

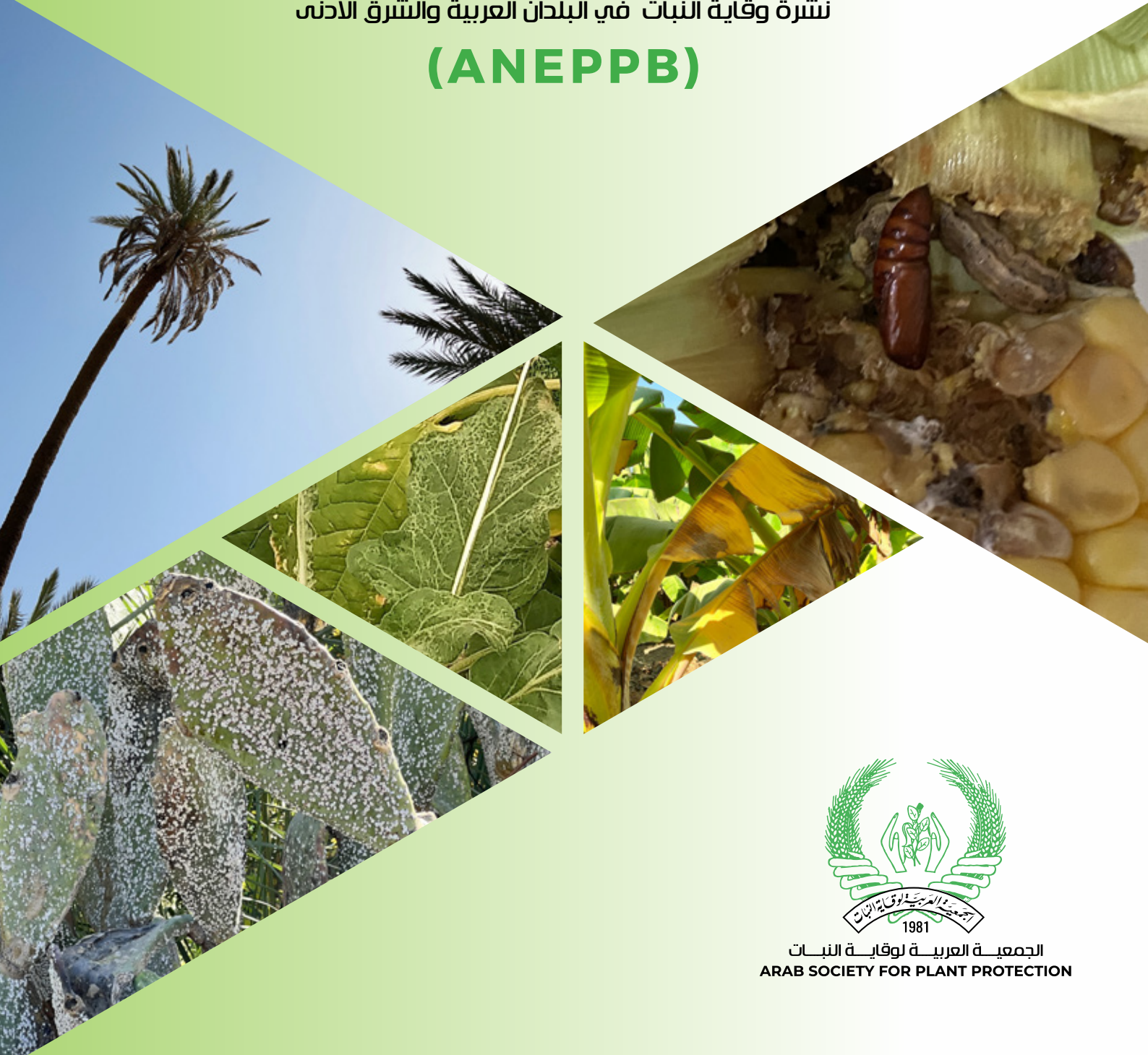


Food and Agriculture  
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# ARAB AND NEAR EAST PLANT PROTECTION BULLETIN

نتشرة وقاية النبات في البلدان العربية والشرق الأدنى

**(ANEPPB)**



الجمعية العربية لوقاية النبات  
ARAB SOCIETY FOR PLANT PROTECTION

# ARAB AND NEAR EAST PLANT PROTECTION BULLETIN (ANEPPB)

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All correspondence should be sent by email to the Editor ([aneppbnl@gmail.com](mailto:aneppbnl@gmail.com)).

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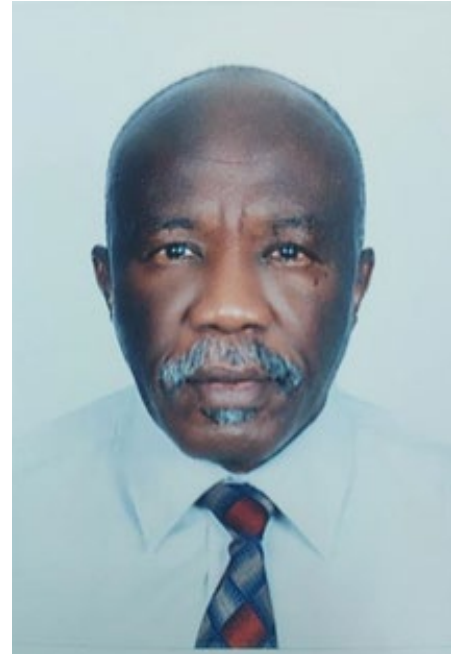
## Sustainable Pest Management in Date Palm: Current status, challenges, and future directions

The date palm *Phoenix dactylifera* is a valuable tree that has economic, social, cultural, and ecological significances. Beside production of highly nutritious edible dates and numerous byproducts, the tree acts as an important sink for sequestration of atmospheric carbon dioxide, thus mitigating the impact of climate change. Moreover, date palm sector contributes largely to food security, livelihood of rural communities, and environmental sustainability.

The date palm agroecosystem comprises diverse groups of animals including insects, mites, birds, reptiles, and mammals. There are so many arthropod pests of date palm, which might exceed 135 species, however, a few ones, wreak havoc on date palm and cause economic damage that necessitate management action. The date palm pests could be classified according to the affected parts of the palm into roots, trunk, fronds, inflorescence, and fruit pests. Pests that cause injury to the roots, trunk, and frond midrib include the red palm weevil *Rhynchophorus ferrugineus*, the longhorn borer *Jebusaea hamerschmidtii*, different species of termites, frond borer *Phonapate frontalis*, and the rhinoceros beetles *Oryctes* spp., while dubas bug *Ommatissus binotatus*, scale insects, and mealy bugs inflict serious damage on leaves. Major preharvest pests that attack inflorescence and premature fruits include the lesser date moth *Batrachedra amydraula* Meyerick, the greater date moth *Aphomia (Arenipses) sabella*, the carob moth *Ectomyelois (Apomyelois) ceratoniae*, the date stone beetle *Coccotrypes dactyliperda*, the inflorescence (spathe) weevil *Derelomus* sp and the old world date mite *Oligonychus afrasiaticus*.

On the other hand, major postharvest pests include the almond moth, *Cadra cautella*, and the saw-toothed grain beetle, *Oryzaephilus surinamensis*. The impact of date palm pests on the environment, biodiversity, and food security is overwhelming. Moreover, the date palm ecosystem includes numerous natural enemies (predators and parasitoids) that play a key role in checking the populations of harmful insects and mites. This unique ecosystem should be considered a living entity when considering the control of major pests.

Any unbalanced intervention may lead to a resurgence of minor pests or even the emergence of new species that are difficult to manage. Currently, date palm pest management depends largely on using chemical insecticides applied through spraying, soil drenching, trunk injection, and fumigation. Additionally, regulatory control, agronomic practices, light and pheromone traps, mechanical control, biological control are deployed. Likewise, microbial insecticides and botanicals are applied to a





limited extent. The main challenges facing sustainable pest management in date palm include, but are not limited to, conservation of natural enemies, insecticide resistance, finding an optimized combination of management components, and climate change

For sustainable management of date palm pests, an integrated holistic intervention strategies that are environmental-friendly should be followed. This intervention approach should consist of the following steps i) proper identification of pests and beneficials ii) preventive practices iii) surveillance and monitoring of pest populations iv) specifying of action threshold v) making action decision to initiate control measures, and vi) evaluation and follow-up of management programs against specific performance indicators. Pest management activities may focus on the use of monitoring, semiochemicals (pheromones and repellents), botanical, biological agents, and microbial pesticides, which are green, climate-resilient, sustainable and environmental friendly. Good agricultural practices (GAP) should be relied upon as one of the most important preventive methods to curb the seriousness of date palm pests. Both micro-and macrosymbionts of date palm pests represent potential biocontrol agents that could be used in biological control against these pests. Before deployment in wide-area pest management, their efficacy, ease of use, and field stability should be enhanced with an emphasis on identifying local strains that can withstand high temperatures and varying environmental factors prevailing in date palm ecosystems.

Infestation by many date palm preharvest fruit pests does not require the application of insecticides. For example, applying insecticides and measurements taken against the date stone beetle or the lesser date moth during April-May could prevent serious injury by the spring generation of the greater date moth *Aphomia sabella*. Additionally, treatments applied during September-October against other fruit moths and sap beetles may also reduce GDM populations and their damage. On the other hand, bunch covering with Agribon™ bags, field sanitation, and early harvesting of certain varieties can sufficiently manage many preharvest insect and mite pests without the need for pesticide application or deployment of other means of control.

This synchronization of control is applicable for trunk borers such as the red palm weevil, longhorn beetle and bunch borer, which could effectively be managed through palm trunk injection using emamectin benzoate or other systemic insecticides.

Setting economic and action thresholds is essential in integrated pest management (IPM) and should be given top priority. The adoption of action thresholds helps in reducing the frequency of insecticide application as well as enhancing management programs for insecticide resistance. Simple action thresholds, which are adaptable to the farmers, should be used to make decisions and initiate control actions. In this respect, prediction models for major date palm pests should be developed. Monitoring of pest population is an important component of IPM, upon which decision-making related to control programs are made. A good example is the SusaHamra App, which is a digital system for monitoring and early warning for red palm weevil. The system was developed by Food and Agriculture Organization of UN (FAO) and contains a cloud platform for processing, analyzing, and mapping the RPW collected data. Area-wide management programs for major date palm pests depend largely on big data and synchronization of control operations and coordination among farmers and stakeholders. Smart digital traps that can send real-time field data (7x24) are commercially available, at least for some pests, could be deployed in the date palm plantations for population monitoring and evaluating the efficacy of any management program. Early detection of the date palm infestation by the major insect



pest such as the RPW is considered the cornerstone of management, which can significantly mitigate the economic damage and enable timely and effective IPM programmes deployment. A persistent, remote surveillance system that combines the features of multi-spectral imaging, chemical sensing, and persistent autonomous measurement and machine learning for data analysis can be used as an innovative tool future date palm pest management. Unmanned aerial vehicle (UAV)-based surveillance and machine learning for pattern recognition and analysis can overcome the limitations of existing early detection approaches. This approach of using IoT and digitalizing date palm pest management will improve governance effectiveness and increase transparency with respect to validity of field data that lead to the success of the control programs.

Reviewing the management technologies adopted against major date palm insect and mite pests, during the last 40 years, reveals many gaps and challenges that need to be adequately addressed in order to keep the pest populations below levels that cause economic damage and to achieve sustainable management. Therefore, to address some of these challenges and to bridge the gaps, the existing management practices need to be improved. Future management technologies should be effective, applicable, cost-effective, socially acceptable, and environmental-friendly.

The genomes of many major date palm insect pests have been released and the essential genes were sequenced and deposited in the global GenBank. Silencing of some of these essential genes through RNA interference technology (RNAi), offers a great chance for innovative method of control of these pests such as vitellogenin-based dsRNA feeding and alpha amylase dsRNA delivery. Precision-guided sterile male technique (pgSMT), incompatible insect technique (IIT), and releasing of insects with dominance lethal "RIDL" technology, which has been tried, with success, in some insects could be used for the management of date palm pests in the future. The use of sterile males in dispersing entomopathogenic fungi (infect-release technique) represents innovative alternative for pest management in date palm in the future. Regulatory measures, capacity building of agricultural engineers, and raising the farmers' awareness about date palm pests and their management, through farmers field schools (FFS), are essential supporting components of a successful sustainable pest management package.

## Conclusion

Currently the date palm pest management depends overwhelmingly on the use of insecticides. Effective combination of the different management components need to be optimized. Future directions should seek and apply innovative technologies such as smart pest detection and monitoring devices, RNAi, pgSMT to achieve sustainable, climate-resilient, and smart pest management. Capacity building of agricultural engineers and stakeholders as well as training of farmers should be given a great consideration.

**Hamadttu Abdel Farag El-Shafie**

Date Palm Research Center of Excellence

King Faisal University

[elshafie62@yahoo.com](mailto:elshafie62@yahoo.com)

### Algeria

#### **Multi-locus phylogeny and morphology of *Curvularia* isolates associated with leaf spots of corn in northern Algeria unveiled two new species, *C. algeriensis* sp. nov. and *C. boudouaouensis* sp. nov., with a new record for *C. spicifera*.**

Fungi associated with leaf spots of corn in northern Algeria were recovered from sampled leaves and subjected to morphological and molecular identification, as well as all postulates Kock analysis steps.

The multi-locus phylogeny included the internal transcribed spacers 1 and 2 with 5.8S (ITS) along with partial glyceraldehyde-3-phosphate dehydrogenase (GAPDH) and translation elongation factor 1- $\alpha$  (TEF1) genes. Results allowed the proposing of two new species, *Curvularia algeriensis* and *Curvularia boudouaouensis*, as well as a new record for *Curvularia spicifera*. The conidia of *C. algeriensis* are asymmetrically ellipsoidal, with the basal side larger than the apical side. However, those of *C. boudouaouensis* are ellipsoidal to subcylindrical.

Additionally, the conidia of *C. algeriensis* are distinctly longer and larger than those of *C. boudouaouensis*. *C. algeriensis* can also be distinguished by its longer conidiophores compared to its closest relatives. The inoculation of corn seedlings supported the pathogenicity of the two new species and the new record. [Zibani, A., Sicora O., Marian Mand Benslimane, H. (Algeria), *Phytotaxa* 650(1):023–046.2024]. DOI: [10.11646/phytotaxa.650.1.3](https://doi.org/10.11646/phytotaxa.650.1.3)

#### **New records of *Bipolaris* from Algeria causing leaf spots of corn including two new pathogens on the host, a challenge to corn silage production.**

This study aimed to investigate fungal species associated with leaf spot diseases on corn in northern Algeria. For this purpose, corn leaves exhibiting spot and blight symptoms were collected from different fields. According to morphological characterization, isolates were first identified among the *Bipolaris* genus.

Their pathogenicity was confirmed through artificial inoculation on a sensitive corn genotype, and then multilocus phylogenetic analyses were conducted. This included internal transcribed spacers 1 and 2 with intervening 5.8S nrDNA (ITS), glyceraldehyde-3-phosphate dehydrogenase (GAPDH) and translation elongation factor 1- $\alpha$  (TEF1) genes. Isolates were identified as *B. cynodontis*, *B. salkadehensis*, *B. variabilis*, and *B. zaeae*. This is the first documented occurrence of these four pathogens in Algeria and the first record of *B. salkadehensis* and *B. variabilis* on corn worldwide, providing useful information for disease diagnosis, prevention and control.

[Zibani, A., Sicora O., Marian M and Benslimane, H. *Phytotaxa* 650(1):023–046. 2024]. DOI: [10.1007/s42976-024-00546-y](https://doi.org/10.1007/s42976-024-00546-y)

## First report of squash vein yellowing virus naturally infecting cucumber, squash, and melon in Jordan

Plant viruses are major restrictive pathogens to cucurbits production in Jordan. During field surveys conducted in September 2022 in the main cucurbit growing areas (desert area, Jordan Valley, and highlands), virus-like symptoms such as vein clearing, mosaic patterns, interveinal chlorosis, and fruit malformation were observed, in the presence of high whitefly populations (*Bemisia tabaci* MEAM1, Mdanat et al., 2022).

A total of 80 leaf samples from different species [48 cucumbers (*Cucumis sativus*), 11 squash (*Cucurbita pepo*), 14 melon (*Cucumis melo*) and 7 watermelons (*Citrullus lanatus*)], including 70 symptomatic and 10 asymptomatic samples, were collected for further investigations. Total RNA and DNA were extracted using RNeasy and DNeasy plant mini kit (QIAGEN), respectively, and molecular detection against an array of cucurbit-infecting viruses was conducted using protocols available in the literature (Suppl. Table). Squash vein yellowing virus (SqVYV; *Potyviridae*, *Ipomovirus*) was detected in combination with other cucurbit-infecting viruses, in 10 of 70 symptomatic samples with primers (SqVYV-v4762; SqVYV-c5512) targeting a portion of the cylindrical inclusion (CI) gene (Hernandez et al., 2021), including 3 cucumbers, 4 squash and 3 melon samples, however, it was not detected in watermelon. Among other RNA viruses, cucumber green mottle mosaic virus, cucurbit yellow stunting disorder virus, cucurbit aphid-borne yellows virus, cucumber vein yellowing virus, and cucurbit chlorotic yellows virus were detected in 9, 34, 7, 18, and 23 samples, respectively.

The DNA viruses, squash leaf curl virus and watermelon chlorotic stunt virus, were detected in 36 and 30 samples. None of the detected viruses were present in asymptomatic samples. All 80 samples were negative for watermelon mosaic virus and tomato leaf curl New Delhi virus. Cloning (pGEM T-Easy Vector; Promega), sequencing, and BLASTn analysis of 4 CI-specific cloned amplicons (~ 0.75 kb, GenBank Acc no. PP908660-PP908663) confirmed the identification of SqVYV, with highest BLASTn identity of ~91% and ~99% to isolates ESF3 from USA (MW584342) and SqVYV-IL from Israel (KT721735), respectively. To reconstruct the complete genome sequence of the SqVYV isolate from Jordan, total RNA from a pool of squash and melon plants was used to construct a cDNA library with the Illumina DNA Prep kit, which was sequenced on a NextSeq2000 instrument as paired reads (2x150 bp) at Leibniz Institute DSMZ, to generate 18,723,252 total reads. Bioinformatic analysis in Geneious (Biomatters) resulted in the assembly of a single genome sequence of 9,831 nt (GenBank Acc. no. PP916052), covered by 83,995 reads, with mean coverage of 1,197 (Geneious mapper, 10% maximum mismatches per read).

The complete genome sequence and the deduced polyprotein sequence shared over 99% identity with SqVYV-IL from Israel. Mechanical inoculation of 10 cucumber (cv. Giant Global) and 10 squash (cv. Lebanese) plants with inoculum from infected cucumber, resulted in vein clearing and mosaic symptoms, after three weeks from inoculation, while no symptoms were observed in the six negative controls. Symptomatic plants were confirmed by PCR to be infected by SqVYV as described earlier. In this study, we report the occurrence of SqVYV for the first time in cucurbit crops in Jordan. SqVYV has been reported to cause large economic losses in cucurbits in USA and Israel, posing a major threat to watermelon growers (Adkins et al., 2007; 2008 a & b; 2013; Reingold et al., 2016; Webster et al., 2013). Our findings should encourage further studies on the incidence and



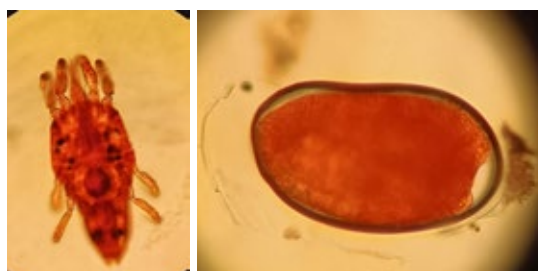
prevalence of SqVYV in cucurbit and non-cucurbit crops, including weeds, to understand its epidemiology in Jordan, including its natural host range.

[**A. Hussein<sup>1</sup>, N. Salem<sup>1\*</sup>, P. Margaria<sup>2</sup>, W. Menzel<sup>2</sup>, M. Abu Muslem<sup>1</sup> (Jordan)**],<sup>1</sup>Department of Plant Protection, School of Agriculture, The University of Jordan, Amman 11942, Jordan. <sup>2</sup>Plant Virus Department, Leibniz Institute DSMZ, Inhoffenstrasse 7B, 38124 Braunschweig, Germany. **Published Online:** 28 Sep 2024]. <https://apsjournals.apsnet.org/doi/10.1094/PDIS-06-24-1264-PDN>.

## Libya

### **First record of Tenuipalpid mite *Brevipalpus oleae* (Baker, 1949) (Acari: Tenuipalpidae) on Olive *Olea europaea* from Libya.**

A survey study was conducted on pests of olive trees in the Tripoli region in 2024. Samples of infected leaves and twigs were collected regularly and examined in the laboratory. As a result of periodic examinations of olive trees at the Research and Studies Station of the College of Agriculture at the University of Tripoli, Libya, a new record of olive false mite was found on twigs and the lower surface of the olive leaves.



A small body size characterizes this mite species; the body is reddish in colour, has slow movements and does not produce a spider web as a true spider mite (Tetranychidae). The first infested samples were collected from the Spanish variety of olive called Arbizana and then from the Italian varieties of olives in the station. All mite stages were found and collected. Samples were stored in small vials with 70% Alcohol. The mites were mounted on glass slides for compound microscopic study. The results showed that this is the first record of Tenuipalpid mite species on olive from Tripoli region named *Brevipalpus oleae* (Baker, 1949) (Acari:Tenuipalpidae). The Tenuipalpid specialist, Prof. Ibrahim Al-Jboory, confirmed the identification of the species *Brevipalpus oleae*. [ **Eman Taher Zentane** PhD (Libya), Plant Protection Department, College of Agriculture, University of Tripoli, Tripoli-Libya, 2024].

## Syria

### **First report of southern blight disease of sugar beet *Beta vulgaris* L. caused by *Athelia rolfsii* (Curzi) Tu and Kimbrough in Syria**

Symptoms of yellowing, wilting of leaves, brown-black lesions, and root rot with white mycelium grown on it were observed in sugar beet fields (Hama Governorate, Syria) during the summer of 2022. The fungal pathogen was identified as *Athelia rolfsii*, a new species that causes sugar beet root rot for the first time in Syria. The pathogen classification was based on the morphological and cultural taxonomic characteristics of the mycelium and the sclerotia of the fungus grown on the nutrient culture medium PDA. The mycelium was cottony, and the fungal hyphae had clamp connections and brown sclerotia with diameters ranging from 0.5 to 1 mm. Within 8 days of incubation at a temperature of 25 ± 3



°C, the isolate grew well on PDA medium, with radial growth at a 3-4.5 mm/day rate. Koch's postulated confirmed that *A. rolfsii* is the causative agent of sugar beet root rot and was not a secondary fungal contaminant. [Reem Aboud Alkhlif<sup>1</sup>, Mohammad Fawaz Azmeh<sup>2</sup>, Wael Al-Matni<sup>3</sup> (Syria),<sup>(1)</sup>Syrian National Commission for Biotechnology, Damascus, Syria. (2)Plant Protection Department, Faculty of Agriculture, Damascus University. <sup>3</sup>Debbane and Co., Damascus, Syria, 2024]. [reem.alkhlif@damascusuniversity.edu.sy](mailto:reem.alkhlif@damascusuniversity.edu.sy)

### **New records of mites (Acari: Mesostigmata, Sarcoptiformes, Trombidiformes) from Hama province, Syria**

This research aimed to identify phytophagous and predatory mites on several plant species in the Hama governorate, Syria, during 2023-2024. As a result, 33 species of 12 families and three orders (one Mesostigmata, two Sarcoptiformes and nine Trombidiformes) are reported, and 13 species are recorded for the first time from Syria. More than 50% of collected specimens belong to the Phytoseiidae, with ten species recorded within this family. Synonymy appears to be present between *Amblyseiella setosa* Muma and *A. antonii* Kolodochka & Omeri, and between *Typhlodromus (Anthoseius) intercalaris* Livshitz & Kuznetsov, and *T.(A.) sternlichti* Swirski & Amitai, when compared with the literature. Further investigations are needed to confirm this hypothesis. [Ali Hamadi and Ziad Barbar, Department of Plant Protection, Faculty of Agriculture, Al-Baath University, Homs, Syria, *Acarologia* 64(3): 907-918, 2024].

### **First record of golden pigmy moth *Stigmella aurella* (Fabricius, 1775) (Lepidoptera: Nepticulidae) on *Rosa* spp. L. in Syria**

Symptoms of leaf miner infestation were observed on the leaves of several species of roses *Rosa* spp. (family: Rosaceae), especially the Damask rose *Rosa damascena* mill L., as a result of infestation with the Golden Pigmy moth (Fabricius, 1775) *Stigmella aurella* (Lepidoptera: Nepticulidae). The



percentage of infestation of Damas rose plants reached about 58% in some areas of its cultivation in the Damascus and Damascus countryside. Symptoms are characterized by long, narrow tunnels that are initially relatively winding and widen and serpentine at the end of the tunnel, and contain scattered blackish-brown frass; the tract is filled with the excrement of the larva. The tunnels can be observed throughout the year. The insect has three generations per year; adults appear in April, June, and September 2024. *S. aurella* is a very small moth. The length of the insect ranges between 4 and 6 mm. The head is red to orange; the antennae covers are white to yellow in colour.

The thorax is fuscous pale, wingspan is between 6 and 7 mm. The forewings are golden-coppery, characterized by a shiny bronze spot, and have a metallic sheen with a thin transverse central stripe of silver. The peripheral cilia are pale grey, the hindwings are dark grey, and the abdomen is dark brown. Eggs are oval in shape and can be transparent, less than 1 mm long. It laid singly, on both leaf sides, often near the vein. Larvae with yellowish-brown head capsules, chewing mouthparts, and opposite mandibles. Larvae amber-yellow with a pale brown spot in the middle of the second segment. The pupa is in oval-shaped cocoons, coiled with waste, and appears light brown at the end of the tunnel. This is the first record of *Stigmella aurella* in Syria. [Houda Zahi Kawas, Abdunabi Basheer (Syria), Damascus University, Faculty of Agriculture, Department of Plant Protection, Syria, 2024].

### First record of the predator *Chilocorus bipustulatus* Linnaeus, 1758 on *Dactylopius opuntiae* Cockerell (Hemiptera: *Dactylopiidae*) as a new host in the Syrian coast

The predator *Chilocorus bipustulatus* (Linnaeus, 1758) was recorded for the first time on the host plant *Opuntia ficus-indica* feeding on the prickly pear cochineal *Dactylopius opuntiae* in Baniyas on the Syrian coast during September 2024. The predator *C. bipustulatus* is a small beetle with a 2.7-4 mm body length. The elytra are shiny dark reddish-brown to black, usually with 6 red spots in a line across the middle of the elytra. The mature larva is about 5 mm in length. Adults and larvae feed on scale insects and aphids (mainly belonging to the Coccidae and Diaspididae). *C. bipustulatus* can form several generations per year. The number of generations depends on environmental conditions and food supply. The predator was recorded on many hosts in different regions of Syria, including on-scale insects on citrus trees on the Syrian coast, and is widely used in biological control programs. [Nadia Al-Khateeb (Syria), Lattakia Center for Rearing Natural Enemies, Directorate of Agriculture, Lattakia, Syria, 2024] [alkh.nadia@gmail.com](mailto:alkh.nadia@gmail.com)



### New record of the parasite *Lysiphlebus testaceipes* (Cresson, 1880) (Hymenoptera, Aphidiidae) on the black citrus aphid *Toxoptera aurantii* (Boyer de Fonscolombe, 1841)

The parasitoid was identified by collecting samples of black aphids and their mummies on citrus fruits in the Bouqa orchard of the Faculty of Agricultural Engineering at Tishreen University from mid-March until the end of April 2022. The samples were transferred to the Economic Entomology Laboratory at the Faculty of Agricultural Engineering. Each mummy and each black aphid were placed individually in a 2 mm tube (115 samples) and observed daily until the parasitoid emerged. The adult parasitoid was classified according to the classification key (Starý, 1976), which describes the genera and species of aphid parasitoids found in the Mediterranean region.

The mummies are light brown, and the adult parasitoid is approximately 2mm long. The male has 14 antennal segments, and the female has 13 segments. The first abdominal segment's tergum is triangular, and the wing's posterior edge has long hair. [Amena Alrostrom<sup>1</sup>, Nabil Abo Kaf<sup>2</sup>, Ensaf Hasan Akel<sup>3</sup> (Syria), Graduate student(PhD), plant protection department, faculty of agriculture engineering, Tishreen University, Lattakia, Syria.<sup>2</sup> Professor, Plant Protection Department, faculty of Agriculture Engineering, Tishreen University, Lattakia, Syria. <sup>3</sup> Research director at the General Commission for Agricultural Scientific Research, Lattakia Research Center, Syria, 2024].

### Recording of the Indian cotton leafhopper, *Amrasca biguttula* (Ishida, 1913) (Hemiptera: Cicadellidae), as a new invasive insect pest on cotton, okra and eggplant in Syria

Leafhoppers (Jassid) (Hemiptera: Cicadellidae) are well-known insects that infect cotton, vegetables and fruit trees in Syria.

They are secondary pests of cotton and are generally under natural control. However, during this year 2024, the cotton-growing areas in Deir Ezzor witnessed an outbreak of leafhoppers on cotton, okra, eggplant and other crops. Also, in the Damascus countryside



(Saboura), severe infestations of leafhoppers were observed on okra and eggplant. These insects caused significant economic damage. As a result, a field survey on the infested fields was conducted, and random samples of insects has been collected in several fields covering cotton, okra and eggplant in Deir Ezzor (Al-Bukamal, Al-Jalaa, Huwayjet Sakr), and from okra and eggplant plants in the Damascus countryside (Saboura), in order to accurately identify leafhoppers that spread in Deir Ezzor Governorate and the Damascus countryside.

Live insects were collected in all stages, and preserved for subsequent laboratory identification. The identification was done based on their morphology using a binocular magnifying glass and based on identification keys such as <http://dmitriev.speciesfile.org/>.

The identification of insects showed a new and almost unique species in Syria, *Amrasca biguttula* (Ishida, 1913) on cotton and vegetables in all the studied areas, which could be considered a new invasive species in Syria. It is different than the known and naturally widespread leafhopper species in Syria, especially the cotton leafhopper *Jacobiasca lybica* (*Empoasca lybica*) and the grape leafhopper *Hebata vitis*. *A. biguttula* was observed alone on cotton in the surveyed infected fields, while a few grape leafhoppers *Hebata vitis* were found on vegetables in Sabboura, but *A. biguttula* outnumbered the local species in number and in terms of damage in all surveyed areas. The adult insect of the Indian cotton leafhopper is yellowish green, elongated and slender, about 2.6 mm long. The insect is characterized by two prominent black spots on either side of the midline on the top of the head with some similar cream-coloured decorations on the head and thorax, and two black spots, one near the tip of each forewing.

The head is wider than the thorax. The front truck has a large and wide-ranging area in the apical area. The Cu Cubital cell of the forewing has a distal black spot in the apical area. The distal CuP segment is twice as long as the distal CuA segment located between the Cu Cubital Stem and the Posterior Median MP. Apical cell 4 is pointed along its entire length. Regarding its damage, it is piercing-sucking insects.

The nymphs and adults feed on plant sap. Eggs, nymphs and adults are found on the lower leaf surface. It injects its toxic saliva into the host plants, causing symptoms similar to bacterial or viral infections, such as yellowing of the leaves between the veins, at the edges, then wrinkling, severe yellowing or redness, wilting and drying of the infected plants. In severe infections, flower drop, weak (failure) fruit setting and drop of new fruit sets are observed, followed by stunted plant growth and a severe decrease in production, and eventually death of the infected plants.

In a preliminary survey of the plant species host to this invasive insect, severe infections were observed on some plant species such as cotton, okra, eggplant, sunflower, and zucchini, and lighter infections were observed on many other plants, especially vegetables. This insect reproduces and spreads very quickly, especially in hot climates. On the other hand, it was observed that it is resistant to most known insecticides, and it also develops resistance to insecticides quickly.

This study is a preliminary survey, which should be followed by a deeper study of this insect, and its geographical spread must be monitored, its biological environment and the diversity of host plants must be studied, in addition to the potential losses in yield that it may cause. [**Dima An-Nahas**<sup>1</sup>, **Wa'el Almatni**<sup>2</sup>, **Eyad Muhammad**<sup>1</sup> (Syria), <sup>1</sup>Plant Protection Directorate in the Syrian Ministry of Agriculture, <sup>2</sup>Researcher in the Protection in Syria and United Arab Emirates, 2024].

## Algeria

**Biodiversity, molecular identification, and pathogenicity of fusarium species isolated from wheat in western Algeria.**

Wheat is one of the major important cereal crops in the world. In agriculture, fungal diseases pose significant constraints on wheat production. *Fusarium* is a major pathogenic and toxigenic fungus that widely affects wheat. This study aimed to identify and characterize *Fusarium* species, with a particular interest in detecting toxigenic strains. Thirty-one samples of wheat plants showing typical symptoms were collected from 7 different regions in western Algeria in 2021. *Fusarium* species were found in 63% of the samples. Based on their morphological characteristics, 53 strains of *Fusarium* were isolated and preserved. Eleven *Fusarium* species were identified based on phylogenetic analyses with the translation factor TEF-1 $\alpha$ . Among these *Fusarium* isolates, 6 were identified as *F. pseudograminearum*, 2 as *F. acuminatum*, 2 as *F. algeriensis*, and 01 as *F. oxysporum*. Pathogenicity tests demonstrated that all eight *Fusarium* species tested (*F. pseudograminearum*, *F. algeriensis*, and *F. acuminatum*) could cause typical symptoms of FCR in wheat in these provinces. *F. algeriensis* is the most aggressive pathogenic species and the second most common isolate of this pathogen in Algeria. [Houaria Benmahti<sup>1</sup>, Wassim Yezli<sup>2</sup>, Mohammed Ziane<sup>1</sup>, Imene Benyettou<sup>3</sup>, <sup>1</sup>University of Ain Temouchent, Algeria, <sup>2</sup>University of Tiaret, Algeria, <sup>3</sup>Laboratory of Hygiene of Wilaya of Oran, Algeria. Brazilian Journal of Animal and Environmental Research, November 2024]. DOI: [10.34188/bjaerv7n4-089](https://doi.org/10.34188/bjaerv7n4-089)

## Egypt

**Effect of mulching manures and use of *Heterorhabditis bacteriophora* on strawberry fruit yield *Temnorhynchus baal* and *Meloidogyne javanica* under field conditions.**

The importance of safe methods to manage strawberry pests has become more evident with increasing strawberry production and export in Egypt. Root damage by white grubs (*Temnorhynchus baal* larvae) and root-knot nematode (RKN), *Meloidogyne javanica* cause severe losses to strawberry fruit yield. Growers often rely on a few selective chemical pesticides to control these pests, minimise pesticide residues, and comply with the maximum residue limits allowed for fruit export. Entomopathogenic nematodes (EPNs) that invade and kill grubs and reduce RKN population levels in the soil may be as effective as these insecticides in some cases. We evaluated the profitability of mulching strawberries with commonly used cow and/or chicken manure, with and without application of commercial *Heterorhabditis bacteriophora* in two farms for four consecutive years. All plots received chemical fertilizers. The designed drip irrigation system for EPN delivery in the farms ensured efficient and even ( $P < 0.05$ ) application of EPN in all treatments. The timing of EPN applications varied due to import regulatory guidelines. All manure mulch treatments increased strawberry yield each year at a farm in Al-Qalyubia governorate, whereas yield remarkably increased in the fourth season at the farm in El-Beheira governorate. Compared to EPN-treated plots, 70% more ( $P = 0.06$ ) insects were recovered in soil beneath dead plants in plots

that did not receive EPNs. *Heterorhabditis bacteriophora* boosted fruit yield ( $P < 0.05$ ) in the second and fourth years at El-Beheira and all years at Al-Qalyubia. It reduced ( $P < 0.05$ ) numbers of *Meloidogyne javanica* galls/egg masses on strawberry roots and juveniles in the soil in both farms. Mulches did not measure EPN performance but suppressed pests and boosted plant productivity. The greatest yield enhancement by EPN occurred in the second year at El-Beheira farm when EPNs were applied shortly after planting (October), enabling early season control of the pests, but in the third year at Al-Qalyubia farm, where the weather was generally warmer than that at El-Beheira, and therefore more suitable for EPN activity. [M.M.M. Abd-Elgawad, L.W. Duncan, M.M.A. Hammam, F. El-Borai and I.E. Shehata (Egypt), Arab Journal of Plant Protection, 42(3): 306-317, 2024]. <https://doi.org/10.22268/AJPP-001262>

## Egypt

### Effect of magnetic field on the toxicity of triflumuron and teflubenzuron pesticides with special reference to some biological and histological parameters of cotton bollworm, *Earias insulana*.

This study aimed to evaluate the impact of magnetic field (MF) on the toxicity of two experimental insect growth regulators (IGRs) pesticides Triflumuron (Cancoun 40% SC) and Teflubenzuron (Nomolt 15% SC) against the spiny bollworm; *E. insulana* larvae under laboratory-controlled conditions ( $26 \pm 1^\circ\text{C}$  and  $75 \pm 5\%$  RH), and their implications on different biological and histological parameters. The results showed an increase in the toxicity of pesticides after exposure to magnetic field strength of 180 mT for one hour. The  $LC_{50}$  values were 45.22 and 66.45 ppm for Cancoun and Nomult, respectively, compared to 35.54 and 49.56 ppm, respectively, after exposure to the magnetic field. A high mortality rate and malformation were observed for each of the larvae and pupae after pesticides magnetization, compared to the non-magnetized insecticides and the untreated larvae. The lifespan of both larvae and pupae was significantly prolonged, and thus the total period of immature stages after magnetization was increased. In addition, the treatments caused a decrease in the rates of adult emergence, female fertility, and hatching rate, and with greater efficiency of the magnetized pesticides. Different histological changes were also observed in the epidermis and midgut of the larvae under study, where the treatments caused significant destruction in the epidermal and midgut cells of the treated larvae, with a more pronounced effect of the magnetized insecticide compared to the non-magnetized and the control check. [Rania M. El-Shennawy (Egypt), Arab Journal of Plant Protection, 42(3): 387-395, 2024]. <https://doi.org/10.22268/AJPP-001249>

## Egypt

### Effect of temperature and prey on biology and life table parameters of predatory mite *Phytoseius finitimus* reared on *Aceria melongena* and *Tetranychus urticae* under laboratory conditions.

The developmental time, fecundity and life table parameters of the phytoseiid predatory mite *Phytoseius finitimus* Ribaga fed on immature stages of *Aceria melongena* (Zaher & Abou-Awad) and *Tetranychus urticae* Koch were studied in the laboratory at three different temperatures (22, 27 and  $32^\circ\text{C}$ ), to find out the possibility of using the predator as a biological control component of eggplant phytophagous mites. The total

developmental time of *P. finitimus* female and male was shortest and reached 5.56 and 5.33 days, respectively, on *A. melongena* at 32°C. In contrast, the longest period was 12.05 and 10.96 days, respectively, on *T. urticae* at 22°C. The oviposition period was longest at 33.35 days on *T. urticae* at 22°C. The total egg production rates were the highest on *A. melongena* (40.37 eggs/female) with a daily rate of 2.05 eggs/♀/day at 32°C. A diet of *A. melongena* showed a higher value of the intrinsic rate of increase ( $r_m$ ), which was 0.230 ♀/♀/day at 32°C. The net reproductive rate was highly affected by temperatures where ( $R_0$ ) values were 23.45 and 19.19; 19.79 and 16.99; 16.98 and 12.72 ♀/♀ at 32, 27 and 22°C for *A. melongena* and *T. urticae*, respectively. The predation rates of *P. finitimus* increased with temperature increase. There is a significant difference between the three temperatures and two prey diets in the feeding capacity of adult females and males. The lowest life cycle thermal threshold ( $t_0$ ) ranged between 8.55 and 12.41°C. The lower temperature threshold ( $t_0$ ) and thermal constant (K) for the total immature stages of this predator were calculated to be 11.72 and 115.22°C degree-days for *A. melongena* and 7.94 and 171.63°C degree-days for *T. urticae*, respectively. These values suggested that the optimal temperature for the population growth of *P. finitimus* ranged between 27 and 32°C. Our findings suggest that *P. finitimus* can complete its life cycle on *A. melongena* and *T. urticae* and have excellent potential as a biological control agent for two pests on eggplant under field conditions. Temperatures 22 and 27°C seem more suitable for mass rearing this predator mite fed on two prey diets. The eriophyid mite *A. melongena* was more favoured to the predator mite than *T. urticae*. [Eman H. Walash, Samah Z. Elkholy and Masoud R. El-Aassar (Egypt), Arab Journal of Plant Protection, 42(3): 361-367, 2024]. <https://doi.org/10.22268/AJPP-001247>

## Egypt

**Studies on nutrition, utilization and hosts preference of feeding fall armyworm larvae, *Spodoptera frugiperda* on some vegetable crops leaves.** The fall armyworm (FAW), *Spodoptera frugiperda* (J. E. Smith, 1797) (Lepidoptera: Noctuidae), appeared in 2016 on maize crops in the Americas. Thereafter, it was recorded as an invasive pest in Africa in 2017. In Egypt, this study was conducted in 2022 to investigate the nutritional indices and host preference of the 3<sup>rd</sup> and 5<sup>th</sup> instars of FAW larval stage on fifteen vegetable crops under laboratory conditions. Experiments were conducted under constant temperature in an incubator at 27±1°C, relative humidity of 65±5% and a photoperiod of 14:10 hrs (light: dark). The results obtained showed that the hosts *Beta vulgaris* L., *Cichorium intybus* L., *Fragaria x ananassa* L., *Brassica rapa* L. and *Zea mays* L. var. *everta* were significantly favoured as primary hosts for FAW development. These hosts had higher larval and pupal weight and feeding indices: consumption index (CI), approximate digestibility (AD), efficiency of conversion of ingested food into body matter (ECI), efficiency of conversion of digested food into body matter (ECD) and relative growth rate (RGR). The hosts *Vigna unguiculata*, *Lactuca sativa*, *Brassica oleracea* var. *capitata*, *Brassica oleracea* var. *botrytis*, *Eruca vesicaria* subspecies *sativa*, *Pisum sativum* and *Vicia faba* were favored as secondary hosts for FAW development, with lower values for larvae and pupae weight and feeding indices. However, the larvae did not prefer or complete feeding on the hosts *Cucumis sativus*, *Solanum lycopersicum* and *Phaseolus vulgaris*. [Mohamed Ibrahim Ouda (Syria), Arab Journal of Plant Protection, 42(3): 269-274, 2024]. <https://doi.org/10.22268/AJPP-001259>

## Egypt

### **Toxicity and histological effects of clove buds' powder, *Syzygium aromaticum* compared with Neomyl (Methomyl) for controlling *Monacha cartusiana* and *Theba pisana* snails.**

A series of laboratory and field experiments were designed to evaluate control measures that can effectively reduce population density and consequently the damage caused by certain land snail species *Monacha cartusiana* Müller and *Theba pisana* Müller. In addition, factors contributing towards safer control measures were investigated. When neomyl 8% and clove powder buds 40% were applied to control *M. cartusiana* and *T. pisana* under laboratory and field conditions, the toxicity effect of these applications on the tested land snail's digestive glands was investigated. The results revealed that the mortality rate increased with the increase in the concentrations and exposure period. Under laboratory conditions, the mortality rate of *T. pisana* snail reached 100% when 2, 4, and 8% neomyl concentrations were utilized, whereas the mortality rate of the same snail reached 36.3% when clove powder 40% was utilized 28 days after treatment. Under field conditions, the initial effect of the examined compounds reached 62.89% and 18.83% mortality rates when neomycin and clove treatments were applied, respectively. Furthermore, the residual effect with neomyl treatment gave a high mortality rate of 83.43%, compared to 28.88% for the clove powder treatment. Generally, it could be concluded that neomycin had the most toxic effect on *M. cartesian* under field conditions. 8% neomyl treatment resulted in histological degeneration with alterations in the digestive cells' cytoplasm. Numerous excretory vacuoles were found in the excretory cells. Calcium cells became granulated, cytoplasm vacuoles were abundant, and bizarre nuclei ranged from pyknosis to severe karyorrhexis and complete karyolysis. The results also indicated that the toxicity effects of the 40% concentration of clove buds' powder 48 hours after treatment were approximately the same on both treated land snail species. [Sh.M. Bayoumi, N.A. Omar, A.H. Mohanna, Sh.A. Ismail, M. Abed, A.M. El-Sayed, M.A. Issa, F.I. El-Akhrasy and E.M. Abd El-Aal (Egypt), Arab Journal of Plant Protection, 42(3): 318-327, 2024]. <https://doi.org/10.22268/AJPP-001246>

## Iraq

### **Hyperspectral imaging for determining reflection variables in chilli leaves infested with green peach aphids.**

Aphid infestations cause a physiological response detectable by a remote leaf reflectance sensor. Changes in the spectral signature of specific wave bands, measured with hyperspectral imagery (HI), may also relate to the absence, presence and/or level of infestation of aphids. Aphids cause significant damage to crops and yields in the field as well as in greenhouses. Green peach aphid, *Myzus persicae* (Sulzer) destroy chloroplast cells; this damage can be spectrally detected in the reflectance of the visible and near-infrared (NIR) regions. The spectral curve showed that the reflectance of the aphid-infested chilli leaves in the NIR decreased over time with the increase in the aphid population. Although the aphid's activity occurred on the leaves' underside, their damage can be spectrally detected by reflection data from the upper side. Early aphid damage was identified in limited areas of chilli leaf, and this damage showed to be the only harm inflicted on the plant, also proven by the HI data obtained. Surface



reflectance (%) from un-infested chilli was lower in the visible and higher in the NIR light 90A spectrum when compared with aphids-infested chilli. The overall classification accuracies of 89% for damage detection were achieved. These results indicated that HI could effectively detect and quantify aphid infestation in chilli for site-specific aphid management. It can potentially be applied to limited areas as well as fields as an early detection tool for aphid management. This study aimed to spectrally explore the ability to assess the level of aphid damage in a limited area grown with the chilli crop. [L.A. Atshan, H.A. Ibrahim, K.J. Al-Hussainawy and K.A. Atshan (Iraq), Arab Journal of Plant Protection, 42(3): 299-305, 2024]. <https://doi.org/10.22268/AJPP-001256>

## Iraq

### **Molecular diagnosis of fall armyworm, *Spodoptera frugiperda* isolated from corn fields in Karkuk Governorate, Iraq.**

This study was conducted in Karkuk Governorate, Iraq, where fall armyworm (FAW), *Spodoptera frugiperda* larvae were collected by the direct manual method from corn fields. The research was conducted during July-October 2022 to diagnose FAW species by determining the nucleotide sequence of the cytochrome c oxidase subunit I (COX1) gene. Sequence analysis confirmed the presence of the species *Spodoptera frugiperda* in Iraq. The Iraqi species was conserved in the global GenBank under the code AHM-1 *Spodoptera frugiperda* isolate K2 under the international number OP557603.1. [EJ- Jiboory, A.H. and S.Z. Bakr (Iraq), Arab Journal of Plant Protection, 42(3): 403-405, 2024]. <https://doi.org/10.22268/AJPP-001250>

## Iraq

### **The effect of chitosan on the infection of apple fruits with *Penicillium fimorum* and on the inhibition of Ochratoxin A production.**

This study was conducted to test the ability of chitosan micro- and nano-chitosan to inhibit the growth of *P. fimorum* and its production of Ochratoxin A, and to protect apple fruits from infection. The results showed that the micro- and nano-chitosan inhibited the growth of *P. fimorum* by 32.33 and 57.91%, respectively. The chitosan treatment reduced the ability of *P. fimorum* to produce ochratoxin A to 69.16 and 71.14% with micro- and nano-chitosan, respectively. In addition, the concentration of Ochratoxin A decreased in apple fruits (red, yellow, and green) from 121.50, 115.80, and 105.60 ng/g in the control treatment to 53.93, 52.60, and 0.00 ng/g in the micro-chitosan treatment, and to 0.00, 0.00 and 35.10 ng/g in nano-chitosan treatment, respectively. [Al-Ahmad, M.M., M.A. Fayyadh and L.A. Al-Saad (Iraq), Arab Journal of Plant Protection, 42(3): 396-402, 2024]. <https://doi.org/10.22268/AJPP-001261>

## Iraq

### **Effects of aqueous and alcoholic extracts of lemongrass, *Cymbopogon citratus* on some biological aspects of the fig moth, *Ephestia cautella*.**

This study evaluated the effects of aqueous and ethanolic extracts of lemongrass on the third instar larvae of the date moth *Ephestia cautella* Walker (Lepidoptera: Pyralidae). The results obtained showed that there were toxic effects of aqueous

extract, which produced the highest mortality rate of 43.35% at 5% concentration 72 hours after treatment, whereas the lowest mortality rate of 17% was obtained at 0.5% concentration 72 hours after treatment. The  $LC_{50}$  was 0.082%. The results indicated that the highest repellency rate of the aqueous extract was 71.33%, two hours after treatment, at 5% concentration, with a significant decrease in repellency rate 4 and 6 hours after treatment. The results also showed that the ethanolic extract gave a higher mortality rate of 96.68% at the 5% concentration and the lowest mortality rate of 43.33% at 0.05% concentration, 72 hours after treatment, with an  $LC_{50}$  of 0.008%. The repellency rates were highest (94.55%) at 5% concentration 2 hours after exposure. In conclusion, aqueous and ethanolic extracts of lemon grass have good toxic and repellent effects that make them potential candidates for insect control of stored dates, as they are safe, eco-friendly and economically inexpensive products compared to chemical pesticides. [Kamil, S.H. (Iraq), Arab Journal of Plant Protection, 42(3): 377-381, 2024]. <https://doi.org/10.22268/AJPP-001245>

## Iraq

### Laboratory evaluation of the efficiency of the entomopathogenic fungus *Beauveria bassiana* as a biological control factor against the Cucurbit Fly, *Dacus ciliatus*.

The cucurbit fly, *Dacus ciliatus*, is a major pest which attacks a wide range of crops and causes significant losses in agricultural production. Due to the high toxicity of chemical pesticides on human health and the environment, scientists focused on developing alternative safe methods to control this insect, including using biocontrol agents. *Beauveria bassiana* is one of the common fungi used as a bio-control agent. This entomopathogenic fungus was cultivated on Petri dishes containing PDA. The spore suspension of this fungus was prepared using sterilized distilled water, and three concentrations were used:  $20 \times 10^6$ ,  $10 \times 10^6$  and  $5 \times 10^6$  spores/ml. The effectiveness of these three concentrations was tested on larvae and pupae of the studied insect. The larval mortality rate ranged from 73.33% at the highest concentration to 33.33% at the lowest concentration. Pupal mortality reached 66.66% at the highest concentration and 16.66% at the lowest concentration of spore suspension. The mortality rate was directly proportional to the spore suspension concentration of the entomopathogenic fungus. [Al-Shweily, B.M., J.B. El-Zidawi and M.J. Hinnawi (Iraq), Arab Journal of Plant Protection, 42(3): 335-339, 2024]. <https://doi.org/10.22268/AJPP-001260>

## Iraq

### Overview of inflorescence rot on date palms and its management using traditional methods and modern technologies.

Inflorescence rot is one of the dangerous diseases on date palms caused by the fungus *Mauginiella scaetiae*; it causes a significant economic loss across all cultivation regions. This disease causes damage and rotting of the inflorescence. An effective management program and monitoring practices must be implemented to control this disease and improve date palm productivity. Agricultural practices such as proper irrigation, removal of infected parts, application of pesticides, and biological control are important to maintaining the health of date palm growth. Additionally, it creates unfavourable conditions for pathogen growth. New technologies such as remote sensing, predictive disease, and genetic engineering play an essential role in

the early detection of diseases and the development of resistant cultivars. By applying these techniques, effective management of inflorescence rot disease is guaranteed. [Ramiz Mahdi Salih Alasadi(Iraq), Date palm research Centre, University of Basrah, Iraq, Basrah Journal of Date palm Research, 23(1):50-62, 2024].

## Iraq

### Tomato seed treatment and germination responses to selected plant extracts.

The study investigated the effects of five plant extracts on tomato seed germination, focusing on their ability to neutralize bacterial and fungal seed-borne pathogens. Pathogenic and non-pathogenic microorganisms were isolated and identified from the tomato seeds. To assess the plant extracts' effect on the seedlings' health and the level of contamination, ten sterile seeds were soaked in each plant extract for ten and fifteen minutes, respectively, and then placed onto 9 cm diameter sterile Petri dishes covered with filter paper. The germination of tomato seeds treated with aqueous extracts of *Rumex tuberosus* and *Artemisia dracunculus* at concentrations of 10% and 15% for 15 minutes each were compared in a five-replication pot experiment. Significant increases in plant height and root length were observed at a 15% concentration of both extracts compared to the control, indicating antimicrobial activity against seed-borne pathogens. Major compounds in the extracts were identified by Gas Chromatography-Mass Spectrometry (GC-MS) analysis, including Estra-1,3,5,7,9,15-hexaen-17-one, 3-methoxy and palmitic acid. According to these results, extracts from *A. dracunculus* and *R. tuberosus* may have antimicrobial qualities that improve plant growth overall, vigor index, and seed germination. [Tavga Sulaiman Rashid, Karzan Kazm Mahmud, Hayman Kakakhan Awla, Sirwa Anwar Qadir (Iraq), Department of Plant Protection, College of Agricultural Engineering Sciences, Salahaddin University, Erbil, Iraq. Department of Medical Laboratory, Erbil Technical Health and Medical College, Erbil Polytechnic University, Erbil, Iraq. Journal of Crop Health (Impact factor: 2.4) Volume 76, pages 1137-1146, 2024]. <https://doi.org/10.1007/s10343-024-01015-6>

## Iraq

### Recent advances in applications, antimicrobial, Cytotoxic activities and their associated mechanism of green silver nanoparticles: A review.

Apart from antibiotic resistance, the increasing incidence of cancers is among the serious health challenges facing humans today around the world. These indeed need new and environmentally friendly solutions. In this respect, synthesis and application of nanoparticles simply AgNPs have become of compelling interest within the last few years, especially within the area of biomedicine.

The green synthesis of AgNPs using plant extracts is one of the promising eco-friendly methods that has treated microbial infections and acted against cancerous activities. A literature search on databases Web of Science, PubMed, and Scopus was performed between January 2023 and October 2023 in light of PRISMA. Afterward, screening for articles by title and abstract was implemented. Then, retrieved eligible studies were assessed for full-text inclusion criteria analysis. The reviewed findings show that AgNPs have contributed to health-related applications in the development of consumer goods like UV-resistant ointments and cosmetics.

Their biomedical application is huge, especially regarding developing diagnosis devices for viruses such as Ebola, yellow fever, and Dengue. AgNPs thereby exhibited formidable antimicrobial action against a wide array of pathogenic microorganisms, each representing Gram-positive and Gram-negative bacteria. It proved to be effective even against antibiotic-resistant strains and pathogenic fungi.

Besides this, their anticancer potentialities are quite extraordinary. In short, all these studies have given evidence for outstanding antimicrobial and anticancer efficiencies of biologically synthesized AgNPs to combat some of the serious health issues of the modern era. [Tavga Sulaiman Rashid, Yaseen Galali, Hayman Kakakhan Awla, S. Mohammad Sajadi (Iraq), Results in Chemistry Journal Volume 11, October 2024, 101849 (Impact factor: 2.5). <https://doi.org/10.1016/j.rechem.2024.101849>

## Iraq

### Investigating the *in vivo* biocontrol and growth-promoting efficacy of *Bacillus* sp and *Pseudomonas fluorescens* against olive knot disease.

Olive knot disease, caused by *Pseudomonas savastanoi*, poses a significant threat to olive cultivation, necessitating sustainable alternatives to conventional chemical control. This study investigates the biocontrol effectiveness of *Bacillus* sp. (Og2) and *Pseudomonas fluorescens* (Oq5), alone and combined, against olive knot disease. Olive plants were sprayed with 5 ml of bacteria until uniformly wet, with additional application to the soil surface.

Pathogen injection occurred 24 hours later. The results revealed that treating plants with a combination of both bacteria provided the highest reduction in disease severity (89.58 %), followed by *P. fluorescens* alone (69.38 %). Significant improvements were observed in shoot height, particularly with the combination of *Bacillus* sp. and *P. fluorescens*. The root length of olive seedlings treated with *P. fluorescens* and *Bacillus* sp., either alone or in combination, was significantly longer compared to the control and pathogen-treated seedlings. In terms of root dry weight, the most effective treatments were treated with *P. fluorescens*, which was the highest (82.94 g) among all treatments, followed by the combination of both isolates with seedlings inoculated with *P. savastanoi*.

These findings underscore the potential of *Bacillus* sp. and *Pseudomonas fluorescens* as effective biocontrol agents against olive knot disease and promoting olive seedling growth, providing a sustainable and environmentally friendly approach to disease management.

[Avin Omer Ali, Hayman Kakakhan Awla, Tavga Sulaiman Rashid (Iraq), Department of Plant Protection, College of Agricultural Engineering Sciences, Salahaddin University, Erbil, Iraq. Scientific Research Centre, Erbil Polytechnic University, Erbil, Iraq. Microbial Pathogenesis Journal (Impact Factor: 3.3), Volume 191, June 2024, 106645]. <https://doi.org/10.1016/j.micpath.2024.106645>

## Iran

### **Biology of apricot bud gall mite, *Acalitus phloeocoptes* determining the emergence time of the first generation using the degree day model and its control.**

The plum bud gall mite, *Acalitus phloeocopte* Nalepa (Acari: Trombidiformes) is one of the important pests of plum trees. The biology and control of this mite during the 2021-2022 period was investigated. The results showed that this mite had four generations a year and spent the winter as an adult female mite. The estimated degree days (DD) for the emergence of 50% of wintering mites with two temperature thresholds of 6.2 and 5.8°C degrees were calculated as 68.50 and 88.00 DD in 2021 and 72.00 and 90.50 DD in 2022, respectively. The number of new galls formed by this mite following different treatments such as volck oil (as winter oil), liquid sulfur, propargit, phenpyroxymit, abamectin, tetradifon and sunmite along with water as a control treatment was determined. The results showed that in 2021, the sulfur treatment led to the least number of new galls 14.22±0.53, whereas in 2022 abamectin gave the least number of new galls 17.70±1.32. The integrated pest/crop management, including pruning and removing infested branches in winter, a foliar spray with 80% liquid sulfur at the end of winter before budding or spraying with abamectin using degree-days following 50% overwintering mite emergence from galls, gave the best results and is recommended for adoption by farmers. [Fereshteh Nourpour, Shahram Aramideh, Shahram Mirfakhraie and Hashem Kamali (Iran), Arab Journal of Plant Protection, 42(3): 275-280, 2024]. <https://doi.org/10.22268/AJPP-001255>

## Jordan

### **Evaluation of endophytic bacteria from durum wheat on Fusarium root and crown rot disease (*Fusarium culmorum*) under drought stress.**

Drought and Fusarium crown and root rot (FCRR) are major stresses impacting durum wheat growth. This study aimed to evaluate the antifungal activity of endophytic bacteria against FCRR pathogens and their drought tolerance, as well as assess their effects on wheat growth under normal irrigation, drought stress, and *F. culmorum*-induced root rot. Sixty bacterial isolates from durum wheat plants in Jordan were tested for antagonism against *F. culmorum* and drought tolerance. Ten isolates were selected based on their antagonistic activity and drought tolerance for further molecular identification. Greenhouse experiments showed that several endophytes, including *Bacillus amyloliquefaciens* (isolate 52), *Bacillus licheniformis* (isolates 37 and 38), and *Paenibacillus ehimensis* (isolate 60), exhibited significant growth promotion under both normal and drought stress conditions. Isolate 52 demonstrated high antagonistic activity against *F. culmorum* and very high drought tolerance, making it a promising candidate for biocontrol and biofertilizer development. Furthermore, bacterial treatments significantly reduced FCRR severity, with reductions of up to 82% under normal conditions and up to 61% under drought stress. These findings suggest that endophytic bacteria can enhance durum wheat resilience to drought and Fusarium infections, offering a sustainable solution for improving wheat productivity in stress-prone environments. [Firas M. Abu El Samen, Imran Alsawalha, Kholoud M. Alananbeh, Nehaya Al-Karablieh, Ayed M. Al Abdallat, Agronomy, 14(12. 2024)] <https://doi.org/10.3390/agronomy14122912>

## Lebanon

**Certified Potato (*Solanum tuberosum* L.) G1 Tubers Production at Different Weight and Planting Distances of G0 Tubers in Lebanon.** Plant spacing and seed tuber size are important agronomic management practices in the production of potatoes. Three weights of G0 potato tubers ( $W1 < 10g$ ;  $10g < W2 < 20g$ ;  $20g < W3 < 30g$ ) and two planting distances (D1: 10 cm and D2: 20 cm) with a potato variety Spunta were taken in a study from March to June during the 2022 planting season at the Lebanese Agricultural Research Institute (LARI, Tal Amara), Bekaa, Lebanon. The objective was to observe the effect of G0 tuber weights and planting distance on average weight (AWe), average number (AN), average length (AL), average width (AW) and production/m<sup>2</sup> of G1 potato tubers cultivar Spunta in Lebanon. The largest G0 tubers ( $20g < W3 < 30g$ ) planted at widest distance (D2: 20 cm) yielded the maximum significant weight, length, width and yield of 41.75 g, 6.63, 3.57 cm and 11.52 Kg/m<sup>2</sup> respectively of G1 tubers produced whereas the lowest average in these traits (4.19g, 2.89 cm, 1.49 cm and 3.49 Kg/m<sup>2</sup>) were obtained in smallest G0 tuber weight ( $W1 < 10g$ ) and closest planting distance (D1: 10 cm). The highest number of G1 tubers (24) was obtained with the smallest G0 tubers ( $W1 < 10g$ ) planted at the closest plant spacing of 10 cm, while the lowest number (12) was obtained in the largest size G0 tuber ( $20g < W3 < 30g$ ) with the closest distance 10cm. To conclude, we outline a protocol to produce potato seeds cultivar Spunta in Lebanon by evaluating the field performance of potato tubers of different sizes and planting distances. Our findings suggest planting G0 tuber of  $W < 10g$  at a spacing distance of 10 cm. This will increase the number of G1 tubers obtained and provide access to broader international markets. [M. Dalleh, J. Borjac, G. Younes, E. Choueiri, A. Chehade, A. Elbitar (Lebanon), Asian Journal of Biotechnology and Genetic Engineering 7: 8-15. Article no. AJBGE.111122.2024].

## Syria

**Virulence of local isolates of the entomopathogenic fungus *Beauveria bassiana* on egg and adult stages of tomato leaf miner, *Tuta absoluta*.** The efficacy of four local isolates of the entomopathogenic fungus *Beauveria bassiana* (Ascomycota: Hypocreales), (b6 isolated from citrus orchard soil (Harisoon), b7 from greenhouse soil (Alkhrab), b8 from palm weevil pupae (Lattakia) and b10 from olive orchard soil (Mengella), were tested on the egg and adult stages of the tomato leafminer *Tuta absoluta* by direct spraying for each stage with three different concentrations of fungal spore suspensions  $2 \times 10^4$ ,  $10^6 \times 2$  and  $2 \times 10^8$  spores/ml. The results obtained showed that both insect stages were susceptible to fungal infection to varying degrees, and there were significant differences in the hatching rate and adult mortality rate caused by the four isolates compared with the control treatment. The b8 and b10 isolates were the most effective on both insect stages at all concentrations tested. Corrected mortality rates at the highest concentration ( $2 \times 10^8$  spore/ml) were 82.59% for b8 isolate, and 86.30% for b10 isolate on eggs, and  $LC_{50}$  was  $1 \times 10^6$  spores/ml for b8 isolate and  $8 \times 10^5$  spores/ml for b10 isolate. In contrast, the corrected mortality rate for both was 100% in adults, 8 days after treatment and by using the highest spore concentration. The  $LT_{50}$  was 3.2 days for both isolates, and the  $LC_{50}$  was  $2 \times 10^4$  spores/ml for b8 isolate and  $1 \times 10^5$  spores/ml for b10 isolate under laboratory conditions. [Hasan, A.H., M. Ahmad, O. Hamoudi and M. Moufleh (Syria), Arab Journal of Plant Protection, 42(3): 340-348, 2024]. <https://doi.org/10.22268/AJPP-001252>

## Syria

### **The effect of foliar spray application with salicylic acid and *Bacillus subtilis* AB1 on the growth and protection of grapevine bushes from powdery mildew disease caused by the fungal pathogen *Uncinula necator*.**

This study was conducted to evaluate the effect of foliar spray with three concentrations of salicylic acid (100, 200 and 300 mg/L), *Bacillus subtilis* AB1 at a concentration of  $2 \times 10^6$  cfu/ml, and the combined mutual effect of both, compared with a farmer's control on vegetative growth, clusters weight, productivity, and reduction of powdery mildew disease spread on grape vines. The growth length was significantly increased (140.7 cm) by applying the foliar spray of the bacteria + salicylic acid (200 mg/L) compared to the two treatments of salicylic acid 100 mg/L and the farmer's control (55.2 and 82.5 cm, respectively), whereas no significant differences were obtained between them and the rest of the treatments. The foliar spray with the treatment of both components (bacteria + salicylic acid 300 mg/L) was superior to all studied concentrations in relation to the average leaf surface area, cluster weight and productivity.

All studied treatments reduced the severity of powdery mildew infection on leaves, except for salicylic acid at 200 mg/L (0.19) and no significant differences were recorded between all treatments (0.11-0.12) except for the two treatments (bacteria alone and farmer's control (0.15 and 0.14), respectively, in terms of reducing disease the severity of infection on fruit clusters. [El-Mosto, E., Z. Hassani and M. Abou Shaar (Syria), Arab Journal of Plant Protection, 42(3): 328-334, 2024]. <https://doi.org/10.22268/AJPP-001244>

## Syria

### **Effect of some medicinal plants' aqueous extracts on two species of two plant pathogenic bacteria, *Pseudomonas savastanoi* and *Xanthomonas campestris*.**

This study evaluated the effect of aqueous extracts of some medicinal plants naturally present in Jableh region, Latakia governorate on two plant pathogenic bacteria, *Pseudomonas savastanoi* and *Xanthomonas campestris*. The inhibitory effect of the bacteria was measured by the diameter length of the inhibition zone around the disc treated with the extract.

The aqueous extracts of *Ocimum canum*, *Salvia sclarea*, *Origanum tythanthum* and *Thymus serpyllum* showed a significantly higher inhibitory effect on *P. savastanoi* compared to their effect on *X. campestris*. Aqueous extracts of *Coridothymus capitatus* and *Majorana syriaca* showed similar inhibition effects on the two studied bacteria species. The highest inhibition rates were 99.975 and 99.997% for *Coridothymus capitatus* and *Majorana syriaca* extracts against *X. campestris* and *P. savastanoi*, respectively. In contrast, the lowest inhibition rate was for *Thymus serpyllum* extracts, with 25.0 and 16.7% inhibition rates against *P. savastanoi* and *X. campestris*, respectively. Results indicate the importance of using these aqueous extracts in controlling bacterial plant diseases. However, such laboratory tests need to be confirmed by extended field trials. [Mouhanna, A.M., M.A.R. Drakly, M.A. Abou Hasan and H.N.H. Al-Obaydi (Syria), Arab Journal of Plant Protection, 42(3): 382-386, 2024]. <https://doi.org/10.22268/AJPP-001254>

## Syria

### Investigation of the spread of natural enemies associated with the Tomato leaf miner, *Tuta absoluta* in Al-Hasakeh governorate, Syria.

The tomato leafminer, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae), is one of the most important pests attacking all parts of the tomato plant, especially leaves, and was first recorded in Syria in 2010. Since then, it has become the most important pest affecting tomatoes and causing economic losses to tomato farmers, ranging from 50-100%. Field applied research was conducted in tomato fields at Amuda and Derbasiyah sub-district of Al-Hasake Governorate, Syria, during the seasons 2016 to 2018. Laboratory research under laboratory conditions (25±2°C, RH 65±5 %) and under long daylight (16 hrs light: 8 hrs darkness) in the biological control research centre, Faculty of Agriculture, University of Damascus, Syria. Five parasitoids and predators were identified on *T. absoluta*, namely: Hemiptera (Homoptera) predators: *Nesidiocoris tenuis* (Miridae), *Orius* sp. (Anthracoridae) and Neuroptera predator *Chrysopa* sp. (Chrysopidae), Hymenoptera parasitoids; *Bracon* (*Habrobracon*) sp. (Braconidae) and *Ratzeburgiola* sp. (Eulophidae). [Darwish, A., A. Besheer and K. Al-Asas(Syria), Arab Journal of Plant Protection, 42(3): 355-360, 2024]. <https://doi.org/10.22268/AJPP-001253>

## Syria

### Investigation of the spread of bacterial wheat leaf blight caused by pathotypes of *Pseudomonas syringae* in some wheat growing areas in Syria.

Wheat is one of the most important cereal crops grown globally, which is affected by several biotic and abiotic stresses, especially in conjunction with the climatic changes that have been evident in the last decade, and among these stresses is the bacterial wheat leaf blight disease caused by the bacteria *Pseudomonas syringae* pv. *syringae*. The importance and danger of this bacterium is due to its ability to be transmitted by seed, as it negatively affects the quality of grain and the weight of one thousand grains. The study aimed to investigate the spread of bacterial wheat leaf blight caused by *P. syringae* and its pathotypes in the main wheat growing areas in Syria (Aleppo, Hama, Homs, Tartous and Latakia governorates) during 2022. The results obtained showed that bacterial wheat leaf blight disease was observed in 42 fields out of 59 fields surveyed (71.2%). The lowest incidence (50%) was recorded in Latakia with a severity of less than 2, and the highest incidence (77.8%) was recorded in the Aleppo governorate with a severity of 4 based on a 0-5 scale. Symptoms of bacterial wheat leaf blight were observed in all fields, which began as water-soaked leaf spots, and then turned into greenish-gray necrosis and finally a straw color. Symptoms of blackish-brown color nodes were observed only in 4 fields in Aleppo and Tartous governorates, it could be caused by the pathotype *P. s.* pv. *japonica*. In addition, the bases of wheat chaffs showed blackish-brown watery spots in 6 fields. In Aleppo and Tartous governorates, these symptoms were identical to those typical of the pathotype *P. s.* pv. *atrofaciens*. Characteristics of 156 isolates, LOPAT tests and fluorescence on King B medium indicated that these isolates belong to the genus *Pseudomonas*, representing 87.7% of the total number of isolates, whereas 26 isolates (14.3%) were negative for Levan and fluorescence tests and their characteristics indicated that they belong to the genus *Xanthomonas*. [Abo Bakr, A., F. Khatib, M. Kassem, S.G. Kumari, N. Husien and N. Asaad. (Syria), Arab Journal of Plant Protection, 42(3): 291-298, 2024]. <https://doi.org/10.22268/AJPP-001257>



## Syria

### Diversity and structure of plant-parasitic nematode communities in some olive nurseries along the coastal region of Syria.

Olive is one of the most important economic crops in Syria. Nurseries are often the main source for pathogens dissemination in olive orchards, especially soil-borne organisms such as *Verticillium* and plant-parasitic nematodes (PPN), and investigating their occurrence and distribution in olive nurseries seems of great importance. No scientific data on the distribution of PPN in olive nurseries along the Syrian coastal region is available. Therefore, the present study was conducted to: (i) explore for the first time the occurrence and diversity of PPN communities distributed in some olive nurseries along the Syrian coastal region, and (ii) compare the nematode diversity and their community structure between two olive varieties. One hundred eight soil samples were collected from different nurseries in Latakia and Tartous governorates, from two common olive varieties Khdiry and Qaissy. Taxonomical and functional indices were calculated and compared between olive varieties and the soil mixture used. The community structure was defined by using principal component analysis (PCA). The results revealed the wide distribution of PPN in olive nurseries, with a total of 17 genera identified. *Aphelenchoides*, *Aphelenchus*, *Ditylenchus* and *Tylenchorhynchus* were the most common. The impact of olive varieties or soil mixture on functional diversity was observed but not on the taxonomical indices. PCA also revealed a distinct structure of communities in each of the two olive varieties and the soil mixture. Economically important genera such as *Meloidogyne* and *Pratylenchus* were also recorded with high population densities in some nurseries, suggesting the inevitable introduction of such nematodes to olive orchards. Certification programs for plant propagation materials in nurseries seem extremely important to be adopted in Syrian nurseries to ensure the production and distribution of "healthy" seedlings to growers. **[Nadine Ali (Syria), Arab Journal of Plant Protection, 42(3): 281-290, 2024].** <https://doi.org/10.22268/AJPP-001258>

## Syria

### Effectiveness of some natural enemies in limiting the spread of Fall Armyworm, *Spodoptera frugiperda*.

The field work of this study was carried out in corn fields in the Hama governorate, and the laboratory work was carried out in Hama Center for Rearing Natural Enemies (HCRNE). This study aimed to evaluate the effectiveness of the egg parasitoid *Trichogramma principium* and larval parasitoid *Bracon hebetor* in the control of fall armyworm (FAW), *Spodoptera frugiperda* (JE Smith) (Lepidoptera: Noctuidae). The rates of parasitism on FAW eggs ranged from 25 to 50%. It was found that there was an inverse relationship between the increase in the number of eggs per batch and the rate of parasitism. The study also showed that the parasitoid *Bracon hebetor* parasitized the fourth, fifth, and sixth larva instars in varying proportions, and the parasitism rate ranged from 10 to 80%. **[Abdulnabi Mohammed Basheer, Eyad Mohammed Mohammed, Shady Mohammad Soliman and Mais Ahmad Naoof (Syria), Arab Journal of Plant Protection, 42(3): 349-354, 2024].** <https://doi.org/10.22268/AJPP-001251>

## Syria

### Life cycle and characterization of cedar moth insect (*Dichelia cedricola*) on Lebanese cedar trees (*Cedrus libani*) at the cedar and fir reserve, Slenfeh.

This study was carried out in the Cedar and Fir Reserve, Slenfeh, Syria, during the period 2021-2022, where the Lebanese cedar moth, *Dichelia cedricola* (Lepidoptera: Tortricidae), was observed for the first time in Syria on the Lebanese cedar tree (*Cedrus libani* A. Rich.). Infestation symptoms were described, and the most important biometric measurements of the different stages of the insect were recorded. The average body length of the fourth and fifth larval instars was  $12.5 \pm 2.6$  mm, and the average length of the pupa was  $9.7 \pm 1.2$  mm. The average length of the female adult was  $11.1 \pm 1.3$  mm, and the wingspan was  $18.7 \pm 2.6$  mm. The average length of the male adult was  $9.4 \pm 1.5$  mm, and the wingspan was  $15.7 \pm 2.6$  mm. The life cycle of the insect was also investigated in the field, where the insect (in its different stages) was active from April to November. Caterpillars feed on needles and new buds and use needles for nesting and overwintering, which causes the leaves to fall and consequently cause damage to the tree. Control measures need to be investigated. [Hasan, R., M. Ali, A. Ramadan and O. Merhej. (Syria), Arab Journal of Plant Protection, 42(3): 263-268, 2024]. <https://doi.org/10.22268/AJPP-001243>

## Syria

### The effectiveness of some plant extracts against adults of the rice weevil, *Sitophilus oryzae* L. under laboratory conditions.

In this study, the effectiveness of three plant extracts (*Schinus molle*, *Melia azedarach* and *Thymus vulgaris*) against adults of the rice weevil, *Sitophilus oryzae* L. (Coleoptera: Curculionidae), using concentrations of 25, 50 and 100%, were investigated. Insect mortality was evaluated 1, 2, 3, 4, 9, 15 and 20 days after treatment, and the corrected mortality rate in addition to the  $LC_{50}$  and  $LC_{90}$  and the  $LT_{50}$  and  $LT_{90}$  values were calculated.

The results obtained showed an increase in the mean of corrected mortality rate with increasing concentration and time after treatment, where the values reached 70, 100 and 80% at the concentration of 100% one day after treatment with plant extracts of *S. molle*, *M. azedarach* and *T. vulgaris*, respectively. The extract *M. azedarach* was superior to the extracts of *S. molle* and *T. vulgaris* with a significant difference at  $P=0.01$ . The  $LC_{50}$  values 4 days after treatment were 54.42% for *S. molle*, 30.23% for *M. azedarach*, and 39.19% for *T. vulgaris*. The  $LC_{90}$  values were 64.68 and 78.89% for *M. azedarach* and *T. vulgaris*, respectively. The  $LT_{50}$  and  $LT_{90}$  values at the concentration of 50% were 5.51 and 39.81 days for the *S. molle*, 1.04; 11.94 days for the *M. azedarach*; 1.59 and 35.17 days for the *T. vulgaris* extracts. Whereas the  $LT_{50}$  values at a concentration of 100% were less than one day for the three studied extracts. The highest effectiveness of *M. azedarach* extract was achieved at concentrations of 25 and 50%, and the values were similar to *T. vulgaris* extract at a concentration of 100%, when the corrected mortality rate reached 100% three days after treatment, with both extracts being superior to the *S. molle* extract at the same concentration and time after treatment. [Esber, R. (Syria), Arab Journal of Plant Protection, 42(3): 368-376, 2024]. <https://doi.org/10.22268/AJPP-001248>

## Tunisia

### **The promising potential of triploidy in date palm (*Phoenix dactylifera* L.) breeding.**

Date palms are a vital part of oasis ecosystems and an important income source in arid and semi-arid areas. Crossbreeding is limited due to the long juvenile stage of date palms and their dioecious nature. This study aimed to create triploid date palms to obtain larger and seedless fruits and to increase resilience to abiotic stresses. A tetraploid date palm mutant was crossed with a diploid male palm, yielding hundreds of seeds suspected of containing triploid embryos. Six years after planting, four palms with confirmed triploidy reached maturity.

They are phenotypically distinct from diploids, with a thicker rachis, thinner spines, wider and longer midleaf spines, and a longer apical spine. They were classified as sterile bisexual, sterile male and fertile female. One of the latter produced delicious dates with a very small seed, promising for the marketability and profitability of date palm fruits. This first report on triploid date palms provides a way in which to make a significant leap forward in date palm breeding. Given the vigor and fruit quality of female triploid date palms, compared to their diploid counterparts, they will be the target of breeding programs and may spearhead new oases.

[Ahmed Othmani (Tunisia), Hammadi Hamza, Karim Kadri , Amel Sellemi , Leen Leus and Stefaan P. O. Werbrouck *Plants* , 13(6), 815; 2024]. <https://doi.org/10.3390/plants13060815>

## Turkey

### **Evaluation of four control methods efficiency and damage mitigation of field Dodder (*Cuscuta campestris* Yunck.) in eggplant cultivation**

Field dodder (*Cuscuta campestris* Yunck.) is one of the most difficult parasitic weeds to control. This study was conducted in 2020 and 2021 to investigate the efficiency of four selected control methods against field dodder in eggplant.

The treatments that were applied in the experiment were hand hoeing, black polyethylene mulch, pendimethalin as a pre-emergence herbicide, and rimsulfuron as a post-emergence herbicide. The hand hoeing treatment achieved the highest efficiency against field dodder among the weed control methods used, reaching 100% weed-free, followed by the mulch treatment, with 91.2% weed-free. When the field dodder was left without control, it caused a decrease in plant height by 31.13%, the number of fruits by 59.00%, and a loss in eggplant yield by 82.16%. Infection with field dodder usually results in failure of the eggplant flowers' pollination and then death, reduced quality of fruits, deformation in leaves, and cases of severe infection lead to the complete death of plants [Kamal Almhemed and Tamer Ustuner, Department of Plant Protection, Faculty of Agriculture, Kahramanmaraş Sutcu Imam University, Kahramanmaraş, Turkey, *Jordan Journal of Agricultural Sciences*, Volume 20, No.4 2024]. <https://doi.org/10.35516/jjas.v20i4.1911>

## GRADUATE STUDENTS THESIS (MSc AND PHD)

### Detection of the causes of crown and root rot disease of cucumber and integrated management of the disease under protected cultivations

On Wednesday, 04/12/2024, a public discussion of PhD student Farid Badran was held at Dr Sabah Baha Al-Din Hall at Tikrit University under the supervision of the Arab Plant Protection Society Executive Committee member Professor **Dr Emad Mahmood Al-Maarroof** and Professor **Dr Saleh Ahmad**.



The scientific discussion committee was comprised of distinguished scientific figures from different universities in mycology and plant pathology. The student diligently defended his thesis, "Detection of the Causes of Crown and Root Rot Disease of Cucumber and Integrated Management of the Disease Under Protected Cultivations," during a prestigious scientific debate. His exceptional performance earned him the title with a high degree of distinction. We extend our heartfelt congratulations to the student and his supervisors for this remarkable scientific achievement, which significantly advances in the field of plant disease research.


We express our profound gratitude and admiration to the scholars who participated in the debate and contributed their valuable scientific insights and experiences to enhance the thesis. Special thanks are also extended to the deanship of the University of Salah al-Din's College of Agriculture and all of the university's colleagues for their support. [**Farid Badran Al-Kanani (Iraq), Tikrit University, Baghdad -Iraq, (Doctorate, 2024)**].

### Study of the effect of *Trichoderma atroviride* on the biochemical and physiological parameters related to the resistance of some wheat varieties to *Fusarium culmorum*, the causal agent of crown rot.

*Fusarium culmorum* (W.G. Sm.) Sacc. is the principal causal agent of wheat crown rot in Algeria, leading to a decrease in yield and seed quality due to the presence of mycotoxins. In order to promote more sustainable agriculture using effective control strategies that preserve human and animal health, we used *Trichoderma atroviride* (Ta.13) P. Karsten as a biological control to manage this disease. Our study aimed to evaluate the impact of this agent on various parameters related to plant resistance to the pathogen.

The results showed variability in the protective efficiency of *Trichoderma* depending on the tested wheat varieties, notably with the highest disease reduction (56%) observed in the Waha variety. Furthermore, we noted specific physiological changes depending on the varieties, with the Ain Abid and Waha varieties showing higher rates of fresh weight, dry weight, germination rate, and chlorophyll content in plants co-inoculated compared to those inoculated only with the pathogen.

We studied the effect of the antagonist on different biochemical parameters related to plant resistance, such as the activities of antioxidant enzymes (peroxidase and catalase), phenolic and protein content of three wheat varieties, as well as hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) levels. Our results showed that the application of *T. atroviride* induced higher systemic



levels of these factors. In particular, the Waha variety recorded the highest induction levels, followed by Ain Abid, when plants were co-inoculated with both Ta.13 and *F. culmorum*, compared to those inoculated only with the pathogen. Additionally, the lowest levels of these factors were observed in the Vitron variety. We noted a strong accumulation of phenols in the basal parts of Waha variety plants, with an increase of up to 1400% in plants co-inoculated compared to those inoculated only with the pathogen.

Furthermore, the Waha variety showed the biggest increase in peroxidase activity in leaf tissues, reaching up to 282% of the control. The protein content in the collars of Waha variety plants also increased by 66% when co-treated with Ta.13 and *F. culmorum*. Furthermore, the most substantial increases in catalase activity were observed in the basal parts and leaves of the Ain Abid variety when co-inoculated with Ta.13 and *F. culmorum*, with respective increases of 641% and 788% compared to plants inoculated only with the pathogen. [Fayza Belhadj Ben Yahia (Algeria), Department of Botany of the National Higher School of Agronomy-El Harrach – Algiers. Supervised by Dr. Houda Boureghda from the National Higher School of Agronomy, El Harrach; Algiers, Algeria. (Doctorate, 2024)].

### **Study of relationships: *Globodera rostochiensis* Wollenweber- potato and search for alternative methods against this pest»**

Cyst nematodes of the *Globodera* genus represent a very serious threat to potatoes in Algeria and throughout the world, particularly due to their classification as a quarantine pest. The aim of the present study was to determine the life cycle duration of *G. rostochiensis* under natural conditions over two agricultural seasons, and to investigate the effect of different initial nematode population densities on potato growth and yield. This work was complemented by a search for alternative methods to evaluate the nematicidal activity of aqueous extracts from two *Brassicaceae* plants, *Nasturtium officinale* and *Raphanus sativus*, on larval mortality (J2) and egg hatching of *G. rostochiensis*, and by determining the nematicidal effect of green manures from these two plants *in vivo*. Finally, the effect of three types of compost on the development of nematode populations was studied. The results revealed that the life cycle of *G. rostochiensis* lasted 66 and 73 days at 620 DJ<sub>6.2</sub> and 699 DJ<sub>6.2</sub> for the two varieties spunta and kondor, respectively, in spring. However, the cycle length of this nematode was 59 days at 402 DJ<sub>6.2</sub> for the spunta variety and 66 days at 459 DJ<sub>6.2</sub> for the kondor variety in winter.

In addition, the effect of different densities showed that the loss of potato yield varied according to the initial density (Pi) of *G. rostochiensis* in the soil. The rate of yield reduction was 85% at the highest initial density (Pi =512 eggs and J2 g<sup>-1</sup> of soil) and 16% at the lowest Pi (1 egg and J2 g<sup>-1</sup> of soil).

Results on the evaluation of the nematicidal activity of brassicaceous plants showed that all aqueous extracts tested caused *G. rostochiensis* juvenile mortality and inhibited the eggs hatching of this nematode. The biocidal effect aqueous extracts increases with increasing concentration and exposure time.

The high mortality of 63.10 and 90.37% was recorded for *R. sativus* leaf and root extracts. *N. officinale* revealed lower percentages of 48.13 and 58.82% for roots and leaves extracts respectively. In addition, egg hatch inhibition rates were 53.28, 65.5, 50.47 and 41.75% for *R. sativus* and *N. officinale* leaves and root extracts, respectively. Finally, the use of *R. sativus* green manure *in vivo* showed high efficacy (69.64%) in reducing nematode populations compared to *N. officinale* (27.43%), and an improvement in potato plant growth and



tuber weight in the order of 55.24 and 20.95% and 44.02 and 13.04% for the green manure of *R.sativus* and *N.officinale* at dose D3, respectively. In addition, chemical screening by UHPLC showed the main secondary metabolites in the leaves and roots of the two plants tested. *R.sativus* is richer in glucosinolates than *N.officinale*, with large quantities of glucoraphasatin in the roots.

Thus, phenolic compounds in the different parts of both plants, mainly flavonoids and phenolic acids, were recorded. Data on the evaluation of the effect of composts revealed that poultry manure compost is more effective in reducing *G. rostochiensis* populations of 62.3%, compared to cow manure (43.39%) and plants waste (34.86%) composts. However, organic amendments showed an increase in potato plant growth and tuber weight. As a result, further and more in-depth studies are needed for the management of this formidable pest.

[**Safia Berrahia**, Department of Botany of the National Higher School of Agronomy -El Harrach – Algiers. Supervise by Dr. Samira Sellami from the National Higher School of Agronomy, El Harrach; Algiers, Algeria.(Doctorate,2024)].


## Activities of the regional office of the Food and Agriculture Organization of the United Nations – Near East and North Africa

### FAO Participates in the shaping of the strategic directions of the Near East Plant Protection Organization (NEPPO)

05/11/2024, Tunisia



In a significant step reflecting its commitment to achieving food security and agricultural sustainability in the Near East and North Africa (NENA) region, the Food and Agriculture Organization of the United Nations (FAO) is participating in the development of NEPPO's Strategic Directions for the period 2025-2035.



Today marks the beginning of the inaugural in-person meeting of the NEPPO specialized task force groups, which will continue until November 7, 2024, in Hammamet, Tunisia, with the participation of a number of officials and experts from various Arab countries. Over the next three days, the working groups' discussions will focus on several vital strategic themes, including the management of transboundary plant pests and diseases, formulation of new standards that align with regional practices, development of innovative strategies for the management of pesticides and their alternatives, capacity building and investing in the skills of plant protection professionals. Additionally, it strengthens regional cooperation and exchanging knowledge and experiences among member countries, thereby enhancing joint efforts to combat pests and ensure food security.

During the meeting, Mr. Thaer Yaseen, Regional Officer for Plant Protection at the FAO Regional Office for the Near East and North Africa (FAORNE), shared insights on shaping and formulating the strategic directions of NEPPO, strengthening the role of specialized task forces while developing their executive plans. He stated, "This meeting is a vital platform for gathering ideas and shaping a sustainable future for agriculture in the region. Through the fruitful collaboration between FAO, the Near East Plant Protection Organization and Member countries, these strategic directions are expected to strengthen the capacity to address increasing agricultural challenges and support sustainable development, ensuring a secure agricultural future in the Near East and North Africa region."

Mr. Mohamed Habib Ben Jamaa, Executive Director of the Near East Plant Protection Organization (NEPPO), stated that by the end of the meeting, the participating experts would work on preparing a Strategic working paper for the Vision of the Near East Plant Protection Organization 2025-2035, in addition to developing an executive work program for the period 2025-2026. This reflects the collective commitment towards achieving the strategic objectives of the organization.

The Near East Plant Protection Organization (NEPPO) is a regional Intergovernmental Organization established to promote cooperation and coordinate efforts in plant protection among member countries in the Near East and North Africa (NENA). <https://www.fao.org/neareast/news/details/fao-participates-in-the-shaping-of-the-strategic-directions-of-the-near-east-plant-protection/en>

## **Strengthening regional efforts: FAO holds wrap-up meeting of the regional programme on Red Palm Weevil eradication in Jeddah**

30/10/2024, Jeddah, Saudi Arabia

The Food and Agriculture Organization (FAO) of the United Nations successfully concluded its Wrap-Up Meeting for the Regional Programme on Red Palm Weevil (RPW) Eradication in the Near East and North Africa (NENA) Region, held on October 28-29, 2024, in Jeddah, Saudi Arabia. The meeting was collaboratively organized by the National Center for the Prevention and Control of Plant Pests and Animal Diseases (Weqaa Center) and was attended by 55 participants. This pivotal meeting brought together key stakeholders, including government representatives, donors, and technical experts, to assess progress, share insights, and outline future strategies and ways forward in combating the Red Palm Weevil.

The Red Palm Weevil is a highly serious invasive pest that poses a significant threat to date palm cultivation, which is vital to the agricultural economy and cultural heritage of



the NENA region. Over the past years, the FAO has spearheaded efforts to manage and eradicate this pest through a collaborative approach involving most NENA countries. During the meeting, participants reviewed the outcomes of the FAO programme, highlighting successful interventions and the importance of regional cooperation in addressing the challenges posed by RPW.

The presentations and discussions focused on the results achieved by 15 project partners representing regional and international scientific institutions and organizations in the field of research, capacity development, and knowledge and technology transfer. Several outcomes have been achieved by the regional programme, such as enhancing governance that supports policies and regulations for sustainable control of the RPW. This includes regional guidelines for phytosanitary measures to prevent the spread of RPW, the establishment and maintenance of RPW-free areas, and guidelines for certifying plant propagation material of date palms. Strategies for monitoring and surveillance were discussed, focusing on the effective early warning systems that were validated to detect and monitor the spread of RPW. Innovations and modern technologies that can contribute to developing long-term solutions for RPW management were showcased. The socio-economic impacts of RPW on local communities and farmers were also addressed.

“The successful conclusion of this programme marks a pivotal step in our collective efforts in the fight against the RPW. By strengthening the governance, enhancing the monitoring systems, and fostering regional collaboration, we are taking significant strides towards sustainable management and protection of our vital date palm resources,” said Thair Yaseen, the plant protection officer for the Near East and North Africa, FAORNE.

The meeting addressed ways to move forward in managing RPW. Participants highlighted the importance of capacity building at all levels to ensure sustainable and effective management of RPW. They reasserted the necessity of ongoing cooperation among countries to share knowledge and enhance regional coordination.

The meeting concluded with a commitment from all stakeholders to enhance ongoing efforts against RPW, emphasizing the importance of collective action to protect date palm cultivation and support livelihoods in the region.

<https://www.fao.org/neareast/news/details/strengthening-regional-efforts--fao-holds-wrap-up-meeting-of-regional-programme-on-red-palm-weevil-eradication-in-jedda/en>



## FAO and MoCCAЕ host graduation ceremony highlighting women's role in agriculture in UAE

14/10/2024, Dubai- UAE

The Food and Agriculture Organization (FAO) and the Ministry of Climate Change and Environment (MoCCAЕ) held a graduation ceremony to mark the completion of the Farmer Field Schools program, highlighting the significant achievements of women in the United Arab Emirates agriculture sector. This initiative, part of the 2024 date palm season, featured five Farmer Field Schools across Al Ain, Ras Al Khaimah, Fujairah, and Al Rahba. Forty-eight participants, including eight women farm owners and managers participating for the first time, were empowered with essential skills and knowledge, marking a significant advancement in female participation in agricultural management. His Excellency **Dr. Mohamed Salman Al Hammadi**, Assistant Undersecretary of Food Diversity at MoCCAЕ, stated, "We are proud to support initiatives that empower women and foster collaboration among farmers. This graduation ceremony reflects our commitment to enhancing agricultural resilience and sustainability in the United Arab Emirates." HE Al Hammadi highlighted the UAE's launch of the national programme 'Plant the Emirates' and the 'National Agriculture Centre' as important steps in seeking solutions to the country's agricultural challenges. The Farmer Field School program exemplifies the UAE's dedication to fostering sustainable agricultural practices and empowering its farmers. By providing hands-on training and practical solutions, local farmers are now better equipped to identify, monitor, and manage the red palm weevil, ultimately contributing to the resilience of the date palm industry in the region.

**Kayan Akram Jaff**, Head of Mission of the FAO Subregional Office for the Gulf Cooperation Council States and Yemen, expressed, "This program not only equips farmers with practical skills but also champions the vital role of women in agriculture. Their involvement signifies a progressive step toward sustainable farming practices in the region." The primary goal of the Farmer Field Schools program was to focus on managing the Red Palm Weevil and cultivating date palms.

**Thaer Yaseen**, FAO Senior Plant Protection Officer, who leads the RPW project, remarked, "The successful implementation of this program highlights the importance of community engagement in managing the Red Palm Weevil. Through collaboration and shared knowledge, we can effectively combat this pest and safeguard our date palm resources." Key achievements of the program include increased awareness and knowledge of the Red



Palm Weevil and its impact on date palm cultivation, improved agricultural practices leading to enhanced yields and healthier date palms, and strengthened engagement and collaboration among farmers, fostering empowerment and resilience.

<https://www.fao.org/united-arab-emirates/news/detail/fao-and-ministry-of-climate-change-and-environment-celebrate-farmer-field-schools-graduation--highlighting-women-s-role-in-uae-agriculture/en>



Kayan Jaff, Head of Mission FAO SNG, stands with H.E. Mohammed Al Hammadi, Assistant Undersecretary, the Ministry of Climate Change and Environment, alongside graduates of the FAO's Farmer Field Schools in Dubai, highlighting the importance of sustainable agriculture and the vital role of women in the UAE's agricultural landscape.

### Three farmer field schools for a preventive approach against Red Palm Weevil in Tunisia


17/09/2024- Tunisia



11 September / Tunisia - In Tunisia, three Farmer Field Schools have been established since last November 2023 in the regions of Debin Metlaoui in Gafsa, and Nefta and Jehim in Tozeur. After nearly one year, around 75 farmers attended ceremonies to receive their certificates of recognition.

These Farmer Field Schools activities are part of the FAO regional Red Palm Weevil Eradication programme for the Near East and North Africa. The Food and Agriculture Organization of the United Nations (FAO) held a training for farmers' field school facilitators on date palm pest management and red palm weevil control in Tunis from 18 to 22 September 2023. The training programme was attended by FAO regional experts and trainers and more than 20 trainees from Tunisia and Libya.

The training aimed to strengthen the capacity of agricultural specialists to establish,



implement, and manage Farmer Field Schools to enhance the skills of farmers to prevent the Red Palm Weevil, manage other palm pests, and adopt good agricultural practices in the date palm. Implementing these three Farmer Field Schools in Tunisia has promoted participatory practices and made farmers aware of their crucial role in preventing the risks of Red Palm Weevil infestation in the oases of southern Tunisia.

During the two-day celebrations in Gafsa and Tozeur, the farmers expressed their support and belief in the role and impact of the FFS in creating a new dynamic for sharing experiences and information on palms. “It must be said that farmers have always worked on their own, each with their own set of poor practices, and this lack of communication is very detrimental to the quality and sustainability of our production. Since we have attended these Farmer Field Schools, we’re more united and less isolated,” says Khaled Khawaldieh a farmer from Debin-Gafsa.

### **Tunisia benefits from the Regional Red Palm Weevil Eradication Programme for North Africa and the Near East as other several countries.**

Around 320 Farmer Field School facilitators were well-trained under the Regional Red Palm Weevil Eradication Programme for North Africa and the Near East. This training of facilitators (ToF) was carried out in several countries in the region, including Egypt, Jordan, Iraq, Tunisia, Libya, Morocco, Saudi Arabia, the United Arab Emirates and Kuwait. Around 46 Farmer Field Schools have been implemented in Egypt (20), Jordan (7), United Arab Emirates (5), Iraq (7), Saudi Arabia (5), and Tunisia (3).

The FAO Regional Programme for the Eradication of the Red Palm Weevil (GCP/RNE/012/MUL programme) focuses on key areas such as scientific research, including innovative detection methods, monitoring, control techniques, and studies to assess the socioeconomic impact of the weevil; knowledge and technology transfer; and capacity building and coordination among countries. Working groups have been set up, in which FAO, donor partners, organizations, and experts in the field are members.

The programme also aims to coordinate regional efforts to support integrated and sustainable management programmes to control the palm weevil and reduce its devastating environmental, food security, and socioeconomic impacts on rural communities and ecosystems in affected areas.

FFSs, implemented in several countries under this regional programme, promoted participatory, practical training to increase farmers’ involvement in RPW management programmes and adopt modern agricultural practices and technologies. Farmer field schools (FFSs), as an important vehicle for knowledge transfer and experience sharing, play an important role in familiarizing farmers with RPW management.

FAO has been a pioneer in the FFS approach since 1989, and since then, FFSs have been established in more than 90 countries, including in the Near East and North Africa (NENA) region. FAO has developed a strong network of FFS in different regions of the world, recognizing that farmers have important knowledge that needs to be shared and preserved.

<https://www.fao.org/neareast/news/details/three-farmer-field-schools-for-a-preventive-approach-against-red-palm-weevil-in-tunisia/en>

## FAO Hosts training in Oman on climate finance and climate change adaptation for agriculture and water sectors

08/09/2024, Salalah, Oman



Participants of the FAO Training Workshop on Climate Finance and Climate Change Adaptation for Agriculture and Water Sectors in Salalah, Oman, September 8, 2024

The Food and Agriculture Organization of the United Nations (FAO), in collaboration with Oman's Ministry of Agricultural, Fisheries and Water Resources and the Environment Authority, has launched a training workshop as part of the "Building a Resilient Environment and Agricultural and Water Resources" project, funded by the Green Climate Fund. The workshop, held today in Salalah, Dhofar Governorate, aims to enhance participants' skills in climate finance and to build their capacities for climate change adaptation strategies in the agriculture and water sectors.

His Excellency **Dr Ahmed bin Mohsen Al Ghassani**, Chairman of Dhofar Municipality, delivered the keynote address, emphasizing that climate change is a global challenge requiring coordinated international efforts to address its impacts and adapt to its consequences. He underlined that "Oman Vision 2040" has designated agriculture as a key sector for non-oil investments, stressing that tackling climate-related challenges is essential to achieving the vision's objectives. The event includes two training workshops: The first session focuses on educating participants about accessing climate finance from international funds, particularly the Green Climate Fund, to support local projects. The second workshop covers the use of climate data to forecast changes and enhance the readiness of the agriculture and water sectors to climate change.

"The workshops are timely given the significant challenges posed by climate change to agriculture and water management, particularly in regions like the Near East and North Africa," stated **Thaer Yaseen**, FAO Representative in the Sultanate of Oman (Ad Interim).

"The workshop aims to build local experts' capacity to secure international funding for climate adaptation projects and implement sustainable practices," He emphasized.

Yaseen highlighted that through collaborative efforts, the goal is to develop practical solutions that address the current impacts of climate change while also protecting agricultural and water resources for future generations.

The workshop brings together 30 entities and organizations, with key officials from the government and private sectors attending. Participants include representatives from the Ministry of Finance, Oman Development Bank, and key stakeholders in the agriculture and water sectors. Civil society organizations, such as the Environment Society of Oman, Oman Women's Association, and the Omani Agricultural Society, are also actively involved.

The event, set to run until Thursday, features expert-led training sessions by international and local specialists, focusing on preparing projects designed to secure financing from the Green Climate Fund, in collaboration with local funding sources. <https://www.fao.org>



# Activities of the Commission for Controlling the Desert Locust in the Central Region (CRC), Food and Agriculture Organization of the United Nation



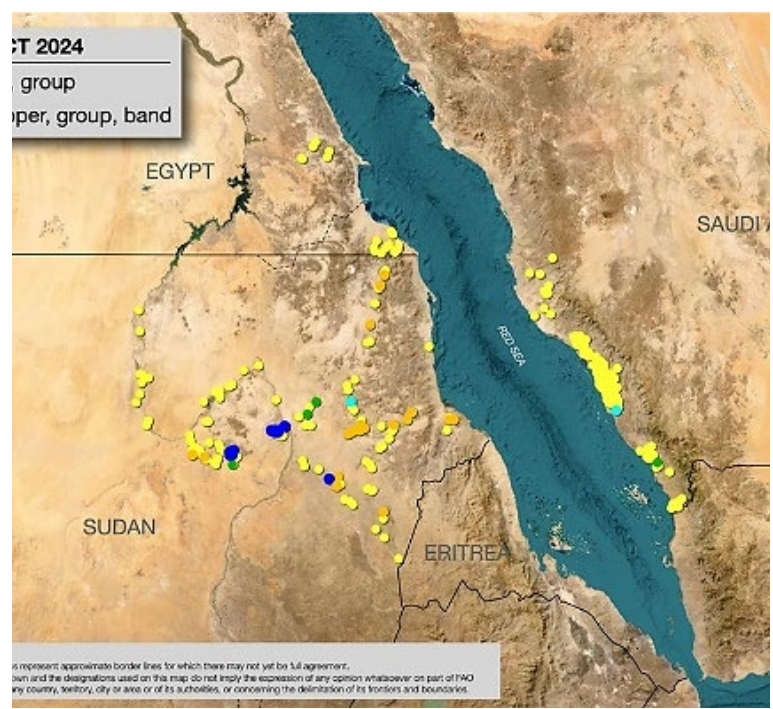
## Desert Locust Situation

### Desert locust situation in October 2024

The Desert Locust situation was calm during October. Summer rainfall began earlier than usual, extending further north in the northern Sahel and southern Sahara until late September. This led to low numbers of hoppers and adults from Mauritania to Sudan and Saudi Arabia, with some in southeast Egypt, Yemen’s interior, northwest Somalia, and along the Indo-Pakistan border. Vegetation remained green in Sudan, Mauritania, and Saudi Arabia. By the end of October, a very small outbreak developed in the interior of Sudan where small groups of hoppers and adults and very small bands were present and treated.

### Desert locusts forecast up to mid-December 2024

Locust will decrease as vegetation dries out in the summer areas in the northern Sahel, except in Mauritania, where hoppers and adults will increase slightly in the northwest where breeding and a few small groups could form for control. In Sudan, adult groups and possibly a few small swarms will move to the Red Sea coast for winter breeding. Locusts number will gradually increase along the Red Sea and Gulf of Aden coasts in Saudi Arabia, Egypt, Yemen, and perhaps Somalia. However, seasonal models predict mostly below-normal rains from December onwards. As a result, only small-scale breeding is expected during the winter with some control.



Desert locust situation in October 2024

## Activities of FAO Commission for Controlling the Desert Locust in the Central Region

### 1. Regional Workshop on Advanced Digital Locust Pesticide Management System (Locust-PMS). Muscat. Sultanate of Oman 1 - 5 September 2024.



In September 2024, the Commission for Controlling the Desert Locust in the Central Region (CRC), held a 5-day regional workshop on the use of the advanced digital system for locust pesticide management (Locust-PMS) with the attendance of 27 participants representing the Commission's member states. The workshop is a continuation of the ongoing efforts to develop the advanced digital system (Locust-PMS) as an innovative solution to meet the challenge arising from one of the most severe crises in decades in East Africa and the Middle East, which is the 2019-2022 desert locust outbreak, which affected 37 countries, during which control efforts covered 5.6 million hectares and used 6.9 million litres of pesticides, which ultimately led to Excess unused pesticides, empty containers and heavily contaminated sites. This knowledge management-based solution aims to mitigate the risks associated with pesticides to human and animal health and natural resources. The workshop came after successful trials and improvements to the LPMS in several countries, including Djibouti, Yemen, Ethiopia, Kenya and Georgia, and the dissemination of this new technology among CRC member states and the Horn of Africa countries became essential. The workshop focused on achieving several objectives, which were to introduce the new desert locust management solutions based on the LPMS to CRC member states and the Horn of Africa by providing an overview of the system components and features and enabling members to carry out the registration process, enter data and use it. The workshop also concentrated on identifying implementation procedures for the new tool, including preparation measures, identifying national contact points and associated costs, precautionary measures before entering data related to warehouses, and attention to developing a national implementation plan. The discussions were fruitful in identifying the comments and feedback from member states regarding using the new tool (LPMS).

### 2. Field training for master's students on desert locust operations September 10 to 25, 2024. Mauritania

Practical training is an integral part of the integrated preparation of master's students, and hence the Secretariat of the Commission for Controlling Desert Locust in Central Region (CRC), in cooperation with the Western Region Commission (CLCPRO) and Hassan II Institute, implemented a field training program for master's students on locust operations, to raise their efficiency and provide practical experience that enhances their academic education. For the Commission to provide students with the necessary skills to conduct fieldwork effectively and learn about the real locust environment, Mauritania was chosen as one of the desert locust habitats, through which students can understand the behaviour and surrounding habitat of locusts and practically apply desert locust operations.



In this context, a total of 16 students took part, with 7 representing the member countries of the central region. Two experts from the commission participated as field trainers for the master's students in these operations. The program was prepared to include a launch to the Al Euin locust base, 800 km south of Nouakchott, the capital. During the first two days, a comprehensive review was conducted as lectures on the biology and behaviour of locusts, survey and control techniques and tools, and the preparation of research theses. This was followed by an application of ground survey operations using drones in several different areas (north and northeast of Laayoune), in addition to camping in the Ljedim area, 400 km from Nouakchott, and conducting many field surveys. The training was characterized by many continuous and effective dialogues between the students and the experts. It also ended with identifying their preferred research interests for their master's theses and formulating and submitting their proposals.

### **3. Regional Training Course on Applying Best Media Practices in Desert Locust Control Efforts 13-17 October 2024 Cairo - Egypt.**



Recognizing the importance of effective communication, the Central Region Commission emphasizes the need to engage all parties involved in combating desert locusts. This includes institutions, stakeholders, and individuals concerned about locust control. Given the significant influence of the media, especially during locust upsurges, the commission acknowledges the critical role of media in raising public awareness about advancements in control methods and tools. It also serves to warn communities about the dangers posed by desert locusts. Furthermore, the commission aims to educate the public on addressing locust threats while safeguarding human health and the environment from the negative impacts of chemical control measures. In response to these challenges, the commission organized a regional workshop for liaison officers from its member states. A total of 17 member states participated in this workshop, along with representatives from locust control commissions in the Western and Eastern regions, as well as from the Desert Locust Control Organization of East Africa (DLCO-EA).

The workshop emphasized the importance of effective communication in locust control efforts while developing clear, concise, and culturally appropriate messages. Participants enhanced their skills in writing press releases and media guidelines related to locust control activities. They also received training on conducting effective media interviews about locust threats and control measures. Additionally, the workshop focused on helping participants apply message formulation strategies and effectively deliver them through various communication channels. This included learning how to design communication messages for different audiences and preparing and delivering clear and engaging presentations. A significant portion of the workshop was dedicated to discussing best practices for communication in crisis situations during locust outbreaks. Participants were equipped with the skills needed to contribute to developing a crisis communication plan in response to a locust outbreak. They also explored the basics of designing a monitoring and evaluation plan to assess the impact of their communication efforts.

#### **4. 33rd Session of the Commission for Controlling the Desert Locust in the Central Region and the 37th Executive Committee Meeting, Kuwait, 24 - 28 November 2024.**



The Commission held its 33<sup>rd</sup> Regional Meeting in Kuwait from November 24 to 28, 2024. Member States participating in the meeting included Bahrain, Djibouti, Egypt, Eritrea, Ethiopia, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syria, the United Arab Emirates, and Yemen. Additionally, the Commission for Controlling the Desert Locust in the Western Region (CLCPRO), the Locust Control Commission in South-West Asia (SWAC), and the Desert Locust Control Organization for Eastern Africa (DLCO-EA) were also present.

This periodic meeting serves as a strategic platform to review past achievements, evaluate collaborative efforts, and outline future actions for managing the desert locust, which threatens the food security of millions. The agenda included several key areas, such as technical, administrative, and financial aspects. Technical discussions focused on the current desert locust situation. Participants reviewed the Commission's activities and the strategies of member states to enhance their responses to existing and potential locust outbreaks. Presentations were made on the Commission's projects, capacity-building initiatives, research and development efforts, and the exploration of new technologies and innovations, including the use of drones in survey and control activities. The meeting also addressed the status of the Commission's trust fund and emergency fund, discussing the future outlook for the Commission's work plan and budget for the next two years. During the session, the State of Kuwait was elected as the Commission chairperson for the term 2024-2026.



### The First Citrus Conference for the Near East and North Africa Region

December 3-5,2024 Chlef, Algeria

Under the slogan “Challenges for Sustainable Citrus Production in the NENA Countries,” Hassiba Benbouali University hosted the First Citrus Conference for the Near East and North Africa Region in Chlef, Algeria, from December 3 to 5. **Dr. Ibrahim Al-Jboory**, a member of the Executive Board of the Arab Society for Plant Protection, participated in the conference and delivered a remote lecture titled “The Arab Society for Plant Protection and Its Academic and Scientific Role in Establishing the Principles of Pest Management.” During the discussion, he highlighted several points regarding the impact of climate change on pests.



### National Centre for Palms and Dates Prize - Season 3

November 20-21,2024 Riyadh, Saudi Arabia

**Dr. Ibrahim Al-Jboory**, a member of the Executive Board of the ASPP and a member of the Trustees Committee for the National Center for Palms and Dates International Prize, participated in the annual award meeting held in Riyadh alongside the annual Palm and Dates Exhibition and Conference in the Kingdom of Saudi Arabia.



His Excellency, the Minister of Environment, Water, and Agriculture, honoured the winners of the award

in its third session, where 14 candidates emerged winners out of 173 participants in the competition. The award consists of three categories: the Best Scientific Research, the Excellence in Innovative Technologies, and the Development of New Products.

In addition to his role on the Trustees Committee, Al-Jboory chaired the first session for the winners, during which they presented brief overviews of their winning products. He also took part in a dialogue session on climate change, which featured four experts and was chaired by Dr. Abdul Rahman Habib, the director of the International Dates Council. This session was one of the significant scientific discussions that explored the impact of climate change on palms and fruits, resulting in valuable insights on addressing the effects of global warming on these crops.

## 100<sup>th</sup> anniversary of the establishment of the Uzbekistan Research Institute of Plant Genetic Resources

November 7-9, 2024 Tashkent, Uzbekistan



**Dr Safaa Kumari** (Head of ICARDA Seed Health Laboratory/Plant Virologist and President of ASPP) attended the symposium as a celebration of the 100<sup>th</sup> anniversary of the establishment of the Uzbekistan Research Institute of Plant Genetic Resources (RIPGR) on the theme “The Role of Plant Genetic Resources in Ensuring Food Security in the Face of Climate Change”, which took place from 7-9 November 2024, in Tashkent, Uzbekistan. Around 200 participants from over 20 countries attended the symposium. The main objective of this symposium is to discuss current issues related to the conservation and use of plant genetic resources, develop international cooperation, and identify new areas for scientific research. During the symposium, several issues were discussed, such as the conservation and use of plant genetic resources in conditions of global climate change, The role of plant genetic resources in ensuring food security, Modern biotechnological methods for the study and use of plant genetic resources; Innovative approaches of developed and developing countries in solving agricultural problems; Rational use of biological and non-biological resources in conditions of water scarcity; Exchange and cooperation in the field of plant genetic resources at the international. Dr Safaa Kumari presented “Phytopathological Management of ICARDA’s Germplasm Seed Collections for Better Future Use”

### Biological control: Does it have a future in Arab countries in light of the excessive use of chemical pesticides?

November 3, 2024

On November 3, 2024, **Dr Ibrahim Al-Jboory**, a member of the Executive Committee of the Arab Society for Plant Protection, delivered a lecture titled “Biological Control: Does it Have a Future in Arab Countries in Light of the Excessive Use of Chemical Pesticides?” This lecture was part of the training curriculum organized by the Jordanian Ministry of Agriculture on biological control. The workshop also featured expert engineer



Shadi Suleiman from the Laboratory of Biological Enemies in Hama, Syria, in collaboration with the Food and Agriculture Organization (FAO).

Thirty engineers participated in the workshop, and half of them will receive training on mass rearing and releasing biological enemies. Additionally, it is important to note that the Laboratory of Biological Enemies in Deir Alla was established through a partnership between the FAO and the Jordanian Ministry of Agriculture as part of the FAO's programme for managing the fall armyworm.

### Participation in the wrap-up meeting of Red Palm Weevil programme

October 28-29, 2024 Jeddah, Saudi Arabia

The Closing Meeting of the Regional Red Palm Weevil Eradication Programme for the Near East and North Africa, funded by the Kingdom of Saudi Arabia, the United Arab Emirates, the Sultanate of Oman, and FAO, took place in Jeddah, Saudi Arabia, on October 28-29, 2024. This event was organized by the Food and Agriculture Organization (FAO) and the National Center for the Prevention and Control of Plant Pests and Animal Diseases (Weqaa). It showcased a participatory scientific demonstration



that highlighted the program's achievements, which involved 15 local, regional, and international organizations focusing on five key areas: governance, scientific research, capacity building, early detection, and the review and enhancement of national plans for managing the red palm weevil. The event featured presentations from 35 specialists from various countries worldwide, as well as the participation of over 25 representatives from the Weqaa Center. **Dr. Ibrahim Al-Jboory**, a member of the Executive Board of the Arab Society for Plant Protection and the red palm weevil program consultant, played a significant role in the closing meeting. He chaired one of the sessions and delivered a lecture on early detection techniques for the red palm weevil, one of the program's notable outcomes.

### Participation in the 15<sup>th</sup> International Agriculture Symposium "AGROSYM 2024"

October 10-13, 2024 -Bosnia and Herzegovina

**Dr. Ahmad Katbeh** participated in the 15<sup>th</sup> International Agriculture Symposium "AGROSYM 2024," held on Jahorina mountain (near Sarajevo), Bosnia and Herzegovina, October 10-13, 2024. The symposium was organized by the University of East Sarajevo, Faculty of Agriculture, Bosnia and Herzegovina, University of Belgrade, Faculty of Agriculture, Serbia and Mediterranean Agronomic Institute of Bari (CIHEAM-



IAMB) Italy in collaboration with 40 international institutions/organizations. Prof. Katbeh presented a lecture in the symposium entitled "Natural Enemies of The Fall Army Worm *Spodoptera frugiperda* (Lepidoptera: Noctuidae) In Jordan and Palestine". This paper was published as: Ahmad Katbeh-Bader, Ibrahim Al-Jboory, and Thaeer Yaseen. 2024. Natural Enemies of The Fall Armyworm *Spodoptera frugiperda* (Lepidoptera: Noctuidae) In Jordan and Palestine. Proceedings of the XV International Scientific Agricultural Symposium "Agrosym 2024": 561-566. Prof. Katbeh was the chairman of one of the plant protection sessions and co-chairman of another session. The link for the abstract book of the symposium is [https://agrosym.ues.rs.ba/article/showpdf/BOOK\\_OF\\_PROCEEDINGS\\_2024\\_FINAL.pdf](https://agrosym.ues.rs.ba/article/showpdf/BOOK_OF_PROCEEDINGS_2024_FINAL.pdf)

## Participation in the Medical and Fiqh Symposium

September 24-25, 2024 - Saudi Arabia

**Dr. Ahmed Katbeh** Bader, Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman, Jordan and vice president of the Arab Society for Plant Protection, participated in the Medical Feqh Symposium organized by the International Islamic Fiqh Academy / Organization of Islamic Cooperation, which was held under the title "Sharia ruling on eating and marketing cultured meat, insects and genetically modified foods of animal origin" at The Ritz-Carlton Hotel in Jeddah, Saudi Arabia 24-25 September 2024. Dr. Katbeh participated in the session on insects and



the extent to which they are considered foodstuffs. He presented a paper entitled "Insects: definition, species, and health effects of eating insects and their extracts". In this paper the following topics were discussed: the definition of "insects" according to previous Arabic language scientists and contemporary scientists, number of insect species in the world, the relationship or impact of insects on humans, the advantages and disadvantages of insects, the contemporary hierarchical system in the classification of animals and insects, the health effects of eating insects and consuming their extracts such as biological risks (e.g. bacteria, viruses, fungi) and chemical hazards (such as mycotoxins, pesticides, toxic metals) as well as physical hazards.

## Lecture on Black Scorch Disease in Date Palm

November 25, 2024 Amman, Jordan

An invitation from the Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA) and within the activities of the Arab Society for Plant Protection, Dr. **Muhammad Amer Fayyad** (Member of the Scientific Committee of the Arab Journal of Plant Protection and Liaison Member of the Arab Society for Plant Protection in Iraq) lectured via Zoom on the subject (Black Scorch on date palm: causes, factors contributing to injury and control methods). The lecturer dealt with the causes of the disease, the most important symptoms it causes on the palm, the factors predisposing to injury and treatment methods, and the fundamental differences between this disease and other diseases. More than 60 participants attended



the meeting, and the attendees enriched the lecture with many discussions and inquiries that made it vital and valuable for everyone. Thanks to Professor Fayyad for this distinguished activity that contributed to this severe disease and made the ASPP more visible to all. The lecture is uploaded to [www.iraqi-datepalms.net](http://www.iraqi-datepalms.net) using the link below. <https://iraqi-datepalms.net/?p=18343>

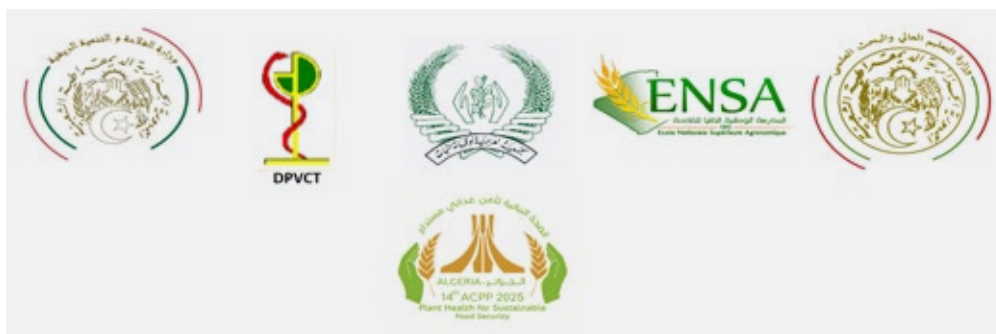
### Date Palm and Dates Festival in Hadramout Vally, Yemen

August 5, 2025

**Dr. Ibrahim Al-Jboory** delivered a lecture titled “Highlights on Early Detection of Red Palm Weevil and Management Techniques in Yemen” during the Palm and Dates Festival in Hadramaut Valley, Yemen. In his presentation, he discussed the outcomes of the Red Palm Weevil Management Programme implemented by FAO in the Near East and North Africa region, of which Yemen is a participating country. The lecture was attended by over 40 specialists, engineers, and students, and garnered significant interest from the audience. The session was coordinated by Dr. Jamal Basahih, the Yemeni liaison member of the FAO project. It is important to note that palm cultivation in Yemen is primarily concentrated in Hadramaut Valley and Al-Hodeidah Governorate, boasting more than four million palm trees.



### The 14<sup>th</sup> Arab Congress of Plant Protection (ACPP2025) “Plant Health for Sustainable Food Security” Algiers, 3-7 November 2025



The Arab Society for Plant Protection, in collaboration with the National Higher School of Agronomy as representative of the Ministry of Higher Education and Scientific Research and the Directorate of Plant Protection and Technical Control as representative of the Ministry of Agriculture and Rural Development, in Algeria, is honoured to invite all those working in the field of plant protection in the Arab region and abroad, including academics, researchers and students in different universities, as well as those working in research centres, to participate in





the 14th Arab Congress of Plant Protection, which will be held in Algiers during the period 3-7 November 2025 under the theme **“Plant Health for Sustainable Food Security.”**

The conference will include high-level lectures presented by Arab and foreign researchers that will form the backbone of the conference program, in addition to a one-day agricultural-touristic trip to historical, cultural, and agricultural landmarks in Algeria. The conference will provide opportunities to build new professional relationships and strengthen old ones with colleagues worldwide who have common interests through scientific seminars, oral and poster presentation sessions, or by visiting the exhibition accompanying the conference. This conference will be an opportunity to exchange experiences and establish partnerships between universities and research centres and to learn about the latest developments in the field of plant protection in the Arab world about the spread of diseases and the impact of climate change on pests, in addition to ways for their monitoring, control and reducing their impact on Arab food security.

The various social activities (welcome reception, morning and afternoon coffee breaks, lunch, and gala dinner) will also serve as an informal interaction between participants from different countries who work in institutions with diverse interests representing the private and public sectors, which will contribute to the formation of new professional ties that will play an active role in establishing scientific cooperation that can grow over time into joint research projects.

### Congress themes

- Economic insect and animal pests (insects, mites, rodents, harmful birds and mammals).
- Plant diseases (fungi, bacteria, viruses, nematodes and abiotic diseases.)
- Invasive pests and emerging pathogens in the Arab region.
- New tools in diseases and pests diagnosis and management.
- Quarantine procedures and control of transboundary pests.
- Pathogen-plant interaction as a tool for disease management.
- Chemical control, biological and plant extracts
- Post-harvest disease management
- Weeds and their control
- Climate change and its impact on plant protection
- Beneficial insects (bees and silkworms)

### Congress Language

Arabic is the official language and English for the symposium sessions.

### Registration fees

Participation type	Participants from Algeria (Algerian Dinars)	Participants from outside Algeria (Algerian dinars)
Regular (with or without abstract)	equivalent to 100 US Dollars	equivalent to 200 US Dollars
Graduate students	equivalent to 50 US Dollars	equivalent to 100 US Dollars
Accompanying persons	equivalent to 50 US Dollars	equivalent to 100 US Dollars

## Registration fees do not include accommodation (hotels, dinner and breakfast) costs

- Registration fees cover congress participation, conference publications, lunches, drinks during morning and evening breaks, a one-day agricultural tourist trip, and the gala dinner.
- Graduate students participating in the conference must provide proof of their status.
- Registration fees for accompanying persons only cover the one-day agricultural tourist trip and the gala dinner.
- **Note: Information related to the specific venue of the congress, abstracts, hotel accommodation, entry visa to Algeria, and other related information will be published later.**

## Correspondence

- Secretariat of the 14th Arab Congress on Plant Protection (ACPP2025)
- **Email:** [info@acpp-aspp.com](mailto:info@acpp-aspp.com)
- **Website:** <http://www.acpp-aspp.com>
- **Mob/Whatsap:** +213 784 14 31 15

## Important Dates

- **Deadline for registration 30 :September2025**
- **Deadline for abstract submission 30 :March2025**
- **Notification of abstract acceptance 30 :May2025**

Registration Form 14th Arab Congress of Plant Protection Sciences Algiers, 3-7 November 2025

First Name	
Family Name	
Gender	
Country	
Adress	
Mob / WhatsApp number	
E-mail:	
Participation Type	
Research topic	
Accompagning persons	

## 14<sup>th</sup> Arab Congress of Plant Protection 3-7 November 2025, Algeria: Invited Speakers

Monday, 3 November 2025	
Keynote address in the opening session	
<b>The role of plant protection in achieving food security in the Arab region.</b>	<b>Dr. Abdulhakim Elwaer</b> Assistant Director General and Regional Representative, Regional Office for the Near East and North Africa Food and Agriculture Organization of the United Nations
Symposium one: Use of artificial intelligence and other innovations in optimizing pest management	
1. <b>Use of decision-making tools to enhance implementation of integrated pest management.</b>	<b>Dr. Vittorio Rossi</b> , Department of Sustainable Crop Production, University Cattolica del Sacro Cuore, Italy. Email: <a href="mailto:Vittorio.rossi@unicatt.it">Vittorio.rossi@unicatt.it</a>
2. <b>Advances in using high-throughput sequencing (HTS) technology to detect plant pathogens and its adoption in implementing agricultural quarantine regulations.</b>	<b>Dr. Maher Al-Rwahnih</b> , University of California at Davis, USA. Email: <a href="mailto:malrwahnih@ucdavis.edu">malrwahnih@ucdavis.edu</a>

3.	<b>A novel approach to combat plant pathogens: genome editing of rice for enhancing resistance to <i>Xanthomonas oryzae</i>.</b>	<i>Dr. Boris Szurek</i> , IRD, FRANCE. Email: <a href="mailto:boris.szurek@ird.fr">boris.szurek@ird.fr</a>
4.	<b>Use of remote sensing for crop diseases surveillance.</b>	<i>Dr. Gerald Blasch</i> , CIMMYT, Mexico. Email: <a href="mailto:g.blasch@cgiar.org">g.blasch@cgiar.org</a>
5.	<b>Use of biotechnology in plant protection.</b>	<i>Dr. Lakhdar Khelifi</i> , National Higher School of Agriculture, Algiers, Algeria. Email: <a href="mailto:lakhdar.khelifi@edu.ensa.dz">lakhdar.khelifi@edu.ensa.dz</a>
<b>Tuesday, 4 November 2025</b>		
<b>Symposium Two: Innovations to improve pest management and enhance plant health under Climate change conditions</b>		
1.	<b>Plant breeding to improve host resistance to pests under climate change conditions.</b>	<i>Dr. Diego Rubiales</i> , Institute for Sustainable Agriculture, Spanish National Research Council, Cordoba, Spain. Email: <a href="mailto:diego.rubiales@ias.csic.es">diego.rubiales@ias.csic.es</a>
2.	<b>EEffects of climate change on plant health: Are beneficial microbes and their metabolites a possible solution?</b>	<i>Dr. Francesco Vinale</i> , University of Naples Federico II, Italy. Email: <a href="mailto:frvinale@unina.it">frvinale@unina.it</a>
3.	<b>How can we maintain crops productivity under climate change and soil salinization?</b>	<i>Dr. Stanely Lutts</i> , Catholic University of Louvain (UCL-Louvain-la-Neuve), Belgium. Email: <a href="mailto:stanley.lutts@uclouvain.be">stanley.lutts@uclouvain.be</a>
4.	<b>Endophytic fungi: a hidden treasure towards plant pathogens management in a changing environment.</b>	<i>Dr. Ahmed M. Abdel-Azeem</i> , Suez Canal University, Ismailia, Egypt. Email: <a href="mailto:Ahmed_abdelazeem@science.suez.edu.eg">Ahmed_abdelazeem@science.suez.edu.eg</a>
5.	<b>The use of allelochemicals in enhancing soil and plant health.</b>	<i>Dr. Narwal Shamsheer</i> , India. Email: <a href="mailto:Allelopathy2017@gmail.com">Allelopathy2017@gmail.com</a> , <a href="mailto:Narwals2017@gmail.com">Narwals2017@gmail.com</a>
<b>Thursday, 6 November 2025</b>		
<b>Symposium Three: Invasive and newly emerging pests in the Arab region and means to reduce their negative effect on food security</b>		
1.	<b>Addressing emerging plant pests is crucial for safeguarding fruit tree crops in the Arab countries.</b>	<i>Dr. Khaled Djelouah</i> , CIHEAM- Mediterranean Agronomic Institute of Bari, Italy. Email: <a href="mailto:djelouah@iamb.it">djelouah@iamb.it</a>
2.	<b>Importance of risk assessment of introduction and establishment of emerging pests in the Mediterranean basin.</b>	<i>Dr. Juan A. Navas-Cortes</i> , High Council for Scientific Research, Cordoba, Spain. Email: <a href="mailto:J.navas@CSIC.es">J.navas@CSIC.es</a>
3.	<b>Management of North Africa-Middle East (NAFME) cryptic whitefly haplotypes to mitigate begomoviruses spread in the Arab region.</b>	<i>Dr. Muhammad Shahid</i> , College of Agricultural and Marine Sciences, Sultan Qaboos University, Oman. Email: <a href="mailto:mshahid@squ.edu.om">mshahid@squ.edu.om</a>
4.	<b>Date palm invasive and newly emerging pests in the Arab countries and measures to reduce their negative impacts on date production.</b>	<i>Dr. Ibrahim Jboory</i> , Faculty of Agriculture, University of Baghdad, Iraq. Email: <a href="mailto:ijboory@yahoo.com">ijboory@yahoo.com</a>
<b>Friday, 7 November 2025</b>		
<b>Symposium Four: Plant health and agricultural quarantine in the Arab region and means of improving monitoring of quarantine pests.</b>		
1.	<b>The role of CGIAR Germplasm Health Units in enhancing the germplasm phytosanitary safety and mitigation of transboundary pest spread.</b>	<i>Dr. Lava Kumar</i> , IITA, Ibadan, Nigeria. Email: <a href="mailto:L.Kumar@cgiar.org">L.Kumar@cgiar.org</a>
2.	<b>The importance of phytosanitary measures in mitigating the spread of transboundary plant pests in the NENA region.</b>	<i>Dr. Thaer Yaseen</i> , FAO/RNE, Cairo, Egypt. Email: <a href="mailto:thaer.yaseen@fao.org">thaer.yaseen@fao.org</a>
3.	<b>Challenges and opportunities for improving quarantine pest surveillance: Is there a way to predict and avoid rare events?</b>	<i>Dr. Claude Bragard</i> , Catholic University of Louvain, Belgium. Email: <a href="mailto:claud.bragard@uclouvain.be">claud.bragard@uclouvain.be</a>
4.	<b>Working together for clean plants: The national clean plant network example for an Arab regional network to support agricultural quarantine and develop plant disease control programs.</b>	<i>Dr. Maher Al-Rwahnih</i> , University of California at Davis, USA. Email: <a href="mailto:malrwahnih@ucdavis.edu">malrwahnih@ucdavis.edu</a>



# Near East Plant Protection Organization Bulletin



## Near East Plant Protection Organization (NEPPO)

This bulletin is a communication tool to inform member countries of the Organization, the countries of the Near East and North Africa region and those who follow plant protection about the activities of the Near East Plant Protection Organization (NEPPO). It also provides information, technical data and statistics regarding pests harmful to crops and, quarantine pests. The bulletin exposes the most important developments and events at the regional and international levels. The Bulletin is issued every three months. This seventh bulletin issue regroups the most important activities during the three months (July/August and September) of 2024.[Editor: **Ben Jamaa Mohamed Habib**, Executive Director, Bulletin no: 7,2024, NEPPO].



## NEPPO ACTIVITIES

### Organization of a Workshop on International Standards for Phytosanitary Measures. (ISPMs):

**July 10 -11,2024 Rabat, Morocco**

The workshop, animated by the NENA regional experts and held at the headquarters of the Near East Plant Protection Organization, was designed to build member countries' capacity to address ISPMs effectively. This training was mainly focused on better preparing participants for the regional workshop, ensuring they were well-equipped to engage in discussions and contribute meaningfully to developing plant protection measures.

The main goals of this workshop were:

- » Understanding the importance of the ISPMs and raising the level of technical teams and workers in plant protection.



- » Proposing recommendations from member countries to develop new phytosanitary measures adapted to the region.
- » Working on standards specific to countries in the region
- » Translating standards into Arabic and contributing to the countries for the translation
- » Working on the Online Comment System (OCS) / application and adding comments

This workshop highlighted several outcomes: **(1)** The region has experts in the field of phytosanitary and therefore it is necessary for FAO to adopt it for the benefit of the region for capacity building; **(2)** countries are invited to submit their candidates to participate in such capacity building workshops; **(3)** The importance of introducing the participation of countries in the region in the CPM BUREAU; **(4)** The importance of the participation and presence of Member States (at least one representative of each country) in the meetings periodicity of the CPM so countries are aware of the decisions; **(5)** The importance of using ePhyto: a digital exchange of data without documents; **(6)** The importance of standardizing procedures between countries at the regional level; **(7)** The importance of countries member working on the development of comments via the OCS; **(8)** the E-commerce and its cause of pest entry into the countries of the region and the world and how to address them.

### **Participation in the Digital Technology in Plant Health and Trade: 2024 IPPC Regional Workshop for the Near East and North Africa (NENA) Region**

**August 5-8,2024 Rabat, Morocco**



The IPPC regional workshops are an opportunity for participants to acquire skills on how to analyze draft International Standards for Phytosanitary Measures (ISPMs), provide productive comments for draft ISPMs and recommendations for consultations in 2024 to build phytosanitary capacity, and raise awareness of IPPC-related activities, and finally exchange experiences at the regional level. The objective of IPPC RW 2024 in the NENA region is to build capacity in a range of areas related to IPPC. For 2024, the IPPC regional workshops focus on “Plant Health, Safe Trade, and Digital Technology”.

The NEPPO coordinates between countries to draft the ISPMs and recommendations for comments on July 1, 2024 (including first and second consultations) on the NEPPO’s Online Comment System (OCS) webpage.

The executive director of NEPPO highlighted the organization’s commitment to supporting the implementation of International Standards for Phytosanitary Measures (ISPMs).

- » NEPPO conducts various activities to improve understanding and compliance with these standards.

- » NEPPO stressed the importance of the training workshops in building member countries' capacity to address ISPMs effectively.
- » NEPPO stressed the importance of ISPMs as a unified reference for all plant health measures:
  - These standards are a critical foundation for ensuring that plant protection activities are consistent and effective across different countries.
  - The unified nature of these standards helps to harmonize measures, facilitating international cooperation and trade.
  - Continuous efforts are needed to educate stakeholders about the importance of ISPMs and strengthen countries' capacity to implement these standards.
  - Such efforts are essential for achieving the region's overarching goals of plant health and protection.

The ED expresses the importance of supporting countries in the region to enhance their understanding and implementation of IPPC standards. He highlighted NEPPO's efforts to strengthen national capacities through targeted activities and initiatives. The ED gives exceptional value to utilizing regional expertise in delivering NEPPO's programs and encourages member countries to actively participate in NEPPO meetings, workshops, and activities. He also called for increased support from member states to help the organization achieve its objectives and continue advancing plant protection efforts in the region.

### **The 36<sup>th</sup> Technical Consultation among Regional Plant Protection Organizations from 1<sup>st</sup> to 4<sup>th</sup> October 2024 Panama City, Panama.**

This annual meeting is a forum for RPPOs to consult as a group and support technical cooperation for regional programs under the International Plant Protection Convention. The RPPOs will contribute to CPM work programs by enhancing cooperation between regions to promote phytosanitary measures and developing the use of relevant international standards for phytosanitary measures.

The ED-NEPPO will present the main activities achieved during 2024.

### **The Final meeting on strategies for prevention, early detection and control of Red Palm Weevil in the countries of the Near East and North Africa**

#### **October 28-29,2024 Jeddah, Saudi Arabia**

This meeting aims to review the regional project's achievements, outcomes, and exit strategy on strategies for prevention, early detection, and control of Red Palm Weevils implemented since 2019. The project involved 15 partners, among them NEPPO. The Executive Director of NEPPO will present the guidelines for phytosanitary measures to prevent the spread of RPW.

### **The First meeting of the working groups**

#### **November 5 -8 , 2024 Hammamet, Tunisia**

*"Raising awareness and coordinating capabilities are the key success of NEPPO"*

Four Working Groups were implemented:

- (1) Standards development;
- (2) Pesticides management and their alternatives;
- (3) Capacity Building and;
- (4) Quarantine and transboundary pest management.



These WGs are working on the work plan for the years 2025-2026 and specifying the initial and strategic activities for the period 2025-2035, with the coordination of the Executive Director of NEPPO.

Five virtual meetings were conducted on June 27th, July 31st, September 18th, and October 21st, 2024, to attend the workshop.

### **The second Meeting of REMESAVE**

#### **November 26-27, 2024 Malta**

This meeting, which aimed to establish the Mediterranean Plant Protection Network (REMESAVE), was supported by the FAO subregional office in Tunisia.

The first Mediterranean Plant Protection Network Meeting was held on 28 and 29 November 2023 in Tunis (Tunisia). The outputs of this meeting were:

- » Identify primary pest
- » Determine requirements for partnership and cooperation
- » Present the work program of NEPPO and EPPO
- » Determine the undertaken tasks
- » Create a management unit responsible for setting up the network.

### **The executive committee meeting and governing council meeting**

#### **December 15 - 19, 2024 Jeddah, Saudi Arabia**

For the first time, the Executive Committee meeting and Governing Council meeting will be held outside the organization's seat (Rabat, Morocco). The EC will mainly (a) review the activities of the Organization, (b) make recommendations, and (c) provide guidance. The GC will approve these guidelines.

### **Joint activities: Preparing for the contingency plans workshop as an efficient simulation exercise**

#### **May 26 -28, 2025 Tunisia**

Two virtual meetings were conducted to discuss the program of this workshop: the first meeting was on 10 June, and the second meeting was held on 9 September 2024.

This Contingency plan aims to ensure a rapid and effective response to a pest outbreak. Likely, some plant health professionals have never had the opportunity to test a contingency plan in a contingency/simulation exercise.

The proposes of this workshop are:

- » Simulate the experience of a plant health emergency,
- » Experiment with responses to an emergency,
- » Test whether relevant contingency plans are available and adequate,
- » Test availability and relevance of other resources, e.g. EPPO guidance,
- » Provide experience in communicating key messages during an emergency,
- » Learn why and how to develop contingency plans,
- » Learn how to carry out an emergency response exercise.

### Implementing a campaign to combat olive pests in Tafilah Governorate



The Directorate of Plant Protection and Phytosanitary organized and implemented a campaign to combat olive pests (olive weevil, olive fruit fly and scale insects) on perennial olive trees in coordination and cooperation with the Directorate of Agriculture in Tafilah Governorate/Plant Production and Agricultural Extension Department. Over 2,000 dunums of perennial olive trees were sprayed during the campaign in Al-Qasaba District, Busayra District and others. The Directorate of Plant Protection and Phytosanitary provided the necessary pesticides for the campaign in addition to public safety tools such as spray suits, safety shoes and masks.

### Completing the training of trainers program titled “Responsible use of Agricultural Pesticides.”

The Directorate of Plant Protection and Phytosanitary organized a program of Training of Trainers on the “Responsible Use of Agricultural Pesticides” in cooperation with Crop Life Africa Middle East and the Merchants Association and producers of agricultural products during the period 28-31/7/2024. The activities of the second part of the training program concluded, through which a few extension officers and private sector engineers were qualified to raise awareness about the responsible and safe use of agricultural pesticides. The Ministry of Agriculture, in collaboration with the partners, began the program activities in the last quarter of 2023 by providing two-day theoretical training for participants from the Agricultural Extension Directorate. The program was concluded by providing specialized practical training in agricultural pest control techniques, the safety of workers in the field of chemical control, and the handling of pesticides at Syngenta’s training station.





### **The Implementation of a training workshop on “ Red Palm Weevil.”**

The Directorate of Agriculture in Ma’an Governorate, in coordination and cooperation with the Directorate of Plant Protection and Phytosanitary, implemented a workshop for farmers on the infection of palm trees with the Indian Red Palm Weevil. An introduction was presented on the red palm weevil, symptoms, prevention methods, and control methods for this pest, as well as the importance of periodic inspection of palm trees and reporting to the relevant directorate when infection appears to take the necessary measures to combat it and limit its spread.

### **Participation in the regional training course on “International Standards for Phytosanitary Measures” in Morocco**

Based on the importance of implementing international standards for phytosanitary measures in the International Plant Protection Convention (IPPC) in protecting sustainable agriculture, enhancing global food security, protecting the environment, forests and biodiversity, and facilitating economic and trade development, Plant Protection and Phytosanitary Directorate participated in the activities organized by the Near East Plant Protection Organization (NEPPO) to build the capacity of plant health officers, raise awareness of all activities related to the International Plant Protection Convention (IPPC), exchange experiences at the regional level, and enhance regional and international cooperation.

**Dr. Amani Alawamleh** participated in the training course during the period (10-11 July 2024) in Rabat, Morocco, with 14 participants from the member states of the Near East Plant Protection Organization who are experienced in plant quarantine and monitoring the import and export operations of agricultural inputs and products, four members representing the region in the IPPC committees, and two officials from the Food and Agriculture Organization (FAO) of the Near East and North Africa region were invited to participate in the specialized training course to understand the importance of international standards and raise the level of technical teams and workers in the field of phytosanitary. The course was an opportunity to raise awareness among member states in the region, which led to recommendations from member states to develop new phytosanitary measures for the Near East and North Africa region.

Presentations were given to introduce the International Plant Protection Convention, the Commission on Phytosanitary Measures, international standards for phytosanitary measures, how to formulate a standard, the main stages of the standards development process, and consultation on draft standards, in addition to presenting success stories and experiences in the region (Egypt/NEPPO).

The course was implemented as a face-to-face meeting through lectures and discussion sessions. Practical training was also conducted by forming working groups to train on how to prepare comments and publish them via the online commenting system (OCS).

The course included several lectures in the field of international standards for phytosanitary and plant quarantine, which were delivered by specialists and experts in the member states of the Near East Plant Protection Organization with experience in plant quarantine, members representing the region in the IPPC committees, and officials from the Food and Agriculture Organization of the Near East and North Africa region.

### Training course participation in Italy

**December 1-8, 2024 Italy**

At the kind invitation of the AlberItalia Foundation and the Italian Society for Forestry (SISEF – Società Italiana di Selvicoltura ed Ecologia Forestale) and under the supervision of the European Forestry Institute (EFI), **Dr. Mokhtar Abdulsattar Arif** from Iraqi Ministry of Agriculture, Plant Protection Directorate participated in the second training course held in Italy from 1-8/12/2024 under the title (Cities call Forests and Back (CFB-WS)). The course was focused



on the concept of transformation to biocities concept by using natural based solution tools as well as reducing emissions of dangerous gases and global warming by increasing the area of forests and their successful management. This course targets a group of advanced researchers as well as doctoral and master's students from all over the world, especially students interested in studies of the relationship between the ecosystem, cities and forests. Providing knowledge on urgent and emerging issues linking cities to forests and providing the tools to transform cities as we know them today into Biocities; Developing discourses, methods, and research insights as collaborative outputs of co-produced Living Labs; strengthening transdisciplinary collaboration to translate knowledge to action for a sustainable future of the urban environment.

For more details: <https://www.alberitalia.it/informati/news-0/efi-biocities-2024-winter-school.html>

### Participation in scientific events in Italy

**December 2024**

During his visit to Italy in December 2024, and in collaboration with the Institute for Sustainable Plant Protection at the National Research Council (CNR) in Bari and the Georgofili Academy, **Dr. Maher Al-Rwahnih**, Director of Foundation Plant Services at the University of California, Davis, USA, delivered two scientific lectures titled:

1. **The role of Foundation Plant Services in quarantine, certification, and distribution of disease-free propagation material.**
2. **HTS adoption and grapevine red blotch virus outbreak and response.**

**First Lecture:** Delivered as part of an online seminar titled: **“Technical Updates on Plant Health Issues Directly Impacting Nursery Activities”**, organized by the Southeast Branch of the Georgofili Academy. The seminar aimed to provide updates, training, and dissemination of knowledge on plant health issues relevant to the nursery sector. Dr. Al-Rwahnih highlighted the critical role of Foundation Plant Services in ensuring the propagation material's quality and disease-free status. The event also featured Dr. Donato Boscia from the CNR and a member of the Georgofili Academy, who presented a lecture titled: **“Xylella fastidiosa: Where Are We? Updates on the Increasingly Complex Scenario.”**

**Second Lecture** Held in the lecture hall of the University of Bari Aldo Moro, Dr. Al-Rwahnih discussed the adoption of high-throughput sequencing (HTS) in the United States as an effective tool for diagnosing viral diseases. He explained how government agencies have embraced HTS and described strategies to manage and mitigate the impact of Grapevine Red Blotch Virus outbreaks.



### **Maher Al Rwahnih Publications 2024**

1. **Occurrence of Grapevine Viruses in Different Cultivars and Regions within Michigan.** Journal Plant Health Progress ,Published Online: November 13, 2024. DOI: [10.1094/PHP-06-24-0061-RS](https://doi.org/10.1094/PHP-06-24-0061-RS)
2. **Characterization of Two Novel Viruses Within a Complex Virome from Flowering Ginger in Hawaii.** Journal: Plant Disease, Published Online: September 26, 2024. DOI: [10.1094/PDIS-10-23-2181-RE](https://doi.org/10.1094/PDIS-10-23-2181-RE)
3. **RNA-Sequencing-Based Virome Discovery in Florida Citrus Pests.** Journal: Phytobiomes Journal, Published Online: September 25, 2024. DOI: [10.1094/PBIOMES-05-24-0055-FI](https://doi.org/10.1094/PBIOMES-05-24-0055-FI)
4. **Characterization of Genetic Diversity in the Capsid Protein Gene of Grapevine Fleck Virus and Development of a New Real-Time RT-PCR Assay.** Journal: Viruses, Published Online: 2024 (September). DOI: [10.3390/v16091457](https://doi.org/10.3390/v16091457)
5. **Discovery and Characterization of Two Highly Divergent Variants of a Novel Potyvirus Species Infecting Madagascar Periwinkle (Catharanthus roseus).**Journal: Plant Disease, Published Online: July 29, 2024. DOI: [10.1094/PDIS-02-24-0459-RE](https://doi.org/10.1094/PDIS-02-24-0459-RE)

### **New Era in Federal Quarantine and State Certification Diagnostics**

Quarantine and certification programs exist to prevent the entry or spread of harmful pests and pathogens into agricultural systems. Their common objective is to identify pathogen-free source material through the application of validated testing methods for subsequent release for propagation. Tests must be accurate, efficient and cost-effective. In recent decades, the best tests have been biological assays in conjunction with PCR testing. High throughput sequencing (HTS) has now become a reliable and cost-effective diagnostic method with greater accuracy and efficiency than biological assays. In this article, we review the role of clean plant centres in quarantine and certification programs, as well as the process by which HTS was evaluated as a testing method to replace biological assays for screening source material. The data from this evaluation included a side-by-side comparison of HTS and biological assays for cultivars of grapevine, Prunus and rose, and intra- and inter-laboratory validations of an HTS protocol. Based on the results of these evaluations, in 2021 USDA-APHIS and several state regulatory agencies accepted the use



of HTS and quantitative polymerase chain reaction (qPCR) to test new introductions of source material, replacing biological indexing. This new protocol requires testing at two timepoints within at least a six-month interval and a dormancy separating the two tests. Under ideal conditions, testing can be completed in 18-24 months with subsequent release from quarantine of plant material that has tested negative for regulated pathogens. This new testing protocol has a profound impact on quarantine and certification programs, facilitating quicker access of stakeholders to clean materials for propagation and increasing the number of pathogens that are detected, and even discovered, with reduced cost, effort, and time. [Maher Al Rwahnih, Vicki Klaassen, Teresa Erickson, Olufemi Joseph Alabi, Kristian Stevens, Min Sook Hwang and Lauren Port. Department of Plant Pathology, UC Davis, Davis, CA, U.S. Foundation Plant Services, UC Davis, Davis, CA, U.S. Department of Plant Protection, School of Agriculture, The University of Jordan, Amman, Jordan. Department of Plant Pathology & Microbiology, Texas A&M University, Welasco, TX, U.S. Department of Evolution and Ecology, UC Davis, Davis, CA, U.S. Plant disease, December 2024]. E-mail: [malrwahnih@ucdavis.edu](mailto:malrwahnih@ucdavis.edu)

### The Olive Sector Facing Climatic and Phytosanitary Challenges

November 12, 2024, Meknes, Morocco

The Moroccan Association for Plant Protection organized a conference titled “The Olive Sector Facing Climatic and Phytosanitary Challenges” on November 12, 2024, at the National School of Agriculture in Meknes, Morocco. The event brought together a diverse audience, including students, doctoral candidates, engineers, researchers, and industry professionals. Presentations addressed key phytosanitary challenges affecting olive cultivation in the context of climate change, with a particular focus on:

- ***Xylella fastidiosa***, the bacterium responsible for olive quick decline syndrome in Europe.
- Root and collar rot caused by oomycetes.
- The biological control of olive anthracnose using antagonistic bacteria.

Additional topics included:

- The distribution and significance of phytopathogenic nematodes in Moroccan olive agroecosystems.
- Monitoring harmful insects and their natural enemies in olive groves in the Marrakech-Safi region.
- The study of the bio-ecology and epidemiology of ***Phloeotribus scarabaeoides*** (the olive bark beetle) infestations.



## Participation in Phytosanitary control of plant pests in the Mediterranean region

November 11-15, 2024 Spain

An Advanced Course, “Phytosanitary control of plant pests in the Mediterranean region: harmonisation, tools and techniques, Zaragoza (Spain) 11-15 November 2024” was organised by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), through the Mediterranean Agronomic Institute of Zaragoza (CIHEAM Zaragoza), in collaboration with the Spanish Ministry of Agriculture, Fisheries and Food (MAPA) and took place at the Mediterranean Agronomic Institute of Zaragoza. Around 21 persons from the Mediterranean



region (Lebanon, Egypt, Morocco, Tunisia, Albania, Turkey, and Spain) participated in this training Course. Through this course, participants had (i) a comprehensive understanding of the risks associated with pests affecting Mediterranean agriculture; (ii) understand the factors contributing to the spread and impact of pathogens on crops; (iii) address the aetiology and epidemiology of major pests affecting fruit and vegetable crops; (iv) be aware of the importance of coordinated action at regional and international levels to address phytosanitary issues; (v) understand the key role of correct, early detection, and identification of causal agents for effective pest management; (vi) explore advanced techniques and technologies for early detection; (vii) learn more about sustainable control strategies to manage agricultural pests effectively. **Dr. Elia CHOUERI**, Head of the Department of Plant Protection, Lebanese Agricultural Research Institute (L.A.R.I.), participated in this training.2024].

## Field day on management of fall armyworm on summer maize in Lebanon

The invasive pest, fall armyworm (FAW), *Spodoptera frugiperda*, poses a significant threat to irrigated summer maize production in Lebanon, endangering food security and income to farmers. A field study was conducted in three farmers' fields in Qob Elias (PHI-IP site), Bekaa Valley in Lebanon, during the summer of 2024 to evaluate the effectiveness of insecticides based on pheromone traps to manage FAW affecting summer maize, in collaboration between ICARDA and the Lebanese Agricultural Research Institute (LARI).



A field day was organized, and neighbouring farmers were invited to visit the trials. Dr. Elia Choueiri, Head Department of Plant Protection, LARI gave a detailed explanation on how and why pheromone traps are used (setting the trap in the field, reading the trap twice a week, watching and monitoring the maize plants in the field, and making the right decision to spray the appropriate and environmentally friendly pesticides). The lead farmer also shared with them the treatments he applied, the experience from this experiment, and the benefits from participating in the PHI-IP. The farmers greatly appreciated and admired the practical results and thanked both ICARDA and LARI for this useful field day. CGIAR Plant Health and Rapid Response supported this activity to Protect Food Security and Livelihoods Initiative (Plant Health Initiative) through the CGIAR Trust Fund. [Dr. Elia Choueiri (Lebanon), 2024]

**Dr. Nida' Salem, Head of the Department of Plant Protection , School of Agriculture, University of Jordan**

The executive committee of the Arab Society for Plant Protection congratulates Professor Nida on her new position and wishes her continued success in her distinguished research, which will enhance her scientific profile with further academic achievements.

**Dr. Nida' Salem, Professor** has been appointed Head of the Department of Plant Protection at the School of Agriculture, University of Jordan, for 2024/2025. Since 2020, Dr. Salem has been a Professor in the Department of Plant Protection. She earned her PhD in Plant Pathology from the University of Jordan and subsequently moved to the United States, where she worked as a postdoctoral researcher at the University of California, UC Davis, and UC Riverside for nearly four years. During this time, she molecularly characterized two of the most challenging viruses affecting rose plants using various biotechnological methods, significantly contributing to the understanding of rose spring dwarf disease in California.



Dr. Salem has applied genetic and genomics approaches to solve complex agricultural problems worldwide, such as fig mosaic disease, cowpea seedborne viruses, and lettuce chlorosis virus. She collaborated with scientists from UCD to identify novel viruses associated with the Asian citrus psyllid (*Diaphorina citri*) using NGS technology and bioinformatics analysis. In 2015, she discovered a novel Tobamovirus infecting tomato crops in Jordan, which threatened vegetable production globally. During her sabbatical at UC Davis in 2017/2018, she focused on genetic engineering of plant viruses as a versatile tool to express proteins in plants.

Dr. Salem has published numerous articles and manuscripts in several international journals and proceedings, including Annual Review of Phytopathology, Virology, Journal of Virology, Archives of Virology, Virus Research, Plant Pathology, New Phytologist, and Plant Disease. She is a member of many international committees and has been teaching undergraduate and graduate students for nearly 13 years at the University of Jordan. Additionally, she leads a research group called Plant Viral Diseases (PlaViD), which includes scientists from Jordan and international collaborators, for further information <https://research.ju.edu.jo/research/groups/PlaViDi/Home.aspx>.



## Characterization and sustainable management of *Aspergillus welwitschiae* induced black rot in Egyptian garlic

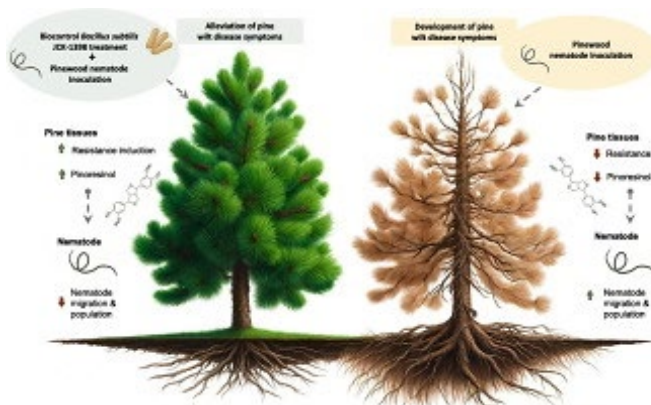
Black rot is a significant postharvest disease that threatens garlic (*Allium sativum* L.) production globally. The disease has been frequently observed in garlic cultivars Balady and Sids-40 in Egypt. This study aimed to accurately identify the causal agent of black rot symptoms in marketed garlic and propose an effective control strategy. Several isolates of black aspergilli were obtained from symptomatic garlic bulbs, and the representative isolate, SHAMS-18, was subjected to detailed morphological and molecular characterization.

Molecular identification using fungal DNA barcoding confirmed the pathogen as *Aspergillus welwitschiae*. Pathogenicity tests on healthy garlic bulbs validated the virulence of *A. welwitschiae*, and the pathogen was successfully re-isolated, fulfilling Koch's postulates. This marks the first report of *A. welwitschiae* as a postharvest pathogen of garlic in Egypt. To mitigate this issue, we developed an eco-friendly control method involving chitosan and gum Arabic coating, significantly reducing the development of black rot symptoms on inoculated peeled garlic cloves. Our findings present the accurate identification and sustainable management of black rot in garlic, offering a viable solution for enhancing garlic storage and reducing postharvest losses.

[Mohamed Manna (Egypt-Korea), Yong Tae Jeong, Gamal Ghanem, Daniela Alejandra Garcia Guedez, Hussien M. Abo-Dalam, Young-Su Seo, *Journal of Plant Pathology*, October 2024]. DOI: [10.1007/s42161-024-01772-3](https://doi.org/10.1007/s42161-024-01772-3)

## Eco-friendly biocontrol of pine wilt disease: Enhancing tree defense with *Bacillus subtilis* JCK-1398 for sustainable forest management

Pine wilt disease (PWD), caused by pinewood nematodes (*Bursaphelenchus xylophilus*), poses a significant threat to forestry worldwide. This study introduces a novel biocontrol strategy using *Bacillus subtilis* JCK-1398, which was selected and identified for its resistance-induction potential after extensive screening of microbial strains from pine tissues. The bacterium was found to biostimulate resistance in *Pinus densiflora*.



Comprehensive analyses, including transcriptomics, qPCR assays, and high-performance liquid chromatography (HPLC), revealed that *B. subtilis* JCK-1398 significantly upregulates defense-related genes and stimulates pinosresinol production, a compound linked to resistance against nematodes. Treatment with *B. subtilis* JCK-1398 suppressed nematode migration and reduced nematode populations within pine tissues, effects attributed to the enhanced tree defense response.

Field trials corroborated these findings, demonstrating a 72 % decrease in PWD incidence with aerial application of JCK-1398, confirming its potential for large-scale forest application. This biocontrol strategy, leveraging the stimulation of plant defense by *B. subtilis* JCK-1398, presents a promising and scalable, eco-friendly solution for managing PWD. Overall, this study provides new insights into the interactions between the bioagent, the host tree, and the pest nematode, offering an effective and sustainable approach to

mitigating pine wilt disease. [Mohamed Mannaa(Egypt-Koria), Ae ran Park, Jungwook Park, Hee Won Jeon, Hyejung Jung, Hyo Seong Jeon, Gil Han, Jin-Cheol Kim, Young-Su Seo, Journal Science of the Total Environment, Volume 955, 10 December 2024]. <https://doi.org/10.1016/j.scitotenv.2024.177233>

## Participation in the 11th International Plasmodesmata Meeting

September 17 -20, 2024

The 11th International Plasmodesmata Meeting Donald Danforth Plant Science Center, St. Louis, MO

The meeting on Intercellular Communication in Plants (PD2024) is a gathering of plant biologists who study plasmodesmata and intercellular trafficking in plants. It is held every three or so years by the community of plant scientists who investigate these intriguing plant structures. This time, it was held in St. Louis, Missouri, in collaboration between The Danforth Plant Science Center and the University of Wisconsin-Madison. Dr. Mazen Alazem gave an oral presentation on the role of plasmodesmata and hormones in regulating the movement of plant viruses between plant cells. The presentation was titled: "Hijacking Plant Communication: How a Viral Protein Disrupts Growth Pathways to Facilitate Intercellular Movement". [Mazen Alazem\*, Jessi Kreder, Patricia Baldrich, Samantha Nuzzi, Tessa-Burch-Smith, 2024]. <https://plasmodesmata.genetics.wisc.edu/>



## A Survey in Natural Olive Resources Exposed to High Inoculum Pressure Indicates the Presence of Traits of Resistance to *Xylella fastidiosa* in Leccino Offspring.

The rapid spread of the pathogenic bacterium *Xylella fastidiosa*, responsible for "olive quick decline syndrome," has severely impacted olive groves in southern Italy, particularly in Apulia. This epidemic has prompted urgent investigations into olive genotypes with potential resistance traits. A comprehensive survey was conducted in heavily affected regions, focusing on naturally occurring olive genotypes in uncultivated areas, as commercial groves exhibit limited genetic diversity. Olive trees displaying no symptoms were sampled and tested to reveal genetic backgrounds, primarily through parentage analysis, to identify resistant traits. In this study, transcriptomic analysis was used to uncover molecular pathways linked to resistance in these genotypes, while artificial inoculations helped confirm resistance levels in specific Leccino seedlings. Out of 171 olive genotypes sampled, 139 were found to have unique SSR (simple sequence repeat) profiles, with cultivars Leccino, Cellina di Nardò, and Ogliarola salentina emerging as the predominant candidate parents. Remarkably, 67% of Leccino progeny exhibited resistance, high resistance, or tolerance to *X. fastidiosa*, whereas only 32% and 49% of Cellina di Nardò and Ogliarola salentina progeny, respectively, demonstrated similar traits. Transcriptomic analysis of three symptom-free Leccino genotypes revealed significant gene expression changes, particularly in genes associated with photosynthesis, cell wall structure, and both primary and secondary metabolism. One genotype (S105) was notably resilient to infection-induced changes, compared to two others. This study provides



evidence for inheritable resistance traits in Leccino olives and highlights the molecular mechanisms at play. These findings hold significant promise for breeding programs aimed at developing *X. fastidiosa*-resistant olive cultivars through marker-assisted selection. [P. La Notte, M. Saponari, S. Mousavi, R. Mariotti, R. Abou Kubaa, R. Nikbakht, G. Melcarne, F. Specchia, G. Altamura, A. Ligorio, D. Boscia, A. Surano, P. Saldarelli, A. Giampetruzzi. Front Plant Sci. 2024 Sep 30;15:1457831.

[doi: 10.3389/fpls.2024.1457831](https://doi.org/10.3389/fpls.2024.1457831), Institute for Sustainable Plant Protection, National Research Council, Bari, Italy; Institute of Biosciences and Bioresources, National Research Council, Perugia, Italy; Forestaforte, Frantoio Oleario Giovanni Melcarne, Lecce, Italy; Centro di Ricerca, Sperimentazione e Formazione in Agricoltura “Basile Caramia”, Locorotondo, Italy].

## General News

### Recognition and Appreciation for a Chemist from Spain

The Spanish toy company Paola Reina has designed a specific doll dedicated to the Spanish scientist Dr Pilar Mateo of Valencia. This toy has been awarded in Spain as the “best toy of the year” in the category of toys that promote EQUALITY in society.



HC Dr Pilar Mateo is a well-known chemist and scientist who has specialized, for the last 30 years, in the fight against vectors, especially those that transmit endemic diseases in poor countries. She has done it with her own patented technology, INESFLY NIMTAC (Non-Interaction Microencapsulated Technology for Arthropods Control), which allows a very slow release of the biocide products and gives a remarkable persistence of the products together with high stability and non-toxicity for humans and animals.

More than 250 scientists worldwide have published papers with very good results on controlling vectors like mosquitoes *Anopheles* and *Aedes*, sandflies, and triatomines, drastically reducing the transmission of diseases like malaria, dengue, leishmaniasis, or Chagas. Since 2015, she has worked with WHO through the Special Research and Training Programme in Tropical Diseases (TDR/WHO).

Dr Pilar’s humanitarian work for indigenous women, improving their professional skills, has also been widely recognized.

This toy aims to promote science among youngsters in general and girls in particular.

### New Book

The Fourth Edition of the Egyptian Society for Integrated Pest Management (ESIPM)

The book “IPM Structural Pests” has recently been published by Dr. Mohamed El-Saeed El-Zamity, authored by the Egyptian Society for Integrated Pest Management. This unprecedented book in the Arab library targets encourage the adoption and

implementation of the IPM strategy on a wide scale in solving structural pest problems in homes, residential and hospitality properties, hotels and resorts, nurseries, schools, university campuses, hospitals, and healthcare facilities, food and dairy factories, restaurants and food preparation and sales outlets, museums and historical buildings, and others. The book is written in an easy, simplified, and comprehensive language to benefit from it academically and practically on

a wide scale. It is designed in 17 chapters divided into 6 sections that focus on: defining structural pests, the differences between traditional control and the integrated pest management system, identifying insect and animal pests and their problems in structural buildings, and their management trends. In addition, separate chapters have been allocated to the applications of integrated pest management for common structural pests in various structures, units, and facilities, and implementing them independently/self-effort or with the help of a pest control company. For this reason, the book concludes with a special section to identify the important companies working in the application, production, and distribution of control materials, and guidelines for choosing between them. I hope this design will please the reader and that the knowledge and professional skills acquired from it will make the book indispensable for homeowners, facility owners, company managers, and technical specialists working in structural pest control. We ask God Almighty that everyone will find the desired benefit in this book and that it will be a real contribution to spreading information aimed at adopting and implementing the integrated pest management system as a basic pillar for solving structural pest problems, including the good and welfare of humans and the environment in Egypt and our Arab homeland.



**17th Congress of the Mediterranean Phytopathological Union, CIHEAM**

**July 6-10, 2025 Bari, Italy**

“New Phytopathology Frontiers of Research and Education for Plant Health and Food Safety”

The upcoming Congress of the Mediterranean Phytopathological Union, titled: “**New Phytopathology Frontiers of Research and Education for Plant Health and Food Safety**”, aims to promote education and research as essential tools to address the new challenges of phytopathology and food safety, thereby raising community awareness and promoting a responsible, ecological and sustainable future.

The Congress will serve as a forum to facilitate the exchange of cutting-edge scientific knowledge, encourage dialogue between researchers, policymakers, industry, and other stakeholders in plant and food health, and empower a robust and connected knowledge community that collaborates towards shared goals and objectives.

We are planning to hold a major event to showcase the role of Education and Research in Phytopathology for food security and safety and help achieve the Sustainable Development Goals (SDGs).



*There can be no sustainable future for phytopathology and food safety without the support of fresh ideas and solutions provided by early career researchers.*

Young scientists' participation is therefore strongly encouraged, and reduced registration fees are available for students, fellows, and early career researchers.

Awards will be given to best young scientists' posters and presentations.

The conference language will be English.

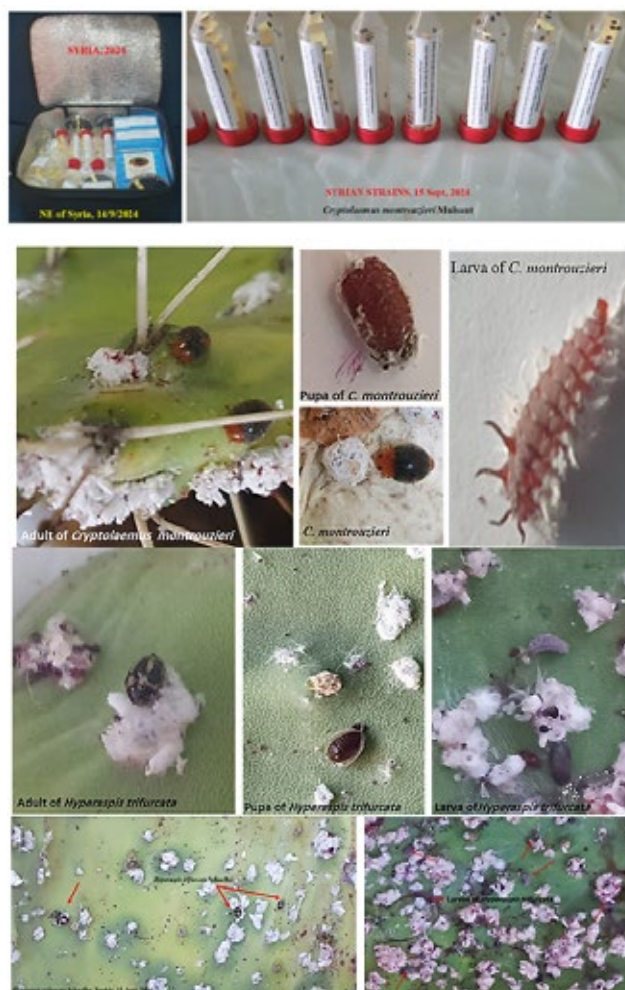
The book of abstracts will be published in MPU's international open-access journal *Phytopathologia Mediterranea*, which will also host some relevant contributions to a special issue.

**We look forward to welcoming you to Bari.**

**Your presence will contribute to a fruitful exchange of scientific ideas and help forge new friendships and future collaborations. We are sure that your experience in our city will be scientifically rewarding, very pleasant and truly unforgettable.** <https://ciheambaricongressmpu2025.org/>

### **Introduction of two predator species from Syria to Tunisia *Cryptolaemus montrouzieri* Mulsant and *Hyperaspis trifurcata* Schaeffer to control the prickly pear cochineal *Dactylopius opuntiae* Cockerell**

Within the framework of cooperation between the Ministry of Agriculture and Agrarian Reform in the Syrian Arab Republic, the Ministry of Aquaculture and Fisheries in the Tunisian Republic, and The Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD) During the period 14-23/9/2024, Dr. Nadia Al-Khateeb participated in the meetings held by the ACSAD delegation headed by the Director General of the Center, Dr. Naser Eddin Al Obaid with the Tunisian side, and two predator species were introduced into the classical biological control program to control the prickly pear cochineal: they were *Cryptolaemus montrouzieri* (200 adults from Syrian laboratory strain collected from Lattakia center for rearing natural enemies, 400 adults from the field strain collected from *Opuntia ficus-indica* infected with the prickly pear cochineal from Tartous and Baniyas, 100 adults "hybrid strain" "laboratory and field" and 60 larvae from the field strain) and a colony of the predator *Hyperaspis trifurcata* containing 200 different stages of the predator (larvae, pupae and adults). It was collected from the countryside of Damascus in cooperation with the General Commission for Scientific Agricultural Research (GCSAR). The predators were introduced to the Citrus





Technical Center (CTA), and some samples of *H. trifurcata* were introduced to the Higher Institute of Agricultural Sciences of Chott Meriem - Entomology Laboratory, aiming to mass rearing both predators. Different hybridization patterns were conducted between individuals of the Syrian and Tunisian strains of *C. montrouzieri* to improve the quantitative traits of the Tunisian laboratory strain and release the improved hybrid individuals in fields infested with the prickly pear cochineal. Mass production of the introduced predators and releasing them at high densities contribute to controlling the pest and protecting the production areas, especially in the governorate of Kasserine, where the cactus area is 100 thousand hectares, and the annual production rate is 250 thousand tons of fruits in dry years and 350 thousand tons in rainy years. [Nadia Al-Khateeb (Syria), <sup>(1)</sup>Lattakia Center for Rearing Natural Enemies, Directorate of Agriculture, Lattakia, Syria. [alkh.nadia@gmail.com](mailto:alkh.nadia@gmail.com)

## Proceedings and results of the first citrus conference for the Near East and North Africa Region

### December 3-5, 2024 Chlef, Algeria

The inaugural Citrus Conference for the Near East and North Africa region took place on December 3rd, 4th, and 5th at Hassiba Benbouali University in Chlef, Algeria.

The first Citrus Conference for the Near East and North Africa region occurred in Algeria, organized by the Laboratory for Crop Production and Protection in the Chlef region at Hassiba Benbouali University. Chaired by **Dr. M. Meziane**, the conference was held on December 3rd and 4th and focused on “Challenges of Sustainable Citrus Production in Near East and North African Countries.”

The conference was rich and fruitful due to the participation of numerous researchers specializing in the field, representing Algeria and other countries, including Tunisia, Libya, Egypt, Oman, Iraq, Palestine, Italy, and France. Various scientific presentations highlighted the current state of citrus cultivation and its experiences across the participating countries. Key topics included:

1. The current citrus cultivation situation in Algeria, the Near East, and North Africa.
2. The impact of climate change on citrus cultivation.
3. New approaches and technologies in citrus management, particularly regarding pests and diseases.
4. The technical impact of citrus on human health and nutrition.

The event's success was further enhanced by the involvement of various stakeholders directly related to citrus topics, including government authorities, administration representatives, agricultural institutes, economic and social actors like agricultural chambers, producers of agricultural tools, and farmers.



The conference concluded with a set of recommendations that summarized its proceedings. The most important was establishing a citrus network in the Near East and North Africa region. Another key proposal was to create a forum led by the first conference's president to develop a roadmap to increase the number of citrus-producing countries. The ultimate goal is to establish a scientific, technical, and economic entity, with its headquarters, responsibilities, program, working methods, and funding to be determined at a second conference, the location of which will be decided later.



### Conference attendance: Guest speaker and scientific committee member

**November 13-14, 2024 Boumedes, Algeria**

**Dr. Hamida BENSLIMANE**, from the National High College of Agriculture (E.N.S.A.), Algiers, Algeria, attended the 2nd international conference on bioinformatics as a guest speaker. The Laboratory of Bioinformatics, Applied Microbiology, and Biomolecules organised the conference in collaboration with the Faculty of Sciences, M'hamed Bougara University; it was held in Boumedes, Algeria, on November 13-14, 2024. She gave a talk titled "Diagnostic of plant diseases in Algeria using molecular methods associated with bioinformatics tools: Causal agents of corn diseases identification a case of study".

The talk aimed to highlight the importance of bioinformatics in plant protection, focusing on causal agent disease identification. After a short outline of plant disease diagnosis and its crucial function in plant disease management, the first part of the presentation was dedicated to the different applications of bioinformatics in plant disease management. These include (i) several examples in plant-pathogen interactions advance using bioinformatics tools, (ii) plant pathogens identification and phylogeny analysis through specific conservator *loci* as well as whole genome analysis, (iii) identification of pathogenicity factors, (iv) Recognition of disease in leaves, using genetic algorithm and neural network based feature selection, (v) developing of disease resistance cultivars, (vi) plant disease treatment, (vii) study of Disease genetics, and (viii) production of disease-free planting materials. For each one, examples of advances were explained.

Then, a glimpse into genome databases of specialized plant pathogens was presented. The second part of the talk was about a case study in Algeria, focusing on identifying fungi causing leaf diseases of corn, using open-access bioinformatics tools associated with the sequencing of appropriate conserved *loci*. The approach followed is successful; it allowed us to get an appreciative advance in identifying causal agents of leaf corn symptoms across fields, particularly fungi species. Some species are recorded for the first time on corn; few are nova, while all are reported in Algeria for the first time.

## Plant Pathology Days, 2024 ENSA Algiers

November 26-27,2024 Algeria

The plant pathology and molecular biology laboratory at the Ecole Nationale Supérieure Agronomique in Algiers, the 3rd edition of its scientific days, under “Plant Pathology Days” on November 26-27, 2024. Over 60 scientists have participated in this edition, where major topics in Algerian plant pathology have been discussed, such as *Fusarium*, pathogenic bacteria, breeding against *Fusarium* and potato late blight. Also, specialists gave several presentations on important diseases, pathogen characterization, conventional and alternative control, weed sciences, and physiological disorders. [Abdelmoumen Taoutaou (Algeria), Laboratory of Phytopathology and Molecular Biology, Ecole Nationale Supérieure Agronomique (ENSA-ES1603),2024].



## Selected Research Papers

- **Multitrophic and multilevel interactions mediated by Volatile Organic compounds.** Dongsheng Niu, Linbo Xu and Kejian Lin, *Insects*, 15(8), 572, 2024. <https://doi.org/10.3390/insects15080572>
- **An Internal marking method for Adult *Spodoptera frugiperda* Smith using an artificial Diet containing calco Oil Red N-1700.** Shishuai Ge, Bo Chu, Xiaoting Sun, Jiajie Ma, Xianming Yang and Kongming Wu, *Insects*, 15(8), 561, 2024. <https://doi.org/10.3390/insects15080561>
- **Safety of the entomopathogenic Fungus *Beauveria bassiana* for wild and laboratory-Reared *Chrysoperla lucasina* strains.** Walaa Morda, Maria Tiziana Nuvoli and Luca Ruiu, *Insects*, 15(8), 576, 2024. <https://doi.org/10.3390/insects15080576>
- **Evaluation of an Attract-and-Kill Strategy using Long-Lasting insecticide nets for the management of the brown marmorated Stink Bug in Northern Italy.** Antonio Masetti, Agata Morelli, Luca Fagioli, Gianfranco Pradolesi, Riccardo Nicoli, Olmo Scagliarini, Maria Grazia Tommasini and Michele Preti, *Insects*, 15(8), 577, 2024. <https://doi.org/10.3390/insects15080577>
- **Impacts of combining *steinernema carpocapsae* and *Bracon hebetor* parasitism on *Galleria mellonella* larvae.** Neama A. Amer, Zeinab A. El-Moaty, Maria Augustyniak, Lamia M. El-Samad and Hanaa S. Hussein, *Insects*, 15(8), 588, 2024. <https://doi.org/10.3390/insects15080588>



- **Biopesticide formulation based on essential oils in *Drosophila suzukii* management as a future of pest control.** Dragana Bošković, Slavica Vuković, Sanja Lazić 1, Nuray Baser, Mihaela Kavran, Dragana Novaković, Aleksandra Šušnjar, Jelena Ećimović, Milica Stožinić, Dragana Šunjka. *Plant Protect. Sci.*, 60(3):288-294, 2024. [DOI: 10.17221/11/2024-PPS](https://doi.org/10.17221/11/2024-PPS)
- **The control of soil-borne fungal pathogens in grapevine nurseries in Türkiye and their impact on sapling quality.** Nurdan Gungor Savas, *Plant Protect. Sci.*, 60(3):241-257, 2024. [DOI: 10.17221/94/2023-PPS](https://doi.org/10.17221/94/2023-PPS)
- **Exploring the role of endophytic fungi in the amelioration of drought stress in plants.** Alulutho Nombamba, Ayomide Emmanuel Fadiji, Olubukola Oluranti Babalola, *Plant Protect. Sci.*, 2024, 60(3):213-228, 2024. [DOI: 10.17221/25/2023-PPS](https://doi.org/10.17221/25/2023-PPS)
- **Effect of legume (Fabaceae Lindl.) seeds on selected life activities in J2 stage of *Meloidogyne hapla*.** Renata Dobosz, Roman Krawczyk, *Plant Protect. Sci.*, 60(2):193-206, 2024. [DOI: 10.17221/17/2024-PPS](https://doi.org/10.17221/17/2024-PPS)
- **Comparative analysis of unmanned aerial vehicles and conventional spray systems for the management of maize fall armyworm *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera; Noctuidae).** P.S. Shanmugam, T. Srinivasan, V.Baskaran, A. Suganthi, B.Vinothkumar, G. Arulkumar, S. Backiyaraj, S.Chinnadurai, V. Somasundaram, N. Sathiah, N. Muthukrishnan, S.V. Krishnamoorthy, K. Prabakar, S. Douresamy, Y.S. Johnson Edward Thangaraj, S. Pazhanivelan, K.P. Rangunath, R.Kumaraperumal, S. Jeyarani, R. Kavitha, A.P. Mohankumar. *Plant Protect. Sci.*, 2024, 60(2):181-192,2024. [DOI: 10.17221/96/2023-PPS](https://doi.org/10.17221/96/2023-PPS)
- **Rapid detection of chilli leaf curl virus using loop-mediated isothermal amplification.** J. M. Catherine, Masilamani Karthikeyan and Pasupathi Rathinasabapathi, Volume 53, pages 297-304, 2024. <https://link.springer.com/article/10.1007/s13313-024-00979-3#citeas>
- **Identification of sources of resistance and comparative metabolomic profiling of resistant and susceptible chilli germplasm to *Meloidogyne incognita* Race 1.** Prasanna Holajjer, T. P. Ahammed Shabeer, M. K. Mahatma, Z. Khan, S. R. Pandravada, N. Sivaraj, Anitha Kodaru & Anita Pardeshi, Volume 53, pages 313-324, 2024. [DOI:10.1007/s13313-024-00981-9](https://doi.org/10.1007/s13313-024-00981-9)
- **Distribution, Population Dynamics, and Management of Moroccan Locust *Doclostaurus maroccanus* (Thunberg, 1815) (Orthoptera, Acrididae) in Tajikistan.** Khuramjon S. Khairov ,Elena Lazutkaite and Alexandre V. Latchininsky , *Insects* , 15(9), 684, 2024. <https://doi.org/10.3390/insects15090684>
- **The Effect of Soil Type and Moisture on the Development of Forensically Important *Megaselia scalaris* and *Dohrniphora cornuta* (Diptera: Phoridae).** Wei Han,Dianxing Feng and Yanan Tang, *Insects*, 15(9), 666, 2024. <https://doi.org/10.3390/insects15090666>
- **Response to the detection of *Fusarium dieback* associated with ambrosia beetles on *Acer negundo* in New South Wales.** Sophia Callaghan, Angus J. Carnegie, Peter Gillespie, Shannon Mulholland, Matthew Nagel, David Sargeant, Andrew Daly and Ossie Wildman, Volume 53, pages 345-352, 2024. <https://doi.org/10.1007/s13313-024-00984-6>
- **The ‘Goldilocks Grub’: reproductive responses to leafroller host development in *Goniozus jacintae*, a parasitoid of the light brown apple moth.** Emma Aspin , Michael A. Keller and Ian C. W. Hardy, *Bulletin of Entomological Research*, 1-9, 2024. <https://doi.org/10.1017/S0007485324000348>

- **Entomopathogenic fungi, *Hirsutella thompsonii* F.E. Fisher Safe Mycoacaricide for the Management of Coconut Mite, *Aceria guerreronis* Keifer in Thailand.** Nattaya Jampameung, Siwaret Arikrit, Sunisa Sanguansub, Suradet Buttachon, VOL. 29, NO. 10, 2024. in progress, Systematic and Applied Acarology, DOI: <https://doi.org/10.11158/saa.29.10.1>
- **A new species of *Cryptognathus* (Acariformes: Raphignathoidea: Cryptognathidae) intercepted from New Zealand kiwifruit.** Owen Douglas Seeman, Jennifer Beard, Jürgen Otto, Systematic and Applied Acarology, VOL. 29, NO. 10, 2024 in progress DOI: <https://doi.org/10.11158/saa.29.10.2>

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## EVENTS OF INTEREST

<b>December 30-31, 2024</b>	International Conference on Agricultural Entomology and Pest Management ICAEPM in Paris, France. <a href="https://rb.gy/txwji83">https://rb.gy/txwji83</a>
<b>April 7-8, 2025</b>	International Conference on Agriculture and Horticulture ICAH in Dubai, United Arab Emirates. <a href="https://agriculture.c2pforum.com/">https://agriculture.c2pforum.com/</a>
<b>June 1 -14,2025</b>	XVII Meeting of the Working Group 'Biological and integrated control of plant pathogens' From single microbes to microbiomes targeting One Health, in Torino, Italy. <a href="https://www.iobctorino2025.org/">https://www.iobctorino2025.org/</a>
<b>July 6-10,2025</b>	17th Congress of the Mediterranean Phytopathological Union, CIHEAM Bari-Italy. <a href="https://ciheambaricongressmpu2025.org/">https://ciheambaricongressmpu2025.org/</a>
<b>June 29-July 2, 2025</b>	International Conference On Urban Pests. ICUP 2025 - in Lund, Sweden. <a href="https://tinyurl.com/y3j2fxj9">https://tinyurl.com/y3j2fxj9</a>
<b>October 8-11,2025</b>	9th Meeting of the IOBC-WPRS WG "Integrated Control of Plant-Feeding Mites". Izmir, Türkiye. <a href="https://iobc-wprs.org/meeting/9th-meeting-iobc-wprs-wg-integrated-control-of-plant-feeding-mites/">https://iobc-wprs.org/meeting/9th-meeting-iobc-wprs-wg-integrated-control-of-plant-feeding-mites/</a>
<b>January 28-29, 2026</b>	International Conference on Plant Pathology and Plant-Microbe Biology in Istanbul, Türkiye. <a href="https://shorturl.at/fmqSY">https://shorturl.at/fmqSY</a>

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ASPP Office, P.O. Box 113-6057, Beirut, Lebanon; Tel/Fax: (+961-1) 809173

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