruple (2%).

**Keywords** Oases, Doves', Phthiraptera, Ectoparasite, Lice, Prevalence.

## AN UPDATED CHECKLIST OF MELOIDAE MYLABRINI (COLEOPTERA) AND HOST PLANTS IN A SAHARAN OASIS ECOSYSTEM IN ALGERIA

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### Abstract

The distribution of Mylabrini species in the oasis ecosystem is scarcely known, our study aimed to improve the knowledge of the beetle fauna in this very peculiar and severe habitat, represented by isolated spots in the desert. Three large oases at the wilaya of Ouled Djellal (Oued El Assel, Oued Djai and Saad), northern Algeria were chosen for collecting insects. In each palm grove five pitfall traps were setup and visited every week. The content of each trap was stored in labelled vial and identified using binocular and confirmed by one of us. The updated checklist of the Coleoptera Meloidae from Algeria indicated the presence of 29 genera and 118 species belonging to the tribes Cerocomini, Epicautini, Lyttini (s.l.), Mylabrini, Meloini, Nemognathini. From the trap sampling we obtained 3 species; *Croscherichia litigiosa* (Chevrolat, 1840), *Croscherichia gilvipes* (Chevrolat, 1840), and *Mylabris impressa* Chevrolat, 1840. During our samplings, different spontaneous and weeds plants were identified from each palm groves. Among these, the most frequent plant species feed by blister beetles were flowers of *Silybium marianum* (Asteraceae), *Hedysarum carnosum* (Fabaceae), *Raphanus raphanistrum*, *Moricandia arvensis* (Brassicaceae) and *Aizoon hispanicum* (Aizoaceae) species. Even though the new records do not represent a significant range extension of the species, our collections will improve the knowledge also on their host plants in this ecosystem.

**Keywords:** Faunistics, oasis ecosystem, blister beetles, checklist.

## ANTIFUNGAL ACTIVITY OF *ATRIPLEX HALIMUS* AGAINST *FUSARIUM OXYSPORUM*

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### Abstract

*Atriplex halimus* is a perennial shrub that grows spontaneously in bioclimatic stages as well as in arid and semi-arid regions. The importance of this species in arid environments is related to its ability to grow in poor and very salty soils, having a positive impact on their fertility and helps it to fight erosion and desertification. *Atriplex halimus* L. is also used in traditional medicine and in feeding local populations and is a quality fodder for livestock especially in times of scarcity. This research work is part of the valorization of extracts of two ecotypes of *Atriplex halimus* L. The objective is to evaluate the antifungal activity of extracts of the aerial part against the phytopathogenic strain *Fusarium oxysporum*. The extraction by methanol solvent was carried out from the aerial part (leaves and stems) from the Djelfa and Tamanrasset regions. The evaluation of antifungal activity was performed by the direct contact method. The results of the antifungal activity assessment indicate that methanolic extracts of both *Atriplex halimus* ecotypes exhibit antifungal properties. *Atriplex halimus* extracts from Tamanrasset and Djelfa showed respective inhibition zones of 46.78 and 48.95% against *Fusarium oxysporum*. Therefore, extracts are considered moderately active. *Fusarium oxysporum* is a pathogen of many cultivated plants. The antifungal power of *Atriplex halimus* against this strain would suggest that the plant may have a role as a natural fungicide.

**Keywords:** *Atriplex halimus*, Ecotype, antifungal activity, *Fusarium oxysporum*.

## THE NARROW RELATIONSHIP PLANTS-INSECTS IN THE TIGOUNATINE FOREST RESERVE (DJURDJURA- ALGERIA)

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### Abstract

The study took place at two sites in the Tigounatine forest reserve (Djurdjura, Algeria). The first one consists of old-growth Atlas cedar [*Cedrus atlantica* (Endl.) Manetti ex Carrière], Aleppo pine (*Pinus halepensis* Mill) and holm oak (*Quercus ilex* L) in the upper stratum and common juniper (*Juniperus communis* L) as the lower woody stratum. The second mainly hosts Atlas cedar, black pine (*Pinus nigra* J.F.Arnold) and holm oak in the upper stratum and oxycedar juniper (*Juniperus oxycedrus* L) in the lower stratum. The aim of the study was to obtain information on the health status of the forest species studied through the biological diversity, the ecological roles and biological activities of the sampled insects. The experimentation was conducted during 2018. 20 field trips were carried out periodically every 15 days. Five sampling methods have been applied (Pitfall traps, sweeping, beating, colored traps and the aerial attractive traps). 12772 individuals belonging to 228 insects species diversified over 140 genera and 103 families were sampled. The Coleoptera order is the most diverse with more than 45% of insects richness, followed by the Heteroptera, Hymenoptera and Diptera with 25 species per taxonomic order. Among the diversity of Hymenoptera, the Torymidae family is present with the *Megastigmus* genus, whose larvae and adults were observed inside the seeds of the plants studied that have negative effect on the natural regeneration of forest plants. The interception traps capture the maximum number of species and individuals. Data collected on the biological activities, the roles of each group of captured insects and the various interactions between plants and insects through the different diets observed will be presented and discussed.

**Keywords:** Plants, Insects, Relationship, Diversity, forest, Algeria

## EFFECT OF BIOREMEDIATION ON THE ENHANCEMENT OF GROWTH OF CULTIVATED PLANTS IN CONTAMINATED SOIL

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### Abstract

Rhizospheric bacteria have developed several mechanisms of resistance to heavy metals. This work aims to inoculate cereals with agriculturally beneficial microorganisms that have a positive effect on plant growth, early development, soil depollution, and detoxification. In this context, we studied the effect of four bacterial inoculants (A, B, C, and D) and their consortium on the morphological and physiological parameters of durum wheat (*Triticum durum*). The plant-bacteria association was cultivated in a controlled greenhouse for a period of 40 days, under the influence of lead-based metal stress (1200 ppm), and then irrigated with non-chlorinated water. Our results for morphological parameters show that rhizobacteria have a potential positive effect on growth.

**Keywords:** *Rhizospheric; Microorganisms; Detoxification; Bacterial Inoculants; Lead.*

## AUXILIARIES DIVERSITY UNDER GREENHOUSES IN THE ZIBAN REGION

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### Abstract

During a study carried out on tomato cultivation under greenhouse in the region of Sidi Okba (Algeria) in 2020-2021, that have for objective to highlight the key pest auxiliaries of tomato cultivation under greenhouse in the region. The results of trapping using the yellow traps show a total wealth of 90 species belonging to 12 families

and 7 orders, the most represented order was that of Hymenoptera (17) species followed by Diptera order with 11 species, in terms of their ecological niches, pest species represent the highest rate with 42% followed by predators 23% as well as pollinators (23%) and parasitoids species represented 12%. This latest that represented an important Biological program applied naturally under green houses in the region.

**Keywords:** *tomato, pest control, biological auxiliary, Biskra, inventory.*

## BIOECOLOGICAL STUDY OF THE OLIVE PSYLLID *EUPHYLLURA OLIVINA*, COSTA, 1839 (HEMIPTERA:PSYLLIDAE) ON THE CHEMLAL VARIETY IN THE DAIRA OF BEN SROUR (W. MSILA).

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### Abstract

The study carried out on the bioecology of the olive psyllid *Euphyllura olivina*, on the Chemlal variety (*Olea europaea*), in an olive grove located in the Daira of Ben Srour Wilaya of MSila from December 2019 to the beginning of March 2020 revealed that, the first numbers of eggs emitted by *E. olivine* were recorded in mid-December 2019. The pullulation of larvae was recorded from the start of the study, with the absence of the first three first stages. The appearance of adults is recorded in mid-December 2019. The mortality is recorded on the variety studied, given the unfavorable climatic conditions such as low temperatures, as well as in spring, due to the appearance of auxiliary fauna which limits insect outbreaks.

**Keywords:** *Chemlal, Ben Srouur, eggs, mortality, spring.*

## EVALUATION OF THE SYMBIOTIC ASSOCIATION BETWEEN MYCORRHIZAL FUNGI AND SOME PLANTS OF THE FABACEAE FAMILY IN ALGERIA

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## Abstract

The majority of plant species can form beneficial associations at their roots with soil fungi, commonly known as mycorrhizal fungi, which enable the plant to increase its surface area in contact with the soil and thus acquire the nutrients required for its development. The aim of this study was to assess the diversity of mycorrhizal fungi in the rhizosphere soil of three Fabaceae (*Ononis natrix*, *Astragalus gombo*, *Genista saharea*) and the mycorrhizogenic potential of these fungal symbionts. Spores from rhizospheric soils were extracted and then identified by comparison with type specimens on the INVAM site. The roots of the three fabaceae selected were then stained with Trypan blue and their colonization rates were estimated. The results show that all the fabaceae studied are mycorrhized, with frequencies of over 80%, and with different endomycorrhizal structures (hyphae, arbuscules and vesicles). The identification of spores shows a great diversity of fungal spores, with a total of 92 species belonging to 7 genera identified (*Glomus*, *Acaulospora*, *Gigaspora*, *Alternaria*, *Multicellaesporites*, *Pleospora*, *Diversispora*); the genus *Glomus* is more common than the other genera in the rhizosphere soil of the three Fabaceae.

**Keywords:** *Genista saharea*, *Astragalus gombo*, *ononis natrix*, *Fabaceae*, *symbiosis*, *diversity*.

## HOSTS OF BOUFAROUA OLIGONYCHUS AFRASIATICUS (MCGREGOR) FROM WEEDS PLANTS IN THE BISKRA OASIS-ALGERIA

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## Abstract

The yellow date palm mite, *Oligonychus afrasiaticus* (McGregor), commonly known as Boufaroua, it is one of the main date palm pests that

can cause considerable damage. In order to bring out its outbreak as well as its secondary host plants, an inventory was carried out at 7 palm groves chosen in the Ziban oasis. During the monitoring period from February to July 2021, this mite affected almost the entire Ziban date basin; however, the infestation and the damage caused differ from region to another and from a farmer to another. Generally, the losses vary from 1 to 3%, although the Boufaroua can in sometimes affect all the palm trees of any palm grove. The Observations show that the infestation of dates by Boufaroua began on June 13, 2021 where the temperatures exceed 30 ° C and the humidity below 40%. The most attacked cultivars were from Deglet Nour in 1st order than Mech Degla and other infrequent cultivars including Tantboucht and Litima,...ect. The results of the inventory of weed plants that grow under palm trees indicate a richness of 61 species belonging to 24 botanical families or 5 species that can be considered as host plants of Boufaroua in our oases; *Cynodon dactylon* (Poaceae), *Daucus carota* (Apiaceae), *Aster squamatus*, *Kochia scoparia* (Asteraceae) and *Salsola titragona* (Amaranthaceae). The Observations on field show that the first appearance of Boufaroua attacks were recorded in the palm groves of El Hadjeb, Sidi Okba and in El Outaya on 5 main host plants; *Cynodon dactylon*, *Daucus carota*, *Aster squamatus*, *Kochia scoparia* and *Salsola titragona*.

**Keywords:** *Phoenix dactylifera* L, *Boufaroua*, *host plants*, *Biskra*, *attacks*.

## POPULATION CHANGE OF TUTA ABSOLUTA (LEPIDOPTERA, GELECHIIDAE), AND THEIR POTENTIAL NATURAL ENEMIES IN ARID ENVIRONMENT (SOUTH EAST ALGERIA)

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## Abstract

The study concerns on control of *Tuta absoluta* in the arid agricultural circles, case of Biskra southeastern of Algeria. A survey of natural enemies was conducted on tomatoes crops during 6 months throughout the period 2019-2020, whereas many methods of monitoring and sampling were used as: yellow basins, yellow sticky traps, Barber pots and yellow bottles in the greenhouse, with randomly sampled of 120 infected leaves every 15 days; The abundance and the diversity of specimens were evaluated using quantitative data calculated in PAST version 2.17 and SPSS. In total, 339 beneficial arthropods were collected, 39.82% predators, 60.18% parasitoids, belonged to 2 classes, 18 families, 35 species, the most represented families were Braconidae (17.1%), Ichneumonidae (17.1%) and Miridae (8.5%), Eulophidae (8.5%), Anthocoridae (5.6%), Chalcididae (5.6%), Trichogrammatidae (5.6%), Salticidae (2.9%), Tachinidae (2.9%), Carabidae (2.9%), Coccinellidae (2.9%), Geocoridae (2.9%), Chrysopidae (2.9%), Formicidae (2.9%), Bethyidae (2.9%), Scelionidae (2.9%), Vespidae (2.9%), Pteromalidae (2.9%). Given that a value of specific diversity was moderate to high richness (H' values in 1 to 3 range), noted a density of species by month was higher in March (27.73%) and April (30.97%), then May (16.83%), February (16.22%), and January (8.25%), such most species were constant (C% = 60% to 100%), and quite abundant. Behavior and temporal variations of natural enemies were related to temperature, but the development of large number of species collected was stopped between 30 °C to 39 °C, which gave an insufficient potential for control the pest due to their perturbation and sporadic presence over the agricultural season with their feeble abundance compared to the host.

**Keywords:** *Tuta absoluta*, Biskra, natural enemies, diversity, abundance, temperature.

## BIOECOLOGICAL STUDY OF THE SCORPION ANDROCTONUS AMOREUXI (AUDOIN, 1826) IN AGRO-ECOSYSTEMS OF THE REGION OF OUED M'ZAB, GHARDAÏA, ALGERIAN SAHARA

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## Abstract

To help solve the problem of scorpion stings, we need to identify dangerous scorpions, their distribution and their bioecology in Algeria. The study of the behavior, phenology and reproduction of these small arthropods has enabled us to prevent a number of accidents. *Androctonus amoreuxi* is a scorpion species of high medical importance and one of the most abundant scorpofaunal species in the Ghardaïa region. We carried out a number of studies on the ecology and biology of this species during 2021-2022, based on a sample of 230 individuals from various biotopes in the Ghardaïa region of central Algerian Sahara. The study focused in particular on the species' stages of variation and development. The results enable us to define the favorable mating season for *Androctonus amoreuxi* (Audouin, 1826), which occurs during late spring and early autumn when climatic conditions are favorable. We also noted that the species develops a winter diapause of 4 to 6 months, During this period, covering the whole winter season and a few weeks in spring, the females were inactive and began their activity at the end of March, with a remarkable interval before the trunks. In spring and summer, after giving birth, a large number of juveniles were observed. However, the number of males remains low compared with females.

**Keywords :** Scorpion, *Androctonus amoreuxi* (Audouin, 1826), Bioecology, Ghardaïa, Algeria

## DIVERSITÉ DES PLUS IMPORTANTS RAVAGEURS DES CÉRÉALES EN ALGÉRIE IDENTIFIÉS PAR L'UTILISATION DES PESTICIDES

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### Résumé

Les céréales trônent sur l'occupation des terres agricoles, car servant d'aliments de base pour une grande proportion de la population mondiale et notamment en Algérie. Cependant, divers bio-agresseurs peuvent survenir tout au long du cycle de vie des différentes céréales et même en post-récolte occasionnant de façon directe et indirecte (transmission de virus), des pertes de rendement considérable. L'objectif principal de ce travail est l'identification des plus importants ravageurs (essentiellement insectes) qui menacent les céréales à l'échelle algérienne à travers l'importance du nombre de substances actives (SA) pesticides autorisées (majoritairement importés) qui sont prescrites pour les éradiquer. Pour atteindre notre objectif on s'est servi de: (1) l'index phytosanitaire des produits phytosanitaires à usage agricole (2017) en Algérie comme référentiel pour ressortir les SA pesticides autorisées sur céréales ainsi que les ennemis visés; (2) les base de données « PPDB/BPDB » pour avoir les classes chimiques des SA et leur statut réglementaire; (3) l'Inventaire National du Patrimoine Naturel (INPN) pour la systématique des insectes (4) la littérature récente pour vérifier l'usage réel des SA ainsi que les ravageurs des céréales les plus recensés sur terrain. Quatre familles chimiques insecticides regroupant au total 12 SA ont été reconnus pour la lutte contre différents insectes s'attaquant aux céréales à savoir la familles des : 1. Pyréthroïdes (avec 5SA : Lambda-cyhalothrine, Alpha-Cyperméthrine, Cyperméthrine, Deltaméthrine et Tefluthrine), 2. Organophosphorés (avec 4SA : Chlorpyrifos, Diméthoate, Pirimiphos-méthyl et Fenthion), 3. Néonicotinoïdes (avec 2SA : Thiaméthoxame,

Imidaclopride) et 4. Dérivée de Micro-organisme-sol bacterium (avec 1SA : Spinosad). Ces insectes appartiennent essentiellement à 5 ordres: Hémiptères (puceron, punaise, cicadelle), Coléoptères (Criocère, vers blancs, taupin/vers fil-de-fer), Lépidoptères (pyrale du maïs, Héliothis, noctuelles), Diptères (Mineuse des céréales, Cécidomyie) et Thysanoptères (Thrips). Aussi, une famille chimique acaricide : Carboxamide (1 SA : Hexythiazox), a été identifiée pour lutter contre les acariens des céréales (Arachnida, Trombidiformes, acariens). Notons, côté classement selon importance, que les punaises (Pentatomidae) viennent en tête de liste, selon critère visé par l'étude, car pouvant être traitées par 9/12 des SA précitées, suivi en 2<sup>ème</sup> position par les pucerons (Aphididae) avec 6/12 SA; Aussi, les criocères (Chrysomelidae), vers blancs (Scarabaeidae) et taupins (Elateridae) viennent en 3<sup>ème</sup> position avec 2/12 SA destinées à chacun. Enfin, en 4<sup>ème</sup> position avec une seule SA, viennent, la cicadelle (Cicadellidae), la Pyrale du maïs (Crambidae), l'Heliothis (Noctuidae), la Mineuse des céréales (Agromyzidae), la Cécidomyie (Cecidomyiidae) et les thrips (Thripidae). D'un autre côté, le thiaméthoxame détient le 1<sup>er</sup> rang, côté usage, car préconisé sur 7 ravageurs (Puceron, punaise, cicadelle, Criocère, Vers Blancs, Taupins et thrips), suivi par la Lambda-cyhalothrine prescrite contre 5 ravageurs (Puceron, punaise, Criocère, Mineuse et Cécidomyie) ainsi que le Chlorpyrifos autorisé contre 5 ravageurs également (Puceron, Punaise, Taupins, Heliothis et Noctuelles). Par ailleurs, 7 des 12 SA insecticides (~60%) dont le thiaméthoxame et le Chlorpyrifos, sont bannis par la réglementation dans la Communauté Européenne. Ce travail a permis de cerner et classer les plus importants insectes et acariens s'attaquant aux céréales à travers le nombre de SA-pesticides qui leur sont alloués. Cette nouvelle méthode doit être extrapolée pour toutes les spéculations et pour tous les types d'ennemis des cultures afin d'avoir des « listes-bio-agresseurs-prioritaires/culture » pouvant servir à orienter les programmes de recherche scientifiques divers voulant cibler les ravageurs les plus préjudiciables pour ainsi aboutir à des solutions saines et durables alternatives à la



lutte chimique et qui permettraient d'alléger progressivement la facture des importations des phytosanitaires. Aussi, les SA, bannies en Europe devraient être retirées de l'homologation et des marchés algériens.

**Mots-clés:** *Insecticides, liste-prioritaire, Hémiptères, Coléoptères, Lépidoptères, Outil d'aide à la décision*

### LES INVERTEBRES DES DRAINS, RICHESSSE ET TAXONS A INTERET AGRICOLE.

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#### Abstract

Dans la région de Touggourt (Sahara algérien), deux sites : Drain à Tibesbest et drain Tazzaouin à Mèggarine situés au sein des palmeraies, présentent un couvert végétal ligneux avec végétation herbeuse ouverte. Un échantillonnage à l'aide de technique active et passive est effectué de novembre 2022 à mai 2023 en collectant les macro-invertébrés benthiques afin de connaître leur structure et leur fluctuation. Les insectes sont plus représentatifs (60%) en termes de richesse en nombre d'espèces et de familles, viennent ensuite, Gasteropoda (20%), Malacostraca et Collembola avec 10% chacune. La présence de 26-30 espèces est notée respectivement dans les deux drains (4 classes, 10 ordres et 19 familles). Cette richesse se maintient entre l'automne et la fin du printemps. Les diptères forment le taxon le plus riche en espèces (24,14%) avec 7 familles et 8 espèces. Ce taxon est suivi des coléoptères (20,69%) puis des éphéméroptères (13,79%) et les odonates (13,79%). Malgré que les valeurs de H' sont faibles à moyennes ( $0,58 \leq H' \leq 2,37$  bits), ces taxons regroupent des espèces ayant un intérêt écotoxicologique, sanitaire, vétérinaire et écologique.

**Keywords :** *invertébrés, drain, palmeraie, Oued Righ, richesse.*

### IMPACT DE RECYCLAGE DES EAUX USEES EN AGRICULTURE

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#### Résumé :

Le rejet en milieu naturel d'eaux non traitées ou mal traitées, génère une pollution catastrophique pour la biodiversité et la qualité des ressources en eau. Le recyclage des eaux usées apparaît aussi, comme une solution alternative pour limiter la pénurie, préserver la ressource naturelle et contribuer à la saine gestion de l'eau. En raison de l'importance de ce domaine, dans le travail, nous avons étudié ses concepts, ses risques et ses aspects avantages dans le domaine de l'irrigation.

**Mots-clés:** *recyclage, eaux usées, l'irrigation, agricoles. sol.*

### LARVICIDAL EFFECT OF LAURUS NOBILIS AND EUCALYPTUS GLOBULUS ESSENTIAL OILS ON L4 LARVAE OF CULEX PIPIENS MOLESTUS

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#### Abstract

The present work is a contribution to the valorization of the effect of essential oils in mosquito control. Toxicological tests carried out at different concentrations on newly exuviated 4th stage larvae of *Culex pipiens molestus* under laboratory conditions in accordance with World Health Organization recommendations, revealed the insecticidal properties of essential oils obtained by hydrodistillation of the medicinal plants: *Rosmarinus officinalis* and *Eucalyptus globulus*. The yields of EO: *Rosmarinus officinalis*,

*Eucalyptus globulus*, show values of: 0.79, 0.46, %, respectively. On the other hand, chemical analysis by GC-FID of these extracts revealed the majority components in the aforementioned essential oils: Limonene 47.28%, Melilotal 28.26%, respectively. The toxicity of the oils tested was assessed, and lethal concentrations, LC50 and LC90 values were estimated for the three exposure times (24, 48 and 72 hours); the results obtained indicated a sensitivity of *Culex pipiens molestus* larvae to the two oils tested, with a dose-response relationship. Lethal concentrations were calculated with their confidence limits. After treatment with the same concentrations. *Rosmarinus officinalis* EO has a very high larvicidal effect on *Culex pipiens molestus* compared with *Eucalyptus globulus*. Biomarkers reveal that aqueous extracts exert a neurotoxic effect by inhibiting specific AChE activity and inducing the detoxification system via an increase in GST. These extracts, in particular that of *R. officinalis*, could be effective in the biological control of *Culex pipiens molestus*, and this may be associated with their inhibitory effects on acetylcholinesterase activity despite stimulation of the detoxification system.

**Keywords:** Essential oils, *Rosmarinus officinalis*, *Eucalyptus globulus*, *Culex pipiens molestus*, Biomarkers.

### CONTRIBUTION TO THE KNOWLEDGE AND INVENTORY OF THE ORHOPTERAN FAUNA IN THE MEDEA REGION. CASE STUDY OF TWO STATIONS: AIN BOUCIF AND BERROUAGHIA.

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#### Abstract

In the highly diversified world of insects, the order Orthoptera holds a special place: they are jumping insects that dominate all terrestrial habitats with

warm, dry climates and become rare in winter and cold. As such, they play an integral role in ecosystems. The present study was carried out over a period of 07 months, from February to August 2023, in two environments located in the Médéa region (Ain Boucif and Berrouaghia). Sampling of orthopteran fauna using sweep nets and the delimitation of 50m×50m quadrat was carried out at a rate of two outings per month. Out of a total of 293 individuals, 36 species were recorded, belonging to 02 suborders, 07 families, 15 subfamilies, and 26 genera. The Caelifera suborder is the most diverse, with 30 species (83.3%). It is dominated by the Acrididae family, which covers 61.1% of inventoried taxa (22 species, 14 genera, and 6 subfamilies). The Encifera suborder is represented by only 3 families (Tettigonidae, Gryllidae, and Gryllotalpidae), 4 subfamilies, 5 genera, and 6 species. In terms of relative abundance of species caught, the first station is dominated by *Dociostaurus maroccanus* (63.3%), while the second is dominated by the genus *Oedipoda* sp. at 79.3% (*Oedipoda caerulescens* 28.3%; *Oedipoda miniata* 26.1%; *Oedipoda fuscocincta* 24.9%). Shanon-Weaver diversity ranges from 2.3 bits at Berrouaghia to 1.7 bits at Ain Boucif, with equitability values ranging from 0.49 <E< 0.72.

**Keywords:** Inventory; Sweep nets; Quadrat; Orthopteran fauna; Diversity; Médéa.

### TAUX DE PREDATION DE COCCINELLA ALGERICA A L'EGARD DE DEUX ESPECES APHIDIENNES

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#### Résumé

Les pucerons sont considérés parmi les ravageurs les plus redoutables aux plantes en raison des dégâts sévères qu'ils peuvent occasionner en agriculture. Pour lutter contre ces ravageurs, la plupart des agricultures favorisent l'usage des pesticides. Ces produits chimiques sont très néfastes à la santé humaine et causent la pollution de l'environnement. La lutte biologique est une méthode alternative qui peut limiter l'usage des pesticides, les coccinelles sont parmi les insectes auxiliaires les plus utilisés en lutte biologique. Ce présent travail consiste à évaluer le taux de prédation de *Coccinella algerica* à l'égard de deux espèces aphididennes, il s'agit d'*Aphis nerii* et d'*Uroleucon sonchi*. 60 larves ont été suivies de l'éclosion jusqu'à l'émergence de l'adulte, 30 larves ont été nourries avec *A. nerii* et 30 larves ont été nourries avec *U. sonchi*. Les résultats montrent que les larves de *C. algerica* consomment en moyenne  $251,86 \pm 22,64$  pucerons de l'espèce *U. sonchi* à une température moyenne de  $23,35^{\circ}\text{C}$  et une humidité relative moyenne de 43,81%. Cette coccinelle consomme en moyenne  $357,36 \pm 22,45$  pucerons *A. nerii*. La consommation des pucerons augmente au fur et à mesure que la larve grandit et mue. La quantité moyenne la plus basse de pucerons ingérée est notée chez les larves du premier stade. Alors que la quantité moyenne la plus élevée de pucerons consommée est enregistrée chez les larves L4 atteignant  $147,82 \pm 18,98$  et  $174,86 \pm 36,66$  pucerons pour *U. sonchi* et *A. nerii* respectivement. La durée moyenne du cycle de développement de *C. algerica* nourrie avec *U. sonchi* est de 16,39 jours à une température moyenne de l'ordre de  $26,02^{\circ}\text{C}$  et une humidité relative moyenne de 48,51%. La durée moyenne du cycle de développement de *C. algerica* nourrie avec *A. nerii* est de 20,3 jours.

**Mots-clés :** puceron, lutte biologique, coccinelle, consommation.

### COMPORTEMENT DE LA PYRALE DES DATTES ECTOMYLOIS CERATONIAE ZELLER ET SES AUXILIAIRES ASSOCIES DANS UNE PALMERAIE BIOLOGIQUE LA RÉGION DE SIDI KHALED

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### Résumé

En Algérie, le palmier dattier (*Phoenix dactylifera* L.) est la culture par excellence de l'écosystème oasien, elle constitue le pivot des régions sahariennes et arides. La polyphagie de la pyrale des dattes (*Ectomylois ceratoniae* Zeller) et sa large répartition dans l'espace sur des hôtes variés, rendent difficile la mise au point d'une stratégie de lutte efficace. Cependant, la lutte biologique pourrait limiter les dégâts. Dans ce contexte, une meilleure connaissance de la dynamique des populations de la pyrale des dattes et son taux d'infestation, permettra d'intervenir efficacement en matière de recherches pour d'éventuelles solutions biologiques de contrôle. Cette étude a été effectuée dans une palmeraie biologique de la région de Sidi Khaled. Les trois types de pièges ont été installés durant la période de la maturation des dattes (octobre – février). On a contrôlé la dynamique spatiotemporelle de la pyrale des dattes par l'enregistrement des mâles capturés sur les pièges à phéromone, en suite une comparaison de la performance des trois principaux auxiliaires *Trichogramma embryophagum*, *Phanerotoma flavitestacea* et *Bracon hebetor* Say a été menée en conditions contrôlées à une température de  $28^{\circ}\text{C} \pm 1^{\circ}\text{C}$  et une humidité relative de 56%. Les captures en relation avec la phénologie des palmiers ainsi que les infestations sont plus importantes dans la palmeraie traduisant la présence de 2 générations de la pyrale. La durée du cycle de vie de *Bracon hebetor* est de 14,06 jours en moyenne avec un taux de parasitisme maximal durant le dernier stade larvaire de l'hôte de 73,33 %. La longévité des adultes est de 6,47 et 10,61 jours pour les femelles et les mâles respectivement. Concernant le cycle de vie de *Phanerotoma flavitestacea* il est de 46, 80 jours divisé en deux phases endoparasite et ectoparasite. Le taux de parasitisme est de 35 % au maximum.

**Keywords:** Palmeraies, *Ectomylois ceratoniae*, *Trichogramma embryophagum*, *Phanerotoma flavitestacea*, *Bracon hebetor*, Sidi Khaled

# Topic 4

## Pest control, monitoring and innovation

1st day : October 18th, 2023

Session President: Dr. Harfi B.

Moderators: Pr. Damnati, Dr. Bettiche, Dr. Diab

### SYMBIOTIC ASSOCIATIONS, FEEDING BEHAVIOR, AND REPRODUCTIVE ANATOMY OF *RHYNCHOPHORUS FERRUGINEUS*: INSIGHTS INTO ITS ECOLOGY AND POTENTIAL CONTROL STRATEGIES

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#### Abstract:

The guild of symbiotic organisms significantly influences the host pest behaviour, ecology and the approach to control strategies. This study investigates the intricate relationships involving *Rhynchophorus ferrugineus* (Olivier, 1790), commonly known as Red Palm Weevil (RPW), and its association with bacteria, fungi and mites. We identified the presence of bacteria belonging to *Serratia marcescens*, yeasts including *Candida tropicalis* and *Hyphopichia burtonii*, mites such as *Uroobovella marginata* and *Centrouropoda almerodai*, as well as a fungus from the

Pleosporaceae tentatively identified as a member of the genus *Curvularia*. Acari play a role in the transfer of fungal conidia, although the viability of fungal propagules remains uncertain. The weevil's feeding habit differs between RPW and *Paysandisia archon*, a palm pest of *Chamaerops humilis*. The RPW grubs distinctive bacterial rotting halos along tunnel walls, the extensive rotting, and the significant amounts of plant fibre debris suggest a unique RPW feeding pattern, which contrasts with the *Paysandisia* caterpillar, leaving essentially empty and clean tunnels. Investigations into the reproductive anatomy of RPW revealed intriguing structures associated with the ovipositor. On the dorsolateral sides of the ovipositor are two eversible conical organs, which display distinct morphological features. The ventral cuticle of these cones is membranous with microtrichia and sparse seta, while the dorsal surface shows sclerotization and multiple apparent duct openings. This study approach offers insight into the complex symbiotic associations, feeding behaviour and reproductive anatomy of *Rhynchophorus ferrugineus*, suggesting its role as a vector. The evidence points to the need for a better understanding of the ecological interactions of the weevil. It offers options for potential control strategies, including disturbance of the associated symbiont guild.

**Keywords:** Alien, Invasive or Quarantine Pests, IPM, microorganisms.

### NANOFERTILIZERS: A NOVEL APPROACH FOR BIODIVERSITY CONSERVATION IN AGRICULTURE

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#### Abstract

This approach aims to delve into the innovative concept of nanofertilizers and their significant potential in preserving biodiversity within the agricultural landscape. In the face of mounting environmental challenges and the need for sustainable farming practices, nanotechnology offers a promising avenue for addressing these concerns while promoting agricultural productivity. Nanofertilizers represent a cutting-edge approach that leverages nanotechnology to deliver nutrients precisely to plants, optimizing their uptake and utilization. By encapsulating essential nutrients within nanoscale carriers, these fertilizers enable controlled release, enhancing nutrient availability to crops while minimizing wastage and environmental pollution. This targeted delivery system also reduces the reliance on traditional bulk fertilizers, mitigating their adverse effects on soil health and biodiversity. By implementing nanofertilizers, farmers can achieve improved nutrient use efficiency, reduced fertilizer application rates, and enhanced crop yields. This sustainable approach not only reduces economic costs but also minimizes nutrient runoff, a major contributor to water pollution and ecosystem degradation. Consequently, the adoption of nanofertilizers holds the potential to safeguard biodiversity by preserving the quality of soil, water, and surrounding habitats. Through interdisciplinary discussions, challenges will be identified, in addition to explore opportunities, and pave the way for sustainable and ecologically responsible agricultural practices that contribute to the preservation of biodiversity.

**Keywords:** nanofertilizers, biodiversity conservation, Agriculture, sustainable farming, nanotechnology, nutrient efficiency.

### THE INFLUENCE OF SOIL MECHANICS ON PLANT GROWTH AND WATER MOVEMENT: INSIGHTS FROM GEOTECHNICAL BIOLOGY

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#### Abstract

Within the cutting-edge realm of Geotechnical Biology, the interplay between soil mechanics and biological systems has unveiled profound insights that align with the rural sustainability, forestry and agro-ecosystems. This inquiry, encompassing the role of soil characteristics and parameters in shaping plant behavior and root growth, creating a suction effect that draws water towards them and underscores the intricate relationships that govern soil-plant interactions. A numerical simulation was expertly dissected using Plaxis 2D software, particularly focused on understanding the complex behavior of root water uptake over time and the changing level of groundwater and its dynamics rhythm affected by the evolution of plants. The output results in our study have important implications for understanding the soil-plant system and the role of geotechnical processes in biological analyses. Our findings suggest that the stability and behavior of geotechnical systems can have a significant impact on plant growth and distribution, underscoring the importance of considering geotechnical processes in biological analyses.

**Keywords:** Soil-Plant Dynamics, Root Growth, Suction, Water - Nutrient Uptake, Numerical Simulation.

### AGROTOURISM AS A MECHANISM TO PROTECT BIODIVERSITY

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#### Abstract

Biodiversity is the basis of all life on land and under water. It is a requirement for the survival of all living organisms. Including human presence. It is therefore very important to preserve biodiversity. Through a series of measures and mechanisms, we consider sustainable agro- tourism as one of these preventive measures to preserve biodiversity. Agro-tourism can play a fundamental role in integrating strategies for the sustainable and equitable use of natural resources. Algeria has elements of biodiversity that can be exploited in the field of agro-tourism. Through the field study of a sample of farms in the region of El Grous, Biskra, which practice agricultural tourism. We concluded that the interviewed farmers were leaning towards organic farming and that the idea of using biodiversity in the oasis' agricultural tourism was also spreading. The main recommendations of the study are, Strategies for national biodiversity conservation plans should include tourism issues. Conversely, tourism development plans should include a full consideration of biodiversity issues.

**Keywords:** *Agro-tourism, sustainability, biodiversity*

### ALLELOPATHY AS AN ECO-FRIENDLY ALTERNATIVE TO PESTICIDES FOR WEED CONTROL IN SUSTAINABLE AGRICULTURE.

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#### Abstract

In agriculture, weeds present a challenge, competing with crops for nutrients, water, and sunlight causing losses in production. Pesticides are widely used for successful crop production, and controlling weeds insect pests, and pathogens, but they have a negative impact, causing the extinction of susceptible individuals in the population, with time, herbicide-resistant weeds become dominant in the ecological niche, and agricultural system,

elevated risks of environmental pollution, and human health problem and These hurdles pose a substantial threat to sustainable agricultural practices. Allelopathy is a biological phenomenon that involves the release of chemicals by plants that hold the potential to function as growth regulators and the development of other plants. Allelopathy has received great attention since the 1980s all over the world, Allelochemicals can act as natural herbicides, eco-friendly alternatives to control weeds, and crop-safeguarding products. This review highlights the desirable phytotoxic effects and the complex bioactivity of allelochemicals, and how they can be applied for sustainable agricultural practices. It also discusses the current challenges and future directions of allelopathy research in relation to ecological, agricultural, environmental, and chemical aspects.

**Keywords:** *Sustainable, Agriculture, Weed control, Eco-friendly, crops, Allelopathy, Bioactivity, Plants, Allelochemicals.*

### ANTIFUNGAL ACTIVITY OF DILL (ANETHUM GRAVEOLENS L.) EXTRACTS ORIGINAL FROM ALGERIA AGAINST TWO FUNGUS PATHOGENS OF CEREALS

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#### Abstract

The present study aims to evaluate the antifungal activity of dill, *Anethum graveolens* L. against two fungus pathogens of cereals in Algeria, where quantification of the secondary metabolites was investigated in different plant part (whole plant, seeds) and two soil conditions, one is non-salty and second salty soil. The polyphenols, flavonoids, and tannins ranged from 6.25±0.74 mg/g dried weight for the tannins to 167±9.47 mg/g dried weight for polyphenols. The antifungal activity of extracts was tested against *Rhynchosporium secalis* and

*Pyrenophora tritici-repentis*. The mycelial growth of the tested fungi was also determined to evaluate the antifungal activity. The ideal concentration showed a significant reduction of the two tested fungi was found to be 10 mg/mL, and the mycelial growth inhibition was determined after 7 days of incubation. Observations on the mycelial growth after extracts treatment decreased growth diameters. The effect of the hexanoic extract on inhibition of *P. tritici-repentis* was 91.17% and the methanolic extract inhibited *R. secalis* at 93.42% as the highest inhibition rate. Thus, the extract of dill could be used to control fungus pathogens as a potential source of eco-friendly fungicide.

**Keywords:** *Anethum graveolens* L., Antifungal activity, *Pyrenophora tritici-repentis*, *Rhynchosporium secalis*, Secondary metabolites.

S2. The 56 individuals sampled for (S1) revealed a total richness of  $S= 10$  species. According to the Shannon index  $H'= 2.55$  the diversity is average in this site too but higher than the previous one for (S2), the equitability index  $E= 0.77$  this value tends towards 1 which means that the numbers of soil macro invertebrates are in equilibrium with each other for S1 too. As a result, in this study, the application of pesticides is likely to have an impact on soil macro invertebrates and their biodiversity.

**Keywords:** soil macro invertebrates; biodiversity; pesticide; abundance; Shannon index; equitability index.

#### RELATIONSHIPS BETWEEN SOIL BIODIVERSITY AND THE APPLICATION OF PESTICIDES IN AGRO ECOSYSTEMS OF WILAYA OF KHENCHELA

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#### Abstract

The aim of our study is to determine the impact of pesticide use on the abundance of soil macro invertebrates. Two irrigated apple orchards were chosen for this study. The use of Mospilan type pesticide (Insecticides) in the first orchard (S1) while for the second orchard (S2) no pesticides were used. The study was carried out during the autumn 2021. The soil fauna was sampled using the physical method, which consists of sorting by hand all the ants in a block of soil 50 cm square and 30 cm deep. All species were preserved in 70% alcohol before being identified and counted. The 129 individuals sampled for (S2) revealed a total richness  $S= 21$  species. According to the Shannon index  $H'= 3.58$  the diversity is average in this site, and the application of the equitability index  $E= 0.82$ , which means that the number of soil macro invertebrate is in equilibrium with each other for

#### VALORISATION DES CHAMPIGNONS ANTAGONISTES DU SOL (TRICHODERMA HARZIANUM ET ASPERGILLUS FLAVUS) COMME UN MOYEN DE CONTROLE BIOLOGIQUE CONTRE FUSARIUM OXYSPORUM F. SP. ALBEDINIS, AGENT DE BAYOUD DU PALMIER DATTIER (PHOENIX DACTYLIFERA L.)

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#### Abstract

Dans cette étude, on a effectué un test de lutte biologique *in vitro* sur la croissance mycélienne de *Fusarium oxysporum* f. sp. *albedinis* (Foa), et *in situ* sur l'incidence et l'agressivité de la maladie de Bayoud. Ces tests ont été réalisés en utilisant 20 souches de Foa, deux espèces fongiques endophytes appelées *Trichoderma harzianum* et *Aspergillus flavus*, et 14 variétés locales du palmier dattier. Le premier test *in vitro* est l'essai d'antagonisme, et le deuxième est l'inoculation artificielle des plantes du palmier dattier par le Foa en présence et en absence des champignons endophytes antagonistes. Les résultats obtenus sont significatifs ( $P<0.05$ ), pour les deux tests effectués. Dans le test *in vitro*, les valeurs de la croissance mycélienne varient entre 2,04 et 2,6 mm/j, sous l'effet de *T. harzianum*,

et entre 1,77 et 2,5 mm/j sous l'effet de *A. flavus*. Ces valeurs sont toujours inférieures par rapport au témoin qui varie entre 2,85 et 5,4 mm/j. Les valeurs du taux d'inhibition de croissance mycélienne varient entre 28,8 et 68,8 %, selon la souche testée et l'antagoniste utilisé. Dans le deuxième test *in situ*, toute la gamme de variétés inoculées a été protégée en présence de l'antagoniste *T. harzianum*, par la réduction du taux de mortalité (TM%) des plantes inoculées par le Bayoud, où on a pu protéger 8 variétés (Feggous, Toudent, Azraza, Deglet Nour, H'mira, Hartan, Sbaa Soltan et Tanboucht). Cette réduction a arrivé pour donner TM% jusqu'à 0% comme le cas des variétés : Feggous, Toudent, Azarza, Hmira, Hartan, et Sbaa Soltan, et sauf la variété 'Figuig' qui a montré une sensibilité vis-à-vis des souches de Foa et ce champignon endophyte n'a pas pu de la protéger. Ces résultats encourageants doivent être valorisés par l'application de ces microorganismes du sol dans le programme de lutte biologique et intégrée contre cette maladie grave dans les palmeraies algériennes contaminées afin de confirmer cette capacité.

**Keywords:** *Palmier dattier, Bayoud, lutte biologique, endophytes, Trichoderma harzianum, Aspergillus flavus, antagonisme.*

### SCREENING AND SELECTION OF NEW BACTERIAL BIOCONTROL AGENTS AGAINST BOTRYTIS CINEREA AND OIDIUM NEOLYCOPERSICI ON TOMATO IL ALGERIA

#### EVALUATION DE LA BIODEGRADATION DES SACS PLASTIQUES PAR PENICILLIUM SP.

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#### Abstract

Les déchets plastiques universels ont atteint environ 6300 millions de tonnes au cours des dernières années, L'accumulation de ces matières récalcitrantes dans l'environnement est une menace majeure pour tous les écosystèmes. L'objectif de cette étude est de déterminer l'efficacité d'un champignon indigène du sol dans la dégradation des sacs plastique. À cet égard, *Penicillium* sp. a été testé pour sa capacité à dégrader des pièces d'un sac en plastique. Cette souche a été isolée du sol d'une décharge située dans le nord-est de l'Algérie, cultivée sur la gélose PDA (Potato Dextrose Agar) et identifiée selon ses caractéristiques macroscopiques et microscopiques. Le test de biodégradation a été réalisé *in vitro* sur milieu minimum liquide (à 27±2°C) et ce, pendant un mois avec agitation continue en suivant la densité optique par spectrophotomètre. La biodégradation a été évaluée à travers plusieurs paramètres : perte du poids, microscopie électronique à balayage (MEB) et spectroscopie infrarouge (FTIR). Les résultats obtenus ont montré la capacité de l'isolat testé à dégrader les pièces du sac plastique. Enfin, la mycoremédiation des sites naturels pollués tels que le sol est l'une des applications directes envisageables qui assurent la dépollution tout en protégeant l'environnement.

**Keywords :** *Biodégradation ; dépollution ; mycoremédiation ; Penicillium sp.; sacs plastiques.*

#### CONSERVATION OF ARTHROPODS AND PLANTS USING RESIN NEW SOLUTION FOR GOOD CONSERVATION

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#### Résumé

In entomology, insect collections are generally subject to problems of degradation. Many insect conservation techniques exist but are expensive. entomologists find always difficulties in conservation and call on several returns to the field to carry out excessive sampling while using different sampling methods and techniques which has negative effects on biodiversity and on naturel enemies or useful fauna (pollinators) or even rare or



under risk of disappearance. The inclusion of insects in the resin offers the advantage of preserving the insects in perfect condition for many years as well as raising awareness of biodiversity. This technique consists of placing insects specimens in silicone containers where a thin layer of 0.5cm of resin is placed on the bottom. Cover the insect gradually with the resin until a transparent and hard dome is formed. This technique offers three advantages; as reducing number of specimens; insects that can be effectively preserved for several months or even years without deteriorating. This technique protects the specimens from attacks by scavengers, molds and harmful arthropods such as mites, ants...ect. Also offers the possibility of observing them at any time; you just have to put them under the magnifying glass without risk of damaging them, unlike a pinned collection. The species preserved in the resin can be exploited by DNA tests..

**Mots-clés:** entomologie, conservation, résine, technique.

### INSECTICIDAL ACTIVITY OF SELECT SOME AROMATIC PLANT EXTRACTS ON CULEX PIPIENS LARVA

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#### Abstract

The objective of this study is to assess the impact of essential oils from three aromatic plants, namely *Thymus vulgaris*, *Melaleuca alternifolia*, and *Pelargonium graveolens*, on fourth instar larvae of *Culex pipiens*. The larvae were exposed to three different concentrations (2.5 µg/l, 5 µg/l, and 10 µg/l) for periods of 24 hours, 48 hours, and 72 hours. The results demonstrate variability in larval

sensitivity, with sensitivity which increased proportionally to the concentration of the extract. Furthermore, the toxic effect becomes more pronounced with prolonged larval exposure. It is noteworthy that the essential oil of *Pelargonium graveolens* exhibits a more pronounced toxic effect compared to the essential oils of *Thymus vulgaris* and *Melaleuca alternifolia*. A combination of these oils was also tested on the larvae for a 24-hour period, using the same concentrations. Mortality rates increase with higher doses, with the *Thymus vulgaris* and *Melaleuca alternifolia* blend showing the strongest effect, resulting in mortality rates ranging from 37% to 89%. Conversely, the least pronounced effect is observed with the *Melaleuca alternifolia* and *Lavandula* spp. blend, which presents mortality rates of (35%, 57%, 69%) for the respective doses of 2.5 µg/l, 5 µg/l, and 10 µg/l. The thyme and lavender blend exhibits the highest mortality rate at the lowest dose (2.5 µg/l), reaching 44%. It is important to note that the combined use of these essential oils leads to reduced toxicity.

**Keywords:** Essential oils, *Culex pipiens*, toxicity, mortality.

### BIOLOGICAL CONTROL OF THE FUNGUS *FUSARIUM OXYSPORUM* F. SP. LYCOPERSICI BY THE USE OF SOME SPONTANEOUS PLANT EXTRACTS

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#### Abstract:

*Fusarium* disease of tomato "*Fusarium oxysporum* f.sp. lycopersici" which causes enormous damage from the stems, roots of an infected tomato plant. The aim of this work is an *in vitro* study of the antifungal activity of ethanolic and methanolic and aqueous extracts of 4 medicinal plants "*Lawsonia inermis* L., *Pergularia tomentosa*, *Nigella sativa* L., *Citrullus colocynthis*" on the strains of *Fusarium*.sp. The obtained results reveal that the ethanolic extracts are exerted a high efficiency on almost all the fungal strains compared to the methanolic and

aqueous extracts. While the aqueous extracts showed no inhibitory effect on the fungal strains. The extracts of *L. ihrichate* strain, for the plant *L. inermis* recorded higher inhibition rates than the other plants at 42.46% (ethanolic extract) and 28.76% (methanolic extract). While the antifungal effect of ethanolic and methanolic extracts of *P. tomentosa* marked inhibition rates at respectively (16.43% and 17.30%), and for the plants *C. colocynthis* and *N. sativa* the antifungal effect is low for alcoholic extracts vary between (8.16 and 11.72%). Indeed, preliminary biological control trials proved that alcoholic extracts of *L. inermis* could eventually be valorized in biological control programs against *Fusarium* wilt of tomato.

**Keywords:** *Fusarium.sp.*, biological control, plant extract, pathogen, antifungal activity.

### CINNAMIC ACID STIMULATED OF VIRULENCE FACTORS OFFUSARIUM OXYSPORUM F. SP. ALBEDINIS

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#### Abstract

*Fusarium oxysporum* f. sp. *albedinis* (Foa) is the causal agent of vascular fusariosis of date palms (*Phoenix dactylifera* L.), commonly known as bayoud. One of the host plant's defense mechanisms against this pathogen is the activation of the phenylpropanoid pathway. The aim of this study is to investigate *in vitro* the effect of different concentrations of cinnamic acid (200, 400, 600 and 800 mg.L<sup>-1</sup>) on the growth, sporulation, fusaric acid production and enzymatic activity of Foa grown in PDA (Potato Dextrose Agar) and PDL (Potato Dextrose Liquid) media. The results show inhibition of mycelial growth and conidiogenesis. However, the production of fusaric acid and hydrolytic enzymes such as pectinases and cellulases is strongly stimulated, with rates of 211.88%, 1247.22% and 138.23% respectively. The results of this study indicate that cinnamic acid

accumulation increases the risk of infection and damage to date palms by Foa. We hypothesize that the pathogen develops a survival strategy by circumventing resistance mechanisms and using molecules synthesized by the host plant to its advantage to stimulate toxin and enzyme production.

**Keywords:** Bayoud, cinnamic acid, date palm, *Fusarium oxysporum* f. sp. *albedinis*, pathogenicity.

### CIRCADIAN RHYTHM'S IMPACT ON SUGAR USED TO MANAGE CYDIA POMONELLA IN ALGERAN ORCHARDS (BATNA REGION)

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#### Abstract

Codling moth *Cydia pomonella* (L.) is a key pest in Algerian apple fruit orchard, with more than 60% of treatments aimed to combat this pest. A new biological concept to crop protection known as "sweet immunity" is a viable biological substitute for chemical control. Sugar signals can alter the circadian clock in two ways: first, by sending environmental signals to it that modify its components, and second, by sending signals from the circadian clock to different paths. This presents the opportunity for sweet priming, defined as a physiological process that prepares plants for a faster and/or stronger defense response of immunity and tolerance to future biotic or abiotic stresses. The aim of this study conducted in the Batna region is to test the effect of sugar spraying (Sucrose and Fructose), at 100 ppm, every 21 days on apple trees, from the end of flowering stage till the harvest, at different times in the day (early, mid-day and late), against codling moth attacks. Results of comparing the mean percentages of damaged fruits per tree at

harvest and fallen fruits using variance analysis; show that spraying sucrose or fructose in the morning and late in the day provides the best results and show a low infestation rate. In comparison to using them in the middle of the day, when sugar levels are low. For harvested fruits, similar results have been noted, and can provide efficiency up to 72.14%.

**Keywords:** *Codling moth, Circadian rhythm, Sugar, Sucrose, Fructose, Apple.*

### ENZYMATIC STUDY USING A MEANS OF BIOLOGICAL CONTROL AGAINST LOCUSTS

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#### Abstract

Coming to overlap with catastrophic episodic pollution of locusts, sauterias constitute in Africa a chronic problem of defence of food crops. Recent developments in research strategies have made significant progress in understanding the mechanism of these pests. Our main objective is to evaluate the insecticide activity of the methanol and ethanol extract from three plants (*Randonia africana*, *Salsola imbricata*, *Zygophyllum album*) on the L4 larvae of *Locusta migratoria* and *Schistocerca gregaria*. For this, we tested their effect on some physiological and morphological parameters, such as their impact on the level of proteins and emolymphatic enzymes, morphogenesis and the development of the L4 larvae of both acridians. The L4 larvae treated with the extracts of three plants have morphological changes in coloration: the larvae become completely red. On the other hand, the results show that the extracts have a toxic effect on the L4 larvae of *Locusta migratoria* and *Schistocerca gregaria* with both treatments. Based on the results, we found that the rate of proteins in the L4 larvae of the two acridians treated by six extracts per ingestion is different from the controls. We also recorded that

the highest levels of protein were recorded in *L.migratoria* compared to *S.gregaria*. We also found that the catalase content of the L4 larvae of the two acridians treated with the six extracts per ingestion was different from the controls. For the GST results, we that the glutathione S-transferase enzyme levels of the L4 larvae of the two acridians treated by the six extract per ingestion were different from the controls.

**Keywords:** *Glutathione S-transferase GST, Locusts, Pests.*

### FIRST PATHOGENICITY TESTS OF THE FUNGI *LECANICILLIUM LECANII* ON IMMATURE STAGES OF *CERATITIS CAPITATA* IN ALGERIA

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#### Abstract

Medfly, *Ceratitis capitata* Wied is one of the main crop pests in Algeria because of its polyphagy and its high reproductive potential. This study aimed to evaluate the pathogenicity of the local isolate of the entomopathogenic fungi (EPF) *Lecanicillium lecanii* (Zimm.) Zare & W. Gams (= *Verticillium lecanii*) towards the third instar larvae and pupae of *Ceratitis capitata*. The in vitro insecticidal effects of *L. lecanii* were tested against L3 larvae and pupae by the contact test method. A series of dilutions were performed to obtain concentrations of 10<sup>4</sup>, 10<sup>5</sup>, 10<sup>6</sup>, 10<sup>7</sup> and 10<sup>8</sup> conidia/ml. The average mortality of larvae after immersion in conidial suspensions ranged from 6.67 to 46.67% depending on applied doses. Pupae resulting from treated larvae appeared to have a higher mortality rate than the control for the tested doses of *L. lecanii*. In addition, we recorded the malformation effect of EPF on the prepupal stage. Average pupal mortality

was generally high and ranged from 36.67 to 70.00% depending on doses. The results obtained show that the tested EPF *L. lecanii* seem to be promising for the biological control of the medfly in Algeria.

**Keywords:** *Biological control, L. lecanii, entomopathogenic fungi, medfly, virulence, pathogenicity.*

### PUPICIDAL ACTIVITY OF THE ESSENTIAL OIL OF RUTA GRAVEOLENS (RUTACEAE) AGAINST TWO SPECIES OF MOSQUITOES CULEX PIPIENS AND CULISETA LONGIAREOLATA

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#### Abstract

Mosquitoes can be simply considered as annoying pests due to the nuisance of their bites, and can also transmit diseases to humans and domestic animals. Synthetic insecticides are considered to be one of the most effective tools for reducing and controlling the number of disease-carrying insects. Unfortunately, the intensive use of chemical insecticides entails risks for the environment and human health. Most researchers have suggested natural plant products as good alternatives to conventional synthetic pesticides. Among the natural products derived from plants, essential oils (EO) have shown a dominant property for the control of insect pests. In this context, this work reports on the evaluation of the effect of *Ruta graveolens* essential oil on *Culex pipiens* and *Culiseta longiareolata* pupae. Toxicological tests were carried out to determine the lethal concentrations (LC25, LC50 and LC90) of oil extracted from *Ruta graveolens* on the pupae of two species of mosquito. In a second series of experiments, the LC50 effect of the plant's essential

oil on the biochemical composition of the EO showed a significant reduction in this content in *Culex pipiens* and *Culiseta longiareolata*. *Ruta graveolens* essential oil is therefore an interesting alternative for controlling mosquito pupae.

**Keywords:** *Culex pipiens, Culiseta longiareolata, Ruta graveolens, essential oil, biochemical composition.*

### ACARICIDAL EFFECT OF LEMON ESSENTIAL OIL ON THE HONEYBEE PARASITE (VARROA JACOBSONI)

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#### Abstract

Essential oil has a biological potential for a natural fight against the enemies of honeybees, the use of these bioproducts makes it possible to reduce the side effects of chemicals on human health and the environment. The present work concerns the application of treatments based on lemon essential oil (*Citrus limonum*) and homologous synthetic products (oxalic acid and Apivar) on the parasite of the Tellian bee " *Varroa destructor*". The results obtained showed that lemon essential oil has a better acaricidal effect at the D2 (0.5%) with an average mortality rate of 56.32%, which is not negligible. The chemical treatment carried out by apivar proves to be more effective (78.21%) compared to oxalic acid (62.1%) and to the bio-product based on lemon essential oil. The control batch had a lower natural varroa mortality (6.18%). The treatment based on lemon essential oil has proven to be effective under our experimental conditions and without harmful effect on the development of colonies and on the environment and deserves to be proposed as a bio-acaricide against varroosis.

**Keyword:** *Essential oil, bio products, Lemon, Apis mellifera, parasite.*

### ACTIVITE ANTI-BACTERIENNE ET ANTI-FONGIQUE DE L'HUILE DES NOYAUX DE DATTES ALGERIENNES

## COMPARATIVEMENT A L'EXTRAIT AQUEUX

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### Résumé

De nombreuses recherches ne cessent de démontrer que des plantes médicinales renferment de nombreux principes chimiques biologiquement actifs qui exercent différentes activités pharmacologiques : activités antioxydantes, anti-inflammatoires, antiviraux, antibactériennes, antifongiques. Les noyaux des dattes renferment des composants extractibles à valeur ajoutée élevée. L'objectif de notre étude vise à déterminer l'activité antibactérienne et antifongique de l'huile des noyaux de dattes algériennes (HND). L'évaluation de l'activité antibactérienne a été réalisée par la méthode de diffusion en milieu gélosé. Sept souches provenant de l'institut pasteur ; *Staphylococcus aureus* (ATCC 25923), *Bacillus cereus* (ATCC11778), *Pseudomonas aeruginosa* (ATCC 27853), *Escherichia coli* (ATCC 25922), *Klebsiella pneumoniae* (ATCC 70603) *Candida albicans* (ATCC 10231) et *Candida albicans* (ATCC 26790). Les différentes souches que se soit bactériennes ou bien fongiques ont été repiquées par la méthode des stries, puis incubés à 37°C pendant 18 à 24 heures afin d'obtenir une culture jeune et des colonies isolées qui ont servi par la suite à préparer l'inoculum en les trempant dans des tubes de solution d'eau distillée stérile afin d'avoir une densité cellulaire initiale. L'activité antibactérienne a été déterminée en mesurant à l'aide d'une règle le diamètre de la zone d'inhibition. Nos résultats ont montré que l'extrait de HND présente une activité anti-bactérienne marquée vis-à-vis trois souches: *Staphylococcus aureus*, *Bacillus cereus* et *Candida albicans* (ATCC 26790), sachant que les deux premières sont des bactéries à Gram positif et la dernière c'est une levure. Par contre, *Candida albicans* (ATCC 10231) et les souches bactériennes *Pseudomonas*

*aeruginosa*, *Klebsiella pneumoniae* et celle d'*Escherichia coli* (Gram-) présente une résistance vis-à-vis de notre huile. Les bactéries utilisées à Gram positif et *Candida albicans* (ATCC 26790) sont sensibles vis-à-vis de l'huile des noyaux de dattes Comparativement aux germes du groupe à Gram négatif qui sont des bactéries multi-résistantes, ceci témoignant une bonne activité antibactérienne et antifongique.

**Mots-clés :** l'huile des noyaux de dattes, valorisation, activité antibactérienne, activité anti-fongique.

## BIODIVERSITY AND BIOTECHNOLOGICAL APPLICATIONS OF MICROBIAL AGENT AGAINST APPLE DISEASES IN THE AURES REGION.

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### Abstract

Apple tree [*Malus domestica* (Suckow) Borkh., 1803] is one of the most widely cultivated fruit trees in the Aures; a partly mountainous region located in the North-East of Algeria. During their growth and development, apple trees can be attacked by various pathogens. The main approach used to combat these diseases is physical and/or chemical treatments. However, their use is becoming increasingly restricted and has a number of disadvantages due to phytopathogens resistance and negative effects on the environment. It is therefore necessary to develop and research appropriate methods for controlling apple diseases. One innovative way of achieving this goal is through the use of microbial biocontrol agents. Such as bacteria, fungi and yeasts, which possess antagonistic activity against pathogens. Microbial agents play an important role in the biological control of plant pathogens. The aim of the present study is to understand the current

state of diversity of biocontrol microorganisms, their plant colonization strategies and their potential roles as protective agents against apple tree's diseases. In particular, it aims to shed light on the importance of autochthone microbial diversity and their efficacy on sustainable agriculture. Actually, these organisms have shown great importance in agricultural applications as plant growth promoters, biofertilizers, and disease preventatives. It will therefore be interesting to implement a new methodology for using biocontrol microorganisms in agricultural practices and reduce our use of chemicals.

**Keywords:** *Apple, Autochthones, Biological control, Microorganisms, Phytopathogens.*

### **BIOLOGICAL ACTIVITY OF JUNIPERUS PHOENICEA ESSENTIAL OIL ON TOXICITY AND ENERGY RESERVES OF CULISETA LONGIAREOLATA (DIPTERA: CULICIDAE)**

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#### **Abstract**

Diptera insects are considered dangerous public health 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, Maltese fever and West Nile virus. Worldwide, several synthetic insecticides have been used to eradicate this population. Unfortunately, insecticide resistance among mosquito populations has been reported. Also, most of these insecticides posed ecological and public health risks. In this context, it is necessary to propose new non-polluting and specific alternatives. Most researchers have suggested

natural plant products as good alternatives to synthetic pesticides. Among the natural products derived from plants, essential oils (EO). 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. The toxicological tests made it possible to determine the lethal concentrations (LC<sub>25</sub>, LC<sub>50</sub> and LC<sub>90</sub>) 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. These results would be useful for replacing chemical insecticides with bioactive compounds of plant origin such as new mosquito repellents.

**Keywords:** *Juniperus phoenicea, mosquitoes, Essential oil, Energy reserves.*

### **CARACTERISATION DE LA BIODIVERSITE DE LA COMMUNAUTE DES VERS DE TERRE DANS LES PRAIRIES NATURELLES IRRIGUEES AVEC DES EAUX USEES BRUTES ET TRAITEES.**

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#### **Résumé**

Cette étude a été menée dans deux prairies naturelles, dont les sols ont été irrigués avec des eaux usées brutes pour le site (SI) et avec des eaux usées traitées pour le site (SII). Dans chaque prairie, la communauté de vers de terre a été caractérisée et comparée à l'aide de paramètres de densité, de biomasse, de composition, de structure, de richesse des espèces et de diversité. Dans les deux prairies, 459 individus de vers de terre appartenant à deux familles et à sept espèces ont été collectés. La densité de vers de terre et la richesse en espèces les

plus élevées ont été enregistrées dans le SI. *Nicodrilus caligenus* était l'espèce la plus abondante. La plupart des paramètres de la communauté de vers de terre ont diminué de manière significative à SII. Seules deux espèces (*Nicodrilus caligenus*, *Octodrilus complanatus*) étaient communes aux deux prairies. Parmi les sept espèces identifiées dans les deux prairies, quatre (*Allolobophora longa*, *Esinia Foetida*, *Allolobophora rosea*, *Allolobophora chlorotica*) étaient exclusivement présentes dans le SI, tandis qu'une seule espèce (*Amyntas sp.*) caractérisait le SII. Trois groupes écologiques de vers de terre (épigés, endogés et anéciques) étaient représentés dans le SI, avec une dominance des endogés (quatre espèces).

**Mots-clés :** irrigation, eaux usées ; vers de terre ; prairies naturelles ; biodiversité.

### EFFECT OF PESTICIDES ON ALKALINE PHOSPHATASE AND BLOOD SUGAR IN FARMERS FROM WILAYA OF BISKRA

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#### Abstract

Pesticides play a major role in food production and yield. These pesticides are potentially toxic to humans and can affect their intermediary metabolism and the activity of certain enzyme systems depending on the level and route of exposure. The aim of this study was to determine the disruption of alkaline phosphatase enzyme activity and blood sugar levels, which can be signs of several dangerous diseases (liver damage, bone

disease, etc.), during chronic exposure to pesticides in farmers at the Doucen infirmary in the wilaya of Biskra. A group of 30 men were divided into 3 sub-groups: a control group (non-farmers), and two other groups, each comprising ten farmers, of different ages (23-45 years), and different duration of exposure to pesticides (5 -17 years). The blood samples were taken in the morning on an empty stomach by venous function, at the elbow using a syringe, then collected in two dry tubes, which were centrifuged at 4,000 rpm for 15 minutes. The serum was separated into two fractions in 200 ml eppendorf tubes. The results showed a non-significant increase in blood glucose levels in group II ( $0.88 \pm 0.11$ ) of the farmers compared with the control group ( $0.83 \pm 0.05$ ) and group I ( $0.87 \pm 0.12$ ), with a significant increase in alkaline phosphatase levels in group I ( $143.9 \pm 51.1$ ) and group II ( $157.1 \pm 65.2$ ) compared with the control group ( $98.80 \pm 6.51$ ). This study therefore highlighted the disruption of certain enzyme systems and metabolic activities caused by pesticides, which may be the cause of several anomalies.

**Keywords:** Pesticides, farmers, alkaline phosphatase, blood sugar, enzyme systems, metabolism.

### EFFET DES PLANTES SPONTANÉES DES RÉGIONS ARIDES DANS LE CONTRÔLE DES INSECTES DES DENRÉES STOCKÉES

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#### Abstract

Cette étude s'inscrit dans le contexte de la lutte biologique contre les organismes nuisibles en Algérie en utilisant des produits naturels. Notre objectif principal est de mettre en valeur le potentiel des plantes spontanées des régions arides et d'évaluer l'efficacité de leurs extraits pour contrôler les insectes du genre *Tribolium sp* qui affectent les denrées stockées. Plus précisément, nous

examinons le pouvoir insecticide de deux plantes sahariennes spontanées, à savoir *Zygophyllum album* L. et *Atriplex halimus* L. Les résultats de notre évaluation de la toxicité des extraits de ces plantes révèlent un taux de mortalité significatif chez les individus traités avec l'extrait de *Zygophyllum album* L., atteignant jusqu'à 99 %. En revanche, l'extrait d'*Atriplex halimus* L. présente une mortalité moyenne. L'analyse des doses létales (DL) confirme la supériorité de l'extrait de *Zygophyllum album* L. en termes de pouvoir insecticide par rapport à l'extrait d'*Atriplex halimus*. En somme, cette étude s'inscrit dans le domaine de la lutte biologique avec des produits naturels en Algérie et se concentre sur l'évaluation de l'efficacité des extraits de deux plantes spontanées des régions arides, offrant des résultats prometteurs pour le contrôle des insectes des denrées stockées du genre *Tribolium* sp.

**Keywords:** *Tribolium* sp, plante spontanée, extrait, insecticide, régions arides, *Zygophyllum*

huiles essentielles de cette dernière par hydro-distillation et nous les avons testées sur *Tribolium confusum* en utilisant trois méthodes différentes : application directe sur papier filtre, inhalation et alimentaire. Nous avons constaté que l'huile de *Myrtus nivellei* a un effet répulsif ou insecticide avec un taux moyen d'expulsion ou de décès de 60 %, 37,5 % et 15 % dans les trois tests respectivement. Ces résultats sont préliminaires et peuvent nous indiquer la possibilité d'utiliser cette plante comme alternative naturelle pour la lutte contre les insectes en particulier dans les zones désertiques.

**Mots-clés :** *Plantes médicinales, Myrtus nivellei* , huiles essentielles, activité insecticides, *Tribolium confusum*.

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### EFFET INSECTICIDE DE MYRTUS NIVELLEI BATH AND TRAB CONTRE TRIBOLIUM CONFUSUM

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#### Abstract

Les céréales sont essentielles à la sécurité alimentaire mondiale, mais leur stockage et leur conservation sont essentiels. Pour prévenir la détérioration causée par les insectes ravageurs, qui peuvent réduire leur quantité et leur qualité ; les produits chimiques sont couramment utilisés mais ils sont toxiques pour les humains et l'environnement. Les huiles essentielles sont des alternatives naturelles et efficaces car elles contiennent des molécules biologiquement actives aux propriétés insecticides. Afin d'explorer les propriétés médicinales et anti-insecte d'une plante aromatique endémique du Sahara *Myrtus nivellei* de la région de Tamanrasset ; nous avons extrait les



**2nd day : October 19th, 2023**

**Session President: Dr. Harfi B.**

**Moderators: Pr. Damnati, Dr. Bettiche, Dr. Diab**

### **IMPACT OF MARRUBIUM VULGAR AGAINST BLATTELLA GERMANICA**

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#### **Abstract:**

*Marrubium vulgare* is an herbaceous plant of the Lamiaceae family, called commonly in Algeria « Marriouta ». This botanical has exhibited by previous works bioinsecticidal properties in several insect pests. *Blattella germanica* (Dictyoptera: Blattellidae), the most associated human cockroach. This species, characterized by a high reproductive potential, resistance to extreme conditions. It presents an important problem for human health, as it is frequently the cause of several infectious diseases. The extract of the leaves of this plant was experimented by ingestion, the day of the exuviation of the adults of this pest. The toxicity of this compound was evaluated, estimating the lethal doses (LD50 and LD90) which are respectively 0,56 and 0,82 mg/insect after 74 hours of exposure. In addition, lethal times were also specified for the various doses tested. The TL50 and TL90 evaluated are respectively 0,20 and 0,18 days for the high dose 3000 mg/insect. Indeed, *Marrubium vulgare* presents a broad spectrum towards *B. germanica* by manifesting a short term toxic activity.

**Keywords:** *Marrubium vulgare*, *Blattella germanica*.  
*Cockroaches*, biopesticide, toxicity, lethal doses.

### **USE OF BIOMOLECULE IN LOCUST CONTROL**

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#### **Abstract**

The effect of aqueous extracts of *Citrullus colocynthis*, *Cassia italica*, *Aerva javanica*, *Fagonia arabica*, *Morettia canescens* was tested in the digestive tract of L5 larvae of *Schistocerca gregaria* under laboratory conditions. The results obtained reveal that: the leaf extract causes L5 larvae, stunting and thinning of the musculature. However, the degree of toxicity of the extract of *Citrullus colocynthis* was very marked. In parallel, the phytochemical study conducted on the aqueous extracts tested, revealed that the phenolic content of the plant leaves is very rich in biomolecules governing the acridicidal nature. Conclusions: The Desert Locust is clearly affected by leaf extracts compared to larvae considered as positive controls. The analysis by HPLC chromatography shows the existence of the major elements of secondary metabolites contained in the extracts of the plants tested and administered in mixture with food for L5 larvae of the desert locust. The comparison of the retention times of our standards (injected under the same conditions) with those recorded in our chromatograms makes it possible to identify the existence of: syringic acid, 3-hydroxy-4-methoxycinnamic acid and M-anisic acid.

**Keywords:** *Acridicidal*, *Locust*, *leaf extract*, *aqueous extracts*.

### **VALORIZATION OF SOME ENDOPHYTIC FUNGAL SPECIES ISOLATED FROM PALM GROVES SOILS OF NAAMAOASES**

## AGAINST BAYOUD DISEASE (*FUSARIUM OXYSPORUM* F. SP. *ALBEDINIS*) OF DATE PALM (*PHOENIX DACTYLIFERA* L.)

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### Abstract

This study aims to search the valorization of endophytic fungal species isolated from soils of Tiout, Moghrar and Boussemgoun oases of Naama, against Bayoud disease of the date palm, caused by *Fusarium oxysporum* f. sp. *albedinis* (Foa). Based on the sampling of soils from palm groves contaminated by Bayoud, in the rhizosphere of date palm trees in these oases, 15 soil samples were taken from these regions, followed by isolation and a series of purifications and identifications of the microbial strains obtained. After the isolation, direct confrontation of these endophytic fungi against Foa strain on mycelial growth. The results showed the presence of these fungal endophytic which are represented by different genera / species, where some fungal species are saprophytic and other are antagonistic fungi. The endophytes are mainly belonging to three genera *Trichoderma*, *Fusarium* and *Cladosporium*. Concerning the direct confrontation, a significant effect was observed in mycelial growth of confronted foa colonies compared to control, where the inhibition rates of Foa mycelial growth varies between 45 and 70% according to endophytic strain. These results encourage us to go to the biological control and agroecological transition is possible where we can protect our palm groves contaminated by the Bayoud by a natural way like the endophytic fungal species.

**Keywords:** Naama oases, valorization, endophytic fungal species, Bayoud, biocontrol.

## ADSORPTION OF ABAMECTIN ON COMMERCIAL ACTIVE CHARCOAL

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### Abstract

The objective of this study is to contribute to the knowledge of the adsorbent power of commercial activated charcoal powder in the adsorption removal of a plant protection product commonly applied in the field of irrigation, recognized under the name of Abamectin and to test the efficiency of this process. The tests showed that, the monitoring of the evolution of abamectin removal yields recorded that, the optimum yield is 95.9% obtained during 120 minutes. The process is more efficient at pH less than 7. For the variation of the initial content of the compound, the elimination is maximum up to 30 mg/l of abamectin then a decrease appeared. However, the change in the mass of powdered charcoal showed an increase in the elimination of abamectin with an increase in adsorbent. The application of kinetic models, the results obtained showed that the two models pseudo first order and pseudo second order are favorable. Similarly, the models of the Langmuir and Freundlich isotherms have proved that the retention of abamectin on powdered activated charcoal obeys the adsorption phenomenon.

**Keywords:** Abamectin, Commercial activated charcoal, Adsorption, Parameters effects,

## THE POMEGRANATE BUTTERFLY (*VIRACHOLA LIVIA*) THREATENS THE PALM GROVES OF BISKRA

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### Abstract

The region of Biskra is known for its date production, which makes it one of the first phoenicultural regions, and contributes to making Algeria one of the most important date-producing countries, in particular by the famous Deglet Nour variety. The pomegranate tree (*Punica granatum* L.) is omnipresent in the palm groves of this region, it has many pests in common with the date palm (*Phoenix dactylifera* L.). Another pest, *Virachola livia*, joins the list of these common pests, it causes considerable losses on pomegranate trees in Biskra region as in other palm groves in southeastern Algeria. This polyphagous predatory butterfly attacks several plant species often grown in the palm groves of Biskra (dates, figs, pomegranates, broad beans, apricots and acacia pods). Through this study, which was carried out at the Chemorra station at the municipal borders of Sidi Okba, the rate of infestation by this pest is close to 50%. The infestation is linked to climatic conditions. The monitoring of the infestation for years has made it possible to determine a formula based on temperature and humidity by which the rate of infestation can be calculated.

**Keywords:** *Virachola livia*, Biskra, pomegranate, infestation rate, polyphagia.

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### EMBRACING INNOVATION BIOPROTECTION SOLUTIONS FOR HEALTHIER CROPS: AN ECO-SMART TOOL FOR EFFECTIVE BIOCONTROL OF PHYTOPATHOGENIC FUNGI, CASE OF *FUSARIUM SPP.*

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### Abstract

Agriculture faces many challenges, including plant pests and diseases, which are responsible for up to 15% of global agricultural production losses each year; plant pathogenic fungi are a major threat to agriculture and human health, accounting for 70-80% of all phytopathogens, causing about 20-40% of the world's economic losses. *Fusarium spp.* has received considerable attention in recent decades for their ability to cause cryptogamic infection one of the most devastating diseases affecting the world's most strategic crops such as tomatoes, dates and potatoes. Despite the effectiveness of agrochemicals in minimizing damage is undisputed, there are serious problems associated with their extensive use, which is harmful to human health and the environment and has sometimes led to resistance in phytopathogenic strains, as well as affecting non-target organisms and the eradicating of beneficial plant-microbe relationships. Fortunately, technology offers an innovative natural strategy that promises an eco-friendly approach to managing plant diseases and ensuring sustainable agricultural practices by embracing technological advances. Monitoring is one such method of increasing agricultural productivity and reducing environmental impact, as is the adoption of new eco-smart tools, particularly those involving biocontrol agents. Thus, scientists have started to exploit the war between microbial populations to control phytopathogenic fungi, using antagonistic bacteria isolated from extreme environments, which can provide huge resources of bioactive compounds with very considerable inhibitory activities against various diseases cryptogamic. In the form of a literature review, we will highlight some of the recent articles that focus on effective biocontrol measures to combat phytopathogenic fungi, aiming at the bioprospection and exploitation of extreme ecosystems whose microbial biodiversity is worth studying, and shed light on the biological potential of extremophilic microbes to suppress *Fusarium spp.* through various mechanisms such as antibiosis, nutrient and space competition, parasitism and reduction of pathogen aggressiveness, and to contribute significantly to plant growth.

**Keywords:** *Phytopathogenic fungi, Agrochemicals, Fusarium spp., Innovative natural strategy, Biocontrol, Extreme environments.*

### USING REMOTE SENSING FOR EVALUATE THE EFFECT OF WILDFIRE ON PINE FOREST OF SOUK AHRAS REGION, NORTHEASTERN OF ALGERIA

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#### Abstract

Wildfire cause damage to ecosystems and are one of the world's worst natural disasters. To effectively respond to fires, it is important to estimate fire behavior characteristics. Obtaining data based on terrestrial measurements is expensive and time-consuming. Therefore, the use of remote sensing and GIS tools has become a valuable tool for studying the spatio-temporal dynamics of plant cover and assessing environmental risks faster, more sensitively, and cheaper. The objectives of this research were to use satellite data to evaluate how fire could impact forest, characterize the severity of post-fire burnt areas in the El Zaarouria pine forest in the Souk Ahras region, determine the recovery of vegetation after fire following the fires of August 17<sup>th</sup> 2022. The approach adopted requires the use of Landsat 8 satellite image data, which have been integrated into the Google Earth Engine (GEE) to monitor the impact of fires on this area. Two indices were used: Differenced Normalized Burn Ratio (dNBR) to detect the degree of severity of these fires, and the evolution of the Normalized Difference Vegetation Index (NDVI) acquired before and after the fire, and field observations. The results obtained show that the forest ecosystems of this forest are highly vulnerable to fire. The dNBR values are estimated at between -0.2885 and 0.7375. Negative values generally reflect vegetation regrowth, while positive values reflect fire severity.

A diachronic study of the NDVI index showed that its values were higher before the fire than after it, indicating a reduction in vegetation cover over the period in question. New technologies need to be integrated for better understanding.

**Keywords:** *Wildfire, remote sensing, pine forest, dNBR, NDVI.*

### EVALUATION OF THE BIOINSECTICIDE ACTIVITY OF ESSENTIAL OILS OF THE LAMIACEAE: MENTHA ROTUNDIFOLIA AGAINST TRIBOLIUM CASTANEUM HERBST (COLEOPTERA: TENEBRIONIDAE)

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#### Abstract

Grain loss during storage caused by harmful insects represents a major problem that haunts humanity in saving adequate food sources. The red flour beetle, *Tribolium castaneum* Herbst (Coleoptera: Tenebrionidae), is a main harmful secondary pest of stored grains and dry foods worldwide. This insect feeds dry foods, such as milled cereal products, causing losses in both the quantity and quality of commercial products and deterioration of seed viability. When properly used, synthetic insecticides still the most prevalent tool to control pests in stores. However, the well documented toxicity hazards to non-target species, for humans and for the environment has led to the search for other safer alternatives. Botanical insecticides have long been considered as alternatives to synthetic chemical insecticides in IPM programs. Essential oils (EOs) represent a bio-rational strategy for developing environmentally safe alternatives to combat insect pests. Effects of EOs obtained from *Mentha rotundifolia* (Lamiaceae), aerial part on a major kind of stored product pests, *T. castaneum*, were evaluated under laboratory conditions for its contact and fumigant toxicity and its repellent by testing 5 concentrations (1%, 2%, 4%, 8% and 10% for the contact and the repulsion tests and 100, 00, 400, 800 and 1000 µL/L of air for the fumigation

toxicity) diluted in acetone for the various tests. The obtained results showed that *M. rotundifolia* EOs was highly toxic to the adults of *T. castaneum*. Significant results for contact and fumigant toxicity was revealed. Indeed, a total mortality of 100% was observed on the first day after treatment for the highest concentration (10%) and on the 3rd day after treatment for concentration 4 (8%) for the contact mode. For fumigant effect, 100% mortality was obtained on the 3rd and 4th day respectively by the highest concentration C5 (10%) and the concentration C4 (8%). The oil also has a very interesting repellent power against adults of *T. castaneum* with a repellency percentage of 95%, after 2 hours of exposure to the highest concentration C5 (10%) and 100 % after 4 hours of exposure. The obtained results showed that *M. rotundifolia* EOs can be explored as a potential natural insecticide against insect pests for stored products.

**Keywords:** *Essential oils, Mentha rotundifolia, Tribolium castaneum, insecticidal activity.*

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### DECISION SUPPORT SYSTEM AS A COMPONENT OF INTEGRATED PEST MANAGEMENT IN DATE PALM GROVES

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#### Abstract

One of the problems is facing the date palm is the ability to detect the occurrence of pests and diseases and starting necessary protective measures in time. Disease and pest monitoring often commences with a field visit by plant protection staff, involving sampling and analysis. However, this approach can reduce the effectiveness of pest control efforts. Decision support systems (DSS) are software tools that support decision-making activities. They collect, organize, integrate and analyse all types of information necessary for decision making and ultimately use the analysis to recommend the most appropriate action. In fact, this study discusses the development of a DSS based on phytosanitary risk

mapping and early warning systems to control the old world date palm mite (DPM) (*Oligonychus afrasiaticus*) that will help date palm farmers to monitor the date palm spider mite (Boufaroua). The building of the map is based on several factors that determine the occurrence of the DPM (agro-climatic and geospatial data, as well as the phenology of the date palm) while early warning system is based on degree days. This DSS aims to measure the degree of potential vulnerability to indicate the degree of risk of infestation development in a given place according to the variability of the measured factors of the site while monitoring and acquisition of data will be realised in an online platform which will serve as a basis for decision-making and launching of alerts.

**Keywords:** *Date palm, Old world date mite, Decision support systems, early warning system, Vulnerability mapping.*

# Topic 1

## Biodiversity in ecosystems and agro-ecosystems

Moderators: Pr. Boukerker, Dr. Salemkour

### PRELIMINARY OVERVIEW ON THE BIODIVERSITY OF SPONTANEOUS PLANTS IN THE WADIS OF BISKRA

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#### Abstract

Plant biodiversity in arid areas is of vital importance for the ecological balance of these unique ecosystems. Despite the extreme climatic conditions, these regions are home to an important variety of plants adapted to drought and extreme heat. This vegetation, especially at Wadis (intermittent waterways), plays a crucial role in protecting against floods and preventing soil loss in arid regions it acts as a natural barrier to slow rainwater flow while the roots act as anchors, helping to retain soil and absorb excess water. This absorption capacity reduces surface water runoff, which reduces the risk of flooding by allowing water to seep into the soil more slowly and helps prevent soil erosion by protecting its vegetation cover by keeping the soil particles together, preventing their erosion by wind or water. However, plant biodiversity in arid areas faces many challenges; climate change, land degradation, overexploitation and desertification threaten these fragile ecosystems which can lead to serious consequences, such as soil erosion and reduced water retention capacity. The purpose of this study is to have a preliminary overview on the spontaneous flora in the intermittent waterways of

Oued Biskra watershed, which is known for its low rainfall rate. The field sampling took place at intervals from February to April 2023. On several points of the Oueds belonging to the watershed of Oued Biskra. The results show a higher biodiversity at the stations that present a meeting point of the rivers (dense hydrographic network), as well as at high altitudes (Oued Guedila station), and a lesser biodiversity on low altitude, several species are common and are present in of all the stations such as *Peganum harmala*, *Launaea nudicaulis* and *Astragalus armatus* however some species are scarce and are present only at a single station such as *Ferula communis* and *Devera scoparia*.

**Keywords:** *Biodiversity, spontaneous plants, Wadis of Biskra.*

### A FIELD INVESTIGATION OF THE FOUM EL KHAZRA DAM IN BISKRA ENVIRONMENTAL CONDITIONS AND DIVERSITY

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#### Abstract

The ecological knowledge of the artificial wetlands in particular the lakes of dam, of the development of their biological richness and their potentialities and their bio-ecological and socio-economic potentialities. Due to their biological diversity and crucial ecological roles that they play, these natural regions are extremely significant. Due to their significant capacity to provide proteins, they are

also regarded as among the most productive environments, making them of tremendous economic importance. There are various wetlands in Algeria, notably the Biskra region, which features a number of sites that are significant both locally and regionally. Both national and global. These are either natural sites, which are typically represented by wadis, or artificial sites, such as dams like the one in the Fom El Kherza study area, which, despite the diversity and richness of its natural resources, has received very little attention in terms of their knowledge and development. The dam that is the focus of our study is situated in the Saharan bioclimatic stage, where ecological elements are susceptible to significant daily and seasonal changes. Ecological elements are subject to significant daily and seasonal variations. Characterization of the site's biotic and abiotic components has been made possible by the bio-ecology study of the biological resources undertaken from October 2019 to Mai 2020 on the 29 ha Fom El Kherza Dam artificial wetland. By examining and keeping track of a number of physico-chemical factors related to the soil, water, and the diversity of flora and fauna, it also enabled us to gain a general understanding of its significance. As a result, we identified the type of substrate, the physicochemical, bacterial, and biological quality of the water, as well as the presence of 33 plant species, 42 phytoplankton species, and 155 animal species, including 103 invertebrate species, 03 fish species, 04 amphibian species, 07 reptile species, 34 bird species, and 7 mammal species. This method allowed us to value the site's biological resources, assess their significance, and formulate management and conservation recommendations related to its socioeconomic status from the standpoint of long-term development.

**Keywords:** Ecological Diagnostic, Humid Zone, Barrage Fom El Kherza, Biodiversity, Water Quality, Biskra.

### CYTOGENETIC BIODIVERSITY IN THREE SPECIES OF VICIA FROM EASTERN ALGERIA (*VICIA SATIVA* L. SSP. *SATIVA*, *VICIA FABA* L. VAR. *MAJOR* ET *VICIA FABA* L. VAR. *MINOR*)

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### Abstract

This work relates to the karyomorphological study of the chromosomes of three species of the fabaceae family: cultivated vetch, broad bean and faba bean; varieties Mariana, Tolera and Gladice, respectively. Objectives: Valorization and highlighting of the biodiversity of leguminous species in Algeria as well as the comparative study of the structure of the chromosomes of three *Vicia*, with the aim of clarifying the mystery surrounding the evolution of the genome of *Vicia faba* L., since his ancestors are still unknown. Methods: The classical cytogenetic technique. Results and discussion: The chromosomal formula of these varieties is described as follows:  $2n=2x=2m + 2t + 8st$  (sat) =12 (Mariana),  $2n=2x=2m(\text{sat}) + 2t + 8st$  (C.S.) =12 (Toléra) et  $2n=2x=2m$  (2 sat)+ 6st +4t = 12 (Gladice). Note the difference in size of the chromosomes of the three varieties studied: those of the major variety (Toléra) are larger than those of the minor variety (Gladice). Those of *Vicia faba* L. are twice as large as those of cultivated vetch. The karyotypes are asymmetrical, with the presence of a pair of satellites in Gladice and Toléra, as well as a secondary constriction and a B chromosome in Toléra. A satellite is observed in *Vicia sativa* (Mariana). Note the presence of a bimodal karyotype in the species *Vicia faba* L. characterized by two sets of chromosomes (very long and short). Conclusion: Chromosomal diversity is observed in the varieties studied. The chromosomes differ particularly in their sizes, the bimodality of the karyotype and the presence or absence of satellites and secondary constriction. Asymmetry is considered as an indicative parameter of the evolution of the species. The B chromosomes play an important role in the adaptation of the plant to unfavourable conditions.

**Keywords:** *Vicia faba* L., *Vicia sativa* L., karyotype bimodal, satellites, chromosome B.

### LA BIODIVERSITE GENETIQUE DANS LES PALMERAIES DE SIDI OKBA (ZIBAN-EST, ALGERIE) : ENTRE RICHESSE ET EROSION GENETIQUE.

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## Résumé

Le changement climatique constitue l'un des plus grands défis du développement durable au cours des dernières décennies et un facteur d'érosion de la biodiversité ; il a contribué de manière significative à perturber l'équilibre des écosystèmes, notamment dans les zones arides où le palmier dattier joue un rôle important. Bien qu'ils jouent un rôle fondamental dans le maintien de la biodiversité et de l'équilibre de l'écosystème oasien et représentent un élément clé de la stabilité des populations et de la sécurité alimentaire, cet équilibre semble aujourd'hui menacé. Ces agroécosystèmes oasiens s'orientent d'aujourd'hui vers le développement de la phœniciculture monovariétale, environ 47 % de ce patrimoine phœnicicole est destiné à la monoculture (variété Deglet Nour) à haute valeur commerciale sur les marchés nationaux et internationaux. Par contre, les autres variétés (ou cultivars) dites communes ou de faible valeur commerciale, sont exclues et n'ont aucun pouvoir de les préserver et valoriser, par conséquent seront exposées aux risques de disparition sous l'effet d'une gamme de contraintes, entre autres, l'érosion génétique ; occasionnée surtout par la force du marché, qui impose des variétés de qualité ou d'excellence, tel est le cas de Deglet Nour, constitue le facteur le plus déterminant. L'objectif de ce travail est d'évaluer l'état et la structure de l'aire variétale du palmier dattier dans la palmeraie de Ziban Est, dans le cas de la région de Sidi Okba, à travers une analyse de cette biodiversité. Elle s'appuie sur un inventaire variétal et une évaluation quantitative et qualitative des variétés de palmiers dattiers, réalisée pour chaque localité de la région envisagée. Les résultats obtenus montrent une diversité et une richesse variétale importante, plus de 112 cultivars, mais sont toujours menacés d'érosion génétique.

**Mots-clés :** *changement climatique, palmier dattier, inventaire, érosion génétique, Ziban*

## OPTIMISATION DE L'EXTRACTION D'ADN GENOMIQUE DES FEUILLES DE LA VIGNE, POUR IDENTIFIER GENETIQUEMENT LA VIGNE CULTIVEE EN ALGERIE.

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## Résumé

La vigne fait partie des plantes les plus anciennes sur terre. Aujourd'hui, par ces fruits elle représente la culture fruitière la plus forte valeur de production dans le monde. L'existence des milliers de variété de vigne, conduit à l'apparition de nombreux cultivars qui sont mal identifiés ou appelés sous différents noms selon les régions. Actuellement, grâce aux méthodes de biologie moléculaire qui nécessitent un ADN génomique de bonne qualité et en bonne quantité, on peut identifier génétiquement ces différentes variétés. Notre étude est considérée comme un premier pas vers l'identification génétique des vignes en Algérie et l'optimisation d'un protocole pour une meilleure extraction des acides nucléiques. Notre étude a été réalisée sur 20 cépages de vigne. L'échantillonnage des cépages qui appartenant à la commune d'El-Kantara Willaya de Biskra. Pour cela nous avons fait une optimisation d'un protocole d'extraction d'ADN génomique et aussi nous avons pu améliorer une méthode simple et peu couteuse pour préparer les feuilles, avec l'utilisation des feuilles déshydratées et conservées à température ambiante, qui sont préparées par des simples moyens, un séchage à l'aide d'une étuve ventilée et broyage sans l'utilisation de l'azote liquide. Afin de les utiliser dans n'importe quel moment pour l'obtention d'un ADN génomique intacte. La concentration moyenne, le rendement moyen ainsi que la pureté de l'ADN génomique extrait par le protocole optimisé sont très satisfaisants par rapport le protocole non optimisé. Le résultat obtenu est plus significatif, on a arrivé à optimiser d'un protocole expérimental pour extraction de L'ADN nucléaire où le rendement est acceptable (2385 µg/g).



**Mots-clés :** *vigne, caractérisation génétique, extraction d'ADN.*

### STUDY OF SPONTANEOUS PLANT RICHNESS AND DIVERSITY OF BISKRA

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#### Abstract

Arid regions are characterized by edapho-climatic conditions that are very difficult for the spontaneous survival of plants. Nevertheless, this ecosystem remains as a living area which characterized by high vegetation diversity. Thus, the knowledge of the floristic composition constitutes an important issue in terms of better management of this threatened natural Bioresource. However, the inventory conducted in the region of Biskra allowed us to indentify 145 species and 44 families which represented 34% of the total families cited in “Flora of Algeria” of QUEZEL and SANTA (1962/1963). The biological specter showed the predominance of thérophytes compared to other life forms with a range of about 38%, this predominance is a feature of the arid region vegetation. From the phytogeographical aspect, the distribution of species demonstrates the different chorotypes and confirms the Mediterranean affinity of the flora of our region. Knowing that our zone is located in two great unites following a north-south gradient, the Saharan Atlas, in one part, where the *Mediterranean* elements are the dominant (35.86%) and in other part, the northern border of the Sahara where the *Saharo-Sindien* elements are the dominant (22.75%). This proves that our region is a result of inter-penetration of these two elements. Finally, the *endemic* element represents a rate of 17.91%. Among the detected species, seven species are considered as protected plants. (decree 93-285 of November 23, 1993.).

**Keywords:** *Biskra; Spontaneous plant; Floristic richness and diversity; Biological types, phytogeographical types.*

### EFFECT OF TILLAGE PRACTICES ON ROOT COLONIZATION OF DURUM WHEAT UNDER RAIN-FED CONDITIONS IN SEMI ARID OF ALGERIA.

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#### Abstract

Arbuscular mycorrhizal symbiosis the most extended terrestrial symbiosis on earth. Its presence in the roots and soil improves plant nutrition and soil quality. This study examined the effects of conventional tillage (CT), direct seeding with tines (DST), direct seeding with discs (DSD) and minimum tillage (MT) on the variability of arbuscular mycorrhizal fungi (AMF) colonization of durum wheat (*Triticum durum Desf.*) roots under rain-fed conditions in a semi arid region. Field experiment was conducted during the 2018/19 cropping season at the experimental field of ITGC in Setif (Algeria). ANOVA reported no significant effect of the tillage system on the total colonization rate, the arbuscular rate and the vesicular rate. The higher value of Arbuscular colonization rate was found in CT with 38.27 %, the higher percentage of vesicles was observed in DSD with 10.12 %, and the higher total colonization rate was detected in CT (40.90 %). The lack of drought in this cropping season seems limited the usual enhancement of the AMF root colonization by direct seeding system.

**Keywords:** *Arbuscular mycorrhiza, root colonization, tillage system, durum wheat, semi-arid.*

### STUDIES ON INSECT DIVERSITY OCCURRING IN OLIVE TREES IN TWO ORCHARDS DIFFERENTLY MANAGED UNDER AN ARID CLIMATE IN THE WESTERN STEPPE LAND, ALGERIA

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## Abstract

This study investigated the insect diversity of olive (*Olea europaea* Linnaeus (Oleaceae)) groves grown in an arid climate in Algeria. In this context, several sampling methods were used within two orchards differently managed. Fifty arthropod species belonging to diverse orders and families were recorded. Hymenopteran species were quantitatively the most abundant, followed by species associated with Heteroptera, Aranea, Coleoptera and Homoptera orders. Regarding functional feeding groups, phytophagous species were dominant in the weeded and the unweeded orchard; however, higher abundance was recorded in the weeded site. Predators were ranked second, and pollinators were more frequent in the unweeded olive orchard. Two-factor Anova with repeated measures had revealed high significant effect of the weed management system, measures repetition and interaction with measurement repetition on arthropod's abundances ( $P < 0.05$ ). Likewise, generalized linear models showed that  $N/S$  ratio varied significantly between the two weed management approaches, in contrast, the remaining diversity indices including the Shannon index  $H'$  had no significant correlation. Moreover, diversity parameters of arthropod's communities in each agro-system highlighted multiples significant correlations ( $P < 0.05$ ). Rarefaction and extrapolation (R/E) sampling curves, evidenced that the survey and monitoring carried out in both sites had a optimum coverage of entomofauna present including scarce and transient species. Overall, calculated diversity and similarity indices were greater in the unweeded orchard than in the weeded orchard, demonstrating spontaneous flora's key role in entomofaunal diversity. Principal Component Analysis (PCA) has defined correlations between arthropod's abundances and naturally occurring plants in olive orchards, including beneficials.

**Keywords.** Algeria, Olive, Insects, Diversity, Wild plants.

## DIVERSITE FLORISTIQUE D'UN MATORRAL DE GENEVRIER ROUGE DANS LA REGION DE DJEBEL AMOUR, ATLAS SAHARIEN ALGERIEN.

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## Résumé

Le présent travail présente une contribution inédite qui traite des aspects biotiques, abiotiques et liés aux matorrals du Genévrier de Phénicie de la région de Djebel Amour durant un an, il ressort de cette étude que les sols de ces matorrals présentent une texture sableuse avec un aspect alcalin, riche en calcaire, et pauvre en matière organique et en éléments nutritifs. L'étude du cortège floristique de la junipéraie ressort 55 espèces avec différentes fréquences d'un site à l'autre. Les résultats de l'indice de diversité de Shannon-Wiener montrent que les peuplements étudiés sont floristiquement diversifiés d'une appartenance majoritairement méditerranéenne. La structure de leur formation représente une physionomie de phanérophytaie donnant un matorral haut arboré avec une forte contribution des chaméphytes et des thérophytes. L'indice de perturbation mesuré indique clairement que cette végétation est fortement menacée par différentes pressions anthropozoïques.

**Mots-clés :** *Juniperus phoenicea*, Djebel Amour, facteurs écologiques, diversité

## ETUDE DE LA DIVERSITÉ GÉNÉTIQUE DE QUELQUES VARIÉTÉS RARES DE DATTES DE LA RÉGION D'EL M'GHAIAI

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## Abstract

Le but de cette étude est l'évaluation de la diversité génétique de sept variétés communes de palmier dattier dans la région d'El Meghaier par la caractérisation morpho-métrique et physico-chimique et biochimique de leurs fruits. Les résultats de l'analyse morpho-métrique ont montré

que la variété Amr semble avoir les plus grandes mesures de la longueur, la largeur, le poids de la datte, le poids de la pulpe ainsi que la largeur du noyau tandis que Tanslt présente des valeurs en H% et en MO% plus élevées avec 22.74% et 98,54% respectivement. Amr détient un taux important en sucres totaux avec 57.03% par rapport aux autres variétés. Par contre, Tnc, expose les plus faibles valeurs pour les sucres réducteurs avec 51, 86%. Les variétés dont l'acidité titrable inférieure à 0,02g d'acide citrique/100g de MF sont Tzr, Tkrbcht et Tanslt. D'après l'analyse de l'ANOVA, ACP et CAH, une différence significative entre les variétés a été trouvée et présente une combinaison de bon au mauvais caractère, seule la variété Amr présente de bons caractères. On conclut que les critères morphologiques et physico-chimiques peuvent être utilisés comme un moyen dans l'évaluation de la diversité génétique.

**Mots-clés :** Diversité génétique, variétés, caractérisation, morphologique, physico-chimique. Authors

### IDENTIFICATION OF THE ALGERIAN CULTIVARS OF *SOLANUM LYCOPERSICUM* USING BIOCHEMICAL MARKERS.

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#### Abstract

Tomato (*Solanum lycopersicum*) is a species from the family of solanacea, it is considered to be one of the most economically remarkable vegetable crops and is grown all over the world. It accounts for 14% of the world's vegetable production. The present study was undertaken to evaluate isoenzymes of 9 tomato genotypes for varietal identification and the evaluation of genetic diversity through these biochemical markers. The seeds of the 9 genotypes were grown in the soil under natural conditions; the isoenzymes esterase (EC.3.1.1.1) and aldehyde oxidase (EC.1.2.3.1) were extracted from the leaves of 21 days old plants. These latter were subjected to a native-polyacrylamide gel electrophoresis (native-PAGE) with a stacking gel of 5% and a running gel of 12%

for esterase and 8% for aldehyde oxidase. Three zones of activity (a, b, c) were detected for esterase which suggests the presence of 3 loci coding for this enzyme, EST1, EST2, EST3. The zone of activity "a" and "c" were more polymorphic and had the highest number of bands with 2 alleles for zone a and 3 alleles for zone c in comparison to zone "b" which only had one allele. For aldehyde oxidase only one zone of activity was detected which indicates the presence of one locus coding for this enzyme with the presence of 4 alleles. The two enzymatic systems were polymorphic but esterase had a higher polymorphism compared to aldehyde oxidase. This study gives an insight into the rich variability present in Algerian tomato genotypes.

**Keywords:** tomato cultivars, isoenzymes, electrophoresis, polymorphism

### INFLUENCE OF LANDSCAPE COMPONENT BIODIVERSITY ON THE DISTRIBUTION AND ABUNDANCE OF COLUMBIDS IN OASES ECOSYSTEMS

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#### Abstract

We studied the influence of various landscape components on the distribution and abundance of three Columbidae species (Eurasian collared dove, Laughing dove and European turtle doves) along urban-rural gradients in the Biskra region. This study holds crucial importance for effective biodiversity management planning in oases ecosystems. Bird observations were conducted by car in 2019 during the peak reproductive period of the Columbids in June. In total, six 12 km transects were randomly selected from 25 possible choices within the study area. Each transect was repeated three times to collect data. To record all doves seen or heard within a circle with a radius of 250 meters, we obtained a total of 450 observation points. Our results revealed a positive correlation between the abundance of Eurasian collared dove and urban

coverage (t-value = 10.400). Conversely, Laughing dove (t-value = -4.748) and European Turtle Doves (t-value = -3.993) were more abundant in areas with low urban coverage. We identified the three best combinations of explanatory models for the abundance of each columbid species using the Akaike Information Criterion (AICc). The most robust model for explaining the abundance of Eurasian collared dove included cereal crop coverage, urban coverage, road length, and the number of active wells. For laughing dove, the predominant model consisted of cereal crop coverage, fruit tree coverage, fruit tree richness, and road length. Regarding European turtle doves, the most informative model included urban coverage, cereal crop coverage, vegetable crop coverage, fruit tree coverage, fruit tree diversity, and road length. Classification of three columbid species based on their response to the urban-rural gradient: Eurasian collared dove (invasive species) as urban dwellers, laughing dove (expanding species) as urban users and European turtle dove (native species) as urban avoiders. Our study highlights the vulnerability of the European turtle dove to future land use changes, emphasizing the importance of preserving the oases ecosystem in the Biskra region.

**Keywords:** *Columbidea, urban-rural gradients, biodiversity, preserving the oases ecosystem.*

### INSECTES ET PLANTES ADVENTICES ASSOCIES A LA CULTURE DE NIGELLES *NIGELLA SATIVA* L. L. ET CRESSON *LEPIDIUM SATIVUM* DANS LA PLAINE D'EL OUTAYA.

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#### Résumé

Dans le cadre de la troisième année de lancement de projet PNR qui a pour but d'évaluer les caractéristiques biologiques notamment des activités antioxydantes, antibactériennes des extraits de différentes parties de plante des deux espèces *Nigella sativa* L. et *Lepidium sativum* L. et dans le but d'éviter toute perte de production suite au attaque des insectes ravageurs ou la concurrence des plantes adventices, un inventaire le plus exhaustif possible des plantes adventices

concurrentes ainsi que des insectes accompagnatrice a été effectué depuis la première décade de mois de novembre jusqu'à la dernière décade de mois de mai 2023. L'échantillonnage des plantes adventice a été effectué selon la méthode des quadrats tandis que les insectes ont été échantillonnées en utilisant des pots jaunes où 3 ont été déposé au diagonal sur une superficie dans chacundes 400 m<sup>2</sup>. Les résultats d'inventaires indiquent une richesse totale des plantes adventices de 50 espèces appartenant à 10 familles botaniques dont la famille la plus importante était celle des Poaceae (7espèces) ; cette même flore qui abrite une diversité importante d'insectes (67 espèces) appartenant à 12 ordres dont le plus représenté et celui des Diptères avec 10 espèces ; ces résultats sont encourageants du fait de la connaissance de l'entomofaune et de la flore adventice associées à ces cultures et qui ne présentent pas un effet néfaste sur le développement de la culture ainsi que la qualité des graines et leur composition.

**Mots-clés :** *Nigelle ; Cresson ; inventaire ; plantes adventices ; insectes ravageurs.*

### ECOLOGY AND DIURNAL ACTIVITIES OF THE COMMON COOT *FULICA ATRA* IN A RAMSAR SITE SEBKHET BAZER (SETIF, ALGERIA)

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#### Abstract

Wetlands are considered to be valuable ecosystems because they represent the heart of biodiversity and are home to a wide variety of aquatic fauna and important flora. The work consists of monitoring to assess some of the biological diversity and the state of conservation of these ecosystems on which they depend. A count and monitoring of the diurnal

activities of the Rallidae family, in particular the Common coot *Fulica atra*, have been carried out since January 2023 at Sebket Bazer (Wilaya de Setif). This shows that the Common Coot *Fulica atra* is a very common species in Algeria. Overall, between 20 and 100 individuals were observed during our study, and monitoring its daytime behavior shows that, feeding was observed with over 50%, followed by swimming and grooming. Other activities account for a small proportion. During the study period, Sebket Bazer hosted a considerable number of Common Coots, who prefer to spend most of their time in water rich in aquatic vegetation. The primordial activities (feeding, swimming, and grooming) dominate this species' time budget when this wetland provides the type of trophic resources required by the common coot *Fulica atra*, to satisfy its daily energy needs. This makes it a good area for comfort activities. Wetlands deserve to be studied, to develop effective conservation strategies and protect the biodiversity of these ecosystems.

**Keywords:** *Rallidae, Fulica atra, Sebket Bazer, diurnal activities, biodiversity, conservation*

### PHENOTYPIQUE STUDY OF AUTOCHTHONOUS ALGERIAN GRAPE VARIETIES USING OIV DESCRIPTORS.

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#### Abstract

The Algerian vineyard profile corresponds to an interesting situation where vineyard cultures based on local varieties coexist but with a generally undefined potential. In order to characterize the autochthonous vine cultivars existing in the wilaya of Khenchela, we applied the method of MARTINEZ and GREAN (1999), using the ampelographic descriptors of the OIV (International Vine Organization) based on quantitative and qualitative parameters to quickly and clearly visualize the leaf morphology of a vine variety with the aim of identifying it. By describing the most discriminating parameters, i.e. angle dimensions and depth of lateral sinuses in relation

to vein lengths, we have been able to group together grape varieties with certain characteristics in common. The results obtained from this study will contribute to our knowledge of the specific characteristics of the varieties grown in this region and to the conservation of the genetic resources of the grapevine varieties grown and indigenous to Algeria.

**Keywords:** *vine, autochthonous, varieties, ampelography, conservation, genetic resources.*

### THE DIVERSITY OF SPECIES ACCOMPANYING JUNIPERAIES IN THE COAST OF THE TLEMCCEN REGION.

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#### Abstract

In order to identify the species that accompany *Juniperus Phoenicea subsp turbinata* and *Juniperus oxycedrus subsp macrocarpa*, floristic surveys were carried out at selected stations along the coast in the Tlemcen area. Correspondence factorial analysis highlights the relationships between the various plant groupings and ecological factors such as climate and soil characteristics, and brings out groups of species linked to the two coastal *Juniperus* species in the Tlemcen region. Results were obtained on characteristic species groupings in general, including biological and ecological aspects. *Juniperus phoenicea* subsp *turbinata* and *Juniperus oxycedrus* subsp *macrocarpa* characterize permanent communities of limestone rocks and cliffs, from the coast to areas far from it, in the semi-arid to dry bioclimatic stage, preferably in the domain of *Pistacio lentisci-Rhamnetalia alaterni: Asparago albi-Rhamnion oleoidis* and *Oleo-Ceratonion*.

**Keywords:** *littoral, Juniperus phoenicea, Juniperus oxycedrus, companion, Tlemcen, Western Algeria.*

### UNE REVUE SUR L'ÉCOLOGIE, LA TAXONOMIE ET LA BIODIVERSITÉ DU GENRE LATHYRUS EN ALGERIE

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## Résumé

La gesse (*Lathyrus* L.) est une légumineuse fourragère bien placée pour aider à répondre à la demande croissante pour l'alimentation animale et de fournir des cultures pour une diversité des systèmes agricoles. Cette culture fourragère est surtout utilisée en Inde, au Bangladesh, en Chine, en Éthiopie, au Népal et au Pakistan. C'est une plante herbacée annuelle ou vivace grimpante à fleurs papilionacées. Le genre comprend un peu plus de 150 espèces il est présent sur tous les continents à l'exception de l'Australie, de l'antarctique et la zone méditerranéenne de l'Europe, Ce genre est proche des genres *Vicia* et *Pisum*. L'objectif de notre étude est de mettre en évidence la biodiversité des espèces de *Lathyrus* algériennes. Les critères taxonomiques de la gesse ont été recueillies à partir de l'ouvrage de nouvelle flore de l'Algérie et des régions désertiques méridionales qui est utilisé comme un guide de la taxonomie et l'écologie du genre *Lathyrus* en Algérie. En Algérie, 4 séries renfermant 22 espèces ont été répertoriées dans la flore de l'Algérie.

**Mots-clés :** *Lathyrus*, écologie, biodiversité, taxonomie, Algérie.

## CONSERVATION OF PLANT BIODIVERSITY AND SUSTAINABLE DEVELOPMENT OF A SEMI-ARID STEPPE AT *ARTEMISIA HERBA-ALBA* IN ALGERIA

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## Abstract

*Artemisia herba-alba* is a low, evergreen, woody plant. Its morphological and physiological characteristics make it a species well adapted to arid climatic conditions. *Artemisia herba-alba* exists in bioclimates ranging from semi-arid to Saharan (between isohyets of 150 to 500 mm). It seems indifferent to altitudes and can live in warm to cool winter regions. Moreover, this species is abundant in the center on fine-textured, fairly well-drained soils (marl, sloping marl-limestone). In the south, it grows on brown steppe soils of medium texture, and in the extreme south on sandy soils. *Artemisia* is drought resistant, tolerates gypsum and moderately high salinity levels. Several studies have shown that in these ecosystems the surface area of pastures has decreased and that degradation has reached an advanced or even irreversible level. This phenomenon is not only explained by restrictive climatic conditions but also and above all by unreasonable anthropogenic activities such as overgrazing, large-scale cultivation and deforestation. These two main causes are strongly correlated: the drier the year, the lower pastoral production will be and despite the fluctuation of ruminant herds depending on the climate, the greater the pressure on grazing will be. To counter or at least reduce this degradation, it is necessary to proceed with a set of pastoral improvement techniques, among which we cite resting. These consist of letting pastoral areas rest temporarily and, therefore, prohibiting access to animals and protecting these areas. Such a ban limits overgrazing, soil erosion and their consequences on plant and animal biodiversity. As their name suggests, these rest periods allow the vegetation to restore itself, leaving the plant the time necessary to carry out its biological cycle. Many studies have already proven the effectiveness of resting and defending them in improving pastures.

**Keywords:** *Prohibition, Artemisia herba alba, biodiversity, restoration.*

## INVENTAIRE FLORISTIQUE DU OUED NSA (REGION DU OUARGLA ,SAHARA SEPTENTRIONELE ALGERIE)

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## R sum 

Le Sahara est caract ris  par un couvert v g tal pauvre adapt  aux conditions  dapho-climatiques particulier du milieu. Le pr sent travail a pour objectif d'inventorier les esp ces v g tales pr sentes dans Oued Nsa de la r gion de Ouargla et de sa composition floristique durant la saison de printemps. L'inventaire floristique a  t  r alis    travers 3 relev s effectu s suivant la m thode de l'air minimale par un  chantillonnage subjectif de la v g tation. Une  valuation de la v g tation a  t  r alis e en utilisant les indices  cologiques (richesse sp cifique, recouvrement, abondance – dominance). Les r sultats obtenus nous ont permis d'inventorier 12 esp ces v g tales appartenant   13 familles. Ce qui indique une faible richesse floristique. L'esp ce *Ephedra alata* est la plus domin e avec un taux de recouvrement de 61,64% et densit  de 85 esp ces. Les types biologiques les plus fr quentes sont les th rophytes (41,66%) et Phan rophytes (8,33%). Au terme de cette  tude, la diversit  floristique du Oued N'sa doit  tre compl t e du point de vue temporelle afin d'avoir une meilleure connaissance de composition floristique qui permet une meilleure gestion des bioressources des milieux arides naturels. .

**Mots-cl s :** *Oued Nsa, Diversit  v g tale, Indices  cologiques, Milieu naturel, Gestion des Bioressources.*

## OVERVIEW OF ENTOMOLOGICAL BIODIVERSITY IN STEPPE FORMATIONS: A CASE STUDY OF NA MA PROVINCE

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## Abstract:

Insects represent the majority of animal species on Earth, with around six million species (Durand-Gillmann; 2014). Their ability to adapt to diverse environments makes them essential players in ecosystems, as well as being indicators of environmental health. Our study was carried out to examine the entomofauna in steppe formations with *Stipa tenacissima* and *Retama Raetam* in the Na ma region (35°35'36.07" latitude N et 1°32'97.70" longitude W) et (35°35'34.83" latitude N et 1°32'97.97" longitude w). Our findings revealed the presence of five orders of insects in the Retama Raetam formations, the most represented being Coleoptera, while the *Stipa tenacissima* formations showed more than ten species belonging to four different orders. This research contributes to a better understanding of the biodiversity and importance of insects in these particular ecosystems.

**Keywords:** *Insects, coleoptera, indicators, steppe, Stipa tenacissima, Retama Raetam*

## ETUDE DE LA DIVERSIT  G N TIQUE DE QUELQUES VARI T S DE DATTES DE LA R GION DES ZIBAN

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## Abstract

Le but de cette  tude  t  d' valuer la diversit  g n tique de trois vari t s communes dans la r gion des Ziban (Oumache) par la caract risation morphologique et physico-chimique de leur fruit. Les r sultats de l'analyse morphologique ont d voil  que la vari t  Arehti semble avoir les valeurs les plus  lev es de la longueur, la largeur, le poids de la datte, le poids de la pulpe ainsi que la largeur du noyau et aussi pr sente des valeurs en H% et sucres r ducteurs sup rieures avec 16.58% et 40.64% respectivement. Tandis que, Deglat baida d tient un taux important en sucres totaux avec 50.56% par rapport aux autres vari t s et pr sente des valeurs en pH, CE et l'acidit  titrable les plus  lev es avec 5.02, 3.7 (mS) et 2,24g d'acide citrique/100g DF. Alors que la vari t  Haloua

dispose des valeurs les plus faibles pour tous les paramètres physico-chimiques. D'après l'analyse de l'ANOVA, ACP et CAH, une différence significative entre les variétés a été trouvée et présentent une combinaison de bon et mauvais caractère. On conclut que les critères morphologiques et physico-chimiques peuvent être utilisés pour évaluer la diversité génétique du patrimoine phoenicicole.

**Mots-clés :** *Diversité génétique, variétés, caractérisation, morphologique, physico-chimique.*

### **FUNGAL BIODIVERSITY IN THE LEAVES OF LIMONIASTRUM FEEI (GIRARD) BATT. IN THE HYPERARID REGION OF BECHAR (ALGERIA)**

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#### **Abstract**

Plants in Saharan ecosystems have several mechanisms to adapt to the arid climate that limits the survival of most living things. These include symbiotic associations with endophytic microorganisms, which play several beneficial ecological and physiological roles within their plant partners. They provide the host plant with protection against various biotic and abiotic stresses, notably drought, salinity, pests, and pathogens. Among these microorganisms are mycoendophytes. These are microscopic fungi that can be found in different parts of plants without causing any symptoms. This is the concept of the holobiont. *Limoniastrum feei* is a spontaneous plant endemic to the Algerian and Moroccan northern Sahara. This pastoral bioresource is valued for its medicinal properties. To gain a better understanding of the mycoflora associated with the leaves of *L. feei* and to measure the fungal diversity associated with this species, we thought it would be useful to begin this work, which consists of a complete inventory of foliar mycoendophytes by calculating abundances and fungal diversity indices. From 23 healthy *L. feei* plants, 10 leaves from each plant were removed and superficially

disinfected for inoculation on a PDA medium at room temperature. Identification was made on a morphological scale. A total of 842 fungal isolates divided into 56 species were recorded. The abundances show that *Penicillium* and *Aspergillus* species are the most dominant. The diversity indices show a very high level of fungal richness. Due to this remarkable wealth of endophytic mycoflora, *L. feei* can be considered a real hotspot of microbial biodiversity. This symbiotic association represents a model system in the diversity and ecology of Saharan regions.

**Keywords:** *Biodiversity, Mycoendophytes, Limoniastrum feei, Hyperaridity, Sahara, Bechar.*

### **EVALUATION OF THE DIVERSITY OF ENTOMOFAUNA IN HENNA CULTIVATION IN THE REGION OF ZRIBET EL-OUED .**

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#### **Abstract**

The Evaluation of the diversity of entomofauna in Henna (*Lawsonia inermis*) cultivation in the Zribet EL-Oued region has enabled us to use the method of pitfall traps to assist in collecting pests and to identify them using a binocular microscope in the laboratory, with the help of identification keys. This study has allowed us to analyse the data collected using ecological composition indices, to discover more about the most abundant species that attack the henna crop. We've obtained that the species with a constant frequency belong to the family Parcellionidae (13% dominance) and Formicidae (10% dominance). As well as the most abundant species with an Omnipresent frequency belong to these families: Formicidae (23% de dominance), Tenebrionidae (17% dominance), and Carabidae (15 % dominance). We deduce that there is a high diversity of species captured, which present a balance between the different population which imposes the risk of loss of yield and quality of Henna seeds.



**Keywords:** Diversity , Entomofauna , Henna ,species , laboratory, pitfall.

### AUXILIARIES' SPECIES DIVERSITY UNDER GREEN HOUSES AT EL OUTAYA SITE BISKRA -ALGERIA

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#### Abstract

The leafminer *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) is a major invasive pest of tomato production in both protected and open-field crops, as well as other solanaceous crops and weeds. It's considered as a typical invasive pest due to its capacity to develop swiftly on tomato plants and spread quickly in new areas, causing economically significant damage. The pest attacks leaves, flowers, stems and notably fruits at any developmental stage, from seedlings to mature plants. In Algeria, the pest was first discovered in March 2008 in the region of Mostaganem (northwest coast) then rapidly spread to all production regions around the country. In Biskra (South-eastern Sahara) was observed in late 2008. Given the important tomatoes production of the region particularly under greenhouse that present an environmental condition for the rapid speed of *Tuta absoluta*. Because of the mine-feeding behaviour of larvae, the pest's short lifetime, their high fecundity, and their high enzymatic capacity for detoxifying pesticides, as well as frequently inefficient spraying technology, chemical control has been the principal method of control. Therefore, the implementation of environmentally safe measures that reduce the use of chemicals will contribute to the sustainability of tomato production. Biological control represents one of the most viable alternative options. While, in the arid regions of Algeria, the community of natural enemies of leaf miner remains poorly discovered, therefore, the aim of this contribution is

to conduct a general inventory on the natural enemies of *Tuta absoluta*, and to study their biodiversity in order to propose good sustainable strategies for management of the leaf miner in the region.

**Keywords :** biological control ; auxiliaries ; inventory ; *Tuta absoluta* ; tomatos.

### ESSAI DE LA FUMURE ORGANIQUE SUR LE RENDEMENT ET LE CONTENU NUTRITIONNEL DES LENTILLES D'EAU (*LEMNA MINOR L.*)

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#### Abstract

La croissance des lentilles d'eau (*Lemna minor L.*) a été étudiée dans un système discontinu extérieur en utilisant une population initiale de plantes fraîches de 50 g dans chacun des 9 bassins (1,3 m x 0,55 m x 0,15 m). Sous une conductivité allant de 5 506 µS/cm à 11 505 µS/cm avec une intensité moyenne de lumière du jour de 4 590 lux. L'expérience a été réalisée de juin à juillet 2022 pour explorer son contenu nutritionnel et sa capacité de croissance. L'expérience de croissance a été réalisée en triplicate à la station Milieu Biophysique Oued-Righ de Touggourt (CRSTRA). Trois milieux de culture composés de différents types de fumure organique ont été utilisés; à savoir le milieu (M1), du fumier de caprin; le milieu (M2), des fientes de pigeon; le milieu (M3), était une combinaison de M1 et de M2 (1:1). *Lemna minor* une teneur en protéines de 18,46 %; matières grasses 0,22 % ; cendres 29,42 %, fibres brutes 4,27% et extrait sans azote de 42,12 %. La croissance la plus élevée a été obtenue dans M2 avec un taux de croissance relatif (RGR) : 0,04-0,15 g/g/jour et une productivité de 2,0-2,1 kg/m<sup>2</sup>/mois. La valeur nutritionnelle des lentilles d'eau ainsi leur potentiel de production, pourraient être utilisés comme source alternative de protéines dans l'alimentation des animaux et des poissons. Des recherches supplémentaires sont nécessaires.

**Keywords:** *Lemna minor*, croissance, contenu nutritionnel, fumure organique

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## THE ANTIOXIDANT PROPERTIES OF MEDICINAL PLANTS IN BEJAIA THROUGH PHYTOCHEMICAL SCREENING AND EVALUATION

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### Abstract

Our work is based to explore the polyphenol composition and antioxidant capacity of decocted and methanolic extract of *Erica arborea L.* is a Algerian medicinal plant harvested in the Bejaia region of Algeria, known for its height ranging from 4 to 7 meters and specific location near Darguina.. The determination of the yield has shown that the yields are vary considerably according to the extraction solvent (methanol or decoction), with methanolic extract yielding the highest (16.15%). the qualitative analyse by phytochemical screening of the flowers and stems revealed the presence of diversity of compounds, including polyphenols, flavonoids, tannins and alkaloids. shows high tenures of phenolic and flavonoids present by the methanolic extract of the stems with respective values of 86.298 mg (Eq AG / g extract) and 1.538 mg (Eq Q / g extract). In vitro antioxidant capacity was assessed using the ferric reducing antioxidant power (FRAP) test, showing substantial inhibition percentages and a superior reducing capacity of 2.5 for the stem decocted extract at 2000 mg/mL. Therefore, these results show that the extract of *E. arborea* contain bioactive compounds endowed with an interesting antioxidant activity, suggesting their use as an extract in order to prevent the oxidative processes.

**Keywords:** medicinal plant, extraction, phenolic compounds, anticoagulant activity.

## EFFECTS OF NITROGEN FERTILISATION ON THE YIELD AND QUALITY OF THREE VARIETIES OF DURUM WHEAT (*TRITICUM DURUM* DESF.) IN A SEMI-ARID ZONE

### Abstract

The experiment was carried out during the 2012/2013 campaign, at the ITGC station in Setif under a semi-arid climatic stage. The study focuses on three local varieties of durum wheat subject to seven increasing nitrogen regimes. Physical, chemical, technological and rheological analyses have been performed on grains and semolina whose main objective is to determine the effect of the dose on the expression of yield and quality and the reaction of genotypes under increasing doses for yield and quality traits. Statistical analysis of the results shows that there is an influence of variety and dose on almost all the parameters studied, namely; grain yield, thousand grain weight, specific weight, mitadinage rate, ash rate (grain, semolina), protein rate (grain, semolina), dry and wet gluten content of semolina, SDS, yellow colouration of semolina, peak height and kneading time. The results showed a marked diversity between varieties and on the reaction of the latter with increasing doses of nitrogen for quality traits, there are parameters that react positively with increasing doses of nitrogen, namely; grain yield, protein content (grain, semolina), sedimentation volume, gluten content (wet, dry), peak height, and other parameters react negatively with increasing nitrogen doses, namely: thousand grain weight, specific weight, mitadinage rate and grain ash rate.

**Keywords:** Durum wheat, varieties, nitrogen fertilisation, quality, characteristics, Setif.

## LA DIVERSITÉ DES PLANTES DANS LE RÉGIME ALIMENTAIRE DE POPULATION DES TOURTERELLES (*STREPTOPELIA DECACTO*, *S. SENEGALENSIS* ET *S. TURTUR*) DANS LA REGION DE BISKRA (ALGERIE).

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## Abstract

Les rapports des oiseaux avec le monde végétal sont nombreux et de tout ordre. D'une part, la plante leur fournit les matériaux pour l'édification de leurs nids et elle leur procure une part importante de leurs alimentations comme les graines, les fruits, les jeunes pousses et le nectar. D'autre part, certaines espèces d'oiseaux sont des pollinisateurs indispensables à la fructification d'un bon nombre d'espèces de plantes, autres de types granivores sont des disséminateurs des semences et/ou des nettoyeurs. À Biskra et après l'identification des 3276 items des 30 jabots des trois espèces de tourterelles (*Streptopelia turtur*, *S. decaocto* et *S. senegalensis*) au niveau de l'exploitation agricole de Garta (Sidi Okba) en 2015, on a conclu que, le régime alimentaire des tourterelles est constitué principalement par des graines cultivées et spontanées, avec un pourcentage de 81, 64% pour *Streptopelia decaocto* de son régime alimentaire global, et de 79,08% pour *S. senegalensis*, et de même pour *S. turtur* 78,01%, Sachant que, le taux des plantes spontanées a été supérieur à celle des plantes cultivées respectivement ; plantes cultivées 24,31% et un taux de 57, 33% plante spontanées (*S. decaocto*), un taux de 16, 55% plantes cultivées et 62, 53% de plante spontanées (*S. senegalensis*), et un pourcentage de 15,71% des plante cultivées et 62,30%. Donc, ces trois espèces de tourterelles sont des oiseaux nettoyeurs des champs des cultures contre les graines des plantes adventices.

**Keywords:** Oiseaux nettoyeurs ; Tourterelles ; Graines ; Plantes cultivées ; Plantes spontanées.

## Topic 2

### Biotechnology and Biosafety

Moderators: Dr. Saad, Dr. Labdeli, Dr. Foughalia

#### THE STUDY OF THE IN VITRO WATER STRESS OF SEVEN ALGERIAN LOCAL GENOTYPES AND ONE HYBRID VARIETY OF CHILI PEPPER (*CAPSICUM ANNUM L.*), USING PEG2000

Mohamedi Yousra<sup>1</sup>, Bedjaoui Hanane<sup>2</sup>, Tahirine Mohammed<sup>3</sup>

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#### Abstract

Chilli pepper is of real socio-economic importance in Algeria. This work aimed to study the behavior of seven local pepper populations and one imported hybrid variety underwater induced by the use of PEG2000 at different doses. The results obtained from the analysis of variance and the HSD test showed that there was considerable variation in the behavior of the varieties used in response to the doses applied, for all the parameters studied, germination rate, weight, and number of days required for germination. Although the genotypes from Tolga, Tugurt, and the hybrid variety had the highest germination rates with 100% at all the concentrations of the PEG, we observed that the genotypes of Eloued and Tolga had the fastest germination rate (6 days to reach 80%). In terms of seeds weight, the results showed that the seeds of Mzir'a had the highest rate of hydration (150mg/100mg of seeds  $\pm 4,05$ ) although they

showed a lower germination rate ( $73\% \pm 3,33$ ) which can be explained by a physiological dormancy.

**Keywords:** *Capsicum annum L*, local populations, hybrid variety, PEG2000, germination.

#### THE GRASSLANDS: AN EXCELLENT SOURCE OF NATURAL PLANT DIVERSITY.

Mohguen Khalissa<sup>1</sup>, Kellil Hadia<sup>2</sup>, Ouldamm

Hanane<sup>1</sup>, Bouchareb Nabila<sup>3</sup>, Hezil Wissam<sup>4</sup>, Khelifi Amina<sup>2</sup>

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#### Abstract

Biological diversity, or Biodiversity, can be perceived at multiple levels of organisation, from the gene to the biosphere. This study focuses on the multitude, diversity and virtues of plants (flora) found in the same specific area and subject to the same soil, climate and environmental conditions, i.e. grassland agro-ecosystems. They are highly dependent on human activities linked to livestock farming. So-called natural or semi-natural grassland vegetation is maintained at the herbaceous stage by grazing and/or mowing. The aim is therefore to draw up a non-exhaustive inventory of the flora of 11 natural grasslands in 3



different areas of the Sétif region, over 3 years of observations, at different altitudes ranging from 800 to 1126 m. The working and observation method adopted consisted of crossing the plot diagonally, using a zigzag path, and using 0.25 m<sup>2</sup> quadrats to mow the vegetation present, with 16 to 17 points. This frequency of sampling meant that around 70% of the species present in the meadow could be inventoried and each plant found identified. The results show the dominance of Poaceae and Fabaceae species and the presence of 29 other families, including Plantaginaceae, Lamiaceae, Renonculaceae, Rubiaceae, Geraniaceae, Alliaceae, Convolvulaceae and Juncaceae. The number of species varies from 9 to 37 per meadow. So we found annuals, biennials and perennials, rhizomatous and stoloniferous species, wetland and floodplain plants, forage, edible, medicinal, aromatic and ornamental species, as well as melliferous and nectariferous species, such as: Red clover *Trifolium pratense*, *Phleum pratense*, *Festuca arundinacea*, *Phalaris aquatica*, *Poa trivialis*, *Lolium perenne*, *Bromus hordaceus*, *Renunculus sp.* and many others. This study is being used to draw up an initial typology of these grassland ecosystems, based on the dominant species encountered, and is also helping to raise awareness among researchers of the great fragility of these environments and the need to safeguard them, as they represent an inexhaustible source of interesting species for livestock feed and for the entomofauna present, which is of undoubted agri-environmental interest.

**Keywords** :Phytodiversity, Natural grasslands, Plant bio-resources, Botanical families, Setif.

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### BIOTECHNOLOGY-DRIVEN BIOCHAR DEVELOPMENT: BALANCING ADVANCEMENTS AND BIOSAFETY IN SUSTAINABLE AGRICULTURE

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#### Abstract

The complex interrelationship between biotechnology and Biochar development stands as a prominent focal point within the sustainable environmental and agricultural practices. Biotechnology enhances feedstock selection and pyrolysis optimization yet necessitates rigorous biosafety evaluations. This abstract explores this dynamic synergy, emphasizing the imperative of technological advancement alongside stringent biosafety protocols (to be used for what?). In this study, raw materials were sourced from the Deglet Noor cultivar, a prevalent semi-dry date fruit variety, originating from the Ziban region -Biskra in Algeria. The objective was to investigate the carbonization process of pretreated Deglet Noor cultivar powder under controlled, oxygen-limited conditions. This thermal conversion process involved gradually heating the material to the target temperature at a rate of 10 °C/min and maintaining it at that temperature for a specific duration. The deliberate use of a slow heating rate was employed to ensure the thorough evaporation of any entrapped pore water within the material. Following the carbonization process, the resulting Biochars (BCs) were naturally cooled to room temperature and subjected to a rigorous purification procedure involving repeated rinsing with hot deionized water. This step was vital to eliminate any residual impurities from the BCs. Subsequently, the purified BCs were dried at 110 °C for a period of 12 hours and carefully stored in sealed, approved containers to maintain their integrity until their future utilization. Furthermore, the study aimed to characterize the optimized BC samples comprehensively. Analytical techniques, including Fourier Transform Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD), Brunauer-Emmett-Teller (BET) surface area analysis, and Scanning Electron Microscopy coupled with Energy Dispersive Spectroscopy (SEM-EDS), were employed for this purpose. Notably, the carbonaceous materials exhibited remarkable porosity, as evidenced by their impressively high specific surface area of 654.7851 m<sup>2</sup>/g and their amorphous structural characteristics. These improved textural properties were a direct outcome of the systematic optimization of key parameters within the

carbonization process. In conclusion, the methodical process of biochar preparation, as outlined in this study, assumes critical significance within the domains of biotechnology and biosafety. It not only yields biochar materials well-suited for biotechnological applications but also adheres rigorously to biosafety standards, thereby ensuring the safe and responsible utilization of this versatile carbonaceous material in diverse scientific and environmental contexts.

**Keywords:** *Biotechnology, Biochar Development, Biosafety, Sustainable Agriculture, Carbonization Process, Porosity Characterization.*

### CHIA: A NEW CROP FOR ORGANIC PRODUCTION IN ALGERIA

Rahmoune Ibtissem<sup>1,2</sup> Karoune Samira<sup>2</sup>, Saad Somia<sup>2</sup>, Abidat Hana<sup>1,2</sup>

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#### Abstract

*Salvia hispanica*, commonly called "Chia," is a pseudo-cereal and the superfood of the 21<sup>st</sup> century. It can be defined as an annual herbaceous plant of the Lamiaceae family, native to southern Mexico and northern Guatemala. It is distinguished by its extraordinary ability to adapt to difficult ecological conditions. As part of an international Eranet fosc project funded by the European UNION and with partners (Egypt, Kenya, Germany, Hungary, Morocco), the first cultivation in Algeria was installed in 2022 by CRSTRA Biskra ; we chose 06 representative sites from east to west, plus the south. This research project, carried out by the "plant physiology" laboratory, aimed to identify the best cultural practices (dates and sowing rates) for cultivating organic chia in Algeria and determine the profitability of this crop in Algeria. In principle, the cultivation was carried out in two regions, Biskra "otaya" and Béchar "Beni abbes." Two sowing dates between the end of October and the end of January. The results show that it is possible to cultivate organic chia in Algeria and obtain a remarkable harvest like the region of Biskra. At the

same time, blessed Abbes. There was no harvest due to the flowering phase, which has stopped due to each region's ecological conditions (climate, soil, and biotic factors). Phytochemical analysis makes it possible to identify that chia seeds contain a high proportion of lipids (30 to 33%), carbohydrates (26 to 41%), proteins (15 to 25%), dietary fiber (18 to 30%), vitamins, minerals and antioxidants. On the other hand, the presence of different types of polyphenols, such as phenolic acids (caffeic acid, gallic acid), depsides (rosmarinic acid, chlorogenic acid), flavonoids (kaempferol, quercetin, myricetin, apigenin and rutoside), which are mainly effective in the treatment and protection against certain disorders of diabetes, Alzheimer's and Parkinson's, celiac diseases.

**Keywords:** *Chia, oil, omega-3, flavonoids, polyphenols.*

### VARIED EFFECTS OF DIVERSE BENEFICIAL MICROORGANISMS AS BIOFERTILIZERS ON CHLOROPHYLL AND CAROTENOID LEVELS IN AVENA SATIVA L.

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#### Abstract

The intricate interplay between plants and microorganisms plays a pivotal role in shaping plant health and overall quality. This dynamic interaction can either enhance or hinder the well-being of the host plant. Leveraging beneficial plant-microbe relationships, particularly in the form of biofertilizers, holds great promise as a sustainable and ecologically responsible approach to agricultural production. In this study, we explore the fascinating realm of beneficial microorganism influence on pigment dynamics within *Avena sativa* L, commonly known as oat, with a focus on biotechnology and biosafety. Our experimental approach involved the meticulous treatment and cultivation of oat plants in natural, open-field conditions. We conducted a comprehensive assessment of microbial impact by quantifying chlorophyll and carotenoid levels during a critical

developmental stage, seed maturation. The results of our study yielded intriguing insights. Across various treatments, we observed significant increases in chlorophyll-a, chlorophyll-b, and carotenoid concentrations, indicating positive microbial effects on pigment dynamics. This divergence underscores the substantial variability in pigment allocation among the treatments, shedding light on the intricate interplay between beneficial microorganisms and the physiology of *Avena sativa* L. This implies distinct effects on photosynthetic efficiency and pigment assimilation within the foliage of this crop. Furthermore, this study offers nuanced insights into the broader implications of these interactions for plant metabolism and biosafety considerations. By deciphering these complex relationships, we pave the way for innovative strategies in sustainable crop management and productivity enhancement.

**Keywords:** *plant-microbe interactions, biofertilizer, beneficial microorganisms, Avena sativa L, pigment content, Biosafety.*

### CONTRIBUTION TO THE IN VITRO REGENERATION OF THE SPONTANEOUS MEDICINAL PLANT '*PHLOMIS CRINITA*'

Abdelhakim Chelgham<sup>1</sup>, Abdelkader Saadi<sup>2</sup>, Abdelazi Merouane<sup>3</sup>

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#### Abstract

*Phlomis crinita* Cav. (*P. crinita*) is a local Mediterranean species of great therapeutic importance, widely used in traditional Algerian medicine to heal wounds. But this plant is overexploited. The aim of the present study is to contribute to the in vitro regeneration of whole plants of *P. crinita*. Nodal segments from wild plants were established on Murashige and Skoog medium supplemented with either 6-benzylaminopurine (BA) or kinetin (Kin) at different concentrations. For rooting, different concentrations of indolebutyric acid (IBA) were

added in MS/2 medium. Multiplication of axillary shoots was affected both by cytokinin type and its concentration, and the addition of Kin ensured the best morphological appearance in terms of shoot length and number. This research offers valuable insights into sustainable micropropagation of *P. crinita*.

**Keywords** *Medicinal plant, Phlomis crinita, in vitro regeneration, micropropagation, nodal explants.*

### MICROWAVE-ENHANCED EXTRACTION OF POLYPHENOLS FROM LEPIDIUM SATIVUM L. SEEDS: AN OPTIMIZATION STUDY

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#### Abstract

*Lepidium sativum* L. seeds, commonly known as garden cress seeds, have a rich history in traditional medicine, offering remedies for a variety of ailments. Polyphenols, renowned for their health-promoting properties, exhibit potent antioxidant and free radical scavenging capabilities. A diet abundant in plant-derived polyphenols has been associated with reduced risks of cancer, cardiovascular diseases, diabetes, osteoporosis, and neurodegenerative conditions. This study delves into the optimization of microwave-assisted extraction (MAE) for the efficient extraction of total phenolic from garden cress seeds. The total phenolic capacity (TPC) of the seed extracts obtained under optimized MAE conditions is compared with extracts obtained through ultrasound-assisted extraction (UAE) and conventional solvent extraction (CSE). Factors influencing the extraction process, including ethanol concentration, microwave power, irradiation time, and solvent-to-solid ratio, are modeled using a second-order regression equation. The optimal MAE conditions are determined as follows: 70% ethanol concentration, 500 W microwave power, 62 seconds irradiation time, and a solvent-to-material ratio of 32 mL/g. Ethanol concentration and liquid-to-solid ratio are identified as the pivotal parameters governing the extraction process ( $p < 0.01$ ). Under these optimized MAE conditions, the recovery of TPC is measured at

162.49 ± 16.95 mg gallic acid equivalent per gram of dry weight (DW), closely aligning with the predicted content of 166.13 mg GAE/g DW. Comparing bioactive phytochemicals extracted from garden cress seeds using MAE with those obtained through UAE and CSE, it becomes evident that MAE extracts exhibit higher levels of total flavonoids (5.02 ± 0.05 mg QE/g) and enhanced antioxidant activities (38.20 ± 1.08 µg GAE/mL) in comparison to the other two extraction methods. These results underscore the efficiency of the MAE approach in extracting bioactive phytochemicals from plant materials, characterized by its reduced solvent usage and time-saving attributes.

**Keywords:** *Lepidium sativum*, Microwave extraction, Ultrasound extraction, Phenolic compounds, Antioxidant activity.

### COMPARATIVE STUDY OF THE ANTIOXIDANT ACTIVITY OF CITRUS FRUITS

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#### Abstract:

Oxidative stress is an imbalance between the quantity of free radicals (ROS) generated and the antioxidants that neutralize them, which is the cause of the appearance of several diseases. An exogenous supply of antioxidant elements remains an important strategy to eliminate oxidative stress. Indeed, several studies have confirmed the antioxidant activity of polyphenols. Thus, the aim of this study is to evaluate the antioxidant potential of citrus fruits, which are known for their richness in antioxidants. The determination of total polyphenols of aqueous extracts of clementine (*Citrus clementina*), orange (*Citrus sinensis*) and lemon leaves (*Citrus limon*) revealed an important quantity of polyphenols (248.27 ± 2.7, 163.83 ± 1.68, 155 ± 0.84 mg EAG/g dry extract, respectively). The evaluation of antioxidant activity is carried out with two tests: total antioxidant activity (TAC) and Ferric ion reducing antioxidant power (FRAP). The inhibitory concentrations 50 (IC<sub>50</sub>) obtained for clementine, orange and lemon

leaves for TAC are: 2408.33 ± 1.8, 1944.3 ± 8.08, and 1943.33 ± 3.2 µg/ml. The Ferric ion reducing antioxidant power (FRAP) gave the following IC<sub>50</sub>: 888.66 ± 3.51, 1007 ± 1.78, and 973 ± 4.35 µg/ml for clementine, orange and lemon, respectively. No correlation was found between the quantity of polyphenols and antioxidant activity (p<0.05). To conclude, citrus fruits can be an important source of natural antioxidant, with their reducing capacity.

**Keywords:** *Citrus* / ROS / polyphenols / antioxidant

### EXPOLYSACCHARIDES OF EXTREMOPHILIC BACTERIA AND THEIR APPLICATIONS IN THE FOOD INDUSTRY

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#### Abstract

Exopolysaccharides (EPSs) are one of biopolymers produced by bacterial communities to strive various extreme environmental conditions. EPSs are extracellular carbohydrate biopolymers produced and secreted by microorganisms, which accumulate outside cells, they are able to be released into the surrounding environment. EPSs produced by extremophiles have attracted potential research interest for several biotechnological applications due to their good thermal stability, non-toxicity and biodegradability. For example, food industries around the world are looking for value-added compounds or additives of natural origin with increased functionality and bioactivity. This communication aims to give an overview about the potential applications of bacterial EPSs. Isolation of bacterial strains was carried out by plating the serially diluted water samples on nutrient agar followed by incubation for 24 to 48 h, then screened for EPSs production based on slimy appearance of their colonies. The selected colonies were inoculated in a nutrient broth for EPSs quantification. The functional properties of EPSs



were evaluated for food industry applications. EPSs play an important role in improving the rheological and sensory characteristics of food products by positively influencing food texture and organoleptic properties. Moreover, these biomolecules have been considered as promising antioxidants for developing effective functional foods with longer shelf life. In conclusion, we can deduce that EPSs are promising candidates that can be used as useful additives for the food industry. Thus, the production and characterization of extremophilic bacterial EPSs is an active area of research to improve culture techniques, in a cost-effective manner.

**Keywords:** *Exopolysaccharides, Biopolymers, Extremophiles, Food Industries.*

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### HOW DO SEED ORCHARDS CONTRIBUTE TO THE PROTECTION OF THE ARGAN TREE IN ALGERIA?

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#### Abstract

The argan tree *Argania spinosa* L. Skeels is an endemic tree in North-Western Africa. In Algeria, it is found in the wild in the northwest of the province of Tindouf. Its natural regeneration is very rare due to overgrazing and intensive collection of seeds for the production of argan oil. As a result, artificial propagation by seed has become essential for the production of seedlings. Today, Algeria has several argan tree plantation sites inside and outside its natural range. Some of them contain seed bearing trees. Across 10 wilayas, we counted 16 *ex-situ* sites producing the seeds. The objective of this work is to illustrate how these seed orchards have contributed to the protection of the argan tree in Algeria.

**Keywords:** *Argania spinosa, seed orchards, plantations, protection, Algeria.*

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### IMPROVEMENT OF THE PHYSICO-CHEMICAL AND ANTIOXIDANT PROPERTIES OF SKIMMED MILK THROUGH FERMENTATION USING EXOPOLYSACCHARIDE-PRODUCING

### LACTIPLANTIBACILLUS PLANTARUM E2AT5

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#### Abstract

Lactic acid bacteria fermentation is an effective way to improve the nutritional value and biological activity of dairy products. The present study aimed to assess the physicochemical properties and antioxidant potential of skimmed fermented milk with *Lactiplantibacillus plantarum* E2AT5 compared to unfermented milk. Changes in physicochemical parameters (i.e, pH, titratable acidity, fat, lactose, protein, EPS production), and viable cell counts were monitored before and after fermentation. The antioxidant capacity of fermented and non-fermented milk was measured with DPPH, hydroxyl and ABTS radical scavenging activity and reducing power assays. The results of this investigation indicate that fermented milk showed a drop in pH (from 6.77 to 4.98) accompanied by a significant increase ( $P < 0.05$ ) in acidity and the number of viable cells from  $10^7$  CFU/mL to  $10^{10}$  CFU/mL, indicating that milk is a suitable substrate for the growth of this lactic acid bacterium. Furthermore, after fermentation, a significant increase in protein and fat contents was observed, while the lactose level was decreased. Similarly, EPS amounts were significantly increased after fermentation ( $P < 0.05$ ). The fermented milk showed an interesting enhancement of the antioxidant activity compared to unfermented milk with respect to their DPPH (from 46.63% to 92.27%), hydroxyl (from 25.42% to 37.46%) and ABTS (from 39.60% to 79.81%) radical scavenging activity. These findings suggested that *Lactiplantibacillus plantarum* E2AT5 could be used as fermented strain in dairy products to improve the quality and the antioxidant activity of milk.

**Keywords:** *antioxidant activity, fermented milk, Lactiplantibacillus plantarum E2AT5, physicochemical properties*

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### STUDY OF THE ANTIOXIDANT ACTIVITY OF ALGERIEN CISTUS LEAVES

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### Abstract

Cistus shrubs consist of 175 species of eight herbaceous genera. *Cistus salviifolius* L. belonged to the family of Cistaceae, it is grown in the Mediterranean region. Phytoconstituents and antioxidant properties of different extracts of *Cistus salviifolius* L. (petroleum ether, chloroform, ethyl acetate, n-butanol, and water fractions) were obtained. Ethyl acetate ( $608.91 \pm 4.58$  mg GAE/g DW) and ( $97.45 \pm 0.13$  mg EQ/g DW) were present a significant difference. In addition, the n-butanol fraction ( $532.32 \pm 8.60$  mg GAE/g DW) and ( $41.68 \pm 1.71$  mg EQ/g DW) showed the highest total phenolic (TPC) and flavonoid (TFC) contents. The results of antioxidant studies showed that the n-butanol extract exhibited potent scavenging activity for (DPPH•) ( $IC_{50} = 6.95 \pm 0.51$  µg/mL) and (ABTS•+) ( $1.06 \pm 0.20$  µg/mL). The ethyl acetate fraction also exhibited high activity for (DPPH•) with an  $IC_{50}$  value of  $63.93 \pm 2.43$  µg/mL and (ABTS•+) with an  $IC_{50}$  value of  $0.41 \pm 0.07$  µg/mL.

**Keywords:** *Cistus salviifolius* L, antioxidant activity, polyphenols, flavonoids.

### ANTIBACTERIAL AND ANTIOXIDANT ACTIVITIES OF ESSENTIAL OIL OF *ANETHUM GRAVEOLENS* L

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### Abstract

Recently, there has been a surge of interest in the biological capabilities of medicinal plants, notably their essential oils. *Anethum graveolens* is an annual plant belonging to the Apiaceae family that exerts many pharmacological effects to treat different diseases. The aim of this investigation was to evaluate the antibacterial and antioxidant activity of *Anethum graveolens* seed essential oil from southwest Algeria. The essential oil from the seed of *A. graveolens* was obtained by hydro-distillation. To evaluate its antibacterial activity, agar disc diffusion and direct contact methods were used to determine the MIC and MBC against five reference strains. For antioxidant activity, a DPPH assay was used. The studied essential oil showed moderate activity against the tested strains. The highest antibacterial activity was observed against *Enterococcus faecalis* (inhibition zone of 12 mm, MIC and MBC of 0.006 v/v), while no inhibitory effects were observed against *Escherichia coli*. The oil exhibited very low antioxidant activity ( $IC_{50} = 1.16$  mg/ml) in comparison with ascorbic acid ( $IC_{50} = 0.43$  mg/ml). These results indicate that the essential oil from the seed of *Anethum graveolens* might be used for the treatment of infectious diseases and also as a natural food preservative.

**Keywords:** Southwest Algeria, *Anethum graveolens*, essential oil, antibacterial activity, antioxidant activity.

### ANTIBACTERIAL ACTIVITY OF EXTRACTS FROM A BROWN ALGA *CYSTOSEIRA COMPRESSA* FROM THE MEDITERRANEAN COAST OF MOSTAGANEM

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### Abstract

Macroalgae is an important source of natural bioactive substances. Recently, seaweed has received much attention for its natural antioxidant potential and antibacterial, antifungal and anti-inflammatory activities. The aim of the present work is to demonstrate the antimicrobial activity of extracts of the brown alga *Cystoseira compressa* harvested from the Mediterranean coast of Stidia, wilaya of Mostaganem. Screening for *in-vitro* antibacterial activity was carried out using the two acetone and methanol extracts of *Cystoseira compressa*, prepared by maceration. These extracts are used to assess antimicrobial activity using the disk diffusion method with a concentration of 100mg/ml, as well as to determine the minimum inhibitory concentration (MIC) using the microdilution method. Antimicrobial activity is tested against the following strains: (*Escherichia coli* ATCC 25922, *Staphylococcus aureus* ATCC 25925, *Pseudomonas aeruginosa* ATCC 27853, *Bacillus cereus* ATCC 11778 and *Candida albicans* ATCC 10231). The yields obtained varied from one extract to another, with the highest yield recorded for the methanolic extract at 19.9%. The results revealed that both algal extracts showed antimicrobial activity. The methanolic extract of *Cystoseira compressa* showed the highest activity against *Candidas albicans* and *Pseudomonas aeruginosa* with a diameter of 39 mm and 23 mm respectively, while the acetone extract was more active against *Bacillus cereus* with a diameter of 15 mm. Minimum inhibitory concentration (MIC) values reveal the lowest concentration against *Candida albicans* for both extracts, *Pseudomonas aeruginosa* and *Bacillus cereus* for the acetone extract, *Staphylococcus aureus* and *Pseudomonas aeruginosa* for the methanolic extract, with a MIC value of 12.5 mg/ml. The present study has shown that *Cystoseira compressa* extracts have a valuable ability to inhibit the growth of pathogenic microorganisms, and this importance will lead to further studies to enhance the value of marine bioactive molecules in the future.

**Keywords:** Macroalgae, *Cystoseira compressa* Extract, Antimicrobial activity, Mostaganem.

### CHARACTERIZATION OF PLANT GROWTH-PROMOTING TRAITS AND INOCULATION EFFECTS ON TRITICUM DURUM OF HALOTOLERANT ACTINOBACTERIA UNDER SALT STRESS CONDITIONS

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### Abstract

Plant growth promoting bacteria (PGPB) are a valuable alternative strategy for sustainable agriculture. Among PBMPs, actinobacteria have recently attracted increasing attention for their ability to alleviate stresses and improve agricultural productivity. The aim of this research was to select actinobacteria strains according to their traits promoting plant growth and to study their biostimulant effects on durum wheat without and with saline stress. Fifteen strains were studied for their ability to produce NH<sub>3</sub>, HCN, enzymes (amylase, cellulase, lipases, proteases and catalase) and antifungal compounds against *Fusarium oxysporum*, *Aspergillus niger*, *Alermaria* sp. and *Penicillium* sp. All bacteria have the ability to produce HCN and NH<sub>3</sub>. The majority of actinobacteria showed enzymatic activities at different rates. Antifungal activity shows that 53.33% of strains are active at least on one of the phytopathogenic fungi. According to these results, the two most efficient strains F6 and H12 and tolerant up to 15% of NaCl were selected to evaluate their inoculation effect on durum wheat (Waha variety) under normal and salt-stressed conditions (0.2 M NaCl). The inoculation by these two strains and their mixture positively influenced the growth parameters of wheat plants. Our results highlight the effectiveness of halotolerant actinobacteria strains as durum wheat biostimulants and their

mitigation of the adverse effects of salt stress on plants.

**Keywords:** PGPB, actinobacteria, salt stress, durum wheat.

## EVALUATION OF THE ANTI-HEMOLYTIC AND PHOTOPROTECTIVE ACTIVITY OF *BALLOTA HIRSUTA* SPECIES

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### Abstract

Plants harbor a diverse array of chemical compounds with various biological activities. Species of the *Ballota* genus have long been employed in folk medicine for their therapeutic properties, including anti-ulcer, antispasmodic, diuretic, choleric, anti-hemorrhoidal and sedative effects. This study aims to investigate the phenolic compound profile of microwave and ultrasound extracts of *Ballota hirsuta* and assess the extracts' anti-hemolytic and photoprotective activities. The total polyphenol content of the extracts (microwave and ultrasound) from the studied species is determined spectrophotometrically using the Folin-Ciocalteu method. Similarly, the quantification of flavonoids is conducted using an adapted method involving anhydrous aluminum chloride (AlCl<sub>3</sub>). The anti-inflammatory activity (in vitro) of the obtained extracts is assessed using the human red blood cell membrane stabilization method. Subsequently, the sun protection factor (SPF) value of the extracts is calculated using the equation proposed by Mansur and colleagues to determine the protective capacity of the studied species. The results of flavonoid quantification in both extracts reveal the richness of this plant, with contents of 15.431 and 20.05 Eq Q/1g DW for the microwave and ultrasound extracts, respectively. Likewise, a higher polyphenol content is observed in the microwave extract, equal to 750.35 µg Eq GAE/1g DW compared to that recorded in the ultrasound extract (358.35 µg Eq GAE/1g DW). Overall, both extracts (microwave and ultrasound) exhibit a significant and superior ability to stabilize red blood

cell membranes compared to the standard at low concentrations. The microwave extract displayed the most substantial effect at 94.47% ± 0.07 compared to the other extract (ultrasound 93.99% ± 0.26). The results indicate that the extracts possess pronounced photoprotective activity, with SPF factors reaching 41.27 ± 0.17 and 40.57 ± 0.10 for the microwave and ultrasound extracts, respectively. These findings validate the traditional use of this species.

**Keywords:** *Ballota hirsuta*, polyphenols, flavonoids, antihemolytic activity, SPF

## COMPARATIVE STUDY ON THE ANTIOXIDANT ACTIVITY OF ESSENTIAL OILS OF THE TWO MEDICINAL PLANTS *JUNIPERUS OXYCEDRUS* AND *JUNIPERUS PHOENICEA*

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### Abstract

Medicinal plants have become important for pharmacological research when not only plant constituents are used directly as therapeutic agents, but also as raw materials for drug synthesis or as models for pharmacologically active compounds (OMS, 1998). Juniper trees (*Juniperus*) occupy an important place in the North African landscape. They are pioneer species that are not very demanding from an ecological point of view and present from the seaside to the summits of the Atlas. Currently, the development of microbial resistance to antibiotics and the appearance of various antioxidant effects lead researchers to tap into the plant world and particularly medicinal and culinary plants in search of effective natural molecules and devoid of any adverse effect. In the context of the enhancement of our two research plants on the aromatic and medicinal level for a better exploitation. It is considered useful to contribute to the study of the antioxidant activity of the oils of two plants *Juniperus oxycedrus* and *Juniperus phoenicea*. These plants are collected in the region

of Tiaret. Our work is based on an extraction of plant oils by hydrodistillation then the evaluation of their antioxidant activities by the method of anti radicalary against the DPPH radical. The results showed that the fruits of *J. oxycedrus* and leaves of *J. phoenicea* showed that the greatest trapping capacity of DPPH for EO fruit of *J. oxycedrus* with a value of  $IC_{50}=78.42 \mu\text{g/mL}$ , followed by that of *J. phoenicea* (leaves) with an  $IC_{50}=63,12\mu\text{g/mL}$ . The sweeping power of free radicals proved to be the most active for leaves *J. phoenicea* than the *J. oxycedrus* which indicates the presence of effective compounds in the biochemical composition of the plant. The two essential oils plants studies have an antioxidant effect. This effect is explained by the existence and presence of bioactive compounds such as  $\alpha$ -Pinene in common in our two essential oils due to the complexity of the chemical composition of essential oils which may be due to the presence of interaction between the different constituents. These results explain the traditional use of its plants in the treatment of different diseases.

**Keywords:** *Tiaret region, J. phoenicea, J. oxycedrus, essential oils, antioxidant activity.*

### ESTIMATION OF ANTIOXIDANTS ACTIVITY AND CAPACITY TO CAPTURE FREE RADICAL USING 2, 2-DIPHENYL-1-PICRYLHYDRAZYL (DPPH) ASSAY OF EXTRACTS AND FRACTIONS OF EPHEDRA ALATA FROM BECHAR REGION

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#### Abstract

Natural substances from plants have multiple interests in biotechnology, the food, cosmetic and pharmaceutical industries. Among these compounds, there are a large part of secondary metabolites that have distinguished themselves in many fields and even in therapy. In this context, we

investigated the antibacterial activity of *E. alata* from the Bechar region, a plant widely used in traditional therapy. The qualitative phytochemical examination carried out on *E. alata* showed the presence of alkaloids, tannins, sterols, triterpenes, reducing compounds, coumarins, terpenoids, saponosides and flavonoids. In order to exploit a possible therapeutic activity, crude extracts under reflux, macerated and fractions of *E. alata* were tested for their antioxidant power by using free radicals 2,2-diphenyl-1-picrylhydrazyl (DPPH) with calculated  $IC_{50}$ . The results obtained in this study, shows the richness of *E. alata* in chemical substances and a high antioxidant activity for this two plants. This can represent a potential new source of bioactive molecules in therapeutics.

**Keywords:** *E. alata, extracts, fractions, antioxidants activity, 2, 2-diphenyl-1-picrylhydrazyl (DPPH), Bechar region.*

### IN SILICO ANTICANCER ACTIVITY OF PHYTOCHEMICALS AND PLANT-BASED TERPENOIDS AGAINST DIFFERENT CANCER TARGETS

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#### Abstract

Numerous studies have established their plethora of pharmacological properties as well as the in vitro cytotoxicity of plant-derived essential oil (EO) and their characteristic terpenes against different cancer cell lines. While recent publications revealed the anticancer potential of phytochemicals and EO, the mode of action of Their chemical compounds have not been evidently explained. In the current investigation, we focused on understanding the possible mechanisms underlying the in silico anticancer potential of EO compounds against different protein receptors using molecular docking and pharmacophore mapping. We assessed the drug-likeness of the EO bioactive terpenes and evaluated the binding interaction of 10 major

selected molecules with macromolecular proteins implicated in the development of tumor such as cyclin-dependent kinase 2 (CDK-2), topoisomerase-I (Topo I), B-cell lymphoma 2 (Bcl-2), vascular endothelial growth factor receptor 2 (VEGFR-2). The *in silico* molecular docking of LEO terpenes was performed with different enzymes and proteins involved with cell cycle, cell growth, and DNA replication. The *in silico* ADMET (absorption, distribution, metabolism, excretion and toxicity) predictions were estimated using online tools. PASS (Prediction of activity spectra of substances) was also completed on the selected EO terpenes. *In silico* toxicity studies revealed that most of the EO terpenes have suitable drug-like features on the basis of “Lipinski Rule of Five” as orally bioavailable lead bioactive molecules. Oxygenated monoterpenes have a good binding affinity with the common of protein targets. Our findings can provide an important lead in the design of novel natural anticancer molecules with safer pharmacokinetic and pharmacodynamic properties.

**Keywords:** Anticancer activity, ADMET predictions, Cancer targets, Molecular docking, Pharmacophore modeling.

### OPTIMIZATION OF MICROWAVE-ASSISTED EXTRACTION OF BIOACTIVE COMPOUNDS FROM ROSMARY LEAVES: ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES

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#### Abstract

This study based on the optimization of operational conditions of microwave assisted extraction (MAE) for extraction of total phenolic compounds (TPC)

from *Rosmarinus officinalis* L. leaves, using response surface methodology (RSM) coupled with a Box–Behnken design (BBD). The optimal conditions were as follows: ethanol concentration 78.162%, microwave power 351.825W, ratio of solvent to raw material 101.623:1 and extraction time 122.648s. It was confirmed that rosemary leaves can be used as a good source of valuable compounds since it was possible to obtain up to 15.01% (on dry weight basis) of TPC.UHPLC-DAD-ESI-MS<sup>n</sup> analysis revealed the major presence of rosmarinic acid (RA), rosmanol (R), carnosic acid (CA), carnosol (C) and methyl carnosic acid (MCA) in rosemary extract. Oxidative stress has been implicated in numerous pathologic conditions, such as inflammation, diabetes, cardiovascular diseases, cancer, and ageing, while natural fractions are potential sources of bioactive compounds able to counteract such events. To provide evidence of the antioxidant potential of the rosemary ethanolic extract, three *in vitro* essays (DPPH, NO, SO) were conducted. The effects of ethanolic extract of *Rosmarinus officinalis* on  $\alpha$ -Glucosidase and Anti-lipase activities were investigated. It was concluded that the rosemary ethanolic extract had powerful antioxidant and antidiabetic effects comparable with some standards.

**Keywords:** *Rosmarinus officinalis* L, microwave assisted extraction (MAE), antioxidant capacity.

### SALT STRESS TREATMENT OF SWEET PEPPER BY INOCULATION WITH A HALOTOLERANT RHIZOSPHERIC BACTERIUM (*KLEBSIELLA* SP. S6) AS A PGPR ISOLATED FROM *PHRAGMITES COMMUNIS* L. FROM M'ZAB VALLEY

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#### Abstract

*Phragmites communis* L. is a halophytic plant that can withstand harsh environmental conditions such



as salinity. In the present study, we isolated a bacterium associated with the rhizosphere of *Phragmites communis* L. Based on morphological and biochemical as well as MALDI-TOF and 16S rRNA sequencing results, the strain S6 was identified as *Klebsiella aerogenes* with a score of 2.34 for MALDI-TOF and a similarity of 99.86% with type strain *Klebsiella aerogenes* KCTC 2190<sup>T</sup>. Furthermore, we demonstrated that strain S6 tolerated up to 15% of NaCl and exhibited resistance to only three antibiotics that are frequently used for *Enterobacteriaceae*. Plant growth-promoting (PGP) results showed that the strain S6 had multiple traits, it was able to fix atmospheric nitrogen, solubilized inorganic phosphate (Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>) and potassium in addition to production of siderophores, ammonia, cellulase, protease and amylase. Indole acetic acid (IAA) production was also detected, and the strain S6 showed a positive ACC deaminase activity. Moreover, when the strain S6 was used as an inoculum for pepper seeds, increases in different parameters including shoot and root lengths and fresh and dry weights were shown under normal and saline conditions. We reported in this study, that the inoculation of pepper (*Capsicum annuum* L.) seeds with the *Klebsiella* sp. strain S6 was efficient for pepper growth in normal and salt stress conditions. The results of this study thus indicate that natural plants from saline habitats present a good source for isolating beneficial PGPR to grow crops like pepper under saline conditions.

**Keywords:** *Phragmites communis* L, *Klebsiella aerogenes*, rhizosphere, PGPR, MALDI-TOF.

### EVALUATION OF THE ANTIBACTERIAL ACTIVITY OF THE AQUEOUS EXTRACT OF SOME FRUIT PLANTS

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#### Abstract

The increases in antibiotic resistance and treatment failures have prompted researchers to exploit the beneficial effects of plants, which have always been used in traditional medicine. Their significant diversity in bioactive molecules was at

the origin of a non-negligible antimicrobial activity. Indeed, research has shown that polyphenols are the most studied biomolecule compounds, which are mainly found in vegetables and fruits. The dosage of the total polyphenols of the aqueous extracts of the leaves of orange, fig, lemon and pomegranate was carried out to confirm this hypothesis with the spectrophotometric method of Folin-Ciocalteu. The antibacterial activity was tested by the agar diffusion method against 04 reference bacterial strains (*Klebsiella pneumonia* ATCC 700603, *Escherichia coli* ATCC 25922, *Staphylococcus aureus* ATCC 25923 and *Enterococcus faecalis* ATCC 49452). A significant amount of total polyphenols was found for orange, fig, lemon and pomegranate leaves (258.3 ± 2.04, 173.5 ± 2, 291 ± 1.33, 420 ± 3.61 mg EAG/g dry extract, respectively). The antibacterial activity of fig and pomegranate leaves gave a zone of inhibition of 16.5 and 15.5 mm, respectively, against *Staphylococcus aureus*. A zone of inhibition of 17mm was recorded for fig leaves against *Enterococcus faecalis*. However, the leaves of lemon and orange showed no effect against the bacteria tested. To conclude, the fruits can be a good source of antimicrobial agents, thus, the leaves of the fig and the pomegranate can be exploited as antimicrobial agents in different fields.

**Keywords:** extract / leaves / antibacterial / polyphenols

### RESPONSE OF LOCAL SPICES ON ENHANCING POULTRY PERFORMANCE AND HEALTHY STATUE

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#### Abstract

The study is to investigate recent knowledge on the efficacy of local bioresources as feed additives in broiler feeding. The research shows that spices have a real impact on the main activities of the physiological systems of broilers. Numerous secondary metabolites of spices have antimicrobial activities. Experimentally, all forms and doses tested of these plants bioactive molecules in the diet

of broilers have created favorable effects for production parameters. Thus, the action of fenugreek (*Trigonella foenum-graecum*) and green anise (*Pimpinella anisum*) on broilers is essentially at three levels: by facilitating the digestion and assimilation of nutrients, improving the immune response ; and producing a healthy meat.

**Keywords:** antibiotic, animal physiology, feed, fenugreek, green anise, poultry

### THE POTENTIAL OF CYSTOSEIRA SP. LIQUID EXTRACT AS AN ALTERNATIVE BIOSTIMULANT AND SALT STRESS MITIGATOR FOR TOMATO (*SOLANUM LYCOPERSICUM* L.)

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#### Abstract

The objective of this study was to determine the effect of soil application of seaweed aqueous extract from *Cystoseira* sp. on certain morphological and physiological responses of tomato (*Solanum lycopersicum* L.) under salt stress conditions (200 mM NaCl) during the vegetative stage. A pot trial was conducted in a greenhouse environment using a randomized block design comprising five treatments, replicated three times. Tomato plants at the three-leaf stage were treated with different concentrations of *Cystoseira* aqueous extract (CLE), as follows: T1 - control 200 mM NaCl; T2 - 10% CLE + 200 mM NaCl; T3 - 20% CLE + 200 mM NaCl; T4 - 30% CLE + 200 mM NaCl; T5 - 40% CLE + 200 mM NaCl. Parameters were measured six weeks after the treatment application. The results demonstrated that seedlings treated with seaweed extract exhibited increased shoot height, root length, shoot fresh and dry weight, root fresh and dry weight, chlorophyll content, and relative water content (RWC) compared to non-treated seedlings under salt stress conditions. These results revealed that the

application of seaweed extract positively influenced tomato plant growth and physiological responses in a salt-stressed environment. The application of seaweed extract as a biostimulant emerges as a viable and environmentally friendly approach for achieving sustainable agriculture in arid and semi-arid regions.

**Keywords:** Seaweed extract, Salt stress, Growth, Tomato, Biostimulant, Physiology

### ANTICHOLINESTERASE AND ANTIOXYDANT ACTIVITIES OF *STACHYS GUYONIANA*

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#### Abstract

*Stachys* (Lamiaceae) is a large genus that includes between 275 and 300 species. In Algeria, it is represented by 14 species including the endemic species *Stachys guyoniana* de Noé ex. Batt.. Some *Stachys* species are used in folk medicine to treat genital tumours, sclerosis of the spleen, inflammatory diseases, cough and ulcers, fevers, diarrhea, sore mouth and throat, internal bleeding and weaknesses of the liver and heart. n-Butanol (BESG), ethyl acetate (EESG) and chloroform (CESG) extracts of *S. guyoniana* were evaluated for their antioxidant activity by the  $\beta$ -carotene-linoleic acid, DPPH and ABTS scavenging, CUPRAC and metal chelating assays. The anticholinesterase activity was tested against AChE and BChE. In the  $\beta$ -carotene test, the CESG (IC<sub>50</sub>: 2.3 ± 1.27 lg/mL) exhibited the highest activity. The BESG was the best scavenger of DPPH (IC<sub>50</sub>: 2.91 ± 0.14 lg/mL). However, with the CUPRAC, the BESG exhibited the best activity (A<sub>0.50</sub>: 0.15 ± 0.05 lg/mL) and was active in metal chelating assay with 48% inhibition at 100  $\mu$ g/mL. The BESG was the best AChE inhibitor (IC<sub>50</sub>: 5.78 ± 0.01 lg/mL) This study demonstrated good antioxidant and



anticholinesterase potentials of *S. guyoniana* which fits in well with their use in folk medicine.

**Keywords:** *Stachys guyoniana*, Antioxydant activity, Anticholinesterase activity.

### ETHNOBOTANICAL STUDY OF A MEDICINAL PLANT FROM ALGERIAN SAHARA: *FAGONIA GLUTINOSA* DELIL

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#### Abstract

In order to get information on medicinal plant *Fagonia glutinosa* Delil and its use, an ethnobotanical study was carried out in the Ghardaïa region. The study was carried out using a questionnaire. We conducted an ethnobotanical survey among the local population of the stations studied to collect the therapeutic information about this plant including. The ethnobotanical survey sheets were conducted with 200 people during for about two months March 2022 and April 2022. The questionnaire was developed; it has several questions that were asked orally, we have collected all the information about this medicinal plant. The ethnobotanical study of the medicinal plant *Fagonia glutinosa* in the region of Ghardaïa results among the 200 people interviewed aged 25 to 70 years. There are 65% of local people surveyed use traditional medicine and 35% of people use modern

medicine. Thus, *Fagonia glutinosa* Delil is used to treat gastrointestinal, genitourinary, kidney disease and oral diseases. The results obtained are a very valuable source of information for the region studied; it appears that the traditional use of medicinal plants still persists in the region of Ghardaïa. Thus, our study is a source of information that will contribute to the knowledge of medicinal flora and the safeguarding of local popular know-how.

**Keywords:** Ghardaïa region, *Fagonia glutinosa* Delil, Ethnobotany study, questionnaire, traditional medicine.

### ISOLATION OF SOME GLYPHOSATE-DEGRADING BACTERIA IN THE WATERS OF SEBKHET SEFIOUNE –OUARGLA (SAHARA OF ALGERIA)

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#### Abstract:

Research has been directed for several years towards techniques for depolluting soils and waters contaminated by pesticides used in agriculture. In this context, we have carried out a sampling of these polluted waters for the purpose of isolation and identification of certain bacterial strains which have the capacity to degrade glyphosate a herbicide widely used by farmers despite its ban, in the waters of Sebkhet Sefioune in Sahara of Algeria. The samples of treated wastewater have a pH between 7.32 and 7.46, which is alkaline water, and an electrical conductivity between 7.44 and 10.04 ds/m, indicating extremely salty water. These characteristics have certainly favored the development of a specific bacterial microflora. Microbial analysis of these samples revealed the presence of seven isolated and identified strains, affiliated to the genera *Serratia*, *Pseudomonas*, *Klebsiella*, *Staphylococcus* and *Erwinia*. These bacterial genera show variability in their growth kinetics indicating significant development in the presence of glyphosate. in bio-remediation.

**Keywords :** Water, Sebket Sefioune, Pesticides, Bacteria, Sahara.

### VALORISATION ET TRAITEMENT CHIMIQUE DES FIBRES VÉGÉTALES POUR PRÉPARER DES MATÉRIEAUX COMPOSITES.

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#### Résumé

Les fibres naturelles sont connues depuis longtemps et sont utilisées comme renfort dans la fabrication de matériaux composites. En particulier, dans le domaine de l'emballage, de la santé, de la pharmacie, de la construction automobile et dans le domaine aéronautique. Les fibres naturelles présentent de nombreux avantages tels que; disponibilité, faible coût, faibles densités, rigidité, biodégradabilité et ont un comportement mécanique important. De nombreux chercheurs ont observé que la préparation de matériaux composites renforcés de fibres naturelles peut améliorer l'efficacité mécanique de ces composites et ont préparé un matériau composite à partir d'une matrice de polyester insaturé avec des fibres de Luffa, qui a subi différents traitements chimiques (NaOH, permanganate, dichromate, silane et eau de Javel) afin d'améliorer l'adhérence interfaciale fibre-matrice. L'objectif de ce manuscrit est d'étudier l'effet d'un traitement alcalin et du temps de traitement sur les propriétés mécaniques d'un matériau composite à base d'une matrice thermodurcissable (polyester insaturé) renforcé de fibres Alfa.

**Mots-clés:** Fibres naturelles, Composite, Traitement chimique, polyester insaturé, Alfa.

### ANTIBACTERIAL ACTIVITY OF SOME MEDICINAL PLANTS AGAINST *ESCHERICHIA COLI* ATCC 25922 AND *STAPHYLOCOCCUS AUREUS* ATCC 25923

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#### Abstract

Research on the antibacterial activity of medicinal plants has consistently sparked significant interest in the fields of traditional medicine and scientific research. Therefore, in this study, we aimed to evaluate the antibacterial activity of hydroalcoholic extracts from the leaves of four medicinal plants: *Moringa oleifera*, *Azadirachta indica*, *Salvia officinalis* and *Mentha spicata*. These plants have a long history of traditional use in the treatment of various conditions, including bacterial infections, and are renowned for their abundance of bioactive compounds that exhibit potential antimicrobial properties. The results of the chromatogram revealed that all extracts exhibited antibacterial activity against the two tested strains, resulting in the formation of inhibition zones around the discs with diameters ranging from 11 to 18 mm. Regarding the Minimum Inhibitory Concentration (MIC), the values ranged from 3.9 to 104.1 mg, while the Minimum Bactericidal Concentration (MBC) ranged from 7.8 to 204 mg. The cumulative results obtained during this study clearly demonstrate that these hydroethanolic extracts possess significant antibacterial potential. However, further studies are needed to isolate and characterize the active compounds responsible for this antibacterial activity.

**Keywords :** medicinal plants / hydroalcoholic extracts / antibacterial activity / leaves.

### ÉTUDES ETHNOBOTANIQUES DANS LE SUD ALGEROIS : CAS DE LA FORÊT DE SAHARI GUEBLI (WILAYA DE DJELFA)

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#### Résumé

Dans le but de connaître les usages traditionnels des plantes dans la wilaya de Djelfa, des enquêtes ethnobotaniques ont été effectuées auprès des différentes catégories d'habitants. La région de Djelfa présente une végétation riche, diversifiée et d'intérêt économique. Notre présente étude a visé la forêt de Sahari Guebli. 110 fiche de questionnaire a été faite auprès des guérisseurs, herboristes et la population autochtone qui ont des connaissances

empiriques sur l'usage des espèces inventoriées en médecine traditionnelle. 80 plantes médicinales ont été recensées et identifiées, répertoriées en 36 familles botaniques, dominées par les Lamiacée, les Apiaceae, les Liliaceae, les Astéraceae, les Poaceae et les Fabaceae. L'étude ethnobotanique a montré aussi que les feuilles sont la partie la plus largement utilisée et que les usages les plus courants sont l'infusion et la décoction pour traiter les maladies de l'appareil digestif et l'appareil respiratoire.

**Mots-clés :** Inventaire floristique, Sahari Guebli, enquête ethnobotanique, Patrimoine médicinaal, Djelfa.

### FLORISTIC INVENTORY OF MEDICINAL PLANTS IN THE TAGHIT REGION

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#### Abstract

The origin of our current medicines' merges with the origin of the knowledge of medicinal plants, that is to say with the origin of phytotherapy. This herbal therapy is based on empirical, ancestral knowledge, and on traditional use, transmitted orally over time. The climate, the geographical situation as well as the immense area of Algeria gives it an original flora composed mainly of wild, spontaneous and endemic plants. Among these plants, there are many important medicinal plants with various therapeutic properties widely used and appreciated by indigenous people in traditional medicine. In order to enhance these bioresources, we carried out a floristic inventory of medicinal plants in the region of Taghit (Bechar) which is located at the western limit of the Grand Erg Occidental, belonging to the Northern Sahara unit, via ethnobotanical surveys with natives, phytotherapists and herbalist. The survey informed us about: the systematics, the geographical distribution, the flowering, the harvest, the botanical description and the therapeutic properties (parts used, bioactive

molecules, modes of administration and therapeutic indications). This work allowed us to inventory 60 species belonging to different botanical families and multiple therapeutic uses, and especially to the importance given to plants by the natives; among the most common botanical families, we mention : *Brassicaceae*, *Capparidaceae*, *Chenopodiaceae* et *Ephedraceae*. As a result, it would be interesting to carry out in-depth studies on the availability of the most popular and most used families, given the therapeutic interest that natives have in these plants; and give more importance to the cultivation, enhancement and exploitation of the medicinal plants that populate our country on the one hand, and carry out studies and scientific experiments in this context in order to better enhance and explore our precious flora.

**Keywords:** inventaire floristique, plantes médicinales, enquêtes ethnobotaniques, autochtones, Taghit.

### ASSESSMENT OF PHYSICO-CHEMICAL AND PHYTO-CHEMICAL PROPERTIES OF SOME ALGERIAN DATE PALM FRUIT VARIETIES

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#### Abstract

Date palm (*Phoenix dactylifera* L.) is the prop of oasis agriculture in the Saharan region. Ten cultivars of Algerian date palm fruits (*Phoenix dactylifera* L.) including Abdel'Azzez, Arechti, Tantboucht, Djouzia, Litima, Timdjuhart, Feggus,

Kahlaya, Hamraya and Cherka were discriminated via physical and chemical properties as well as phytochemical composition with their antioxidant capacity. Significant differences were observed in the characteristics that were studied, permitting for distinguishable ranks among date cultivars. Principal Component Analysis (PCA) revealed a consistent grouping of Arechti, Timdjouhart and Feggus from the rest of varieties.

**Keywords:** *Phoenix dactylifera L., Algerian dates, Date's characteristics, Principal Component Analysis (PCA).*

### ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS IN THE TAZOULT REGION: EXPLORATION AND ANALYSIS.

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#### Abstract

This study focuses on understanding the uses of medicinal plants in traditional medicine by the local inhabitants of the Tazoult area (Batna province). To achieve this, a series of interviews were conducted using 200 questionnaires. The results obtained allowed for the identification of the most commonly used plants (such as wild mint, thyme, and wormwood) among individuals aged 20 to 35. The aerial parts (leaves) are the most frequently used portions, and the majority of recipes are prepared through infusion. The analysis of the collected data has enabled us to compile valuable information about therapeutic uses practiced by the local residents, making this study a valuable source of knowledge about medicinal plants. It can also serve as a foundation for further research in various fields.

**Keywords:** *medicinal plants, Tazoult, ethnobotany, traditional medicine.*

### EVALUATION OF ANTIMICROBIAL ACTIVITY OF *PISTACIA ATLANTICA*

### ESSENTIAL OILS FROM WILAYA OF BATNA IN ALGERIA

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#### Abstract

The botanical genus *Pistacia* includes around fifteen species of shrubs belonging to the Anacardiaceae family; whose origin is Asian or Mediterranean. *Pistacia atlantica* is one of the species of the genus *Pistacia* found in Mount Belezma (Northeast Algeria), in the Wilaya of Batna. In the present study, the antibacterial activity of essential oils (EO) of *P. atlantica* was evaluated. The extraction of essential oils from the fresh leaves and branches of *P. atlantica* is carried out using the hydrodistillation method (Clevenger type) which gave a yield of 0.34%. The study of antibacterial activity by aromagram showed a good inhibitory effect of *P. atlantica* oil on the six reference strains tested, satisfactory inhibition zone diameter values (12; 13; 09; 10; 13 and 10 mm) for bacteria: *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Proteus mirabilis*, *Staphylococcus aureus*, *Bacillus cereus* and *Salmonella enterica*, respectively.

**Keywords:** *Pistacia atlantica, essential oil, antibacterial activity*

### STUDY OF THE STATUS PLANTS IN ARID REGIONS: THE CASE OF THERAPEUTIC BOTANY IN EL ABIODH SIDI CHEIKH, WILAYA D'EL BAYADH -SOUTHWEST ALGERIA

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#### Abstract

Circumscribed in the arid zones of southwest Algeria, the commune of El Abiodh Sidi Cheikh was the subject of a study on ethnobotanical knowledge and the evaluation of the state of the plant cover, particularly on the plants recognized as medicinal in order to frame the main causes at the

origin of their degradation and implement the means necessary for the conservation of their biotope with a view to rational sustainable use. The approach used was based on the collection of data and documents following an ethnobotanical survey of the local population and professional herbalists and the mass of results obtained was statistically analyzed using SPSS software with the aim of the interpretation of the latter. The preliminary analysis demonstrated excessive use of medicinal plants, in particular taxa belonging to the Amaranthaceae and Asteraceae families, for the treatment of certain diseases common in the region such as those of the digestive system or the circulatory system. Morphologically, all parts of plants are used in general, although their use is more accentuated on aerial parts. All these human practices, added to those of grazing, really demonstrate the very degraded state of the vegetation cover of the commune and that the means of preserving this heritage are almost absent. As a future perspective for this contribution and as part of my doctoral training, we plan to follow up on this study by increasing the surface area to be explored to include other municipalities in the wilaya of El Bayadh as part of an inventory. very exhaustive floristics of this pre-Saharan steppe especially since bibliographically in the old stories there are local endemics (in the sense of Trabut, Quezel and Santa or even Ozenda) with the aim of classifying potentially vulnerable sites according to the terms of the international union for nature conservation (IUCN).

**Keywords:** *arid zones, El Abiodh Sidi Cheikh, Ethnobotanical study, medicinal plants, conservation.*

### CURRENT APPLICATIONS OF BIOACTIVE MOLECULES OF CITRUS FRUITS

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### Abstract

Citrus fruits fall into the category of commercially grown fruits that constitute an excellent deposit of phytochemicals and biologically active compounds, with beneficial properties for health. Peels (flavedo and albedo), seeds are considered powerful biological resources for various uses in the food and non-food sectors. The inherent bioactive compounds present in citrus fruits can be used as a food additive, encapsulant, nanoparticle, prebiotic, pectin source, essential oil, polyphenol, carotenoid or dietary fiber. It can also be used as a natural ingredient for cosmetics, medicines, packaging materials and synthetic fuels. Use as bio-absorbers, biofertilizers, biodiesel, biogas and bioethanol are other non-food applications of citrus waste. In this study we are interested in the valorization of the bark of some citrus varieties. Therefore, we carried out a phytochemical study that allowed us to highlight the richness of bark bioactive compounds (phenolic compounds, terpenes, sugars and mucilages). Knowledge of the chemical composition of citrus peel, pulp and whole fruits can encourage their use in the food and pharmaceutical industries.

**Keywords:** *Citrus, phytochemicals, polyphenol, carotenoid, human health*

### L'UTILISATION DE LA BIOTECHNOLOGIE DANS LA LUTTE DURABLE CONTRE LES NEMATODES A KYSTE DE LA POMME DE TERRE

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### Résumé

La biotechnologie agricole est un ensemble de techniques scientifique permet d'assurer un approvisionnement des cultures suffisant et respectueux de l'environnement, Cette étude est une approche des études précédentes afin de clarifier l'importance de la biotechnologie dans la lutte durable contre les nématodes à kyste de la pomme de terre. La pomme de terre est un aliment de base, des résultats d'études menées dans la majorité des pays indiquent que les nématodes ravageurs d'importance économique pour cette culture stratégique sont deux espèces: *Globodera rostochiensis* et *Globodera pallida* et qui sont

dispersés sur tous les continents, en plus de cette situation inquiétante, la majorité des agriculteurs se réfèrent à l'utilisation de produits chimiques, qui sont souvent inefficaces pour ces ravageurs plus particulièrement, cela confirme qu'il est un contrainte majeur à la sécurité alimentaire et nutritionnel, aujourd'hui la biotechnologie nous offre des méthodes tel que la PCR classique, PCR quantitative, la RT-PCR qui a fait ses preuves et a permis de cartographier le fond génétique de ces ravageurs, et nous montre les gènes parasitisme, que leurs connaissance est la clé pour y faire face efficacement et de manière qui garantit de produire nos aliments avec une préservation sûre de la biodiversité.

*Les Mots-clés:* Biotechnologie, durable, Nématode à kyste, Biodiversité

### EVOLUTION OF THE DYNAMICS OF BLACK BEAN APHID *APHIS FABAE* AND ITS PREDATORS ON *VICIA FABA* BEAN CROPS IN THE BISKRA REGION

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#### Abstract

Our study consists of an inventory of the aphid population and its aphidophagous predators on the broad bean crop at Oued M'lili in the Biskra region from January to May 2023. We carried out sampling using Baber pots and yellow sticky traps. This inventory enabled us to identify 03 orders of insect predators divided into three categories. We collected the first ladybugs represented by four species: *Coccinella septempunctata*, *Coccinella undecimpunctata*, *Coccinella bipunctata*, and *Hyppodamia variegata*. The species *Coccinella septempunctata* is the most frequently found in the faba bean field. The final category of predatory species comprises two dominant families divided

between two Syrphidae *Episyrphus balteatus* and *Eupeodes corollae*, and a single species of Cecidomyiidae, *Aphidoletes aphidimyza*. Several environmental factors influenced the population dynamics of the black Bean aphid *Aphis fabae*. Climatic factors such as temperature, humidity, and the host plant's phenology influence variations in aphid population numbers. All these predator species inventoried in the study area are among the most important natural enemies of aphids. They are among the solutions biological control of aphids can provide to protect the bean crop. In the end, to preserve the bean crop from the most harmful aphid species, it was necessary to identify them to establish the best possible biological control program, using predatory species or well-known specific or generalist parasitoids. This control method can reduce the risks resulting from chemical treatments that are harmful to human and animal health and the environment in general.

*Keywords:* Aphids, predators, ladybugs, aphidophage, broad bean, Biskra.

### INFLUENCE OF CLIMATE ON THE PHENOLOGICAL STAGES OF THE DATE PALM (CV.DEGLET-NOUR) IN BISKRA

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#### Abstract

The date palm is cultivated in vast regions of the world with variable pedoclimatic conditions. However, date palm productivity is seriously affected by ongoing climate change. The objective of this study is to fully understand how air temperature influences date palm cultivation and productivity. To understand this phenomenon, monitoring the phenological stages of the date palm (cv.Deglet-Nour) in the north of the Wilaya of Biskra by calculating the thermal accumulation necessary to reach the tamar stage. A comparison of the results was made with those of the year 2018-2019 in the same region. In the Deglet Nour cultivar, dates need 203 days with an estimated

thermal accumulation of 3836.4°C to reach their final stage of maturity.

**Keywords:** *Climate change, Thermal accumulation, Deglet Nour, Tamar stage.*

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## **ETUDE DE L'AGRO-BIODIVERSITE DES OASIS DE BISKRA ( CAS DAÏRA DE TOLGA)**

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### **Résumé**

L'Oasis de Tolga est l'une des plus importantes dans la région des des Ziban (wilayas de Biskra). Le but de notre recherche est de clarifier l'état actuel de l'agrobiodiversité dans l'oasis de Tolga. Sur la base du questionnaire, nous avons mené une enquête auprès de 40 agriculteurs de palmier dattier et sélectionné 10 exploitations agricoles dans chacun des quatre secteurs principaux de la zone d'étude. Les résultats ont montré que les exploitations les plus anciennes, les exploitations mixtes et les jeunes exploitations étaient gérées par des adultes dont l'activité principale était l'agriculture. Au niveau technique, l'utilisation d'engrais organiques est rarement associée à la fertigation. L'irrigation se fait principalement au goutte-à-goutte et certains des travailleurs employés sont des membres de la famille. Les palmiers dattiers forment la première couche, Degret Noor étant la variété la plus cultivée, suivie par Mach Degla, Ghars et quelques variétés courantes. Le deuxième niveau est constitué de figuiers, de vignes et de grenadiers, et le dernier niveau est constitué de cultures maraîchères et fourragères locales. L'élevage est rare dans cette région et limité à l'agriculture vivrière. Il convient de noter que l'agrobiodiversité de la région de Tolga est menacée par la pratique de la monoculture mono-variétale.

**Mots-clés :** *Torga, oasis, agrobiodiversité, strate, palmier dattier, irrigation.*

## Topic 3

### Pest, predation and parasitism in agro-ecosystem

Moderators: Dr. Bengouga, Dr. Absi, Dr. Tahar Chaouach

#### THE ROLE OF HYMENOPTERAN PARASITOID ON THE POPULATION DYNAMICS OF THE ROSY APPLE APHID *DYSAPHIS PLANTAGINEA* IN APPLE ORCHARDS IN A SEMI-ARID REGION (OUM EL BOUAGHI PROVINCE ALGERIA)

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#### Abstract

The rosy apple aphid *Dysaphis plantaginea* is an important pest of apple trees in Oum El Bouaghi province. The knowledge of their specific natural enemies allows optimizing decisions about the use of natural enemies. Parasitoid wasps (Hymenoptera; Aphidinae) have been introduced as biocontrol agents in classical biological control programs of aphids, as an alternative way of the chemical control in many countries. In Oum El Bouaghi province, we noted the presence of three primary parasitoid species hyperparasitoid species; *Aphidius matricariae*, *Diaretiella rapae* and *Lysiphlebus testaceipes* and one hyperparasitoid species *Pachyneuron aphidis*. The parasitoid activity started in the end of April with the *Aphidius matricariae* species until the end of May with the species of *Lysiphlebus testaceipes* and

*Diaretiellarapae* species and the hyperparasitoid *Pachyneuron aphidis*. Our results might be useful in making the best biological control choice.

**Keywords:** Parasitoid, apple, *Dysaphis plantaginea*, Oum El Bouaghi, Algeria.

#### THRIPS FLUCTUATION ON FABA BEAN GROWING

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#### Abstract

Thrips are pests that could cause great damage on crops. Thrips investigation was realized on faba bean growing in the plain of El-Outaya (Biskra, Algeria). Sampling using blue water dishes was conducted on a period of four months during different phenological stages of the cultivation. Results permitted to determine five species on broad bean crop. Among the inventoried fauna, *Aeolothrips intermedius* is a predatory species. Four species (*Melanthrips fuscus*, *Odontothrips confuses*, *Frankliniella occidentalis* and *Haplothrips setiger*) are phytophagous species. Thrips complex fluctuations are dealt through total number caught by species, overall flight curve and



flight curves by species are main information reported in this study.

**Keywords:** Algeria, faba bean, fluctuations, Thrips.

## AEOLOTHRIPS INTERMEDIUS (THYSANOPTERA, AEOLOTHRIPIDAE) UN PREDATEUR FACULTATIF SUR LA FÈVE EN ALGÉRIE

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### Resumé

L'échantillonnage des thrips sur la culture de la fève (*Vicia faba*) mené en conditions Bio durant la campagne 2011/2012 à la station Bio-Ressources d'El-Outaya (Biskra, Algérie) a permis d'identifier des espèces des thrips nuisibles aux légumineuses telles que *Odontothrips confusus*, *Melanthrips fuscus* et le thrips le plus agressif *Frankliniella occidentalis*. En plus ; le prédateur *Aeolothrips intermedius* est également enregistré sur cette culture. Le suivi des espèces des thrips présenté dans cette contribution a été réalisé par des pièges bleus du début du mois de février à la fin du mois de mai et par secouage des plants durant le stade de floraison. Les résultats montrent que l'apparition massive du prédateur a lieu pendant la phase de floraison qui est la plus attractive pour l'insecte ; tandis qu'une fréquence élevée d'*Odontothrips confusus* et de *Frankliniella occidentalis* est enregistrée au stade de maturité des gousses. Pendant la phase de floraison le prédateur a réussi à sédentariser la population d'*Odontothrips confusus* alors qu'au stade de maturité des gousses, il a été moins efficace. Ainsi; *Aeolothrips intermedius* n'est probablement un prédateur efficace que dans un environnement qui fournit une nourriture alternative à base de pollen.

**Mots-clés :** Algerie, *Aeolothrips intermedius*, fève, prédateur, Thrips,

## PRODUCTIVITY OF BIOACTIVE SUBSTANCES OF BACILLUS GENUS STRAINS

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### Abstract

The deterioration of the biological and physicochemical quality of agricultural fields by the excessive use of chemicals such as pesticides, herbicides and fertilizers have several potential adverse impacts on human health and the environment, for this reason it's important to find alternative approaches such as bioactive substances derived from bacteria that can be used against phytopathogens while reducing the impact of toxic substances. The aim of this study was to isolate and identify strains of the *Bacillus* genus capable of producing enzymes and bioactive molecules in order to enhance their production and utilization in biological control. Soil samples were collected from northern Algeria. The isolation of strains was carried out by a series of dilutions, then the solution was mixed and subjected to a thermal shock to maintain only spore-forming bacteria. After cooling, 100 µl of the solution phase were spread on TSA medium and incubated at 37°C for 48 to 72 hours. Various colonies displaying distinct characteristics were seen, purified, and stored. The preliminary screening was based enzymatic activities, the selected hyperperforming strains were identified by morphological characterization, biochemical and molecular methods. 26 strains were selected as high-performance organisms hyperproducing bioactive molecules. The results obtained in this study promote the valorization and exploitation of other secondary metabolites in preparation for future challenges and threats to protect food security, human health and the environment.

**Keywords:** *Bacillus*; Bioactive substances; Health; Environment.

دور المؤسسات الحكومية في حماية البيئة والتنوع البيولوجي

تركية خليفة! ذياب نسيمه  
1. مركز البحث العلمي للمناطق الجافة وشبه الجافة *crstra* بسكرة - الجزائر  
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أدت التي ظهور في بيئة واخلت بالتنوع البيولوجي. ماهي المشكلات البيئية الناجمة عن سوء استغلال الموارد الطبيعية وكيف قامت وزارة البيئة بالبحث حول قانونية وتشريعية وبيئية؟

الكلمات المفتاحية: البيئة - الدور - حماية البيئة - المؤسسات الحكومية

### المخلص

شهدت العقود الأخيرة اهتماما ووعيا متزايدا بإشكالات البيئة في عديد المجتمعات والدول مرده إلى التقدم التكنولوجي الذي يسعى فيه الإنسان لتحقيق أهدافه في التنمية دون المبالاة بالخطر الذي أوجده على التوازن البيئي، بسبب الأفعال اللامسؤولة لها والتي لم تقتصر على البيئة الطبيعية فحسب بل أصبح يهدد المحيط الاجتماعي والحضري بسبب التنافس الصناعي واستنزاف خيرات الطبيعة بلا عقلانية ولا ترشيد. فمعظم صفقات الإنسان للتقدم كانت ضد البيئة، مما أدى إلى ظهور العديد من المشكلات البيئية التي تمثل التهديد الأساسي لحياة الجنس البشري، على اعتبار أننا نعيش على كوكب واحد وأرض واحدة وأي خطر يهدد دولة أو بلدا سيكون محدقا لا محالة بباقي الدول على حد تعبير الإنسانيين "أرض واحدة وحياة واحدة ومصير واحد، إذ يكتسي موضوع حماية البيئة مكانة بارزة واهتماما كبيرا على جميع المستويات والذي يعد نقطة التقاء بين كثير من العلوم منها الأيكولوجيا والقانون والاقتصاد وعلم الاجتماع، هذا الأخير الذي بدأ يسهم في هذا المجال من خلال علم اجتماع البيئة، ويرجع هذا الاهتمام إلى المشكلات البيئية التي بدأت تظهر بوضوح في مطلع السبعينيات من القرن العشرين. لقد أفرز ذلك التوجه اتجاها يؤكد على أن أي محاولة لحل مشكلات البيئة يجب أن تنبع أساسا من معرفة دقيقة بطبيعة العلاقة بين الإنسان وبيئته والمتغيرات الثقافية والبنائية التي تشكل تلك العلاقة وتحددها ومن ثم يتعين أن نبدأ بفهم الإنسان كي نفهم المكان ويكمن التدخل في حماية ووقاية الإنسان ليصبح عنصرا داعما لأدواره في الإنتاج والبناء والإبداع. فهو المتغير المباشر في تشكيل أزمة المكان، كما أنه المتعرض الأول لتأثيراتها المدمرة، ولاشك في أن تعامل الإنسان بطريقة غير لائقة مع ما يحيط به أشياء يؤدي إلى حدوث خلل واضطراب يؤدي إلى قلب للموازين على سطح الأرض، حيث قال تعالى: "ظهر الفساد في البر والبحر بما كسبت أيدي الناس ليذيقهم بعض الذي عملوا لعلهم يرجعون" (سورة الروم، الآية 41). ففساد البيئة بصورة المتعددة مرجعة الأول أيدي الناس وسلوكياتهم، حيث أن كل خلل في النظام البيئي وراءه إنسان، ومما لا جدال فيه أن البقاء القادورات والمخلفات المتنوعة سواء في البر أو البحر وفي غير الأماكن المعدة لها ضرب من ضروب الفساد كما أن تعرية الأرض من كسائها الأخضر وإزالة الغابات وعدم إجراء أي نوع من المعالجة للمخلفات الصناعية المختلفة سائلة كانت أم غازية وترك تلك المخلفات الضارة لتجد طريقها إلى المياه في الأنهار أو البحار أو انبعاث الغازات السامة في الهواء يعد انحرفا سلوكيا أيضا وضربا من ضروب الفساد. وإذا كان البشر تعرضوا للأخطار طوال تاريخهم إلا أن المجتمع الحديث معرض لنمط خاص من الخطر، والذي هو نتيجة عملية التحديث ذاتها التي غيرت من التنظيم الاجتماعي، وإذا كانت هناك أخطار نتيجة لأسباب طبيعية كالزلازل والفيضانات والتي لها آثار سلبية على الناس، إلا أن الأخطار الحديثة من ناحية أخرى هي نتاج النشاط الإنساني في الأساس، والذي من خلال هذه المداخلة سنبرز أهم السلوكيات التي قام بها الإنسان والتي

## FIRST RECORD OF THE GENUS *SCELIO* (HYMENOPTERA: SCELIONIDAE, SCELIONINAE) EGG-PARASITOIDS OF ACRIDIDAE IN SOUTHEASTERN ALGERIA.

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### Abstract

Often, there is insufficient information on the auxiliary pests of the agricultural areas in Algeria; the contribution is to declare the first record of parasitoid species against Acrididae pests in the arid region of our country. The collection of species was made in the region of Biskra (south-east of the Algerian Sahara) in two experimental biological sites of tomato crops (El Alia and El Hadjeb). The insects were collected randomly using yellow water traps added with a few drops of liquid soap ("von Moericke", Ø = 27 cm, h = 10 cm). Two egg-parasitoids species *Scelio poecilopterus* and *Scelio vulgaris* of the genus *Scelio* have been identified as the first records of this group in Algeria. The distributions and confirmations of their morphological characteristics are demonstrated, together with the identification of the available hosts of this genus in the Biskra region.

**Keywords:** *Scelio*, first record, *Scelio poecilopterus*, *Scelio vulgaris*, egg-parasitoides, Biskra.

## INVENTORY OF THE AUXILIARY ENTOMOFAUNA AND VARIATION IN THE TEMPORAL ABUNDANCE OF THE MOST IMPORTANT ENTOMOPHAGES IN TWO CITRUS ORCHARDS.

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## Abstract

The entomophagous communities were studied over a period of 5 months, at two Citrus orchards surrounded by various cultivated plots and located in the Rouïba region. Sampling of useful taxa was done by mowing the herbaceous layer and capturing with yellow sticky traps in the canopy of the lemon and nectarine / orange trees. The results showed an important diversity of auxiliary communities in both orchards. On lemon trees, entomofaunal availability is represented by a total richness of 48 species distributed in 1079 individuals and 20 families dominated by the Aphelinidae (61.53%). On nectarine/orange trees, the entomofaunal availability was less important with a species richness of only 44 taxons distributed in 547 individuals and 19 families also dominated by Aphelinidae (26.70%) followed by the family Encyrtidae (15.35%) and Platygastriidae (15.17%). The assemblages of predators and parasitoids are mainly represented by aphidiphagous and coccidiphagous specialists who are unequally distributed over time and space. The richness of these species seems conditioned by the availability of their prey and the surface of the habitat as well as by the vicinity of the cultivated parcels and the spontaneous vegetation between these parcels, the structure of the landscape of the parcel and also the temperatures. Local orchard conditions may influence the distribution of entomophagous communities. Spontaneous plants found either in or around orchards appear to be alternative hosts and prey populations, which allows developmental continuity for entomophagous communities.

**Keywords:** biodiversity, entomophagous communities, yellow sticky traps, Spontaneous plants.

## MUSHROOM FLIES (DIPTERA: SCIARIDAE), THE INVASIVE PESTS OF AGRICULTURAL AGRO-ECOSYSTEMS IN THE DJELFA REGION.

## Abstract

Mushroom flies, often known as fungus gnats, are pesky members of the Sciaridae family of flies. Since they are mostly Mycophagous and are also referred to as opportunistic herbivores, they are serious plant pests. This poses a problem because they primarily impact agro-ecosystems. They damage the plant both directly through larval feeding and indirectly by opening up entry points for plant diseases. Additionally, they cause plant diseases with fungi. Sciaridae family adults were found in the Djelfa region when monitoring pest species found in agro-ecosystems. The sampling was carried out from February 2021 to February 2022, by yellow traps. The study's results revealed that there are differences in the relative abundance of mushroom flies in the sites between AR= 9.09% and AR= 0.95% in two sites. Based on Shannon-Wiener Index (H'), the stations presented a weak diversity of species (H' = 1.85 and 2.67 bite) and a high regularity of individuals (E= 0.79 and 0.80).

**Keywords:** Pest; Agro-ecosystems; Sciaridae; Diptera; Djelfa.

## SPATIAL AND TEMPORAL EVOLUTION OF WHITEFLY INFESTATIONS ASSOCIATED WITH GREENHOUSE CHILLI CULTIVATION IN BISKRA

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## Abstract

Due to the transmission of viruses, whiteflies cause a major problem on greenhouse crops. The present study aims to acquire bio-ecological data to be used in control programs. During the 2021/2022 season, the Ain Naga commune was chosen as the study site. A chilli greenhouse was selected for sample collection and pepper leaves were sampled once every two weeks to assess infestation levels. After each treatment, the effectiveness of the farmers' products was also assessed. Furthermore, the pest's food preference and distribution in the host plant were studied at three leaf stages. In January, attacks were the most severe (46.76%). Acetamiprid was the most effective active ingredient, with an effectiveness rate of 26.85% after the treatment. Moreover, the basal stage was the most preferred by the insect for oviposition and feeding. The results indicate that infestations still remain high due to abusive and unreasoned use of pesticides. As a consequence, the pests have developed resistance, and their enemies have been destroyed.

**Keywords:** *bioecology, Biskra, control, infestation, whiteflies.*

## BIODIVERSITE ET REPARTITION DES AMPHIPODES EPIGEES DES EAUX DOUCE DE LA REGION DE SOUK-AHRAS (NORD-EST ALGERIEN)

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## Résumé :

L'un des points les plus chauds et les plus importants de la biodiversité mondiale de la faune aquatique en eaux douces est la région méditerranéenne. La connaissance de la variété des crustacés aquatiques en Algérie est restreinte. Le but de notre étude est d'examiner la variété et la répartition des amphipodes d'épiguée d'eau douce qui ont été échantillonnés dans huit stations situées dans le nord-est de l'Algérie, dans la wilaya de Souk Ahras. Les résultats de l'examen systématique ont montré une grande diversité pour 520 individus,

avec 3 groupes distincts de "Echinogammarus". Au final, nous avons découvert cinq espèces différentes, dont une inconnue. Chaque espèce peut exister dans plusieurs stations et chaque station ne peut contenir qu'une seule. Nous pouvons tester des idées sur la distribution comparative d'espèces spécifiques.

**Mots-clés :** *Biodiversité, Amphipodes, Souk Ahras, systématique, Echinogammarus.*

## DIAGNOSIS OF SOME XYLOPHAGOUS INSECTS OF THE ATLAS CEDAR IN THE BELEZMA BATNA NATIONAL PARK

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## Abstract :

The Atlas cedar, *Cedrus atlantica* Manetti, is a species of the Atlas in North Africa and endemic to this region. The largest areas are found in Morocco and Algeria. In Algeria, its area is more fragmented where it is mainly found in the mountains of Ouarsenis, the Mitidjien Atlas and the Aurès. This species occupies in the region of the Belezma Batna National Park, an area of 5500 ha at altitudes varying between 1400 and 2200 m above sea level. Unfortunately, currently, drills based on this noble species pose a real problem with the establishment of many insect pests, including the most formidable "xylophagous" insects, thus causing massive dieback throughout the Algerian territory. This study concerns one of the most important cedar groves of the Belezma national park, that of Djebel Boumerzoug located in the territory of the commune of Oued El Chaâba, Batna, where the impact of xylophages and upheavals in the climate is much stronger than this drought-sensitive forest species, which makes it susceptible to pest attacks. The method used in our study is that the diagnosis of the xylophagous insect attacks through the description of the different galleries dug by them. Thus, it is often possible to simply identify a xylophagous species by the examination of its fresh

or old galleries, where the interest to describe; the type of galleries traced by each principal studied species, by using a certain number of measurements. Thus, our investigations allowed us to identify 11 xylophagous insects which turned out to be dangerous and expanding, belonging to 3 families: Scolytidae, Buprestidae and Cerambycidae. The Buprestidae and Cerambycidae are in the majority with total appearance rates of 65.94% and 21.47% respectively. The remaining family is that of Scolytidae represented by a relatively low overall rate of occurrence; of 12.59%. This study shows that a diagnosis of attacks on the attacked tree, even late, is essential because, beyond the individual, it is the stand that is threatened. The diagnosis of attacks on a few individuals is one of the basic elements of the preventive fight against an epidemic. In perspective we can say that in these old cedar groves of the park where the biocoenoses are complex, research must be undertaken in order to inventory potentially dangerous insects such as xylophages and the necessary techniques and means likely to be applied or installed in the areas. where a species has proven dangerous.

**Keywords:** *Xylophagous, park, Belezma, Algeria, decline, galleries*

### **BIODIVERSITY OF THE ENTOMOFAUNA OF THE ELMACHROUHA AND OULED DRISS FOREST IN SOUK AHRAS (ALGERIA)**

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#### **Abstract**

The Cork Oak (*Quercus suber*. L), endemic species of the Mediterranean basin whose ecological and economic interest is largely established, has been undergoing a wave of dieback for many years. The deterioration of the sanitary state of these olive groves results from the interaction of several biotic

and abiotic factors that still remain poorly known in Algeria. We conducted an inventory at the forest level, We proceeded to the different harvesting techniques commonly used in the field of entomology: Visual harvesting, Barber traps and the Japanese umbrella. In 2019, We recorded in the Ouled Bechih forest of Elmachrouha 47 species. The insect species recorded are divided between 42 families and 11 taxonomic orders: Coleoptera, Hemiptera, Homoptera, Dermaptera, Hymenoptera, Orthoptera and Lepidoptera, Diptera, Spiders, Odonata, Isopods, The most represented group is the order of the Coleoptera which counts 14 species. In 2020 in the cork oak forest of Bouchahda from Ouled Driss to Souk-Ahras, we highlighted 84 species spread over 48 families, divided into 13 orders: (Coleoptera, Hemiptera, Dermaptera, Hymenoptera, Orthoptera and Lepidoptera, Diptera, Spiders, Thysanoptera, Blattoptera, Stylommatophore, Pseudoscorpion, Julida) The most represented group is the order of Beetles which has 28 species distributed, This harvest allowed us to identify a high number of species especially in Ouled driss compared to Elmachrouha. The Shannon Diversity index shows that the population of these forests is diverse and the environment is favorable to the installation of a significant number of pests. These figures are relatively important if we compare them to those of other inventories carried out in Algeria. The high value of diversity and equitability in the two forests reveals the richness and complexity of the settlement studied with a balance in the distribution of species abundance. Then an important activity of defoliators and xylophages in the studied berry groves.

**Keywords:** *Biodiversity; Decline; Cork oak; Inventory; Entomofauna ;Souk-Ahras.*

## Topic 4

### Pest control, monitoring and innovation

Moderators: Dr. Boultif, Dr. Meradi

#### ACTINOBACTERIAL STRAINS BIODIVERSITY IN ARID LANDS AND THEIR FUNCTIONAL ATTRIBUTES

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#### Abstract

The objective of this study is to investigate the cultivable actinobacterial strains inhabiting the roots and rhizosphere soil of *Artemisia herba-alba* Asso, which is a significant element of the flora found in the dry steppes. The study focused on examining the functional features of the isolates in relation to their antifungal capabilities, *in vitro* growth-promotion properties, and enzymatic capacities. One out of all the tested strains, *Streptomyces* sp. BKS30 showed promising antifungal activities. This strain was in-depth

characterized morphologically and biochemically. The filtrate of strain BKS30 showed antifungal activity against all the target-fungi, with a strong activity for *Fusarium culmorum* (30.33 mm) followed by a moderate activity against *Fusarium oxysporum* f.sp. *lycopersici* (25.33 mm) and low activity against the rest of the tested micro-fungi. The butanolic extract, on the other hand, also showed an antifungal activity against all the tested micro-fungi with a moderate activity with inhibition diameters towards *Fol* of 27 mm followed by *Fc* with 26.67 mm and *Aw* as well as *Fusarium oxysporum* f.sp. *albedinis* each with inhibition zones of 22.33 mm. This strain displayed multiple biological traits, which make it a good candidate to further be tested as potential fertilizers, biostimulants and for plant protection.

**Keywords** : Actinobacteria, Arid lands, PGP traits, Biocontrol.

#### REVIEW ON THE MAIN ANTIFUNGAL ACTIVITIES OF ARTEMISIA HERBA ALBA AND ARTEMISIA CAMPESTRIS

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## Abstract

*Artemisia* is a medicinal and aromatic plant, used for a long time in traditional Algerian medicine. Despite its potential biological effects, it is not sufficiently exploited. The present work is devoted to a bibliographical analysis aiming to characterize the main antifungal activities of two types of this plant *Artemisia herba alba* and *Artemisia campestris*. The Essential Oil of *Artemisia herba alba*, has a very significant antifungal activity translated by percentages of inhibition exceeding 75% against the strains *aspergillus niger*, *Fusarium oxysporum* et *Rhizopus stolonifer*, this is due to the presence of major compounds such as  $\alpha$  and  $\beta$ -thujone. The antifungal activity of *Artemisia herba alba* has also been associated with two large volatile compounds isolated from the fresh leaves of the plant: carvone and piperitone, this antifungal activity is remarkable against *Penicillium citrinum* and *Mucora rouxii*. In addition to many phytopathogenic fungal species including *Fusarium Oxysporum* f. sp *radicis lycopersici* are sensitive to the inhibitory activity of natural extracts from *Artemisia herba alba*. Significant antifungal activities ( $\approx 87\%$  inhibition) of the essential oil of *Artemisia campestris* on different strains of molds have been revealed. This is probably due to the presence of certain majority compounds such as  $\mu$  pinene known for its antifungal activity. It appears that *Artemisia* could be valued more particularly in the fight against different forms of infestations and that the antifungal efficacy could be explained by the richness of this spontaneous plant in aromatic compounds.

**Keywords:** *Artemisia herba alba*, *Artemisia campestris*, antifungal activities, biological activities, bioactive compounds.

## ARTHROPOD'S DIVERSITY POTENTIAL IN TWO DIFFERENT CITRUS CROPPING SYSTEM IN ALGERIA

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## Abstract

Over the last decades, Algerian citrus industry has benefited from significant public subsidies for renewing old plantations. As a result, some growers have switched from the conventional extensive cropping system to a new intensive production system. The relative management systems have their relevant impact on insect diversity and abundance; consequently, they affect ecological stability and biodiversity. In this context, a comparative study was carried out in two managed citrus orchards in Chlef Valleys aimed to assess the insect diversity and abundance in those two areas. Overall, 717 insects belonging to 62 species were identified in the extensive unweeded orchard with a Shannon diversity index of 2.94, whereas only 394 insects belonging to 32 species were recorded in the intensive weeded orchard. Concerning the flora, 10 species were identified in the extensive orchard, permitting the establishment of diverse insect species compared to the intensive managed orchard. Non-parametric tests analysis of the recorded data showed significant correlation between cropping systems and arthropod species abundance and richness, likewise, similarity indices evidenced clear differences between the studied agroecosystems. However, general linear models tests showed no correlation of weeding methods on some diversity estimators. Nevertheless, main diversity parameters indicated that extensive approach maintained better insect diversity and allowed different insect functional groups to live and interact, enhanced by naturally occurring plants present within and surrounding the studied orchards. Diversity potential in the extensive management of citrus crop highlighted during this survey, gives a concrete insight that conversion

from extensive to organic production system will be fluent, safe and promising.

**Keywords :** *Citrus, cropping system, conversion, insect diversity, Algeria*

## THE INFLUENCE OF GEOGRAPHICAL ORIGIN ON PHENOLIC AND FLAVONOID CONTENTS OF ALGERIAN APIS MELLIFERA PROPOLIS

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### Abstract

The variety of geographic areas and climates leads to a diverse mix of vegetation. This great diversity of botanical species can result in increased diversity of propolis that is produced by bees from several plant exudates. This study, therefore, aimed to determine the impact of geographical origin on phenolic and flavonoid contents of eight methanolic extracts of propolis collected from beehives located at humid, sub-humid and semi-arid regions of Algeria. The total phenolic and flavonoid contents were evaluated using Folin-Ciocalteu and aluminium chloride assays, respectively. The results showed a variability in bioactive content among propolis samples. The phenolic levels of propolis extracts ranged from  $32.85 \pm 3.26$  to  $561.99 \pm 3.50$   $\mu\text{g GAE/mg E}$  while the flavonoid levels were within the range  $1.91 \pm 0.08$ – $76.98 \pm 0.26$   $\mu\text{g QE/mg E}$ . The highest phenolic content was found in propolis samples from sub-humid and humid regions with amounts ranging from 504.21 to 561.99  $\mu\text{g EAG/mg}$  of extract, whereas the highest content of flavonoids was found in samples from sub-humid regions with values ranged from 60.43 to 76.98  $\mu\text{g EQ/mg}$  of extract. Thus, propolis from sub-humid zones is the richest source in phenolic and flavonoid compounds.

**Keywords:** *propolis, phenolic content, flavonoids*

## USE OF FOOD TRAPS AS METHODS OF OLIVE FLY CONTROL IN THE M'SILA REGION (ALGERIA)

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### Abstract

*Bactrocera oleae* (Rossi, 1790) is the most dangerous olive pest in the Mediterranean region. This study reports on the control of the olive fly using attraction, destruction, and mass-trapping devices in two olive farms in the M'Sila region (Algeria). The study period extends from February to August 2023. This study focuses on the effects of temperature (maximum and minimum) on the abundance of olive fruit fly, and the performance of the lure and kills system. The attraction traps used in the fight against the olive fly are of the McPhail type, baited with a 3% aqueous solution of diammonium phosphate to capture both male and female adults, which is attractive to both sexes. The results showed a different number of catches in the two farms in relation to the temperature (maximum and minimum) and a significant negative correlation with the abundance of adults in the two study sites. This contribution could help to optimize the application schedule of the olive fruit protection program, especially within the framework of integrated pest management, thus reducing the costs of chemical sprays and reducing the risk of unintended effects that can contaminate the environment and harm beneficial entomofauna.

**Keywords:** *Bactrocera oleae, food attraction traps, control, temperature, olive, M'Sila.*

## CONTRIBUTION A L'ETUDE DE L'INFLUENCE D'UN FONGICIDE ET DU



## STRESS HYDRIQUE, SUR LA GERMINATION ET LA CROISSANCE DE QUELQUES VARIETES DE *D'AVENA SATIVA* L. ET DE *PISUM SATIVUM* L.

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### Résumé :

Les céréales, y compris les légumineuses, sont considérées comme des cultures primaires cependant, leur production demeure très faible et reste loin de subvenir aux besoins de l'homme et de l'animal dans certains pays, notamment l'Algérie à cause de plusieurs stress biotiques et abiotiques. L'objectif du présent travail consiste à étudier le comportement des deux variétés d'*Avena sativa* L. et deux variétés de *Pisum sativum* L. face à un fongicide, le Mancozèbe, largement utilisé en Algérie et au stress hydrique. A cet effet, nous avons ces deux espèces sous trois concentrations de PEG 6000 afin de stimuler le stress hydrique ainsi que trois doses de Mancozèbe dans le but d'estimer le taux de germination et la croissance des génotypes étudiés. Les résultats obtenus montrent que le Mancozèbe et le PEG n'ont eu aucun effet sur le taux de germination des deux espèces où elle présente un pouvoir germinatif avoisinant 90% sous les différents traitements testés, alors que ces deux traitements ont des effets positifs et négatifs sur la croissance des plantules selon la dose et la variété, où on peut signaler que le stress osmotique à 15% diminue la croissance de la variété Lakhhal de l'espèce *Avena sativa* L. avec un taux d'inhibition de 8% néanmoins la variété Prévision de la même espèce. La variété Sefrou de l'espèce *Pisum sativum* L. peut être considérée comme un précieux cultivar tolérant à la sécheresse vu qu'il a montré un potentiel génétique pour continuer à germer et à se croître en cas de stress hydrique sévère.

**Mots-clés** : *Avena sativa* L., *Pisum sativum* L., Mancozèbe, PEG, Germination.

### LARVICIDAL ACTIVITY OF MEDICINAL PLANT EXTRACT AGAINST *CULEX PIPIENS*

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### Abstract

*Pulicaria odora* possesses notable pharmacological activity, rendering it a promising candidate for the extraction of bioactive chemicals, particularly phenolic compounds. The objective of this work was to conduct a qualitative analysis using (LC-ESI-MS/MS) to identify and characterize the polyphenols present in the leaf extract of *P. odora* (POE). Additionally, the study aimed to assess the larvicidal efficacy of these compounds. Furthermore, the quantification of the overall phenolic content, total flavonoid content, and the capacity to scavenge free radicals in the samples was conducted. Ten phenolic compounds were discovered in the hydro-alcoholic extract of *P. odora*. The compounds identified in the study were esculin, sinapic acid, myricetin, coumarin, epicatechin, catechin, genistein, vanillic acid, naringenin, and kaempferol. The plant material was extracted via maceration. The extract yields 17.77%. The quantitative analysis was conducted to determine the polyphenol content using the Folin-Ciocalteu method. The results showed a polyphenol content of 2.27 mg Eq AG/g of DE. Additionally, the flavonoid content in the extract was determined using the ALCL3 method, yielding a result of 0.70 mg Eq Q/g of DE. The spectrophotometric method was employed to assess the radical scavenging activity of the extract using DPPH as the substrate. The IC50 values for the *Pulicaria* extract were determined to be 0.022 µg/ml and 0.037 µg/ml for ascorbic acid. The larvicidal efficacy of (POE) against *Culex pipiens* larvae, was investigated. The results demonstrate a significant dose-dependent mortality rate when exposed to four different doses: 0.0125, 0.25, 0.5, and 1mg/ml. In conclusion, the extract derived from *P. odora* exhibits significant potential as a viable natural biocide, primarily attributed to its substantial presence of phenolic compounds.

**Keywords**: *Pulicaria odora*, *Culex pipiens*, Larvicidal activity, Polyphenolic extract.

## EFFECT OF SOLVENT AND EXTRACTION TECHNIQUE ON COMPOSITION AND ANTIOXIDANT ACTIVITY OF *LEPIDIUM SATIVUM* AERIAN PART

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### Abstract

The valorization of bioactive substances of plant origin consists in using the compounds present in plants for various applications, such as food, cosmetics, pharmacology, agriculture and industry. The aim of this study was to determine the phenol and flavonoid content of different extracts from the aerial parts of *Lepidium sativum*, and to evaluate their antioxidant capacity using three different extraction methods: Soxhlet-assisted extraction, ultrasound-assisted extraction and maceration. Quantitative estimations of phenols and flavonoids showed that the methanolic extract presented the highest contents with  $149.84 \pm 2.1 \mu\text{g EAG/mg MS}$  and the chloro-formic extract  $25.11 \pm 8 \mu\text{g EQ/mg MS}$  respectively. For the DPPH test, the methanolic and aqueous fractions obtained by maceration also showed high antioxidant capacities. The scavenging activity assessed by ABTS showed that the aqueous fraction of aerial parts extracted by soxhlet-assisted extraction was the most potent compared with the other fractions tested.

**Keywords:** Extraction ; phenols ; flavonoids ; antioxidant ; DPPH ; *Lepidium sativum*

## BIOLOGICAL CONTROL TRIAL AGAINST *ECTOMYELOIS CERATONIAE* USING THE PARASITOID *BRACON HEBETOR*

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### Abstract

The date palm (*Phoenix dactylifera*) is the cornerstone of the rural economy in arid and Saharan regions, due to its fruit. Unfortunately, the significant date production has declined over the years due to attacks from various pests such as the date moth (*Ectomyelois ceratoniae*). This latter is among the most devastating pests of date palm production. The study of the parasitic complex of *E. ceratoniae* reveals the coexistence of a species of native parasitoids; *Bracon hebetor* Say, an ectoparasitoid insect of lepidopteran larvae, which serves as an important natural control agent. In this context, our work consists in studying some biological parameters of the parasitoid *B.hebetor* on *E.ceratoniae* caterpillars. We used three petri dishes, each containing 25, 50, and 100 *E. ceratoniae* caterpillars, respectively. Our results demonstrate that *B. hebetor* paralyzes 100% of the caterpillars after 45 hours for the 25-50 caterpillar groups and after 51 hours for the 100 caterpillar group. The number of eggs laid by *B. hebetor* and the number of hatched eggs increase as the number of caterpillars increases. Eggs were deposited on 24.34%, 39.48%, and 35.10% of the caterpillars in the 25, 50, and 100 caterpillar groups, respectively. The average life cycle of *B. hebetor* is 14 days for all groups. Therefore, *B. hebetor* represents a biological control method against *E. ceratoniae*, a major pest of date palm trees.

**Keywords:** Dates, *Bracon hebetor*, *Ectomyelois ceratoniae*, parasitism, biological control.

## MAPPING THE CURRENT AND FUTURE HABITAT SUITABILITY OF THREE NATIVE SHRUBS IN THE ALGERIAN STEPPE UNDER CLIMATE CHANGE CONDITIONS

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### Abstract

Among the basic principles of ecological restoration and recommendations for reforestation and restoration programmes, local species should be encouraged in most cases. Thus, the definition of the geographical extent of the areas that are favourable to the presence of these species in current climatic conditions and the understanding of the impacts of climate change on the geographical distribution of these local species constitutes a prerequisite for any reform aimed at their introduction into reforestation programmes. This study looked at modelling the potential distribution of three steppe shrubs (*Retama raetama* (Forssk.) Webb, *Ziziphus lotus* (L.) Lam, *Rhus tripartitum* (Ucria) D.C) using the Maxent method in the Algerian steppe. The generated model has shown to be accurate (AUC values range from 0.91 to 0.98). The Maxent modelling carried out as part of this research is a good decision-making tool for the territory's managers in terms of restoration planning, taking into account the species of origin and carrying out any reforestation programme at the local scale.

**Keywords :** Algerian steppe, native shrubs, climate change, habitat suitability.

### VALORIZATION OF ALGERIAN LOCAL RESOURCES AND IMPORTANCE OF BIO-ACTIVE SUBSTANCES: CASE OF DATE WASTE (*PHOENIX DACTYLIFERA* L.)

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#### Abstract

The date palm (*Phoenix dactylifera* L.) which is the pivot of oasian agriculture, offers a range of agricultural by-products, which remains very poorly exploited and still in a traditional way in the ration of small ruminants. Date waste is the result of sorting after harvest, accounting for 25% of annual date production. This co-product of poor quality and low market value has been shown to be rich in various secondary metabolites endowed with anti-oxidant and anti-radical properties. In order to

make the most of our Algerian oasian flora, a potential source of bioactive natural molecules, a chemical and biological study of three parts of the fruit of the *Phoenix dactylifera* plant ('N' stone, 'P' pulp and 'N+P' date waste) was carried out. After the date harvest (November 2021), a representative sample of date waste (5kg) is recovered from palm groves in the Biskra region (Algeria), for the purpose of conducting forage and phytochemical analyses to assess the nutritional value and secondary metabolites responsible for biological activity. These tests are carried out at the Constantine CRBT biotechnology research centre and at LURPHATOX. Based on Topçu et al. (2007) and Müller et al. (2010), total polyphenol content (TPC) and total flavonoid content (TFC) were determined. According to AOAC (1999), forage analyses were conducted on the determination of dry matter (DM), organic matter (OM), raw ash (CT), Crude protein (MAT) by the Kjeldahl method, parietal carbohydrates (NDF, ADF and ADL) by the Van Soest method, raw cellulose (CT) by the Weende and method and total fat (GM) by the continuous Soxhlet extraction method. The antioxidant activity of extracts (crude and fractions) of declassified dates was evaluated and compared using spectrophotometric methods: the method for determining the oxidation of radical 2,2-diphenyl-1-picrylhydrazyl (DPPH) (Blois 1958), the trapping activity of the radical cation ABTS (2,2'-azino-bis[3-ethylbenzothiazoline-6-sulfonate]) (Re et al., 1999) and the reduction of the copper-neocuproen complex (CUPRAC) (Apak et al., 2004) and the 50% inhibitory concentration (IC50) is determined. The forage analysis of the date waste supplemented in the sheep ration shows a low moisture content, crude protein and fat content but rich in mineral matter. Dietary fibre assays indicate low levels of NDF and ADF residues, in contrast to ADL, which indicates high lignification of this co-product. The phytochemical assay revealed a high content of polyphenols for the P+N part of the Mec phase (methyl ethyl ketone) as well as flavonoids for the N part of the Mec fraction. In addition, the Mec phase of date waste showed a better anti-free radical activity with the DPPH test. The bioactive substances isolated in the stone fractions showed

excellent antioxidant activity with the ABTS test. Moreover, the raw extract of N showed an excellent anti-oxidant activity superior to that of the standard BHT (Butyl hydroxy toluene) with the CUPRAC test. Thus, despite the low nitrogen content, these date scraps are fruits rich in dietary fiber and biologically active antioxidants, giving them a great pharmacological interest.

**Keywords:** *Phoenix dactylifera* - Date waste - herbal medicine.

### POSTHARVEST CONTROL OF THE DATE MOTH *ECTOMYELOIS CERATONIAE* (LEPIDOPTERA: PYRALIDAE) USING *THYMUS ALGERIENSIS* AND *THYMUS HYEMALIS* ESSENTIAL OILS

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#### Abstract

The present work aims at evaluating the insecticidal activity of *T. algeriensis* and *T. hyemalis* (Lamiaceae) essential oils against different life stages of *Eceratoniae ceratoniae* Zeller (Lepidoptera: Pyralidae) in controlled conditions. Essential oil vapours were extracted by hydrodistillation and analysed by gas chromatography–mass spectrometry technique (GC–MS). Camphor (37.29%), 1,8-cineole (11.12%), camphene (7.81%), myrcene (7.13%) and borneol (5.54%) were obtained as major compounds in the essential oil of *T. algeriensis*, while the main essential oil compounds of *T. hyemalis* were 1,8-cineole (34.17%), camphor (8.33%) and camphene (7.11%). Ovicidal activity of oils was studied by topical application, while the adulticidal and larvicidal activities were assessed by fumigation and ingestion. The results revealed that *T. hyemalis* oil was more effective as compared to *T. algeriensis*. The exposure to *T. hyemalis* vapour caused 0% of hatching rate at the concentration of 2.5 mg/mL, while at the same

concentration, the hatching rate was 15% when eggs were exposed to *T. algeriensis* oil. The adulticidal activity of both oils decreased with the increase in concentration or exposure time. The corresponding LC<sub>50</sub> values were found to be 0.11 and 0.19 mg/mL respectively for *T. hyemalis* and *T. algeriensis*. Young larvae L1 seemed to be more resistant to both essential oils in the antifeedant bioassay (LC<sub>50</sub> = 2.75 mg/mL for *T. hyemalis* and 5.78 mg/mL for *T. algeriensis*). Overall, this work showed the efficacy of essential oils from plants of Mediterranean origin that could be used as an alternative to synthetic insecticides for the managing of *E. ceratoniae*.

**Keywords:** *Ectomyelois ceratoniae*; Essential oils; Insecticidal activity; Lethal concentration; *Thymus algeriensis*.

### INFLUENCE OF DIFFERENT FACTORS ON THE POPULATION DYNAMICS OF THE OLIVE FLY *BACTROCERA OLEAE* (DIPTERA: TEPHRITIDAE) IN THE BISKRA REGION

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#### Abstract

The olive fruit fly belongs to the Tephritidae family, and this insect can cause significant economic losses, mainly when its larvae develop in olive fruit with a high market value. We encouraged the application of specific protection measures against this pest that are already well known, such as early harvesting during seasons of high infestation, tillage to eliminate pupae by exposing them to difficult climatic conditions and natural enemies, water management in irrigation perimeter is indispensable in the environment of the olive fly, the use of yellow sticky traps, and pheromone traps

are also responsible for declining population dynamics and reducing their damage, the management of agricultural practices is therefore decisive in maintaining or even restoring olive production on a national scale, while these alternative solutions reduce the quantities of pesticides used. Mass trapping is also giving encouraging results. Adopting a biological approach to pest control in their orchards by maintaining a certain number of beneficial auxiliary fauna, particularly the various parasitoids, appropriate farming practices can help reduce olive fly populations. For example, managing crop residues and weeds can limit breeding sites and refuges for flies. In addition, regular trimming of trees can facilitate access to fruit for trapping and control methods. Setting up regular monitoring programs so that infestations can be detected early and appropriate measures are taken to control them, achieved through trapping methods, biological control, and adapted agricultural practices. An integrated approach and continuous vigilance are essential to maintain healthy, productive olive plantations. Finally, the integrated use of these techniques can contribute to better managing this pest fly in olive orchards. It should be stressed that prevention and monitoring are critical elements in the fight against Controlling *Bactrocera oleae* is a continuous and complex process, requiring a combination of different methods adapted to each situation.

**Keywords:** Olive, Pests, irrigation, environment, traps, parasitoids.

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### PROMISING PHYTOCHEMICALS AND PLANT-DERIVED ESSENTIAL OILS IN FOOD PRESERVATION: CURRENT STATUS AND CHALLENGES

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#### Abstract

The use of phytochemicals and plant-derived essential oils (EO) as natural food preservatives has gained important attention due to growing

consumer claim for safer and more healthy functional foods. EOs, derived from various medicinal and aromatic plant sources, have demonstrated potential as potent and effective natural food preservatives due to their antibacterial, antifungal and antioxidant effects. Bioactive compounds and EO contain a complex mixture of phytochemicals such as terpenes, phenols, ketones, esters and aldehydes, which contribute to their inhibitory effect against various bacterial and fungal strains. These chemical compounds can disrupt the integrity of bacterial and fungal cell membranes, inhibit the activity of proteins, and interfere with important cellular reactions, eventually leading to the inhibition of microbial growth and spoilage. It is worth noting that the efficiency and specific uses of these natural products and their chemical compounds as preservatives can vary depending on different factors such as solubility, concentration, interactions, stability, food matrix, pH, storage conditions and organoleptic impacts. This current presentation aims to explain and discuss the potential application of plant-derived EO and their major compounds (terpenes) as natural food preservatives, focusing on their mechanisms of action, effectiveness against foodborne pathogens, and potential applications in different food matrices. Furthermore, phytochemicals and EO have synergistic actions when associated with other chemical or physical preservation methods. Finally, additional investigations are needed to improve the use of natural product compounds as food preservative, and to assess their impacts on food safety and quality attributes.

**Keywords:** Food safety and quality, Natural food preservatives, Plant-derived essential oils, Oxygenated terpenes, Phytochemicals

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### ALTERNATIVE SOLUTION TO PESTICIDES FOR WEED CONTROL UNDER OASIS ECOSYSTEM.

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#### Abstract



Algerian oases are complex and fragile agro-ecosystems in which the date palm constitutes the central pivot. Associated with all these crops, weedy herbaceous vegetation competing for water, light, nutrients and development space can have a direct or indirect negative effect on production (presence of pests and transmission of diseases). The difficulty in controlling these competing plants constitutes one of the major reasons which force farmers to abandon old palm groves "plots" especially infested by Diss (*Cynodont dactylon*) and *Cyperus rotundus* (case of the Ziban oasis), to create new farms. Integrated pest management is one of the integrated pest management strategies that uses preventive, cultural, mechanical, biological and chemical techniques in combination to obtain a sustainable production system that takes into account concerns relating to the economy,

health and the environment (diversity and diseases). Integrated control of weed flora under palm trees is based on combinations of techniques aimed at limiting and reducing the potential for weed infestation under palm trees by reducing the use of herbicide treatments. This is only possible by reducing the potential for infestation (surface seed stock), avoiding periods of preferential emergence of the species present (false sowing), destroying the seedlings emerged during the crop cycle, in particular by solarisation, to limit the growth of weeds. Hence the importance of this study at the level of the Ziban oasis where important results were obtained.

**Keywords:** *weed, oasis ecosystem, integrated control, Solarisation.*

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