P R O C E E D I N G S

8th International Conference of Biodiversity and Biotechnology ICBB8 – Marseille – 2024

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BIODIVERSITY VERSUS BIOTECHNOLOGY: IMPLEMENTING SCIENCE-BASED SOLUTIONS AND STRATEGIES FOR BIODIVERSITY RESILIENCE

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PREAMBLE

The organizing Committee of the eighth International Conference on Biodiversity and Biotechnology ICBB8 is delighted to announce that this highly anticipated event, focusing on implementing science-based solutions and strategies for promoting biodiversity resilience and sustainability. It will be hosted by the European Research Center Marseille and the Zoological Society of France (SZF).

Coastal seas, mountains, plains, rivers and their living populations are all extremely vulnerable to the multiple pressures imposed by recent human activities through global warming and environmental change. With a focus on flora and fauna, species resilience, and management, this meeting aims to foster scientific collaboration, knowledge exchange between science and society, and the development of practical strategies and solutions. It will serve as an important platform for researchers, practitioners, policymakers, and stakeholders to collectively address the challenges now faced by ecosystems worldwide.

The ICBB8 conference offers opportunities to fulfill a central role in bringing together all participants to encourage exchanges of know-how and forge partnerships that facilitate innovation and breakthroughs in plant and animal security , agriculture and the food industry. Following the Covid-19 pandemic and the digital switchover, this meeting will also fulfill its mission for the biodiversity and biotechnology sector to connect the international community of life scientists by providing a forum for associating, remotely and in complete safety, for three days, from May 17 - 19, 2024. The live sessions (oral, posters) throughout the event will be supported by the modern platform. The entire event of accessible scheduled meetings will take place during the live conference with unique links to secure video conferencing so facilitating participants communicating with speakers during presentations.

OBJECTIVES

The International Environment Day celebration is set for June 5 each year; within this framework, biotechnology in its widest sense, can include modern agriculture and food production, pharmaceuticals, utilization of waste, environmental monitoring, and management of ecosystems. Appropriate environmental management and wise use of biotechnology can promote species diversity and help ensure sustainability of ecosystems and their services. This event will stimulate and enrich the dialogue between scientists in the fields of biodiversity and biotechnology and inform decision-makers about measures recommended to enhance biodiversity resilience by adopting policies of protecting vulnerable species, their habitats and their ecosystem services.

TOPICS

Biodiversity versus biotechnology: Implementing science-based solutions and strategies for biodiversity resilience.

1. Pollution: Ecotoxicology: Parasitology and integrated biological control - Monitoring of chemical and particulate pollutants - Contamination of plants and animal communities- Public health and regulation of pollution - Assessing water, land, and air pollution impacts - Environment industrial interactions - Assessing interactions and monitoring changes in marine, land and air environments - Measuring negative impacts on environmental ecosystems and their various components - Recognition of climate change affects.
2. Medicinal and aromatic plants: Honey plants and beekeeping development - Flowering plants and beekeeping, control insecticides - Poaching and illegal trade in wild species.
3. Marine and freshwater ecosystems: management - Aquaculture - Breeding and repopulation - Protected areas- Integrity of trophic food chains - Micro-organisms, Flora & fauna interactions.
4. Ecosystems and specific spaces: Conservation of species habitats - Critical factors for species habitats - Defining boundaries for sustainable ecosystems - Invasive species.
5. Restoration of natural/semi-natural ecosystems: Preserving ecosystem structure and function including fragile/rare species Habitat integrity (forests, wetlands, mountains, coastal zones) - Promotion of national parks and biological natural reserves.
6. Restoration of constructed ecosystems: Rehabilitation and development of zoos.
7. Biotechnology and phytochemistry: Agricultural wealth, population genetics - Genetic improvement of plants - Agronomy - New products and zootechnics - Strategies for safeguarding endangered species - Strengthening regulations for species habitats - Monitoring environmental exceedance limits - Management & enforcement policies - Minimizing waste issue - Algae valuation.
8. Crisis management to support decision makers: Natural disasters, red tides and fish deaths, floods, dust storms - Monitoring and prediction using observation systems and models.
9. Remote sensing, GIS and data analytics: Use of remote sensing and GIS in mapping and monitoring- Water quality modelling - Machine learning and advanced data analytics for marine resources - Sustainable management - Aquaculture and agriculture management.

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ORAL SESSIONS

Topic 1

Marine and freshwater ecosystems: management - Aquaculture - Breeding and repopulation - Protected areas- Integrity of trophic food chains - Micro-organisms, Flora & fauna interactions.

Moderators :

Amel MILLA and Adel NASEEB

Key-speaker

Molecular biodiversity: a tool for traceability of marine co-products

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Food traceability is becoming a tool for monitoring foodstuffs and their co-products marketed internationally. In this context, specific identification is essential both during marketing and during possible controls. Molecular tools offer the means for specific monitoring through a genetic signature characteristic of each species. Although these molecular tools are widely developed for farmed animal species, gaps still exist for species taken directly from the environment, in particular for aquatic invertebrate species of economic interest. Depending on the molecular marker used, the information obtained can allow not only the specific identification of the marketed product whatever its condition but also potentially its geographical origin. Indeed, genetic markers are likely to provide information on species limits and population limits. However, the analysis of molecular markers is only informative if it is based on genetic databases that are as exhaustive as possible ensuring the correspondence between the sequence of the marker and the name of the species or its population origin. These databases therefore constitute biodiversity assessment tools applied to commercial species.

Concerning specific identification, the Barcode of Live Data System (BOLD) consortium brings together the molecular signatures of most aquatic invertebrate species exploited for commercial purposes but does not systematically present the expected level of intra-specific biodiversity. Furthermore, little information is available to characterize the geographical origin of these products. In a context of global amplification of the circulation of products, it is urgent to rely on biodiversity analysis tools to put in place the resources necessary for specific and/or geographical identification.This approach requires knowledge of the databases already available but also the development of new tools particularly suited to characterizing the population origin of products. The objective of this work is to present the different approaches allowing the use of molecular data from biodiversity studies as part of monitoring the traceability of a marketed product.

Keywords: genetic tools, biodiversity, traceability.

OR01- Cost benefit analysis of Jellyfish bio-fertilizer

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Recently, different species of jellyfish blooms have been occurring in the world's oceans, causing huge impacts on power plants, fish farms, and fishing operations. There are several explanations for possible derivatives of such blooms, including overfishing (i.e., declining of predators feeding on jellyfish), eutrophication of coastal waters, and climate change. Such blooms were reported from the Arabian Gulf and the Arabian Sea. Kuwait is no exception, where these blooms occurred twice: in Kuwait Bay in 2011 and at both Al-Zour and Shuaiba Power and Desalination Plants during 2016-2017 and in Doha in 2017.

All incidents were caused by a single species *Catostylus mosaicus*; also reported to bloom in Australia. Power and desalination plants in Kuwait have suffered from these blooms, and their capacity has been reduced to 50% or even less due to the clogging of seawater intake screens.

This was a significant issue that took workers nearly ten days to address, involving the disposal of the jellyfish in landfills, thereby incurring costs and causing environmental pollution. In response to this recurring oceanic crisis, scientific research in countries like Japan and Korea has proposed a novel solution by converting jellyfish carcasses into bio-fertilizers. Thus, this research aims to evaluate the cost-benefit analysis of the new alternative method, seeking its beneficial outcomes for this problematic issue.

In doing so, it was discovered that the Ministry of Electricity, Water, and Renewable Energy (MEWRE) for the state of Kuwait could generate a significant revenue of around $600,000 from the sale of jellyfish to be used as a bio-fertilizer product. This not only provides a solution to the recurring jellyfish bloom problem but also offers a potential source of income for the ministry.

Keywords: Jellyfish bloom, biofertilizer, revenue, power and desalination plants, cost-effectiveness, environmental investment.

OR02 - Importance of maintaining the cold chain in control of the danger of histamine in fishing products in Morocco

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Histamine food poisoning is a major public health problem worldwide. This study aims to contribute to better control of the histamine danger in the Moroccan sardine (*Sardina pilchardus* Walbaum, 1792) by following the kinetics of histamine production in three batches of sardines, stored at 0°C and 10°C for 6 days of storage, as well as monitoring the evolution of organoleptic characteristics. The sensory evaluation was carried out according to European Council Regulation (EC) No. 2406/96 establishing common marketing standards for certain fishery products and the quality index method.Histamine determination was carried out using the fluorometric method of Lerke and Bell.

When stored at 0°C, the average histamine content did not exceed 5 ppm during the entire storage period. The freshness of the samples was of extra quality the first three days corresponding to QIM values of 0 to 10, then of quality A on the 4th and 5th day corresponding to QIM values of 11 and 12 and then in quality B corresponding to a QIM of 15 on the last day of storage without reaching the organoleptic rejection threshold. At 10°C, the average histamine content exceeded the regulatory limit in force (100 ppm) after 32 hours of storage and the deterioration took place on the 3rd day.

The statistical study showed a good correlation between the freshness of the sardine and the storage duration according to the two evaluation methods with a coefficient of determination of 0.85 for the IF and 0.9 for the QIM and a very weak correlation between histamine content and storage duration with a coefficient of determination of 0.09. The Moroccan sardine, which has an Extra freshness index, guarantees a very large margin of safety with regard to histamine and that it can be consumed without any risk. These results underline the importance of strict respect for integrity. of the cold chain since the capture of the fish to control the danger of histamine in fish products. This task is a shared responsibility between the 2 main players in the fisheries sector, the competent health authority and the food business operators.

Keywords: Sardine, storage, histamine, freshness, health safety, Morocco.

OR03 - Rocky intertidal gastropods (Gastropoda- Mollusca): diversity and seasonal variations in abundance near Umm Al-Namil Island, north-western Arabian Gulf

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The gastropod assemblage is an essential component of invertebrates in the intertidal shore as they are an important component in the marine food web. This work aimed to describe the diversity of the rocky intertidal gastropod community and the seasonal taxa distribution near Umm Al-Namil Island in Kuwait. Sampling of gastropods was performed during low tide along 3 transects (3 quadrants at each transect) set perpendicular to the sea during 4 seasons. The mean abundance, diversity, and evenness for species in every season were considered.

Total abundances ranged from 6.5 ± 0.71 ind. m^{-2} to 400 ± 45.17 ind. m^{-2} in autumn and summer, respectively. 20 taxa were identified. Rocky habitat showed a heterogeneous distribution of the dominant Gastropoda species:*Indothais scalaris*, *Mitrella blanda*, *Clypeomorus bifasciata*, *Clypeomorus caeruleum*, and *Trochus erithreus*. *Clypeomorus bifasciata* (31.07%) and *Trochus erithreus* (21.43%). The most abundant species were *Bulla* sp., *Mitrella blanda*, and *Semiricinula tissoti* being omnipresent in all seasons. The diversity in this rocky habitat ranged from 0.88 ± 0.24 in autumn to 2.19 ± 0.33 in summer, while evenness ranged from 0.33 ± 0.03 in autumn to 0.76 ± 0.13 in summer.

The values of the Shannon-Winer diversity index classified the rocky habitat as low to medium diversity. Diversity and evenness were strongly affected by season in this habitat type. This investigation formed an integral component of the research initiative (FA121C) focused on the strategic designation of Umm Al-Namil Island as a protected area. Consequently, the data gathered holds significance within this framework, aiding assessment of biodiversity in the region.

Keywords: Mollusca, Kuwait Bay, Species Richness, Abundance, Biodiversity, Evenness, Habitat.

OR04 - Taxonomic diversity and spatial distribution of Mollusca on the intertidal rocky shores of Safi (Atlantic coast of Morocco)

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Molluscs play a major role in coastal and marine ecosystems due to their high diversity and abundance among macro-benthic fauna, thus contributing significantly to the functioning of these ecosystems. This study aims to describe the spatial distribution of mollusc communities along the rocky shoreline of Safi, on the Atlantic coast of Morocco, based on the main biodiversity parameters and the major hydrological parameters such as pH, conductivity, temperature, salinity, and dissolved oxygen.

Samples were collected using a quadrat method (4 quadrats/station), from Cap Beddouza (Site 1) in Safi's northern region, extending Southward to Souiria Kedima (Site 4), covering a distance of 75 km, and including Two other stations (Jorf lihoudi (Site 2), Mrissa (Site 3). These areas were selected because they are facing a noticeable urbanisation, industrial, and maritime activities that may adversely affect biodiversity. The taxonomic diversity and spatial distribution of mollusks along the Safi rocky coastline were investigated during spring 2023.

A total of 742 specimens representing 38 taxa were documented. Gastropoda (60.50%), mainly *Steromphala ombilicalis* (da Costa, 1778) (24,35 %), and Bivalvia (23%), mainly *Mytilus galloprovincialis* (Lamarck, 1819) (39,57%), exhibited the highest abundance.

Diversity (H') values ranged from 2.28 to 3.95, while Pielou's index (J') varied between 0.62 and 0.89, primarily influenced by the low dominance of a few species. Principal Component Analysis revealed that the structure and distribution of benthic Mollusca assemblages were principally influenced by environmental factors (Temperature, pH and dissolved oxygen) and anthropogenic activities (fishing activities, urbanization, and industrial wastes).

Keywords: Mollusca assemblages, taxonomic diversity, rocky shore, Safi, Morocco.

OR05 - Parameters of stock assessment of the Gadidae *Trisopterus luscus* (Linnaeus, 1758) living in the Moroccan central Atlantic waters

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The fish *Trisopterus luscus* (Gadidae) has a geographical range from Norway (62°44'N) to the Moroccan Atlantic waters (to 25°N). Our study is limited to the south part of its geographic distribution between 25° and 30°N (North of Agadir). The stock of *T. luscus* is considerable in this area and is accessed, from recent statistics (2013-2023) obtained by sampling fish markets throughout the year.

A total of 2210 individuals of the fish *Trisopterus luscus* (11≤ Lt ≤32 cm) were sampled between January 2018 and December 2019 from the Agadir commercial fishing landings. The sizes of the specimens were measured (Lt, cm) and weights were measured (gr.). The data were processed with FISAT II software. Production was significant during 2019 at 246744.5 kg. Parameters such as asymptotic length, growth coefficient, performance index, fishing mortality and exploitation rate obtained are respectively:

$L\infty$ = 35.75 cm; K = 0.51 yr^{-1}; Ø' = 4.04; F = 0.91 yr^{-1} and E = 0.50.

The results show that T. luscus has good growth performance (Ø' = 4.04) in the Moroccan central Atlantic waters. However, this fish suffers fishing mortality (F = 0.91 $year^{-1}$) that is much more than natural mortality (M = 0.89 $year^{-1}$). In addition, the exploitation state of the T. luscus stock (Exploitation rate = 0.50) is higher than the maximum exploitation rate (Emax = 0.42). Therefore, it is necessary to draw attention of decision-makers to the regulation of the fishing of this species to avoid stock collapse.

Keywords: *Trisopterus luscus* – Fish, Growth - Exploitation – Moroccan central Atlantic waters.

OR06 - Growth and reproduction of three fish species (*Clarias gariepinus, Oreochromis niloticus,* and *Bagrus bajad*) in Foum-Gleita Lake (Mauritania)

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This study focuses on 3 fish species in Foum-Gleita Lake (Mauritania): *Clarias gariepinus*, *Oreochromis niloticus,* and *Bagrus bajad*. Growth and reproduction in 3 species are investigated. Growth parameters are used to determine median sexual maturity size and the reproduction periods during an annual growth cycle. Knowledge of the population parameters of these fish is relevant to their exploitation and growth rate data is used to estimate size distributions and fishing impacts on each fish population.

Catch seasons and the minimum catch size for populations of each species were collected to assist in better stock management. Each species stock was sampled, and caught specimens were measured for total length, fork length **,** and total body weight. The evisceration of fish enabled the determination of sexual maturity by examining and weighing the gonads; food availability was assessed from prey in the alimentary bolus.

Male *Clarias gariepinus* growth rate (k=0.16) was higher than for females (k = 0.12). This growth difference was confirmed by the growth performance indicator, phi. The same scenario was observed in *O. niloticus*. However, the opposite scenario occurred in *Bagrus bajad* where female growth rate tended to out-perform that of males. *Clarias gariepinus* showed two well-marked seasonal growth modes with total lengths of about 40 cm during January to July and about 30 cm between September to December in males.

But in females the two seasonal growth modes are 43 cm from January and August and around 40 cm from September to December. For both sexes of *Oreochromis niloticus*, the two modes of seasonal growth were well marked at between 20 and 30 cm from August to December. *B. bajad* did not show well marked seasonal growth modesl. This could be due to an artefact linked to the low numbers per size class of the male individuals sampled or to environmental factors. These results are compared to data from elsewhere and they contribute useful biological indicator data relevant to supporting new policies for the rational management of freshwater fishery resources in Mauritania.

Keywords: Freshwater fisheries, *Clarias gariepinus, Oreochromis niloticus, Bagrus bajad*, reproduction, sexual maturity, Foum-Gleita Lake, Mauritania.

OR07 - Use of the mussel *Mytilus galloprovincialis* and gooseneck barnacle *Pollicipes pollicipes* for biomonitoring coastal pollution by trace metals: a comparative analysis from Safi shores, Morocco

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The present study aims to assess the spatial and temporal pollution status related to metal contamination in coastal waters at two specified points along the Safi areas situated on the Moroccan northwestern Atlantic coast. These sites include a presumed clean site and a contaminated metal site. The main objectives are to assess the level of contamination of the environment and the deterioration of costal water at these sites. The Water Pollution Index highlighted concerning degradation levels of seawater quality, classifying the study sites as 'strongly to seriously affected'.

Moreover, the investigation delved into a comparative analysis of trace metal accumulation capacities between two biofilterer invertebrates, the gooseneck barnacle *Pollicipes pollicipes* and the Mediterranean mussel *Mytilus galloprovincialis*. In overall, the mussel tended to accumulate higher metal concentrations compared to the barnacle. The metal content analyses showed average annual means of ~ 19, 30, 14, 434, and 334 µg g^{-1} dry weight for *M. galloprovincialis* and ~ 17, 3, 8, 548, and 431 µg g^{-1} dry weight for *P. pollicipes*, for Cd, Cr, Cu, Fe and Zn, respectively. In addition, average concentrations of trace metals exhibited distinct patterns among soft tissues between species: Fe > Zn > Cd > Cu > Cr for *P. pollicipes* and Fe > Zn > Cr > Cd > Cu for *M. galloprovincialis*.

Seasonal variations were observed, with higher trace metal concentrations during wet seasons and lower levels during summers for both species. Significant spatiotemporal variations ($p < 0.05$) in trace elements concentrations were noted, except for Cu levels in *P. pollicipes*, which displayed no spatial variability. Strong positive correlations ($p < 0.05$) were found between Cd, Fe, and Zn concentrations in soft tissues of *M. galloprovincialis* and *P. pollicipes* and those and their concentrations in seawaters. Conversely, Cu and Cr values in *P. pollicipes* soft tissues did not exhibit such correlations ($p > 0.05$).

Bioaccumulation potential, assessed via Bioaccumulation Factor (BWAF), followed distinct orders for each species, with higher Cd values recorded at the polluted site during Summer for both species. Furthermore, the Trace Element Pollution Index (TEPI) and Trace Element Spatial Variation Index (TESVI) were determined based on metal concentrations in the soft tissues of organisms, classifying the polluted site MS as highly contaminated during winter by both species. Throughout the four-season period, significant differences were observed in TESVI values for both species for the studied trace elements. The highest spatial variability was observed for Cd in both species, with TESVI scores ranging from 0.35 for *M. galloprovincialis* to 0.56 for *P. pollicipes*.

Keywords: Bioaccumulation, Coastal waters, Mediterranean mussel, Gooseneck barnacle, metal contamination, pollution indices.

OR08 - Decontamination of cadmium in production areas at Dakhla Bay, using *Gracilaria gracilis* during the period 2018-2023

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Dakhla Bay is a paralic environment distinguished by different potentialities, including fishing, aquaculture, and tourism. However, the development of these human activities can lead to negative impacts on this environment, which can generate a threat to human health. This requires special attention to this environment and the implementation of a program of protection and preservation of this ecosystem. This work is anchored in this monitoring mission to carry out an integrated study of supervising the marine environment of Dakhla bays.

The objective of this study is to look for solutions to protect the marine environment from the chemical contamination of this marine ecosystem, by cadmium. To this end, a decontamination test of cadmium shellfish production areas by macroalgae was programmed in 2019, in Dakhla Bay. The breeding trial of *Gracilaria gracilis* is launched in the same area following an agreement between the SETEXAM Society and INRH.

The results of cadmium analyses in the different compartments of Dakhla Bay including bivalve molluscs, seawater, sediment and macroalgae, indicate a difference in cadmium accumulation by the different studied compartments. It was noted that the highest levels of cadmium are noted in macroalgae, followed by bivalve molluscs, then sea water and finally in the sediment of the Bay. It appears that: a decrease in levels of Cadmium in seawater, sediment and shellfish is detected from the first months of rearing of *G. gracilis*, especially from the summer season 2019.

The decontamination of cadmium by *G. gracilis* has been well confirmed without impacting the quality of algae. Indeed, cadmium levels noted in macro-algae are still below the thresholds set by the regulations in force (ANSES 2020). However, the in vitro study is recommended to confirm the decontamination of cadmium by the macroalgae species *G. gracilis*. The obtained results encourage algoculture in Dakhla Bay, to protect its ecosystem from various polluting aggressions.

Keywords: Bivalve molluscs, Cadmium, *Gracilaria gracilis*, Algoculture.

OR09 - Comparative study of the nutritional value of red Tilapia flour *Oreochromis sp* and waste meal of the sardine (*Sardina pilchardus*)

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The survey carried out in 2023 among fishmongers in the Algiers fishery revealed that the most consumed species of fishery resources is the sardine (*Sardina pilchardus*). The cleaning service offered by the fishmonger generates waste dominated by this species.

This work carried out during the same year of the investigation, aims to study the possibility of integrating red Tilapia fish meal (*Oreochromis sp*) into the animal ration. For this purpose, six fish were used, including two whole and four gutted, headed and deboned for a comparison of nutritional value with that of 500g of sardine waste. Before drying and grinding, biometric parameters are noted.

To carry out the analyses, we used the AFNOR (1982) and AOAC (1990) methods. The results showed that the richness of Tilapia flour in MAT varies from 19.32 to 64.09%, the rate of mineral matter varies from 4.78 to 21.86% depending on the slice of fish, the quantity of matter fatty varies between 13.02% and 66.47% depending on the organ; however, the fiber rate is negligible less than 1%. Sardine waste offers 41.70% MAT; 17.61% MM and 35.05% GM.

Tilapia flour and sardine waste can replace part of the oilcake imported by ONAB and make the price of the animal proteins produced more accessible, while reducing the negative impact of this waste on the environment.

Keywords: Fish meal, Tilapia, sardine waste, chemical composition, Algeria.

OR10 - Biochemical evaluation of the flesh of the common carp *Cyprinus carpio*, fished in two dam reservoirs in Mascara region (western Algeria)

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The chemical composition and biochemical quality of different species of fish in intensive or extensive farming in dam reservoirs show variations following seasonal changes, sexual maturity, and food cycles. This approach focuses on the chemical and biochemical evaluation of the two populations of the freshwater fish common carp *Cyprinus carpio* fished in two dam reservoirs in the region of the Wilaya of Mascara: Bouhanifia dam and Ouizert dam.

Biochemical analyzes of muscle flesh show a richness in vitamins as follows: Vitamin E = 0.804, Vitamin C = 0.241. The mineral salts show potassium contents K = 41.24 and 28.51 for calcium. The values of the phosphorus element (P = 15.55) and the iodine element (I = 9.98) constitute an appreciable contribution for our body.

The other biochemical and water components are very close to the levels cited in the literature for this freshwater fish: Protein 16.0%; Lipids: 2.1%, Water: 81.6%.

The flesh of common carp muscles provides excellent nutritional properties in terms of vitamins C and E and mineral salts for human health. This fish, extensively farmed in these dams, provides the local and national Algerian population with both nutritional and dietary food.

Keywords: *Cyprinus carpio*, freshwater fish, dams, minerals, vitamins, Algeria.

OR11 – Spatial fluctuations of summer micro-phytoplankton communities in correlation with environmental parameters in the coastal vicinity of the El Bibane lagoon (Tunisia)

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The research was conducted meticulously during the summers of 2009 and 2010. Using a rigorous methodology, we examined the distribution of micro-phytoplankton in the coastal waters of El Bibane lagoon. Physical parameters, nutrients, and micro-phytoplankton were sampled during one-day campaigns performed in summer (July 2009 and 2010) along the lagoon. Water samples were collected in four stations, and sub-samples of 50 ml for micro-phytoplankton counting were analyzed using an inverted microscope (Utermöhl method).

The research findings from the El Bibane lagoon during the summers of 2009-2010 are significant. They reveal that the abundance and variety of micro-phytoplankton, particularly dinoflagellates, remained relatively stable despite slight variations in environmental factors. This suggests a robust resilience of micro-phytoplankton communities in the face of changing conditions, a finding that could have profound implications for our understanding of marine ecosystems. While there was an increase in micro-phytoplankton abundance during the summer of 2010 (169.50 ± 60.77 × 102 cells l-1) compared to the summer of 2009 (84.50 ± 74.24 × 102 cells l-1), the difference in species richness was only marginal.

Specifically, species richness was slightly higher during the summer of 2009 (28 taxa) compared to the summer of 2010 (27 taxa). Throughout the study period, dinoflagellates remained the predominant micro-phytoplankton group, constituting 77–83% of the total micro-phytoplankton community during both summers of 2009 and 2010.

Keywords: El Bibane lagoon, micro-phytoplankton, physicochemical parameters, summer season, Tunisia.

Oral Session 2

Topic 2

Medicinal and aromatic plants – Phytosociology and Ecology - Control insecticides – Poaching and illegal trade in wild species.

Moderators :

Ahmedou SOULE and Françoise DENIS

OR12 - Analysis of the flora of northern Mauritania (Adrar, Tiris Zemmour, Inchiri, and Dakhlit Nouadhibou)

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Located on the Mauritania-Moroccan political border, northern Mauritania has never been the subject of special floristic study since the colonial era except for a few surveys carried out by Barry (1987). In these studies, the authors considered the northern zone of Mauritania and the Moroccan Sahara as a single botanical territory.

The flora analysis, the subject of this study, was carried out based on the work of Daget "the flora of Adrar and Titis Zemmour (Northern Mauritania) in the work of Barry and floristic surveys that we carried out in 2016, 2017, 2018, 2019 and 2023 during environmental impact studies in the study area. In the latter case, these are traveling floristic inventories which consisted of visiting several sites in the study area and inventorying the different species based on their presence. Species not observed during our surveys and whose presence in Mauritania was doubtful according to Daget (2015) were not retained.

The flora of the analyzed area includes 238 species, spread over 53 families. Among the families encountered, 21 contain only one species (i.e. 29% of the families), only 6 contain more than 10 species. The dominant families are in descending order of magnitude: Poaceae (41 species), Fabaceae (28 species), Asteraceae (16 species), Amaranthaceae (5 species), Euphorbiaceae (11 species) and Zygophyllaceae (11 species).
Therophytes (44.5%) occupy a large share, followed by chamephytes (16%), nanophanerophytes (14%) and hemicryptophytes (12.7%). Other biological types are poorly represented. The importance of therophytes denotes the aridity of the climate in this study area.

Furthermore, we note a predominance of the Saharo-Arabic element (58.9%) followed by the Sudano-Angolan (15.3%). The Mediterranean element is poorly represented. It is an essentially Saharan flora, mitigated by a small contingent of Sudano-Angolan and Mediterranean plants. The importance of the number of Sudano-Angolans results from their presence in the flora of the Adrar. The contingent of endemic and Mediterranean plants increases markedly as we advance towards the NW (towards the Moroccan Sahara).

Keywords: Flora, floristic analysis, biodiversity, northern Mauritania.

OR13 - The steppe ecosystem facing climatic hazards: case of the Ras El Ma region (Algeria)

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Desertification is a major environmental preoccupation for the 21st century (World Bank, 2002). It results from an imbalance in the dynamic interactions between several elements in the ecosystem: climate, soil, vegetation and man. It is a state which sets in under the combined effects of climatic changes and human activities applied to fragile soils and vegetation.

The Algerian steppe is an arid ecosystem defined by limited natural resources, poor soil, low plant formations and open to severe climatic conditions. Ras El Ma region of application is characterized by a breakdown in the balance in the interactions between pastoral environments and societies, marked by a degradation of the rangelands which constitute the basis of all activity in the steppe zones.

In the region, rangelands representing 86% of the total surface area are subject to degradation which affects 70% of the steppe space and a massive reduction in plant cover. With this current situation, the commune of Ras El Ma is thus classified as an area of very high sensitivity to desertification, with a recovery rate of total perennial vegetation of around 30%. Drought, land clearing and overexploitation are at the origin of the disappearance of large parts of the steppe facies such as the esparto, atriplex and sagebrush steppes.

This work is a contribution to the analysis of desertification in the Ras El Ma region. The work is based on the monitoring and understanding method. A phyto-ecological diagnosis and a climatic study. The objective is to highlight the importance of the phenomenon and to analyze the main discriminating factors in the evolution of this ecological problem, notably the climate and its socio-economic consequences on the balance of the system of traditional pastoral organization.

Keywords: Steppe, ecosystem, climate, Biodiversity, Ras El Ma, Algeria.

OR14 - Diachronic study of four steppe routes with *Stipa tenacissima* L. along a North-South transect (Wilaya of Djelfa, Algeria)

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This study consists of carrying out a diachronic study of a *Stipa tenacissima* steppe on a qualitative and quantitative level (phytoecological, pastoral and phytomass parameters), the objective is to analyze the current state and the development of this steppe over time by adopting a comparative methodology, between 2005 and 2023, in four stations of Ain Ibel region (wilaya of Djelfa). During the study, 24 phytoecological surveys were carried out in 4 stations with an average of 6 surveys per station. The surveys were carried out along a North–South transect (from S1 S4).

It should be noted that the surveys were carried out on plots of 100 m², and within each plot, we carried out two phytoecological surveys: one survey below the physiognomically dominant species (Stipa tenacissima) and another at the outside of the tuft. According to our results, considerable changes were noted in the alfa steppe studied in 2023 compared to 2005 (decrease in plant cover, increase in the covering of coarse elements and litter, increase in floristic richness).

Sgnificant vegetation dynamics were noted between the two study periods, where the majority of species inventoried in 2023 are therophytes, species reflecting the opening of the plant cover. The raw biological spectra revealed a therophytization phenomenon for the two study periods, with a certain magnitude in 2023, a phenomenon considered as a sign of vegetation degradation and disturbance of these stations. In addition, the real biological spectra revealed the presence of a chamephytization phenomenon, which originates from the aridization phenomenon.

On the pastoral level, a pronounced regressive evolution of the total phytomass was observed between the two study periods, attesting to the degradation of Stipa tenacissima facies. Pastoral value and pastoral productivity declined in some stations and increased in others; such an overlapping evolution could be explained by the contribution of species with good/poor forage quality for the herd. In conclusion, our diachronic study allowed us to note the regressive evolution of the plant cover of the alfa steppe studied towards a secondary chamephytic steppe in an extreme state of degradation, dominated by therophytes and characterized as having low pastoral productivity. Hence the urgency of rapid intervention based on the application of large-scale development plans to rehabilitate the esparto steppe in Algeria within the framework of sustainable economic and social development.

Keywords: Stipa tenacissima, Diachronic study, Steppe, Floristic diversity, Pastoralism.

OR15 - Study of the anti-inflammatory and healing properties of the rhizome of *Carthamus caeruleus* L., (Asteraceae) collected in Tipaza region (Algeria)

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In some regions of Algeria, in Tipaza, natural medicine still occupies a place of choice in the treatment of many pathologies, among these natural remedies are quoted extracts of the rhizomes of *Carthamus caeruleus* are used to treat burns with these astringent properties Medicinal plant extracts contain a variety of phenolic compounds that are attributed to various biological activities (antioxidant and antimicrobial activity).

The aim of this investigation is to study some biological activities of the roots of C. caeruleus L., collected in the Tipaza region during the spring season. In order to promote this plant, we evaluated the anti-inflammatory and healing activity of the aqueous extract of C. caereulus L., root powder.

The anti-inflammatory effect was assessed by measuring the volume of oedema in the paw treated with 1% carrageenan. A circular incision 2 cm in diameter was made in Wistar rats to assess the healing activity of the pasty aqueous extract of C. caeruleus L., rhizomes at 100 mg/kg.

The results showed that aqueous extracts of the rhizomes of C. caeruleus L., at a dose of 100 mg/kg, prevented the increase in oedema induced by 1% carrageenan in rats, with a percentage inhibition of the volume of oedema of 87.34% at the 6th hour. With regard to healing activity, the tests showed that application of aqueous extracts of the roots of C. caereulus L. at a dose of 100 mg/kg to wounds resulted in healing after 14 days.

This study confirmed that aqueous extracts of C. caereulus L. roots have curative properties and an anti-inflammatory effect. These results could support the use of this plant in traditional medicine to treat inflammatory diseases.

Keywords: *Carthamus caeruleus*, rhizome , Anti-inflammatory, healing activity.

OR16 - Comparative study of the resistance of some potato varieties to *Phytophthora infestans*, the agent of late blight, by in-vitro inoculation

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Potato late blight, caused by the pathogen *Phytophthora infestans*, remains one of the most devastating diseases on this crop of agronomic and nutritional interest. Varietal resistance appears to be a promising sustainable control strategy that allows us to reduce the use of chemicals that have a negative impact on the environment. This study aims to evaluate the resistance to late blight of four potato varieties widely grown in Europe and North Africa: Spunta, Bintje, Sarpo Mira and Désirée.

For this purpose, detached leaflets aged nine weeks are inoculated with suspensions of porangia of isolates previously characterized genotypically: EU_13_A2 (n=3) and EU_2_A1 (n=2), the components of resistance were evaluated as follows: the incubation time, the latency time, the size of the necroses and the sporulation rate. We also inoculated the tubers of these varieties with the same isolates in order to evaluate the level of resistance on this reserve organ by estimating the percentage of attack and calculating the area under the disease progression curve l 'AUDPC.

The results showed that the Sarpo Mira variety has good resistance to downy mildew on leaves and tubers, followed by the Désirée variety which was quite sensitive on leaflets and more or less resistant on tubers, while the two varieties Spunta and Bintje showed themselves to be very sensitive with significant values in relation to the size of the necroses and the AUDPC on leaflets and on tubers. In-vitro tests indicate that the Sarpo Mira variety has strong potential for potato production free of phytosanitary treatments thanks to its resistance to late blight. However, field experiments will be necessary to validate these obtained results under controlled conditions.

Keywords: *Phytophthora infestans*, varietal resistance, potato, late blight.

OR17 - Study of the antimicrobial activity of essential oils from the leaves of male and female *Pistacia lentiscus* against pathogenic microorganisms causing diseases in livestock

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Pistacia lentiscus is a dioecious plant which grows spontaneously and is widely distributed in the central Maghreb, widely used by local populations in traditional medicine. The essential oil extracted from its leaves and its components are widely used as antimicrobial agents. This work aims to analyze the chemical composition of essential oils extracted from the leaves of male and female *Pistacia lentiscus* and evaluate their antibacterial activity against pathogenic microorganisms causing diseases in livestock, and which may be responsible for collective food poisoning.

The extraction of the essential oil was carried out by hydro-distillation on dried leaves. The results showed a higher yield of extracted oil for female leaves than for male leaves. The organoleptic and physicochemical analysis of mastic essential oils revealed results in compliance with AFNOR standards.

The analysis of the chemical composition was also carried out by gas chromatography coupled with mass spectrometry (GC/MS) and the results showed relatively significant variations between the two sexes, with average percentages of several major compounds and minors which differ considerably.

The study of antimicrobial activity by disk diffusion technique was carried out on a set of pathogenic strains responsible for diseases in livestock. It showed a sensitivity of certain strains to the essential oils tested, while others appeared resistant.

Keywords: *Pistacia lentiscus*, essential oil, antimicrobial activity, contamination, animal communities.

OR18 - Etiology and diversity of pathogenic Alternaria sp Apiaceae in Algeria

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The Apiaceae represent a botanical family of major economic interest, Algeria being the leading producer of carrots in Africa. However, this crop and agricultural products are subject to numerous health constraints such as fungal diseases caused by Alternaria. This pathogen being prevalent on vegetable crops in the country causes early defoliation and rot of the crowns and roots. Its transmission is mainly through the seed. This foliar and root disease, increasingly frequent due to high temperatures and humidity, constitutes a real threat to yield in terms of quality and quantities. Contamination occurs at temperatures of 22°C to 25°C characteristic of the Mediterranean climate.

This plant pathogen is most damaging in the coastal areas of the country. To better understand this problem, a study carried out during the growing seasons from 2018 to 2021 in the northwest areas of Algeria showed that the disease mainly spreads on carrots and coriander. Sampling at field level and marketed products followed by isolation on Potato Carrot Agar (PCA) medium revealed a high incidence of early blight (55%). Among Alternaria species isolated from carrots, 34% were morphologically identified as members of sections Porri and Radicina. However, 26% coriander samples were mainly affected by a species from the Porri section. In both cases, half of the isolates (49.5%) consisted of species with small spores.

Colony morphology and conidia morphometry on Potato Dextrose Agar (PDA) and PCA media were consistent with literature descriptions. A phylogenetic analysis carried out after sequencing the glyceraldehyde-3-phosphate dehydrogenase (gpd) region revealed that the strains studied belonged to four different species: A. dauci from the Porri section, A. radicina from the Radicina section, A. alternata and A. arborescens from section Alternaria. The sequences relating to this gene representing the species of the different phylogenetic sections of the genus, obtained from GenBank were included in the phylogenetic analysis. This molecular analysis confirms the differences observed in the morphology of the conidia as well as the symptomatology.

The main ones described being A. dauci on foliage and A. radicina detected on the roots. Furthermore, the results of the pathological test on carrot and coriander seedlings validated Koch's postulates. Alternaria dauci and A. radicina being highly aggressive compared to species with small spores (A. alternata, A. arborescens). Indeed, the aggressive strains affected more than 70% of the leaf surface of the seedlings 21 days after inoculation in the greenhouse. These results are of capital importance for the development of more effective monitoring and control strategies against early blight, thus making it possible to preserve the productivity of Apiaceae crops in Algeria.

Keywords: Alternaria, Apiaceae, alternaria, taxonomy, diversity.

OR19 - Impact of the Sidi Bennour municipal solid waste landfill (Morocco) on groundwater quality

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This study assesses the potential impact of leachate generated by the uncontrolled municipal solid waste (MSW) landfill on groundwater quality in the Sidi Bennour municipality, Morocco. Leachate samples and 23 groundwater wells were monitored during the wet and dry seasons from November 2020 to November 2021. Major physicochemical parameters were analyzed using standard methods.

Physicochemical parameters values indicate that leachate generated by the Sidi Bennour uncontrolled landfill have an alkaline pH of 8.19, which means the landfill is very old. They are highly saline (EC varies between 61.6 $mS.cm^{-1}$ and 123.7 $mS.cm^{-1}$), extremely turbid (maximum NTU = 4160), with a high mineral content (max of Cl^- and SO_4^{2-} were respectively 2102.69 $mg.L^{-1}$ and 1096.1 $mg.L^{-1}$) and a highly concentrated organic composition BOD_5/COD ratio is 0.15, indicating that the Sidi Bennour landfill is in a methanogenic phase. The highest concentrations of heavy metals in all leachate samples were within the permitted limits, except for Fe at 291.32 $mg.L^{-1}$, Al at 267.10 $mg.L^{-1}$, and Zn at 8.63 $mg.L^{-1}$, which significantly exceeded the permitted limits for leachate discharge.

For groundwater, the concentrations of chlorides, sulphates, and nitrates in the monitoring wells were significantly higher than Moroccan and WHO standards, with mean values of 934.08 $mg.L^{-1}$, 251.44 $mg.L^{-1}$ and 17.5 $mg.L^{-1}$, respectively. This result was confirmed by high conductivity values (max = 4.23 $mS.cm^{-1}$). The results obtained indicate that some water stations are not recommended for drinking water consumption and that groundwater quality is compromised by leachate penetration, particularly during the winter season.

Keywords: Uncontrolled landfill, Landfill leachate, Groundwater; Quality.

OR20 - Evolution of physico-chemical and bacteriological parameters of dayat Morsli lake water in western Algeria

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Water is a vital source; its use requires a high level of physicochemical and microbiological quality. This study focuses on the evaluation of the change of quality of lake water (Dayat Morsli) through the analysis of the following parameters: hydrogen potential (pH), conductivity, chloride, ammonium, Chemical Oxygen Demand (COD), total Phosphorus, Sulphate and Nitrate for the physicochemical parameters and research of total Coliforms for the bacteriological parameter.

The results obtained two years later clearly show, on the one hand, that no improvement in the parameters studied was observed. Nevertheless, certain parameters have seen their values decrease; this is the case for Electrical Conductivity, sulfate, and chlorides. Water potential (pH), Ammonium, Total Phosphorus and COD recorded higher values while remaining outside the norms. Even the nitrates which were within the standards, their value has completely doubled to exceed the international WHO standard. On the other hand, the total coliforms showed very high rates compared to the standards and previous results.

Keywords : Pollution, Lake Dayat Morsli, physico-chemical analyses, Coliformes.

ORAL SESSION 3

Topic 3

Biotechnology and phytochemistry: Agricultural wealth - Agronomy - New products and zootechnics – Parasitology - Strategies for safeguarding endangered species – animal health- Monitoring environmental exceedance limits - Minimizing waste issue – Pollution

Moderators:

Amina SMAÏ and Nassima CHIKHI-CHORFI

OR21 - Data on internal and external characteristics of eggs of two game species *Coturnix japonica* and *Coturnix coturnix* (Aves, Phasianidae) in Algeria

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Phasianidae is the most widespread in the world, with many species bred for food. Among small game birds, the Japanese quail is the highest-ranking quail belonging to this family, as its meat and eggs have therapeutic properties. In the wild, quail is also one of the most popular wild game species in Algeria. The study focuses on the internal and external parameters of the eggs of 2 small phasianids. The first species is the domestic *Coturnix japonica* bred at the Zéralda hunting center, where 429 eggs were analyzed; the second species is the wild *Coturnix coturnix* quail. The measurements taken were egg weight (g) and large and small diameters (mm), which were used to calculate other indices such as density, volume (mm^3), shape index and shell index. Internal egg parameters (yolk, white) are also weighed.

The age of Japanese quail breeders is taken into account. The same parameters are used for quail. *Coturnix coturnix* eggs were collected from different regions of Algeria, at different bioclimatic levels: the coast, the Tellian Atlas, the Tellian high plains and the steppe high plains. About thirty eggs per region were collected during the breeding season from March to May. The results obtained for *Coturnix japonica*, show average values as follows: weight (11.86±1.21), large diameter (33.32±1.53), small egg diameter (25.75±0.82), egg yolk weight (3.78±0.38), egg white weight (6.82±1.2). For volume, mean values ranged from 9.81±0.91 to 11.28±0.88, with highly significant differences between the series represented by females aged 13 to 16 weeks and the other series, stabilizing from the 19th week of age.

The shell index and shape index recorded averages of 0.36±0.03 and 77.28 respectively. On the other hand, the same external and internal biometric parameters are repeated for quail. The average values for all bioclimatic stages are lower than those of the Japanese quail: egg weight (10.87 ±0.11), large diameter (30.27 ± 0.33), small diameter (23.21 ±0.31), yolk weight (3.76 ±0.06), white weight (5.82 ± 0.07), volume (8.51 ± 0.26). The measurement and volume figures for Japanese quail are significantly higher than those for *Coturnix coturnix*; this is probably due to the maintenance of the reared species. On the other hand, the shell index, calculated for both game species, shows the same average value, i.e. 0.36. This index provides information on shell strength.

Egg shape is also important for clutch success; it influences egg hatching and is measured by an index called the shape index, which is the ratio of the small diameter to the large diameter. In fact, the shape index calculated for the two species shows similar values (77.28 and 76.43). These numbers indicate good egg shape in quail.

Key words: *Coturnix japonica*, *Coturnix coturnix*, eggs, biometry, Algeria.

OR22 - Copro-parasitic study in wild felids at the Hamma experimental garden zoo (Algiers, Algeria)

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The coprological study of wild felids was carried out at the El Hamma experimental garden zoo between August and December 2022. We chose to work on three different species. These are a couple of lions, a couple of tigers and a couple of leopards. The enclosures were visited once a week early in the morning to collect feces. These are placed in labeled 50 ml jars and stored in the laboratory in the refrigerator at 4°C.

In order to evaluate the rate of parasitic infestation and to identify the different parasites that concern our study, we used a qualitative copro-microscopic method called flotation by filtration and centrifugation. This method is advantageous because it remains easy to use and inexpensive. It also makes it possible to concentrate various parasitic elements, from sometimes small samples of fecal matter. Its objective lies in the identification of oocysts, eggs or even larvae.

The results demonstrated a total richness of 3 parasites species in the lion and tiger and 1 species in the leopard. The dominance of *Toxascaris leonina* is noted in lions and leopards. While in the tiger *Isospora* dominates. The relative abundance of *Toxascaris leonina* is 69.5% in the lion, 100% in the leopard and 20% in the tiger. While the relative abundance of Isospora is 60% in the tiger. The assessed prevalence shows a dominant infestation in the lion and satellite in the leopard for the species *Toxascaris leonina* while the tiger presents a rare infestation with the three species *Toxascaris leonina, Isospora* and Acari.

Keywords: Wild felids, coprology, parasites, El Hamma test garden, Algiers.

OR23 - Ovarian endocrine and local steroids regulation in the fat sand rat, *Psammomys obesus*, immunohistochemical study

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The fat sand rat, *Psammomys obesus*, constitutes a model for studying numerous physiological adaptations and metabolic disorders. The reproductive function of this diurnal gerbil is studied. In this work, we investigated several regulatory processes of the ovarian function by immunohistochemical localization of steroid hormones, aromatase enzymes, and the receptors of FSH, LH, progesterone, and estrogen. We applied the indirect immunohistochemistry method using streptavidin-biotin complex. Anti 17β estradiol antibody presented a strong immunoreactivity in the oocytes and granulosa cells; theca cells were devoid of label.

Progesterone label was clear in theca and granulosa cells. We detected aromatase only in the granulosa compartment. FSHR were found merely on granulosa cells. LHR were viewed in theca interna and in granulosa of large antral follicles. ERα predominates in the theca interna, ERβ in the granulosa. PRs were marked in the theca and in the granulosa. In the fat sand Rat, pituitary FSH and LH provide normally endocrine regulation of ovarian function; LHR ensures the production of androgen in the theca, substrate for aromatase detected only in granulosa cells expressing FSHR. LHR, also viewed in the granulosa of large antral follicles, ensures the production of progesterone of luteinizing cells.

The involvement of estrogens and progesterone in local ovarian regulation is expressed by the presence of their specific receptors; estrogens exert a paracrine control on theca cells and an autocrine regulation of granulosa cells; progesterone exerts both paracrine and autocrine regulation.

Keywords: Ovarian steroids, FSH and LH receptors, estrogen and progesterone receptors, estrous cycle, immunohistochemistry.

OR24 - Evaluation of the poultry farming performance using the alternative use of organic acids (case of TECACID and TECAVIAR)

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Food additives are substances with a favorable effect on the foods to which they are incorporated as well as on animal production. Thus, the main objective of this experimentation is to correct certain failures in broiler breeding through the use of organic acids. The main categories currently used in Algeria in poultry feed are: TECACID, TECAVIAR and BACTERTEC additive products acidifying the digestive tract, preventing the proliferation of pathogenic bacteria, causing a health effect in farmed animals.

This investigation was carried out in Msila zone on a population of 34,000 chickens, distributed in four buildings containing 8,500 individuals each. The duration of the experiment is 45 days. These two acidifying products are mixed separately in water. After calculating the pH of the water, we add the organic acids until we obtain a pH of 4 - 4.5. Water quality may affect the dose which may be different.

On the other hand, we had encouraging and promising results due to the fact that the used organic acids were capable of improving the effectiveness of the rations which resulted in weight gain and maintaining good health. chickens by the absence of digestive diseases.

Ultimately, organic acids used in experiments seem to be a better alternative for lowering production costs and influencing the characteristics of animal products in poultry farming.

Keywords: Farmed chickens, organic acids, animal performance, Algeria.

OR25 - Influence of hydroponic barley on milk production, growth performance and nutritional quality of milk from typical cow's production system of Southern Algeria

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The aim of this survey is to study the effect of two Algerian feeding systems consisting of three main sources namely hydroponic barley, concentrate and corn silage on the physicochemical characteristics, the nutritional and microbiological qualities of cow's milk. Ten cattle of the Montbéliarde breed aged 3 to 8 months with an average live weight of 450 ±55 kg, were monitored during the spring season of 2023. Two groups of animals were divided into ten subjects (n=10) on two different farms in the region of Ain El Masrane in the Wilaya of Ghardaïa.

The cows received different diets for the same season studied, the first group received a diet based on hydroponic barley (50%), grass and concentrate (50%) while the other group cows were fed corn silage (70%) and concentrate (30%). After three months of breeding, cows fed hydroponic barley and concentrate (group1) recorded greater final bodyweight gains than those fed only on silage (group 2) (100 Kg vs 83 Kg. $p<0.05$). Hydroponic forage feeding improves the rate of milk production through increased nutrient intake and digestibility.

The results based on the diets offered to dairy cattle revealed variations in the biochemical composition between the two groups studied. The crude protein and minerals increase in hydroponic fodder, with 31.64% and 12.07%, respectively. On the other hand, low dry matter content was noted for the sample of hydroponic barley with 11.47%. It depends on the type of grain and the retention period. Depending on the type of diet, a significant effect ($p<0.05$) was noted at the level of all the physicochemical parameters of milk, with the exception of density. The results obtained show variations in the nutritional composition of the milk depending on the type of diet. Incorporation of hydroponic barley into the batch ration; contributed to produce milk with high protein contents (39.52%) and mineral matter 0.66%. This is linked to the higher energy intake provided by barley and its high digestibility. A significant increase in milk production around 3.9% was observed to the group receiving hydroponic barley. in the microbiological analysis of the milk, a total absence of pathogenic germs was recorded in both milks. This indicates hygienic conditions and the compliance of equipment used. The use of hydroponic barley is very interesting for the breeding dairy cattle and makes it possible to obtain recommended milk by the nutritionists and with some attractive sensory properties.

Keywords: Bodyweight, Cow's milk, Hydroponic barley, Nutritional, Hygienic quality, Algeria.

OR26 - Analysis of the effect of age on male fertility in the population of OranClinically Cases, Hospital-University Establishment of Oran, Algeria

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Subfertility is defined by the WHO as the inability of a couple to procreate or carry a pregnancy to term after one year or more of regular, unprotected sexual intercourse. Around 15% of couples, trying to get pregnant are affected by subfertility, in almost half of these cases the man is the cause. Male subfertility is, through its frequency and its impact on quality of life, a real public health problem.

The spermogram and spermocytogram are the best indicators of male fertility. This is a comparative study targeting spermograms from a variety of age groups of the population of Oran, with the aim of statistically evaluating the effect of Age on spermatic appearance. Indeed, the absence of statistically significant age differences between all sperm abnormality groups compared to the control group (all p values > 0.05) suggests that age alone may not be a determinant main cause of observed sperm abnormalities. This finding is consistent with previous research indicating that age-related declines in sperm quality are often subtle and may not be the only factor contributing to male infertility.

Although age may influence sperm parameters to some extent, other factors such as genetic predispositions, environmental exposures, and lifestyle choices may play a greater role in the development of sperm abnormalities. While age can influence sperm parameters to some extent, other factors such as genetic predispositions, environmental exposures, and lifestyle choices might play a more prominent role in the development of sperm abnormalities.

The correlation matrix revealed weak to very weak correlations between age and other sperm characteristics. The strongest correlation was observed with Vol ($r = -0.171$), indicating a slight negative association between age and sperm volume. However, the correlations with Visc ($r = 0.163$), numeration/ML ($r = 0.099$), num/ejaculat ($r = 0.044$), pnn ($r = 0.057$), and the various motility parameters (mob-a to mob-d) were all very weak ($|r| < 0.1$). This suggests that age may not have a substantial direct effect on these characteristics.

Keywords: Algeria, Oran, fertility, Age, Spermogramme.

OR27 - New data on spider fauna from Souss Massa region, Morocco (Arachnida, Araneae)

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In Morocco, the study of spiders has historically gathered very little interest from the scientific community over the past fifty years. As a result, much remains unknown about the arachnological fauna of Morocco, and fundamental investigations are needed to identify the species present throughout the country.

The present work aims to investigate the spider fauna within the Agadir-Ida-Ou Tanane and Chtouka Ait Baha Province. Previous investigations documented the presence of only 83 spider species within the Souss Massa region.

Over one year of investigation, a total of 455 individuals, belonging to 21 families and 38 genera were manually collected. Six families and 19 genera are new records for the Souss Massa region, and one family and two genera are new records for Morocco. Targeted efforts in specific habitats will undoubtedly yield numerous new records within the provinces studied here.

Keywords : Souss Massa, arachnological fauna, new genera, new family.

Saturday 18th May 2024

Oral Session 4 Topic 4

Biodiversity and Biotechnomogies:

Essential oils and antibacterial effects- Genetics-

Moderators:

Amina BOUBEKRI & Mohammed Ramdani

OR28 - Evaluation of the essential oils effects on the growth and quorum sensing of phytopathogenic bacteria

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About 30-40% of annual global crop losses are caused by diseases and pests, 14% are caused by diseases alone. The fight against parasites is mainly based on the use of pesticides and antibiotics. However, excessive use of synthetic substances has been shown to be toxic to mammals and polluting the environment.In addition, many pathogenic microorganisms can develop resistance to these antibiotics. For this reason, multiple initiatives have been developed to replace the use of antibiotics with essential oils. Bacteria use Sensing (QS) to regulate the various physiological processes relating to the management of their population and the expression of their genes. This process depends on the synthesis of signal molecules: acyl-homoserine lactones (AHLs) regulating vital functions such as motility, the production of antimicrobial agents, biofilm formation and the production of virulence factors in many bacteria.

The screening of the antibacterial activity of the essential oils of peppermint (*Mentha pepirita*), bitter orange (*Citrus aurantium*) and eucalyptus (*Eucalyptus globulus*) was evaluated using the aromatogram technique, against phytopathogenic bacterial strains: *Pectobacterium atrosepticum* (P.c.a.11), *Pectobacterium carotovorum* (P.a.21) and *Dickeya chrysanthemi* (Dc), responsible for blackleg disease, and soft rot.

The presence of anti-QS activity in the essential oils tested was evaluated by the inhibition of violacein pigmentation in *Chromobacterium violaceum* CV026 cultured on Luria Bertani agar. The results demonstrate that the essential tested oils have strong, interesting activity on the growth of three strains of phytopathogenic bacteria, with inhibition zone diameters ranging from 32 to 81 mm.

The QS inhibition activity was observed in the essential oils of *Mentha pepirita, citrus aurantium* and *Eucalyptus globulus* with a volume of 10 ml repress the production of violacein, by the formation of clear halo with colorless bacterial colonies around the discs impregnated with essential oils. Moreover, they were also able to inhibit QS-regulated virulence in, *Pectobacterium atrosepticum* (P.c.a.11), *Pectobacterium carotovorum* (P.a.21) and *Dickeya chrysanthemi* (Dc), and significantly reduce soft rot symptoms on tubers of potato.Our results suggest that plants have quorum-sensing mimicking signals, which could serve as potential sources to disrupt quorum-sensing in associated bacteria and inhibit the secretion of pectolytic enzymes in Pectobacterium. Which would be a biological alternative to the fight against phytopathogens.

Keywords: Essential oils, biological control, Phytopathgenes, quorum sensing.

OR29 – Morphological and molecular characterization of five varieties of the olive tree cultivated in the semi-arid zone of Tiaret (north-west Algeria)

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The objective of this study was to compare the morpho-biochemical and physiological characteristics of some varieties of Olea europaea europaea installed in the semi-arid region of Tiaret Algeria. These varieties are planted by the Technical Institute of Arboriculture and Vine "ITAV" in the steppe zone of the wilaya of Tiaret in Algeria. The methodology of this study consists of developing a database based on morphological observations recorded in the field in the spring of 2022. This base is then supplemented by data from analyzes in the laboratory.

A total of five varieties of the cultivated olive tree "*Olea Europaea*": Rougette, Gordale, Tablout, Agrarez and Mission were selected for morphological measurements of the tree (total height of the tree, diameter and height of the trunk and canopy circumference), followed by leaf samples in sealed plastic bags to determine physio-biochemical parameters in the laboratory. The biochemical parameters concerned the chlorophyll a and b content, carotenoid content) and the physiological parameters (relative water content, wax content).

The results showed that the varieties studied had small differences in behavior, largely due to the controlled conditions, but that their presence was due to the genetic variability of the varieties. The Rougette or Roussette variety originates from the Jijel region, also very widespread in the north of the Constantine region, intended for the production of olive oil. It is an early variety, resistant to cold and drought with an average oil yield ranging from 18 to 22%.

The Tabelout cultivar originates from the mountainous area of the Gulf of Bejaïa; cultivated for the quality of its olives and for the production of oil. The yield can reach 20%, even 24%. The Agrarez variety comes from Tazmalt (BejaÏa) to extract table oil with a yield of 16% and rarely 20%.
The two varieties Gordale and Mission are not very widespread in Algeria because of their low productivity; however, they are well adapted to the bioclimatic atmosphere of semi-arid Algerian regions.

Keywords: Olive tree, cultivar, morphology, physiology biochemistry, semi-arid, Tiaret, Algeria.

OR30 - Nutritional composition of sweet potato *Ipomea batatas* Algerian cultivar (yellow flesh) and tast quality of its chips

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Ipomoea batatas known as sweet potato is an edible tuber belonging to the Solanales order and the Convolvulaceae family. The commun sweet potato in Algerian markets is Ipomea batatas, Lam. Algerian cultivar (yellow flesh).

The biofortified starch from the fresh weight of the sweet potato has a chemical composition of water, ashes, proteins, lipids, total carbohydrates, and fibers . Others stydies confirmed the chemical constituents of Ipomoea batatas include citrusin C, caffeic acid, 3,4-di-O-caffeoylquinic acid, and 1,2,3,4-tetrahydro-beta-carboline-3-carboylic acid.

This study is aimed promoting the use of sweet potato as chips food by highlighting its nutritional potential. For this purpose, cooking tests were carried out by cutting slices of sweet potato with a thickness of 2 to 3 mm and 3 to 4 cm in diameter. The slices are soaked in edible oil for 5 minutes.

The tests consist of determining the time necessary in the oven to obtain crispy and golden chips. Three cooking temperature positions were experimented: 270°C, 280°C and 290°C. four cooking times were tested: 16 mins, 20 mins, 24 mins, and 28 mins.

The best results correspond to the temperature 280° for 24 minutes.

Keywords: *Ipomea batatas*, sweet potato, Algerian cultivar, nutritional composition, chips

OR31 - Lactic acid bacteria from fermented mare's and donkey's milk from the El Bayed region (Algeria): identification of strains by 16S rRNA sequencing

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Equine milk has long been known for its high nutritional and functional quality. This nutrient rich in lactic acid bacteria is widely appreciated for human health; however, its contribution in lactic acid bacteria remains little studied and less valued in the dairy industry in Algeria.

This study focuses on the isolation and identification of strains of lactic acid bacteria from 10 samples of fermented milk from equines (mares and donkeys), collected in two regions of the Wilaya of El Bayed (Algeria).

The identification of lactic acid bacteria strains is obtained by 16S rRNA sequencing. The results provide insight into the high diversity of lactic acid bacteria. Indeed, the milk of the mare with a father of 10 reveals the presence of 9 genera and 60 isolates of lactic acid bacteria while the milk of the donkey has 10 genera and 50 isolates (strains).

A significant number of strains identified, dominated by species of the genus Lactobacillus) could contain important probiotics with potential activity in the field of dairy biotechnology.

Keywords: Bacterial biodiversity, lactic acid bacteria, fermented milk, horses, Algeria.

OR32 - Probiotic performance and aromatic productivity power of lactic acid bacteria from mare's and donkey's milk sampled in El Bayed region (Algeria)

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The great diversity of strains of lactic acid bacteria which make up the fermented milk of the donkey and the mare, collected in the region of the Wilaya of El Bayed during the spring period of 2023, allowed us to evaluate the probiotic performances of 19 strains selected from 31 isolates tested. The inhibitory agent for 19 important lactic acid bacteria strains was determined to be a bacteriocin substance of protein nature.

Technological tests of the 19 most efficient bacteriocin-producing strains showed that Lactiplantibacillus plantarum and Leuconostoc mesenteroides are the most suitable for industrial use due to their effective proteolytic activity and their good acidifying power. The safety aspect of the 19 selected strains was non-hemolytic and their resistance to antibiotics (Fosfomycin, Oxacillin and Kanamycin) is well demonstrated in the laboratory.

This study of the probiotic profile suggests that the tested strains could be used as probiotics due to their aggregation properties, hydrophobicity and tolerance to various biological barriers such as acids (pH 3 and 4), bile salts (0.5%, 1% and 2%) and pepsin 3mg/ml (at pH 3), which have confirmed their ability to survive in extreme conditions of the digestive tract.

A significant number of the species identified in this study have already been detected in donkey and mare milk, but their importance for probiotic activity and biotechnological potential in Algeria is highlighted. The results provide an overview of the considerable diversity of microorganisms present in the highly selective ecosystem of fermented equine milk in Algeria.

Keywords: Fermented equine milk, Lactic bacteria, probiotic performance, aromatic power,

OR33 - Assessment of antifungal activity of organic dichloromethane extracts from *Lavandula spp*, *Marrubium vulgare*, and *Inula viscosa* against phytopathogenic fungi

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The objective of the present study was to evaluate the efficiency of organic extracts "dichloromethan extracts" *of Lavandula spp*, *Marrubium vulgare* and *Inula viscosa* in respect of some biotic fungal agents of cultivated plants. Tested on mycelial growth of seven phytopathogenic fungal strains (six from the *Fusarium* genus, and one from the *Microdochium* genus).

Among the five extracts tested on mycelial growth,the extract of *Inula viscosa* proved ef fective against four strains. However, the highest rate of mycelial growth inhibition (14.9 %) was recorded with the *Lavandula dentata* extract.

Keywords: dichloromethane extracts, *Fusarium* spp, *Microdochium nivale*, mycelial growth.

OR34 - Inventory of sandflies “Diptera: Psychodidae” in the Tizi-Ouzou area (Algeria)

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Sandflies are nematoceran dipteran insects belonging to the Psychodidae family and the Phlebotominae subfamily. They form a very homogeneous group that plays an important role in the transmission of diseases.

To better understand the phlebotomian fauna of the wilaya of Tizi Ouzou, we carried out our trappings in 4 regions (Draâ El Mizan, Boughni, Fréha, Larbaâ Nath Irathen) divided into 20 capture stations, an entomological investigation lasting 05 months (from May to September 2023) was carried out in its 20 stations. Two trapping methods were carried out: adhesive traps and CDC light traps. Eight species were captured, 7 species belonging to the genus *Phlebotomus* (*Ph. longicuspis, Ph. perniciosus, Ph. perfiliewi, Ph. papatasi, Ph. Sergenti, Ph. Ariasi*, and *Ph. bergeroti*) and a single species of the genus *Sergentomyia* (*S . minuta parroti*).

The genus *Phlebotomus* with a high abundance, i.e. 93% of all catches. The best represented species is *Ph. longicuspis*. For proper exploitation of the results obtained, we subjected them to analyzes using ecological indices of composition and structure.

Keywords: Phlebotominae, Psychodidae, Draâ El Mizan, Boughni, Fréha, Larbaâ Nath Irathen, Algeria

Friday 17 May, 2024 -

POSTER SESSION 1

Topic 1

Biodiversity and biotechnology: Marine and terrestrial ecosystems – Ecology - Aquaculture –- Water pollution - Medicinal and aromatic plants – Phytosociology -Ecology - Control insecticids –

Moderators :

Wafa BENCHALEL and Souaad SMAÏ

PO1 - Temporal variations of the plankton community in the subtidal zone near Umm Al-Namil Island, Kuwait Bay, Kuwait

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The study aimed to analyze the impact of physicochemical factors on plankton communities, including phytoplankton, zooplankton, and ichthyoplankton, in the subtidal waters of Umm Al-Namil Island, Kuwait Bay, through seasons. Sampling was performed covering all seasons for one year during low tide at the very beginning of the subtotal zone by collecting 5 liters of seawater by sieving through the 20 microns, 110 microns, and 300 microns for the collection of phytoplankton, zooplankton, and ichthyoplankton, respectively.

The Kruskal-Wallis statistical approach was employed to assess the influence of various environmental parameters on abundance and species richness. Phytoplankton abundance exhibited seasonal variations, with the highest mean values in summer and winter and the lowest in spring. Species richness was highest in autumn and showed no significant difference between spring, winter, and summer.

The study also identified nine larval fish families and observed variations in zooplankton abundance and species richness across seasons. Overall, the findings emphasize the importance of temporal monitoring for conservation and restoration programs, considering the influence of physicochemical and biological factors.

The fluctuations in water temperature were highlighted as a primary factor affecting plankton dynamics throughout different seasons at the beginning of the subtidal zone near Umm Al-Namil, Kuwait Bay, Kuwait.

Keywords: Phytoplankton, zooplankton, season, physicochemical parameters, subtidal zone, Kuwait Bay.

PO2 – Reproduction and growth of the sardine (*Sardina pilchardus*) and two sardinellas (*Sardinella aurita* and *S. maderensis*) in the Mauritanian coast

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The small pelagic fish represent more than 80% of landings in the northwest African cpoasts. The main species targeted by fishing are dominated by *Sardina pilchardus Sardinella aurita, Sardinella maderensis*. Despite numerous studies carried out on the biology of small pelagic at the sub-regional scale, data on growth and reproduction parameters remain insufficient to carry out reliable stock assessments. To this end, IMROP has initiated a research program since 2022 to update knowledge on the biology of the main species landed in the ports of Mauritania. This study focuses on the reproduction and growth of *Sardinella aurita*, *S. maderensis*, and *Sardina pilchardus*. These 3 species are among the most targeted by pelagic fleets.

A total of 2,302 individuals of the 3 species were sampled from January to December 2022. The samples come from three sources: (i) observation missions on board purse seiners operating in the ZEEM, (ii) fishery product processing plants, (iii) the fish market at the artisanal port of Nouadhibou. The processing and analysis of samples concerns the length (total, fork, standard); Weight (total, eviscerated, liver, gonads), sex and maturation of gonads, adiposity index and stomach filling rate.

The FONTANA scale was used for the classification of gonad maturation scales. The sex ratio and height-weight relationship were determined. Size at first sexual maturity (L50) was determined using R software using the packages “FSA”, “FSAdata” and “CAR”. The reproductive period of S. aurita, S. maderensis and S. pilchardus was carried out by monthly monitoring of the percentages of the Gonado-Somatic Ratio (GSR) of male and female individuals. The growth parameters ($L\infty$, K and to) are obtained using the R software using the “TropFishR” package. This package is inspired by the FISAT II technique, which uses the ELEFAN method from restructured LFQ data.

The results of the size-weight relationship showed a strong correlation between size and weight for the 3 species and an allometry that was lower for *S. maderensis* and the sardine and higher for the round sardinella. The determination of the L_{50} showed that for 3 species, males reach the size of first sexual maturity before females. The study of the reproduction of the round sardinella shows two reproduction peaks. A first peak in February, with a laying period spread from February to March. A second peak is recorded in August, with a laying period which extends from August to October. For the flat sardinella, the monthly evolution of the gonado-somatic ratio (GSR) showed a reproduction peak in June, with a spawning period extended from July to September. For sardines, the monthly evolution of the RGS showed a first reproduction peak in December, with a spawning period from December to July and a second peak in October. The results of growth parameters show that sardine and flat sardinella, males show faster growth than females. Unlike the round sardinella which shows a greater growth performance of females than that of males.

Keywords: Growth, reproduction, *Saridinella aurita, S. maderensis, Sardina pilchardus*, Mauritania

PO3 - Composition of dietary taurine supplementation to cultured Arabian yellowfin seabream *Acanthopagrus arabicus* Iwatsuki, 2013

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Fish food is a crucial and essential component for the success of farming, especially with the enormous growth of fisheries aquaculture. The need for less expensive solutions has increased due to the high cost of production and prices. Taurine is one option, which proved in other species that it helps to improve the quality of fish food and has a positive impact on the growth and health of fish.

This amino acid has a crucial role in regulating essential fish functions, improving fish productivity and nutritional value. It is known that Yellowfin Seabream (*Acanthopagrus arabicus*) has a slower growth rate compared to other cultured domestic species. In this research activity, cultured *A. arabicus* was supplemented with dietary taurine to study the effects of taurine on fish growth rate and to investigate and assess the nutritional value of cultured *A. arabicus* after supplementation with dietary taurine.

Keywords: Aquaculture, *Acanthopagrus arabicus*, Dietary Taurine, Nutritional value, Growth, Feed.

PO4 - Biology, growth and exploitation of the Sardine, *Sardina pilchardus* (Walbaum, 1792) in the Bay of Agadir (Moroccan Center Atlantic waters)

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Sardina Pilchardus (Walbaum, 1792) is the dominant small pelagic fish in the waters of the Atlantic and Mediterranean continental shelf. Its vertical distribution is between the surface and 100 m depth. For the study of the state of the sardine stock, which represents 80% of the tonnage of annual catches across Morocco, we based ourselves on data from the first half of the year, relating to the fishing effort, landing statistics, fishery data, size composition of the exploited population (National Fisheries Office ONP), and biological sampling carried out by researchers from the National Fisheries Research Institute, in the bay of Agadir (central Moroccan Atlantic waters).

The sardine is a targeted species in coastal artisanal fishing and is distinguished by its seasonality in the studied area. The results demonstrate a slight exploitation of this fish in the studied area. The distribution of marketed size frequencies shows a range from 12.0 to 22.6 cm in total length (TL). The laying period extends from January to March. The size of first maturity (L50) is 13.33 cm (total lenght).

Keywords: sardina pilchardus Growth, exploitation, light exploitation, Agadir Bay, Moroccan central Atlantic,

PO5 - Health risk assessment of arsenic associated with consumption of sardine *(Sardina pilchardus)* from the Algerian littoral

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Toxic trace elements are one of the most important contaminants in the marine ecosystems due to their toxicity, long persistence, bioaccumulation, and biomagnification in the food chain. In this study, the levels of arsenic (As), have been determined in the flesh of sardine (*Sardina pilchardus*) fished in three Algerian coasts; Algiers (North Centre), Bejaia (North East) and Oran (North West).

Quantification of this toxic trace element was carried out using the inductively coupled plasma mass spectrometer (ICP-MS) according to the method European Standard EN 15763 (2010). The results obtained were compared with the regulatory thresholds set by the food standards of Australia and New Zealand. In a further step, the risk to consumers was assessed using estimated daily intake (EDI), target hazard quotient (THQ) and hazard index (HI).

The average concentrations of Arsenic registered were (1.24; 2.98; 1.40 mg kg^{-1} w.w) in Algiers, Bejaia and Oran respectively. The concentration of As registered in sardine from Bejaia was the highest which exceeded the limit set by the food standards of Australia and New Zealand. The target hazard quotient (THQ) and the hazard index (HI) were widely below 1. The consumption of sardine does not pose risk to the Algerian consumers.

Keywords: Fish, Sardine, Arsenic, Algerian consumers, risk assessment.

PO6 - Signs of eutrophication in the Gulf of Gabès (Tunisia)

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Eutrophication, an environmental disruption triggered by excessive nutrients in natural ecosystems, is a pressing issue. These chemical compounds, such as nitrogen and phosphorus, are discharged in high concentrations through industrial and agricultural activities. This leads to an overgrowth of algae, upsetting the ecological balance and degrading water quality. Unfortunately, the Gulf of Gabès, a unique and ecologically significant region in the Mediterranean Sea, is not immune to this phenomenon.

This communication presents a comprehensive overview of the published data on signs of eutrophication in the Gulf of Gabès. This area constitutes the major sources of nutrient pollution from industrial discharges, urbanization, and agriculture. The consequences of eutrophication are severe, including harmful algal blooms, oxygen depletion, and a decline in water quality.

These disruptions are impacting the marine ecosystem and aquatic life, including fish. Nutrient enrichment is further complicated by trace metal pollution, overfishing, and climate change. To address this complex issue, future research should focus on understanding and managing the intricate interactions among these variables. Initiatives in the Gulf of Gabès must be comprehensive, involving stricter industrial regulations, improved agricultural practices, and enhanced wastewater management. These measures are crucial for preserving the integrity of the marine environment and ensuring sustainability for the future.

Keywords: Eutrophication, phytoplankton, zooplankton, algal blooms, phosphorus, Gulf of Gabès.

PO7 - Energy transfers through the food web in the hypersaline ponds of salterns of Sfax (Tunisia)

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The solar saltern of Sfax is located on the central-eastern coast of Tunisia (34° 39'N 10°42'E) and consists of interconnecting shallow ponds (20–70 cm deep) extending over an area of 1700 ha. The food web in the hypersaline ponds, up to 150 PSU, is mainly composed of three Eukaryote organisms *Dunaliella salina* (microalgae), *Fabrea salina* (ciliate) and *Artemia salina* (crustacean). We analyzed the Predator/Prey relationship between these three organisms in laboratory conditions, studying the grazing and energy transfer rates. In solar saltern, the dynamic population of *Dunaliella* displays a negative relationship with that of *Fabrea* and *Artemia*. Grazing experiments confirm that *Fabrea* and *Artemia* exercise a top-down control on *Dunaliella* populations.

While *Artemia* and *Fabrea* occupy the same trophic level in the food chain, the grazing rate of *Fabrea* on *Dunaliella* is strongly high reaching $0.85 \times 10^6 \pm 0.05$ cells mL^{-1} day^{-1}. The fatty acids (FA) appeared as good tracers to define the energy transfer along the food chain studied. Effectively, the FA composition of consumers appeared correlated to the FA of their prey. In parallel, the saturated fatty acids (SFA) content decreased according to the trophic levels, and the opposite was observed for monounsaturated fatty acids (MUFA). Therefore, Palmitic acid (C16:0) showed trends that rendered it useful for tracing trophic transfer to consumers (*Artemia*).

The polyunsaturated fatty acid (PUFA) and especially linoleic acid (C18:2) and linolenic acid (C18:3) were able to be traced across the transfer to *Fabrea*. This study increased our knowledge of the energy transfer between the major halophile organisms living in the solar salterns at Sfax (Tunisia). We propose also that the fatty acids be used in future investigations to understand the Predator/Prey ecological relationship in marine eukaryote organisms.

Keywords: Solar Saltern, Food web, Energy transfer. Tunisia

PO8 - Protective effect of *Halamphora* sp exopolysaccharides on nickel chloride-induced liver toxicity in rats

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This study is focused on the extraction of sulfated exopolysaccharide from *Halamphora* sp. (CH-EPS) and the determination of their biological properties with a view to studying their antioxidant power in vitro and protective power in vivo in rats subjected to a toxic agent: nickel chloride. 24 female Wistar rats, randomly distributed into four experimental groups, namely (C): control, (Ni): rats treated with nickel with 5 mg/kg of $NiCl_2$ for 30 days, (CH-EPS): rats having received a sulfated exopolysaccharide extract from *Halamphora* sp. with 250 mg/kg BW for 30 days and (Ni+CH-EPS): rats treated with Ni and CH-EPS-administered for 30 days.

In vitro tests showed high total antioxidant capacity of CH-EPS due to hydroxyl radical scavenging activity. The high antioxidant properties were probably related mainly to L-galacatose followed by xylose, D-galacose, uronic acid and ribitol. In control positive rats, nickel chloride causes an increase in serum biochemical variables and triggers oxidative stress in the liver. CH-EPS (250 mg/kg) causes a significant reduction in increased levels of ALT, AST, ALP, LDH, γGT, total cholesterol, triglycerides, LDL and causes an increase in HDL concentration compared to the $NiCl_2$ group.

In the liver, nickel chloride was found to induce an oxidative stress evidenced by an increase in lipid peroxidation and changes in antioxidant enzymes activities. Superoxide dismutase (SOD) activity was found to be increased whereas glutathione peroxidase (GPx) and catalase (Cat) activities were decreased. Furthermore, treatment with CH-EPS (250 mg/kg) in $NiCl_2$-treated rats resulted in a significant decrease in TBARS concentrations in liver tissue compared to the $NiCl_2$-treated group. The formation of pathological liver lesions induced by $NiCl_2$ administration is strongly countered by the CH-EPS (250 mg/kg).

Overall, this study suggests that administration of CH-EPS exhibits high potential to quench free radicals and reduce $NiCl_2$-induced liver toxicity in rats.

Keywords: *Halamphora* sp, $NiCl_2$, liver, oxidative stress, Histopathology.

PO9 - Impact of global warming on phytoplankton of the Boukerdane dam (Tipaza – Algeria)

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The significant reduction in the water level of the Boukerdane dam, linked to the global warming that Algeria has experienced in recent years, has had a detrimental effect on phytoplankton biodiversity. This study was compared with the results of previous work carried out in this same dam by Arab et al. (2017). Phytoplankton sampling was carried out according to a seasonal cycle during the period 2020-2021, using a 50µm plankton nets.

Knowledge of the physicochemical characteristics of the dam waters makes it possible to better explain certain changes that occur in the general structure of the phytoplankton population of this body of water. Variations in nutrient salt concentrations (nitrates, nitrites and ortho-phosphates) vary from one season to another where high values are recorded only for nitrates, probably due to the surrounding agricultural land.

Nitrates constitute a nutrient source for the proliferation of phytoplankton but in our dam no bloom was observed during the sampling period. The phytoplankton recorded in the dam belongs to 5 classes (Chlorophyceae, Cyanophyceae, Euglenophyceae, Diatomophyceae and Dinophyceae). In a short period of time (4 years),

The systematic composition of the phytoplankton population has undergone profound changes compared to that of 2017, with specific richness falling from 162 to 32 species with a marked reduction in abundance. This is strongly linked to the increased drop in the water level of the dam which went from -124m to -7m depth under the effect of the intensity of global warming. The qualitative composition of the phytoplankton shows that the Chlorophyceae went from 56 species to 13 species, Diatomophyceae from 47 to 4 species, Euglenophyceae from 14 species to 9 species and Cyanophyceae from 17 to 5 species.

The dam has become less productive because in the recent past it was dominated by Diatomophyceae throughout the year. Currently we see an alternation in dominance between the classes: Chlorophceae euglenophyceae (autumn and spring) and Cyanophyceae euglenophyceae (winter). Euglenophyceae and cyanophyceae develop in eutrophic waters. Based on the qualitative aspect, the dam classified as mesotrophic in the past, currently becomes meso-eutrophic

Keywords: Boukerdane Dam, phytoplankton, biodiversity, global warming. Algeria.

PO10 - Water quality in two wetlands in western Algeria: Dayat Morsli and Lake Telamine

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Diatoms are good indicators of the level of eutrophication of watercourses and the increase in the concentration of dissolved minerals. They are also affected by metals and pesticides. The objective of the present study is the evaluation of the pollution of two Lakes (Dayat Morsli and Télamine) of western Algeria through the calculation of the Generic Diatomic Index (GDI).

The results allow the identification of two orders, Central and Penal. The latter one is the most represented with 11 families (*Bacillariaceae, Naviculaceae, Stephanodiaceae, Fragilariaceae, Eunotiaceae, Achnanthiacea, Cymbellaceae, Catenulaceae, Brachysiraceae, Surirellaceae, Cocconeidaceae*) and 13 Genera (*Nitzschia, Navicula, Cyclotella, Denticula, Eunotia, Achnanthes, Diatoma, Cymbella, Amphora, Melosira, Surirella, Fragilaria, Cocconeis*) at Lake Dayat Morsli and six families (*Fragilariaceae, Achnathaceae, Eunotiaceae, Surirellaceae, Bacillariaceae, Naviculaceae*) and 13 genera (*Diatoma, Fragilaria, Eunotia, Cocconies, Achnanthes, Naviculaceae, Pinnularia, Cymbella, Amphora, Gomphonema, Nitzschia, Surirella, Cyclotella*) at Lake Telamine.

The order of the centrals presents only one genus *Cyclotella* for the two sites studied. The generic study shows richness in number of genera *Nitzschia and Navicula* at Lake Dayat Morsli and reveals richness in number of genera Amphora, *Navicula* and *Nitzschia* of Lake Telamine. The values of the Generic Diatomic Index obtained show that the water of Lake Dayat Morsly is of poor biological quality.

Keywords: Diatoms, Generic Diatomic Index, Lake Dayat Morsli, Telamine Lake, Algeria.

PO11 – Monitoring of the evolution of composted municipal solid waste in Sidi Bennour city (Morocco)

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The aim of this study was to assess the physical composition of municipal solid waste (MSW) generated by the town of Sidi Bennour and to investigate the accelerated composting of the organic fraction of this household waste in the presence of an organic co-substrate (immature mule manure) with varying proportions of manure representing 10%, 20% and 30% by weight. In our study, accelerated composting was carried out in a laboratory-scale reactor during 21 days.

To monitor compost evolution, important parameters such as temperature, moisture content, pH, electrical conductivity (EC), carbon to nitrogen ratio (C/N) and organic matter were measured during the composting process. In addition, phytotoxicity such as seed germination index and heavy metal concentration was determined at the end of the composting period.

The results of the physical characterization of the MSW indicate the presence of a high percentage of biodegradable organic matter, reaching 84%. During composting, the results of temperature changes in the various mixes demonstrate the effectiveness of accelerated composting, since the thermophilic phase is completed after an average of 9 days, reaching maximum temperatures of between 64 and 68 °C. Also, the C/N ratio decreases with increasing composting time, due to the loss of carbon and the increase in nitrogen content. In toxicological terms, the final compost is considered to be of excellent quality due to the absence of toxic heavy metals and with a germination index values above 100%.

Keywords : Municipal solid waste, Compost, Mule manure, Sidi Bennour Morocco.

PO12 - Evolution of chemical parameters during locust growth and possibility of its use in ruminant feed

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The desert locust *Shistocerca gregaria* is capable of gregarizing. These are polymorphic species to integrate it into the diet of ruminants; we have discussed the influence of some biometric parameters (color, size, fresh and dry weight) and the biological stage on the chemical composition of the species. This chemical composition is studied at two different stages to assess their nutritional values.

The biological material (locusts) used in the experiment comes from breeding at the National Institute for Plant Protection (NPV). It is composed of deceased individuals collected regularly and stored in petri dishes in the refrigerator at temperature of 5°C. Others came from the wilaya of Batna. For this study conducted in 2021, 23 individuals are used. After taking the biometric parameters, weunder took the drying in the oven at 65°C then the grinding of the samples to obtain a fine powder ready for the analyses by AFNOR method (1982) and AOAC (1990).

Our analyzes indicate that the organic matter of *Shistocerca gregaria* is on average 80.64%. The two organic constituents vary from 97 to 119% for proteins and from 30.22 to 49.19% for fat. The composition of mineral substances (ash) does not show a very great variability 6.31 to 7.31%, the fiber content as for it varies from 5.46 to 6.45%.

The high amount of protein, fat, tolerable fiber and minerals of this locust could contribute to taking it as an alternative food to other foods used in the diet of ruminants.

Keywords: Animal feed, biometrics, chemical composition, *Shistocerca gregaria*, Algeria

POSTER SESSION 2

Topic 2

Flore : Medicinal and aromatic plants – Phytosociology and Ecology - Flore - Faune - Zootechnics - Insectes and Control insecticides - Parasitology - Pathogenic fungi - Lichens - Bacteria

Moderators :

Fairouz HADDADJ and Amina SMAÏ

PO13 - Cytogenetic and molecular data on the threatened species of the *Allium* section *Codonoprasum* Reichenb. from Algeria including the endemic *Allium fontanesii* Gay

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Genus *Allium* L. especially species belonging to the Mediterranean section *Codonoprasum* occur in disjointed habitats, within ecosystems increasingly impacted by anthropization, overgrazing and climate change. Phenologically, this species are usually spring-flowering bath some of them are autumnal.

The autumnal group mostly encompass scarce diploid exclusively distributed in the eastern Mediterranean islands while polypoid species where mentioned in the southwestern Mediterranean region (Italy, France and Spain). In this study, we explore the diversity of the Algerian representatives which remain taxonomically equivocal.

Plant material from 60 natural populations of 06 species was sampled then subjected to taxonomic identification and cytogenetic investigations. Karyotypes and idiograms were performed for each population. Comparative molecular phylogenies covering both of Algerian and related Mediterranean taxa were inferred using nuclear ribosomal ITS_1-5.8S-ITS_2 rDNA sequences.

Cytogenetic survey highlights occurrence of diploid and tetraploid cytotypes (2n=16, 24 and 32) with relatively symmetric and small karyotypes. Moreover, the relationships between diploid autumnal species originating from eastern Mediterranean region with the spring-flowering Algerian ones were resolved here for the first time. Results supported a common evolutionary history with local adaptations of this fragmented species throughout Mediterranean region. We also provide and informative data for future phytoresources conservation.

Keywords: *Allium*, evolution, karyotype, endemism, Algeria.

PO14 - Cytotaxonomy and phylogenetics as predictive tools for identifying medicinal plants: Examples of species from the Algerian flora

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Traditional medicinal herbs as well as their phytochemical products have been proved active and safe as preventive or alternative treatments. Though, identification of the medicinally useful specific entities represents the initial critical task that requires application of multidisciplinary approaches to assess their variability and taxonomic boundaries. In facts, the biological complexity in plants, involved in their polymorphism, can cause misuses.

In this context several taxa represent relevant examples of medicinal herbs with high genetic diversity suggesting a complex evolutionary history. Here we characterize the diversity of some noteworthy plant groups from Algerian pharmacopeia, in order to establish an actualized inventory of the spontaneous species, which mostly occur in sensitive habitats, and to check their main ethnobotanical uses.

Plant material was sampled in various bioclimatic sites, and then subjected to sharp taxonomic determination. Chromosome counting and karyotyping were performed. Cytogenetic survey highlights a significant diversity and variable chromosomal asymmetry indexes values.

Results emphasize the importance of cytogenetic data in high genome plasticity. Results also highlight the importance of phylogenetic methods as informative and efficient tool for phytoresources management and conservation; and predict that species explored may represent a novel source of drugs.

Keywords: Medicinal plants, phylogeny, taxonomy, ethnobotany, Algeria.

PO15 - Study of the vegetation of an Aleppo pine forest (*Pinus halipensis* Mill.): Senalba Chergui (Djelfa, Algeria)

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This study aims to characterize and analyze, qualitatively and quantitatively, the floristic diversity of a Pinus halepensis pine forest in the forest of Senalba Chergui, located in the cool semi-arid bioclimatic stage (wilaya of Djelfa), in order to understand the distribution plant groups and the factors that govern them. Two stations were selected (Nakkazia on the north side and Mezreb El Ali on the south side) and sampled by subjective sampling which resulted in the completion of 30 phytoecological surveys (15 surveys per station) thus making it possible to inventory 109 taxa.

The floristic surveys, in abundance-dominance in the form of a matrix, were subjected to multivariate statistical analyzes (Correspondence Factor Analysis (CFA), Hierarchical Ascending Classification (CAH)), in order to be able to individualize or group these surveys according to the same ecological affinities. Multivariate analyzes made it possible to highlight 4 plant groups and show that the anthropogenic intensity and the overall effect, resulting from a combination of several factors such as soil, North-South exposure and altitude, are the factors responsible for the composition and distribution of vegetation in the forest landscapes of our study stations.

The qualitative analysis, through raw biological spectra, showed the dominance of therophytes, which reflects the modifications made by man and his livestock in this natural forest. The forest character of the studied stations was confirmed by the dominance of phanerophytes through the analysis of real biological spectra. However, the analysis of these spectra showed the regression of the plant cover of the stations through the progressive disappearance of phanerophytes, the extension of geophytes and chamephytes and the progressive appearance of hemicryptophytes.

These stations have a floral species made up of Mediterranean elements. The other chorological types are less represented with relatively similar rates. The quantitative analysis, through diversity indices, made it possible to conclude that the overall diversity of the stations studied is moderately low, which reinforces our concerns about the conservation status of this natural forest of high biological and heritage value.

Keywords: *Pinus halepensis*, biodiversity, Multivariate analyzes, Saharan Atlas,

PO16 - Biological control of lettuce drop *(Sclerotinia minor)* using antagonistic *Bacillus* species

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Sclerotinia minor Jagger (*S. minor*) is a phytopathogenic fungus that causes white mould, a serious problem of lettuce (*Lactuca sativa* L.) production. The control of this pathogen is challenging because of the presence of resistance of sclerotia, which can survive in the soil under favourable conditions. In Bulgaria, the management of lettuce drop relies primarily on the strategic application of synthetic fungicides. To find alternative methods for disease management, four bacterial isolates were screened for antagonism against *S. minor*. This study reports the *in vitro* evaluation of the antifungal activity of *Bacillus subtilis*, *Priestiamegaterium*, *Bacillus safensis*, and *Bacillus mojavensis* against *S. minor*.

The molecular identification of the isolates involved in the activity was examined by 16s rRNA sequencing. Isolated bacterial strains produced indole-3-acetic acid (IAA) in a medium supplemented with 0.1% L-tryptophan. The ability of those strains to increase the mobility of phosphorus and zinc has been elucidated. The production of siderophores has been confirmed on CAS (Chrom azurol S) medium. The inhibitory action showed by the filtrates of the bacterial growth broths against *S. minor* and points out the nature of the molecules involved.

The analysis of the presence of *ituA*, *fenD*, and *surfA* genes confirmed the potential production of cyclic lipopeptides, such as iturin, fengycin, surfactin and their ability to inhibit the germination of the pathogen. The evaluation of the antifungal activity was carried out *in vitro* and pot experiments. This study determined the effect of growth-promoting rhizobacteria on the development of lettuce. Growth promotion was evaluated on seedlings after treatment with suspensions from the four bacteria. The bacterial strains promoted lettuce growth and rootdevelopment, approving potential biofertilizers for.

Keywords: Lettuce, *Bacillus* sp., biocontrol of white mould, *Sclerotinia minor*, cyclic lipopeptide, biofertilizers.

PO17 - First report of powdery mildew caused by *Erysiphe cruciferarum* on *Camelina sativa* in Bulgaria

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Camelina (*Camelina sativa* L. Crantz) belongs to the Cruciferous family and is a relatively new crop for our country. The Agricultural University is a partner of the SCOOP Project. The project is focused mainly on organic farming systems intended to preserve ecosystem and food and feed security. In the spring of 2022, camellia was grown in small plots of 10m2 (1.4 x 7.7m) at the experimental field of the Agricultural University, Plovdiv. Field trials were conducted on the certified organic field at the Agroecological Center of the Agricultural University -Plovdiv. The soil type is neutral Mollic fulvisols – FAO, with a low humus content of 3.7%. At the end of June of the same year, symptoms of powdery mildew (*Erysiphe cruciferarum* Opiz ex L. Junell) were detected, with an attack rate exceeding 40%. External manifestations are typical of classical powdery mildew.

A white mycelium was observed on the upper side of the leaves and the stems, later the leaves turned yellow. The structure of the white colonies with hyphal growth is observed under a microscope. Conidiophores are cylindrical, 19.9 to 41.7 × 8 to 17.1 µm and composed of 3 to 4 cells. The chasmothecia of the pathogen was also discovered. Fruiting bodies are 110 µm (80-130 µm) in diameter, with colourless, club-shaped asci with colourless, ovoid ascospores. These characteristics are consistent with previous reports on *Erysiphe cruciferarum* (Braun and Cook, 2012; Fu and Yan, 2021). Partial sequence analysis of the ITS5-5.8-ITS4 region of the nuclear ribosomal DNA with universal primers identified the pathogen as *Erysiphe cruciferarum* according to method of White et al. 1990.

The unweighted pair group method obtained the phylogenetic tree using the arithmetic average (UPGMA) clustering algorithm (Saitou and Nei, 1987). Pathogenicity experiments performed according to Koch's rules were conducted in a greenhouse at 220 C, 14 h photoperiod and 70 % humidity. Inoculation of the experimental plants (at 14 days) was performed by gently pressing the upper surface of naturally infected leaves with the upper surface of the leaves of the healthy experimental plants for about 5 seconds. In the control variants, naturally healthy leaves were used. On the 8th day, the typical symptoms of powdery mildew appeared; the plants were healthy in the control. It was re-isolated and identified by morphological characteristics. According to the literature, the article is the first report of powdery mildew caused by *E. cruciferarum* on camelina in Bulgaria.

Keywords: Camelina sativa, Erysiphe cruciferarum, powdery mildew, Bulgaria

PO18 - Positive effect intercropping of *camelina* with legumes on soil microbial diversity by applying NGS and mobile fluorescence spectroscopy

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Camelina (*Camelina sativa*) is a low input cruciferous plant with multiple uses depending on the genotype. It could be valuable oilseed crop for food and feed with essential amino acids, especially sulphur-containing ones, which are generally lacking in leguminous crops, thus representing an alternative source of protein for both humans and farm animals. Other varieties are preferred as energy crop according to their fatty acid composition. The low requirement to soil quality and nutrients and good drought tolerance as well as weed suppression and the short vegetation period are of interest to farmers especially in organic crops. The combination of the crop with pulses increases the nutritional value of soil, improving also the biodiversity below and aboveground. Analyses of small plot experiment with camelina in pure stand and intercropped with pulses on certified organic field of the Agricultural university – Plovdiv during 2 experimental years under the SCOOP project are presented.

For better understanding mechanism of plant-microbial interactions, rhizospheric soil samples from five experimental plots of mono- and mixed cultivation of three camelina genotypes- two introduced varieties Cs1, Cs2 and one Bulgarian landrace Cs3 with variety 666 of vetch (*Vicia sativa* L.) (Cs3.Vs) and variety Mir of pea (*Pisum sativum* L.) (Cs3.Ps) were collected and analyzed. Total DNA was isolated from the rhizosphere soils and the presence of the 16S rRNA gene was confirmed by amplification with universal primers 16SV34. In the present study, the structure of the soil bacterial community in plots where camelina grew alone and intercropping with pea and vetch was analyzed by a metagenomic approach. The number of observed species was highest in Cs3, Cs3.Vs, CsS. Ps and decreased in the soil of introduced camelina cultivars Cs1 and Cs2. The ratio between individual species of

Proteobacteria in individual soil variants is relatively similar among different soils. The analyses revealed that Actinonobacteria were higher in the rhizosphere of the local Cs3 variety. Acidobacteria, Gammatimonadota, Bacteriodota, were the common genera in studied soils with a relatively constant ratio between species. Research has shown that the amount of beneficial microorganisms is high in Cs3 and increases when co-cultivated with legumes. The α-diversity analysis indicated the richness and inverse Simpson diversity index of the bacterial communities in the rhizosphere to be 9.226 and 9.150 in soils intercropping with vetch and pea, respectively. Soil bacterial communities differed among the conventional cultivation of camelina and soil with intercropping with vetch and peas, indicating that legumes considerably affected the growth and development of beneficial micro-organisms such as nitrogen fixing, nitrifying bacteria, phosphorus dissolving bacteria, thus helping to provide better plant nutrition.

Spectral analysis was successfully performed with the mobile fiber optic system generating fluorescence spectra. A correlation was clearly observed in the value of the emission wavelengths of soil samples from self-grown plants co-cultured with peas and vetch. In the self-grown plants, the highest intensity was Cs3. The signal intensity of the intercropped samples was higher than that of the self-grown plants. The sample with the highest signal intensity is the sample in combination with vetch. The results of the experiment can be used to optimize the analysis time of soil samples from field cultivation of camelina. The research makes it possible to carry out analyses by means of mobile fluorescence spectroscopy, which can be applied to the analysis of soil samples in the independent cultivation of camelina and a variant with co-cultivation with leguminous crops locally in the field after harvest.

Keywords: *Camelina sativa*, intercropping with pea and vetch, NGS, mobile fluorescence spectroscopy.

PO19 - Epiphytic lichens biodiversity in the urban environment of Sidi Bel Abbes province (north-western Algeria)

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Sidi Bel Abbes is located in the North West of Algeria (439-500 m, altitude) with an area of 70 km². The town is surrounding by cereal cultivations and olive orchard. This study is focused on the epiphytic lichens vegetation biodiversity and ecology. The sampling period was between 2021 and 2022, in 18 stations. The climate of the area is mostly dry Mediterranean, characterized by cool winters and dry summers. The collected specimens were examined in water, 10% KOH (K), Lugol's iodine solution, directly (I) or after pre-treatment with KOH (K/I), using standard stereoscopic and light microscopy (Zeiss 4X *47 50 22* and Optica Axiom 2000).

Thirty species of epiphytic lichens were identified in the urban environment of Sidi Bel Abbes , 26 of them are new to this province: *Acarospora cervina, Aspicilia cinerea, Candelariella aurella, Candelariella reflexa, C. vitellina, Circinaria calcarea, Gyalolechia flavovirescens, Heteroplacidium fusculum, Kuettlingeria teicholyta, Lecania fuscella, L. naegelii, L. campestris, L. chlarotera, Lecidella elaeochroma, L. stigmatea, Myriolecis dispersa, M. hagenii, M. sambuci, Protoparmeliopsis muralis, Rinodina pyrina, Sarcogyne algerica, S. regularis, Polycauliona polycarpa, Rufoplaca arenaria, Variospora flavescens* and, *Xanthocarpia lactea*. One additional species is new to Algeria: *Athallia cerinelloides* (Erichsen) Arup, Frödén & Søchting, characterized by the thallus crustose, episubstratic not lobed, inconspicuous, forming small pale grey yellow or greenish-yellow spots. Photobiont chlorococcoid. Apothecia sessile, 0.2-0.5 mm in diameter, biatorin, zeorin, more or

regular round with a flat yellow-orange disc and a clean concolorous proper margin, a grey thallin margin is sometimes visible only on the underside of apothecia. Epithelium orange-yellow, hymenium colourless, 55-70 µm high, I+ blue, hypothecium colourless. Paraphyses 1-2 µm thick, the apical cells hardly swollen 3-5 µm. Asci octosporate, cylindrical, claviform, Teloschist type, the apical dome K/I+ blue amyloid.

Keywords: Lichens, biodiversity, ecology, *Athallia cerinelloides new species for Algeria*,.

PO20 - The contribution of biological control against the tomato leafminer *Tuta absoluta* (Meyrick, 1917)

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In 2008, Algeria experienced devastating damage caused by a new pest: “The tomato lifeminer” *Tuta absoluta*. The insect spread rapidly throughout the country's tomato-growing regions, causing substantial production losses.

This study aims to propose alternative solutions based on the use of natural "bio-insecticide" Novacrid produced from the entomopathogenic fungus Metarhizium acridium, products to fight the larvae population of the pest *Tuta absoluta*, against this background we have evaluated the insecticidal effect of the fungus which was selected for its therapeutic properties and its bio-pesticidal effect.

Three doses were tested to estimate larval mortality and three replicates were carried out for each treatment, with the controls receiving sterilized distilled water (containing no additives). 1st dose (D1 = 1.25 g); 2nd dose (D2 = 2.5 g); 3rd dose (D3 = 3.75 g). Results show that the number of dead individuals demonstrated that the fungus was truly effective, he has a high toxicity against *Tuta absoluta* indeed 100% mortality of larvae treated with novacrid was observed after 7 days of treatment.

Keywords: *Tuta absoluta*, biopesticide, novacrid, leafminer toxicity.

PO21 - Physico-chemical study and bioinsecticide effect of the essential oil of *Schinus molle (L.)* on a stored foodstuff insect: *Sitophilus oryzae*

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As part of the search for new products combining aromatic properties and biological benefits, we studied the bio-insecticide effect of the essential oil of the false pepper tree *(Schinus Molle* L.) on the biological activity of the rice weevil. (*Sitophilus oryzae* L.); a major insect pest of stored cereals.

The essential oil of the plant is extracted by the hydrodistillation technique with a yield of 1.18%. Contact tests were carried out on adults of *Sitophilus oryzae* aged less than 24 hours at a temperature of 28°C and a relative humidity of 70%.

The determination of physicochemical indices revealed that the essential oil of *S. molle* has a relative density equal to 0.8535, a pH of 6.045 and a refractive index of 1.4972.The physicochemical analysis of the essential oil tested comply with AFNOR standards.

The evaluation of the toxicity of the essential oil was carried out by inhalation – contact. Three doses were tested to evaluate the insecticidal activity of *Schinus molle* on *S. oryzae*. Dead insects were counted and corrected mortality was calculated using the Abbott formula.

Insect mortality of 100% was recorded for *S. oryzae* after 8 hours of exposure with *S. molle* essential oil. The results of the insecticidal activity showed that the essential oil of *Schinus molle* has remarkable effectiveness on the coleoptera insect.

Keywords: *Sitophilus oryzae*, Insecticidal activity, *Schinus molle*, Essential oil. Hydrodistillation.

PO22 - Physicochemical characterization and study of the insecticidal activity of *Origanum floribundum* essential oil.

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Origanum floribundum Mumby is a rare aromatic and medicinal plant endemic to Algeria, belonging to the Lamiaceae family. The species grows spontaneously in the high mountains of Hammam Melouane (Blida - Algeria).

The present work consists of an extraction, physicochemical characterization and study of the insecticidal effect of the essential oil on chewing lice of the species *Bovicola caprae*. The essential oil was obtained by hydro-distillation using a Clevenger-type apparatus. The yield of essential oil was 1.86%.

The results of the physico-chemical analysis show that the essential oil has a refractive index equal to 1.492, a relative density equal to 0.9539, a rotatory power equal to +0.003°±0.00047 and a pH equal to 6.058. Analysis of the essential oil showed that its physicochemical properties conformed to AFNOR standards. The toxicity of the essential oil was assessed by inhalation-contact. 100% insect mortality was recorded after one hour's exposure to an essential oil concentration of 0.8µl/ml.

Keywords: *Origanum floribundum*, essential oil, insecticidal activity, hydrodistillation, *Bovicola caprae.*

PO23 - Influence of soil climate on the chemotypic composition of the essential oil of Algerian *Thymus vulgaris* L.: comparative study of two terroirs

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The objective is based on the comparative study of essential oils obtained by hydro-distillation from "*Thymus vulgaris* L" harvested in 2 different regions: Tipaza (sub-humid climate) and Ain Defla (arid climate). The results show that there are differences between the essential oils of *T. vulgaris* from Ain defla and Tipaza. The yield of essential oil varies depending on the mass of the plant material. It reaches 1.42% at Ain Defla and 1.38% at Tipaza. The physical indices of EO from the 2 stations show significant similarity. They comply with those cited by AFNOR. The characterization of chemical indices highlights notable differences between the EO of the 2 stations for the same plant species.

An analysis by gas chromatography coupled with mass spectrometry (GC/MS) of the EO of *T. vulgaris* collected in Tipaza and Ain Defla made it possible to highlight distinct chemotypic profiles for each locality. In Tipaza essential oil, 36 compounds were identified, dominated by carvacrol (31.44%) and gamma-terpinene (28.15%). Other minority constituents are also present, with contents between 0.08% and 8.48%. Ain Defla EO has a simpler composition, with 25 identified compounds.

The majority constituents are also carvacrol (50.78%) and gamma-terpinene (16.56%). Minority constituents are also present, with contents between 0.11% and 9.43%. The high proportion of carvacrol and gamma-terpinene in the two essential oils classifies them in the carvacrol-gamma-terpinene chemotype. This chemotype is characterized by the predominance of these two compounds among all the constituents detected in the samples studied.

The EO of *Thymus vulgaris* from Tipaza and Ain Defla present distinct chemotypic profiles, although sharing the same carvacrol-gamma-terpinene chemotype. This difference in composition is probably explained by environmental and soil specific factors to each site.

Keywords: *Thymus vulgaris* L, hydro distillation, essential oils, physicochemical indices, chromatographic analysis by GC/MS.

PO24 - Influence of the cooking method on the biochemical and sensory characteristics of lamb meat raised in western Algerian pastures and fed with brewers' grains

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The objective of this work is to evaluate the consequences of the cooking method used on the nutritional and sensory qualities, as well as the oxidative stability of lamb meat. Indeed, this experiment was conducted on ten Rembi breed lambs, aged 7 months, with an average live weight of 38.13 kg, raised in the west of Algeria and fed a diet consisting of 40% concentrate and 70% brewer's grain spent, the green rationing is unlimited.

The results of this experiment yielded acceptable and comparable levels to standards. Cooking in broth applied to the *biceps femoris* muscle showed that the contents of dry matter, mineral matter, and proteins were significantly ($p<0.05$) lower than those obtained in grilling the meat, with levels of approximately 25.51% vs. 30.83%, 0.17% vs. 3.03%, and 15.42% vs. 21.77%, respectively.

The intramuscular fat content, which represents 3.80% of the raw meat, increased significantly ($p<0.05$) with the increase in cooking temperature, reaching 9.37% for boiled of muscles at 100°C and 13.87% for those grilled at 250°C. No significant effect was recorded for the pH results.

However, the results obtained from the study of the effect of cooking on the oxidative stability of lamb meat revealed a significant increase in the content of substances reactive to thiobarbituric acid (TBARS) for leg muscles (boiled vs. grilled), due to their content of fat sensitive to oxidation, with levels of 0.50% vs. 0.57%. Although cooking leads to an increase in lipid oxidation of lamb meat, its nutritional and dietary value is not altered.

Furthermore, it was observed that the cooking method influenced the sensory properties of the studied muscles. Sensory analysis conducted by university campus tasters highlighted a preference for the broth treatment. The latter resulted in better sensory attributes and contributed to producing meat that was more tender, juicier and with a more pronounced taste.

Keywords: Brewer's grain spent, cooking, lipid oxidation, Sensory Quality, Lamb Meat.

PO25 - Study of some factors limiting the success of bovine artificial insemination in the wilaya of Sétif and Mascara (Algeria)

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Dairy cattle breeding remains a workshop requiring particular attention maintained over time, particularly in terms of reproduction. Indeed, the objective of dairy cattle breeders is undoubtedly a ten-month lactation and one calf per cow per year. However, in bovine reproduction, infertility remains a problem with serious economic consequences. This is why AI has always, over time, produced biotechnologies aimed at the genetic improvement of cattle herds.

The study is carried out in the wilaya of Setif and Mascara. It concerns 13 dairy cattle farms spread over two wilayas. The aim is to evaluate the zootechnical performance of dairy cows and to determine the strong and weak points of the management of the dairy cattle herd with regard to reproductive management.

The objective of this work aims to assess the reproductive performance of cows by quantifying the following criteria:

Evaluation of the technicality of 3 inseminators: one in Mascara and to in Sétif; Calving-first service interval; Calving-fertilizing service interval; Success rate in first covering.

The analysis of the reproduction criteria showed that the success rate of artificial insemination at the farm level varies from 14.28% to 90.90% and that the calving-first service interval V-IAF is well above the accepted standards, this resulted in a V-V interval exceeding a year. The results of artificial insemination of the 3 inseminators are 46.16%, 32.25% and 51.11% respectively.

Keywords: Infertility, artificial insemination, dairy cows, reproduction.

PO26 - Survey of spider species in Taroudant (Aoulouz and Imi Lkhang dam), Morocco

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With 51726 identified species spread over 136 families (World Spider Catalog, 2023), spiders (Araneae) comprise one of the most diverse animal orders.

Predominantly preying on invertebrates, spiders inhabit nearly all ecosystems. As such, these arachnids serve as indicators of ecosystem health and balance.

The field of spider research in Morocco remains relatively modest and largely underexplored. Consequently, there is a clear need for further studies to comprehensively understand and identify the diverse range of spider species inhabiting Morocco.

In this study, our focus was on conducting an inventory and identification of spiders within the vicinity of the Aoulouz and Imi Lkhang dam situated in the region of Taroudant. A total of 261 specimens were captured, representing 13 families and 21 genera. The distribution of specimens across families is as follows: Salticidae with 76 individuals (29.11% of total); Gnaphosidae : 69 individuals (26.44% of total), Lycosidae with 55 individuals (21.1% of total)

Conversely, the families Thomisidae, Theraphosidae, and Palpimanidae were the least represented, each with only 1 individual, accounting for 0.38% of the total specimens per family.

Keywords: Spiders, Species identification and inventory, Taroudant, Morocco.

PO27 – Copro-parasitic study in horses in Algiers (Algeria)

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The study is devoted to intestinal parasites of horses in an equine breeding facility in the Ouled Salem equestrian club at Réghaïa. The samples were taken during the period between February and June 2021. One sample per month was taken. A total of 44 dung samples collected from 26 different horses were examined to identify the presence of possible intestinal parasites. The horses examined all came from the Algiers region and were divided into two populations: owners' horses including 8 animals and sport horses which included 18 individuals. Epidemiological data such as horse age, sex, breed and deworming were recorded for each horse. The breeds represented are the French Trotter (4), the Beard (18) and the Arabian Beard (4).

The dewormed horses numbered 23 out of 26. Feces were collected either from the ground superficially or directly from the rectum of the animal. They were placed in plastic bags and clearly identified by systematically adding potassium dichromate. We then stored them in a refrigerator at +4°C until their parasitological analysis in the laboratory.

Two diagnostic methods were used. The first method is the flotation technique which is the most effective and least expensive of coprology for revealing oocysts, eggs and larvae of parasites. The second method is Ziehl Neelsen staining technique to identify *Cryptosporidium* oocysts.The results show a total richness of 5 species of intestinal parasites and an average richness of 2 species of parasites per horse. The species reported in the Ouled Salem equestrian club are *Strongyloides sp., Strongylus sp., Trichostrongylus sp., Fasciola sp*. and *Balantidium coli*.

This low number of parasitic species is perhaps due to the good breeding conditions practiced in this station and the treatments administered. In terms of prevalence, the most dominant species in the station is *Strongylus* sp. (Pr% = 42.3%). The result confirms that this nematode is a cosmopolitan species that adapts to changes in temperatures observed from one month to the next. As for average intensities, the values obtained vary depending on the species.

Trichostrongylus sp. has the highest value (Im = 39.89). The 26 horses analyzed were free from cryptosporidiosis, as no oocysts of Cryptosporidium spp. was not detected. Dewormed animals showed a significant prevalence of intestinal parasites. Indeed, the frequent use of anthelmintics over several years has inevitably led to the development of resistance phenomena in different groups of parasitic nematodes. Thus, the problem of resistance to broad-spectrum anthelmintics in certain herbivores, particularly equines, has become a growing threat and a major concern. In the field, this loss of effectiveness results in therapeutic failures perceptible by both the veterinarian and the breeder.

Keywords: Horse, coprology, parasites, deworming, Algiers.

PO28 - Antimicrobial effects of the skin of the unpeeled yellow fleshed sweet potato (Ipomea batatas Algerian cultivar)

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The aim of this study was to evaluate in vitro the antimicrobial activity of crude extract from sweet potato skin (*Ipomoea batatas* L, Algerian cultivar). Antimicrobial action (in vitro) of the ethanolic extract from sweet potato skin was analysed against gram positive and negative microorganisms: *Staphylococcus aureus, Streptococcus sp, Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumoniae* and the *Candida albicans fungus*. Chorhexidine gel (2%) was used for positive control. The experiments were conducted by using solid and liquid culture methods at 5 different concentrations.

The results showed that ethanolic extract from sweet potato skin had antimicrobial activity against gram negative bacteria, but had no activity against gram negative positive.

Within the limits of this study, ethanolic extract from sweet potato had low antimicrobial activity in comparison with positive control (chrohexidine).

Keywords: Antimicribial effects, Ipomea batatas, Algerian cultivar skin,

PO29 - Use of phytotherapy by the Algerian population to fight against the Corona virus pandemic (Covid-19)

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The Corona Virus pandemic has mobilized a large number of researchers around the world to put in place the appropriate vaccine and effective pharmaceutical and phytotherapeutic treatments to relieve humans across the planet. In Algeria, numerous attempts and trials based on phytotherapy have been tested and applied to a wide public, using more than 24 species of medicinal plants, either as a curative or as a preventative measure.

The questionnaire of the ethnobotanical survey that we conducted in 2022 concerned 1008 people aged over 18 years. The results show that the majority of participants are university students (43.85%) and people with secondary education (26.75%). The duration of treatment for the majority is 2 weeks (38%). The advice of a health professional before using the plant is exceptionally requested by the population, thus neglecting all the risks and side effects.

A percentage of 45% of the people questioned used herbal medicine before any conventional treatment, referring to the family environment or general culture and the media. The most cited reasons are, rightly or wrongly, the safety and effectiveness of plants compared to chemical medications. This false idea is widespread in society about the total safety of plants, seen through their use in self-medication, almost without any medical advice, even among subjects suffering from chronic illnesses for whom we have noted some potential interactions between their drug treatments and the plants associated with them. According to this survey, plant species belong to 16 floral families used during this pandemic. Among the most used plants: myrtle (*Myrtus communis*) (35% of plants used), eucalyptus, thyme, mugwort, garlic, ginger, verbena, mint, lemon and nail cloves. The leaf is the most used part and the decoction is the dominant method of preparation.

Plants known for their use in respiratory tract infections (thyme, eucalyptus, garlic, verbena, mugwort, etc.) are justified in the choice of the population surveyed.

Certain plants cited in this survey have anti-inflammatory and anti-platelet aggregation effects. Mugwort, cloves, ginger, lemon, and thyme caused side effects according to some respondents.

Keywords: Covid-19 pandemic, phytotherapy, medicinal plants, ethnobotanical survey, Algeria

PO30 - Molecular detection of Acinetobacter sp in head lice (*Pediculus humanus capitis* De Geer, 1778) among schoolchildren in the Tizi-Ouzou region (Algeria)

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Molecular detection of Acinetobacter sp in head lice (Pediculus humanus capitis De Geer, 1778) was carried out in four areas of the Tizi-Ouzou region. The sampling technique used is direct capture by hand. This technique made it possible to collect 169 head lice from 26 schoolchildren in all four areas of Tizi-Ouzou: Oued Aissi, Boukhalfa, Tizi-Ouzou town and Draa Ben Khedda.

The results show a prevalence of infestation in most of the centers visited with a higher rate among girls (2.77%). The chi-square test shows that there is not a significant difference between the four study areas, but there is a very highly significant difference compared to the boys/girls sexes.

The parasitic indices tell us about the infestation rate and parasitic loads of head lice which is very intense in girls. The detection of Acenotobacter sp. was carried out by RT-PCR on lice, confirms the existence of the pathogenic Acenotobacter sp in the Tizi-Ouzou region

Keywords: Head lice, Pediculus humanus capitis, parasitic index, pathogen, *Acinetobacter* sp, Tizi-Ouzou, Algeria.