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EDITORIAL

Citrus Greening Disease (Huanglongbing) in the Southwestern USA

Citrus greening disease (CG), also known as Huanglongbing (HLB), is generally acknowledged as the most destructive citrus disease known, eclipsing the worst citrus tristeza virus outbreaks in the early 20th century. This article will describe CG and its vector and describe its effects on citrus trees and the citrus industry in the United States. Comparisons of disease spread in tropical and sub-tropical areas such as Florida with spread in the Mediterranean and desert climactic zones, which are similar to those found in the Middle East and North Africa (MENA), will be made. Additionally, successful methods used to slow the spread of the disease in the USA will be presented, and some suggestions will be made that may slow the movement of CG into the MENA and reduce its impact upon arrival.

Description and Characterization of the Disease and its Vector

The term "citrus greening" originated in South Africa a, where it likely referred to the abnormal green color of the fruits at harvest. However, the correct name of the disease is "Huanglongbing", which is translated as "yellow shoot disease", referring to the yellowing of branches and entire sections of the affected trees. The CG pathogen is a gram-negative bacterium that exists in the phloem. It occurs in two strains: *Liberibacter africanus* causing African CG, and *Liberibacter asiaticus* causing Asian. Even though the strains are both well-characterized, they are unculturable, thus they were renamed *Candidatus* liberibacter africanus (Claf) and *Candidatus* liberibacter asiaticus (Clas). Claf is transmitted by the African citrus psyllid *Trioza erytreae* (Del Guerico), while Clas is transmitted by the Asian citrus psyllid (ACP) Diaphorina citri (Kuwayama).

Effect of Temperature on Claf and Clas

Claf appears to be heat-sensitive; symptoms disappeared at 27 to 32 ˚C in a greenhouse study, and the pathogen is found in cooler areas of southern and eastern Africa, as well as the islands of the Indian Ocean. *Trioza erytreae* has been found in all these areas, including coastal Spain, Portugal, and Madeira. Clas is more heat-tolerant; symptoms become visible above 25 ˚C. The author observed symptoms in Punjab, India, in November, where mean daily maximum temperatures reach 27˚C and record high temperatures can reach 35˚C. Clas is widely distributed across China, India, Pakistan, Indonesia, the Philippines, South America (excluding the western Andes), Central America, Mexico, the Caribbean, and the United States. The ACP vector is found in all these countries and has recently been found in Kenya, Tanzania and Benin. Both strains have been reported in Saudi Arabia, Yemen and Reunion Island, where Claf is found in the cooler highlands, while Clas has been found in warmer coastal areas. Since only Clas has been found in the United States, the remainder of this article focuses only on it and its ACP vector.

Symptoms of CG in Citrus Trees

Virtually all citrus species have some susceptibility to CG. CG enters a region as it is carried with the ACP, in infected trees or other host plants or through the use of infected citrus budwood. Nurseries and individuals can spread CG by propagating trees using infected budwood.

After 20 years of experience in Florida, lemons, grapefruit, pummelos, and sour oranges are less susceptible to disease than oranges, mandarins, and tangelos. Some limes, trifoliate orange and trifoliate orange hybrids are the most tolerant. Primary symptoms of CG in the tree include asymmetrical, blotchy mottling of leaves (which

varies by citrus type and is often the first symptom noticed), vein yellowing and corkiness, small leaves, sparse foliage, and root dieback. Fruit CG symptoms include small, lopsided fruit, aborted seeds, incomplete ripening, bitter or sour taste (low sugar to acid ratio) and drastically reduced production. Secondary symptoms include increased susceptibility to root diseases and pests, such as phytophthora, and chronic drought stress, leading to ethylene production and pre-harvest fruit drop. Generally, CG does not kill a tree but makes it economically worthless.

There has been considerable controversy regarding how Clas causes CG symptoms. There is a general consensus that symptoms are caused by phloem blockage, which limits the movement of nutrients and carbohydrates to the roots, leaves and fruit. Recently, a study suggested that CG is a pathogen-triggered immune response which leads to callose deposition in the phloem, and production of reactive oxygen species, which leads to the death of sieve and companion cells of the phloem. Control methods that reduce the formation of reactive oxygen species, such as the application of antioxidants or gibberellins, have been suggested.

Once in the tree, the bacteria moves throughout the tree, including the roots. One study in Florida, where the trees flush most of the year, showed that 43% of all tree leaves had detectable Clas after one year, and it took three years for the entire tree to become infected. Considering the slowness of movement of Clas in the tree, symptoms of CG are not immediately visible. Therefore, a tree may exhibit the disease several weeks or months before the pathogen is detected by inspection. Furthermore, it is likely that sampling at one location on the tree may not always detect disease because the Clas is unevenly distributed. At some point, much of the Clas in a tree may be in the roots, meaning that pruning a tree to eliminate CG is ineffective. Heat treatments have been found effective in slowing the spread of CG and reducing the bacterial titer of Clas. Brazilian citrus orchards in the northern periphery of the main citrus growing region are less at risk of the disease. Treatment of infected trees at CG spread in the tree can also be reduced through the injection of antibiotics, and there is some tolerance to CG in certain citrus varieties.

The ACP Vector

The ACP prefers to feed and reproduce on new flush; ACP are unable to transmit Clas on mature leaves. Visual symptoms of ACP feeding include the presence of adults and/or nymphs, twisted or notched leaves, evidence of waxy "tube-like" deposits produced by the nymphs, honeydew and/or sooty mold. In the absence of Clas, the damage caused by the ACP feeding is negligible.

ACP will survive temperatures as low as -6˚C for several hours, and optimal survival temperature is between 20 and 25˚C. In desert areas where the summer heat reduces flush, ACP populations are generally lowest during the summer and increase in the fall through spring. A recent study showed that when ACP populations were subjected to 3 and 6 hour thermal cycles of 28, 37, 40 and 43˚C, longer cycles and increased temperatures reduced adult emergence. At 43˚C, there was no emergence at all as the entire population of ACP died. However, the beneficial effect of high temperatures causing ACP population decreases should not cause citrus growers to become complacent. If CG is in the area, it is vitally important to reduce ACP populations, especially in the cooler months of the year. ACP populations can be reduced through the use of contact or systemic insecticides, through the introduction of parasites and parasitoids and through repellants.

Discoveries of infected ACP almost always precede discoveries of infected trees. ACP's can jump from one tree to another, can fly up to 2 km, can be carried on strong winds perhaps up to 480 km and can "hitchhike" on vehicles. An infected psyllid means there is an infected tree somewhere nearby, but it may be very difficult to find that tree. We have noted that when ACP is spreading, it is almost always found along the side of the orchard that faces the prevailing wind or along transportation corridors.

Citrus Greening and the Asian Citrus Psyllid in the United States

In the United States, the ACP was first found in Florida, California and Arizona in 1998, 2008 and 2009, respectively. Clas was first detected in those states in 2005, 2012 and 2025. ACP and Clas are now found in all citrus growing states except Hawaii, where only the vector is found. In Florida, California and Arizona, the presence of the ACP, presence of Clas, tree phenology, the environment and degree of regulatory oversight have led to quite different outcomes in the fight against CG.

Florida

The Köppen climate zones encompassing the Florida citrus industry include tropical rainforest (Af), tropical monsoon (Am), tropical savannah(Aw) and humid subtropical (Cfa) None of these climates occur in the MENA. Citrus growing in Florida is the most damaged by CG. Although the ACP was first discovered in 1998, it was likely widespread before that time, but was considered

to be inconsequential because Clas was not found in the state, Clas was found in a garden south of Miami in 2005, likely blown in with ACP on hurricane winds or was smuggled in. The disease moved quickly and could not be contained by phytosanitary regulations. Within five years virtually the entire industry was affected. Florida's tropical climate ensures continual tree flush in the spring, summer and fall months. Abandoned orchards harbor the disease and the insect. Insecticide resistance is growing. As a result, Florida citrus production has dropped from 300 million boxes to under 20 million boxes from 2003 to 2023. Some of the drop is due to freezes, hurricanes and urbanization, but the majority is due to CG. Losses to the economy have been in the billions of dollars. Thousands of jobs have been lost as orchards are abandoned, converted to other crops or urbanized, processing plants are closed and agricultural support industries become smaller. Hundreds of millions of dollars have been spent on research, and there are some new plantings of tolerant citrus from breeding programs and a "clean" budwood program. Growers are injecting trees with oxytetracycline to lower the disease titer, and new management strategies that reduce the impact of stress, root loss and fruit drop are implemented. The viability of the Florida citrus industry is still in question. The question is: "Will the cure come before the patient is dead?"

California Coastal and Interior

In California there are about 105,000 ha of citrus. The industry is growing slowly. The main part of the citrus industry is encompassed by the hot summer mediterranean (Csa) and warm summer mediterranean (Csb) Köppen climate zones. These zones in the MENA include the coastal regions of Türkiye, Syria, Lebanon, Israel, Palestine, Tunisia, Algeria and Morocco, and the northern regions of Syria and Iraq. The citrus industry in California has not been significantly impacted by CG because of the environment, strong phytosanitary regulations and diligence on the part of the growers and the government. Most California citrus trees grow in areas where the summer temperatures can reach 40C, rainfall is limited except in the winter and spring, and shoot flush is limited to the spring and fall. ACP was first found in California in 2008, and it is regularly found in the urban and rural areas of Southern California but is not as often encountered in the San Joaquin (Central) Valley, California's main citrus growing region. This is probably because there are mountains separating the two regions. Growers in California have organized themselves into "Citrus Health Management Areas" where insecticide sprays are applied at coordinated times to reduce ACP populations across large areas. Parasites and parasitoids are reared to help control the ACP populations. The USDA and the California Department of Food and Agriculture monitor traps for ACP and submit hundreds of samples for Clas detection annually.

Since CG was discovered in one Los Angeles garden in 2012, it has been confined mostly to the urban areas of that region. There are four GC quarantine areas in the Los Angeles area, where citrus plants or fruits may not be moved out or through without a permit. From 2012 to 2024, about 9,400 infected citrus trees, out of an estimated 6,000,000, have been positively identified with Clas and removed using the authority of governmental agencies. No Clas has been found in the San Joaquin Valley, but growers and authorities are vigilant. California has its own "clean" budwood program, and there are regulations on treatments needed to move citrus plants and fruits throughout the state to minimize the spread of the ACP and the Clas. California authorities and growers have learned from the experiences of Florida and have been fairly successful in minimizing the impact of CG.

Arizona and California Desert

Arizona citrus is mostly grown in the Köppen hot desert climate zone (BWh) which extends westward into California and includes the desert industry in that state. Similar areas in the MENA would include Eastern Syria, middle and southern Iraq, all of the GCC countries, most of Yemen, Egypt and Libya, southern Tunisia, and the Algerian and Moroccan Sahara. There are a few urban areas in the hot semi-arid zone (BSh) where citrus can be found. Similar areas in MENA include northern Syria and Iraq, small areas in coastal Libya and the river valleys of southwestern Morocco. The size of the desert industry in both states is about 5,000 ha and is shrinking due to shortage of water. The citrus industry and urban citrus in the deserts of Arizona and southern California have not been significantly affected by CG. Average summer maximum temperatures are above 40C from June to September. Rainfall is minimal and all citrus is irrigated. Trees flush only in the spring and fall. ACP was first found in Arizona in 2009, and most were originally found in transportation corridors coming from Mexico, indicating that the insect entered the desert region on the wind or on vehicle traffic. ACP levels are still low, but desert growers in both states have their respective Citrus Health Management Areas and conduct coordinated spraying. Networks of traps are monitored and many samples submitted.

Clas was first discovered in Arizona in January 2025 in the city of Nogales (Köppen Zone BSh) at the Mexican border (Figures 1,2 and 3). This city

is about 400 km from the main citrus growing area of the state. The trees are old and appear to have been infected several years ago, with the symptoms only becoming noticeable this year. Trapping and sampling have been increased and a quarantine zone established. Inspectors are going "door-to-door", speaking with residents and collecting samples. Currently there are 17 positive trees in 11 gardens in a small part of the city. All these trees will be removed within the next month. Homeowners whose trees are removed will receive a replacement deciduous tree free of charge. Arizona benefits from the experiences of Florida and California and because of this and its climate has generally escaped impact from the disease.

Figure 1. First tree infected with CG disease, Nogales, AZ 2025.

Figure 2. Leaf symptoms of CG disease, Nogales, AZ

Implications and Suggestions for MENA

Based on our experience in the United States, Clas is most likely to enter MENA countries by the introduction of infected trees or budwood either to commercial nurseries or to individuals. There is a smaller chance that the disease could arrive in infected ACP via the wind or by 'hitchhiking" on vehicles.

Areas in the Mediterranean climates (Köppen zones CSa and CSb) and hot semi-arid climate (Köppen zone BSh) are most likely to see introduction first. Movement of the disease into an area will not be

as fast as it was in Florida because the environment is not as favorable for ACP survival and the trees do not flush continuously. Disease entry may be slowed further if any or all of the steps listed below are taken:

Before CG arrives:

1. It is likely that the first find of CG will be in a garden rather than in a commercial orchard. As the disease gets closer, there should be organized communication with private citizens, nursery owners and growers. This communication should inform them of the threat of the disease to their own trees and to the industry and encourage them to report anything unusual.
2. Government and University employees, growers and nursery workers should be trained to recognize the disease. A plan should be developed to determine everyone's roles and responsibilities when confronting the disease. What shall be done if there is a positive find?
3. Quarantine regulations restricting entry of citrus and citrus relatives from other countries should be established and rigorously enforced, especially at airports and at national borders. Dogs can be trained to smell ACP and Clas and should be used.
4. Governmental authorities should be given the authority in advance to remove trees that are infected and replace them with alternatives if requested by the owner of the infected tree.
5. It is best to have a "clean" budwood program established so that infected trees are not propagated by nurseries.
6. Nurseries should be enclosed with screenhouse or greenhouse to exclude ACP and only disease-free budwood should be allowed to propagate trees.
7. Growers should create Citrus Health Management Areas to coordinate spraying if ACP is in the area.
8. Plans to import, rear and release the ACP's natural enemies should be made.
9. Authorities should be sampling for Clas in ACP and trees before their arrival. Urban areas around airports, transportation corridors, citrus nurseries and where there are already citrus trees in gardens should be prioritized. Citrus orchards should be sampled, especially those closest to an ACP or Clas quarantine zone.

After Clas is discovered

1. Survey and sample collection for Clas in trees and in ACP should be extensive and ongoing.
2. Infected trees should be removed as soon as possible, chipped and buried.
3. Trees surrounding the infected trees should be sprayed with insecticide and given systemic insecticide as soon as possible. Treated zones should be as large as practically possible.
4. A quarantine zone should be established. It should be as large as practically possible.
5. Citrus trees, leaves, roots, fruit and prunings should not be removed from th
6. e quarantine zone. Transport of harvested citrus fruit out of the quarantine zone should only be allowed if the fruit is washed and if all leaves are removed. Transport of harvested fruit through a quarantine zone should be prohibited, or if that is not practical, those fruit should be washed then covered while passing through the quarantine zone.

Measures taken now to reduce or eliminate the impact of CG disease will improve the chance of a successful and profitable citrus industry in MENA nations far into the future. Good luck!

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CROP PROTECTION NEWS FROM ARAB AND NEAR EAST COUNTRIES

INVASIVE, NEW PESTS AND NATURAL ENEMIES

Algeria

First report of seed decay and seedling damping-off of wheat (*Triticum aestivum*) caused by seed-transmitted *Alternaria rosae* in Iraq

During the 2022–2023 growing season, wheat (*Triticum aestivum*) crops in Karbala Governorate, Iraq, experienced severe seed germination failure (up to 30%) and seedling damping-off. To identify the causal agent, seeds from 13 wheat varieties were collected across five regions (Al-Khayrat, Al-Hurr, Al-Sahrawea, Ain Alten, Al-Jadual Al Garby) and subjected to fungal isolation. Morphological and molecular characterization of purified isolates revealed *Alternaria rosae* as the pathogen. Colonies exhibited greyish-white to dark olive-green pigmentation with obclavate conidia (13–28.5 × 6–14 µm) bearing 1–3 transverse and 0–3 longitudinal septa. Multilocus sequencing (ITS, EF1-□, RPB2, actA) confirmed 100% identity with *A. rosae* reference strains (GenBank accessions: PP732704.1, PP750861.1–PP750863.1). Pathogenicity tests on wheat cv. Ibaa 99 demonstrated complete germination inhibition in inoculated seeds and post-emergence symptoms, including shoot wilting, yellowing, and root browning. Koch's postulates were fulfilled by re-isolating the pathogen from infected seedlings. This study provides the first report of *A. rosae* as a seed-transmitted pathogen of wheat in Iraq, highlighting its role in seed decay and damping-off. The findings underscore the need for stringent seed quality control and disease management strategies to mitigate losses in wheat production.[**Zainab L. Hameed and Ban T. Mohammed** (Iraq), Biology Department, Education College for Pure Sciences, University of Kerbala-Iraq. New Disease Report Journal, 50, e12291, 2024. https://doi.org/10.1002/ndr2.12291

Molecular identification and first report of *Fusarium annulatum* inciting wheat root rot on bread wheat in Iraq by multi-locus phylogenetic analysis

Fusarium spp. are very important plant, animal, and human pathogens. In this study, severe field wilt infection in bread wheat was observed in January 2021 in the wheat field of the Muradia Agriculture Station, Babylon, Iraq. Disease symptoms on the roots were observed as brown discoloration and root rot. Pathogen isolation, morphological characterization, pathogenicity, and sequencing of ITS, TEF1-□, TUB2, and ACT regions, and the phylogenetic analysis with multi-gene of the isolated pathogen were performed. The results revealed that the multigene phylogenetic trees using Maximum Likelihood phylogenetic analysis and morphological characteristics confirmed the identification of *Fusarium annulatum*. Phylogenetic analysis utilizing Bayesian and Maximum Likelihood trees based on only ITS sequences and ITS data was not sufficient to distinguish this species among *Fusarium* spp. However, the results of phylogenetic analysis using Bayesian and Maximum Likelihood trees based on TEF1-□ region or multigene phylogenetic analysis showed that isolates of *F. annulatum* were grouped in a distinct species clade belonging to the *Fusarium* spp. This work is considered as the first molecular identification using 4-gene phylogenetic analysis and first report of *F. annulatum* as a wheat pathogen in Babylon, Iraq. [**Alshuwaili, F.R.H., H.A. Tamur, Z.M. Abbas, M.Q. Joodi and R.A.A. Al Anbagi. (Iraq),** Arab Journal of Plant Protection, 43(1):62-68, 2025]. https://doi.org/10.22268/AJPP-001296

Libya

New record of *Leptadenia arborea* (Forssk.) Schweinf. in the flora of Libya.

A new record for *Leptadenia arborea* (Forssk.) Schweinf. is reported for the first time in the flora of Libya. This species was collected from Ariggiba region (110 km southwest Sabha city). A full description and habitat information on the plant are provided. A brief discussion about the most important traits of this species is presented. [**El-Ahamir, S.M. and Imohammed, K.S. (Libya),** Tunisian Journal of Plant Protection 19 (2): 63-68, 2024**].** https://dx.doi.org/10.4314/tjpp.v19i2.1

Syria

First record of the Caper Bug, *Stenozygum coloratum* on Figs, *Ficus carica* L. in Syria.

The caper bug, *Stenozygum coloratum* (Hemiptera:Pentatomidae) was observed for the first time on all vegetative parts (leaves, fruits, branches and stems) of fig trees, *Ficus carica* (Moraceae), Khudayri variety in Homs Governorate, Syria, at a very high density (25 insects/fruit). Symptoms appeared in the form of silver mottling of the fig leaves with black residues on the upper surface of all vegetative parts of the plant. This report includes morphological description, life cycle and damage caused by the pest. [**El-Habeeb, A.F.(Syria),** Arab Journal of Plant Protection, 43(1):143-145,2025]. https://doi.org/10.22268/AJPP-001286

New record of the cucurbit fly *Dacus ciliatus* in Syria.

In early July 2023, unusual infestations in circular spots were observed in the middle of zucchini (*Cucurbita pepo*) fruits on an organic farm in the Sabboura area of rural Damascus, Syria. The infestations progressed to severe levels on zucchini, Armenian cucumber (*Cucumis melo flexuosus*) and melon (*Cucumis melo*) on the same farm and continued to develop from August until the end of November 2023. Fruit fly traps containing the attractant methyl eugenol were distributed in the infested field to monitor generation development and control the fly by aggregation trapping. The captured adults were collected and photographed. Samples of the infested fruit were also collected and placed in an insect-rearing box until the adults emerged. Identification was carried out by examining the morphological characteristics of the adults and following specialized keys, as outlined in PM7/134 (1) EPPO Bulletin. The insect was identified as the lesser pumpkin fly or cucurbit fly (*Dacus ciliatus* Loew, 1862). The appearance of this cucurbit fly infestation can be considered a new record for this insect, which was previously unknown

in Syria. The cucurbit fly, *Dacus ciliatus*, was mentioned in Al-Hariri's 1968 list of insects and mites recorded in Syria; however, it has not been observed or reported in Syria since then. The presence of the lesser cucurbit fly was not reported in the field survey conducted by Korneyev and Dirlbek (2000) in Syria, Jordan, and Iraq. This situation persisted until 2016, and this observation was made in the summer of 2023. Following up on local Syrian agricultural technical groups on social media, it was observed that the first instance was reported in November 2016 in Daraa Governorate, southern Syria, in some cucurbit fields; however, its identification was not scientifically confirmed (Eng. Fadi Abu Rekba). Its spread gradually expanded until it reached the eastern countryside of Aleppo in October 2024 (Eng. Ahmed Badinjki). The cucurbit fly is now widespread throughout Syria. This insect has been classified as an invasive pest by the European and Mediterranean Plant Protection Organization (EPPO) and the Centre for Agriculture and Bioscience International (CABI). It has been recorded in Turkey, Cyprus, and Italy (2024) and has become a new threat to cucurbit cultivation in the region. [**Wael Almatni, Entomologist, Syria, 2025].**



The migration of *Belenois aurora* (Fabricius) (Lepidoptera: Pieridae) in Syria: implications for the caper industry?

We report on migration/dispersal in Syria of *Belenois aurota*, a tropical migrant pierid. The routes followed to the east of the Anti-Lebanon and Silsilat al-Jibāl as-Sāḥilīyah (Latakia) mountain ranges indicate the use of previously undocumented migratory pathways into northwestern Syria with potential for further incursion into the Mediterranean provinces of Türkiye. The host plants in Syria are species of Capparis, a source of economic benefit to those foraging for caper buds in the northwestern governorates of the country. However, we consider the threat to *Capparis* spp. posed by migrant *B. aurota* currently to be secondary to that of the proliferating *Stenozygum coloratum*, now a very common resident pentatomid (Hemiptera).

Note: This report is a new record of the outbreak of both insects in Syria. [**Eddie John,** Vale of Glamorgan CF71 7BB, U.K.; **Wa'el Almatni**, Damascus, Syria; and **Mudar Salimeh**, Latakia, Syria; Entomologist's Monthly Magazine 161: 2–12,2025]. doi:10.31184/M00138908.1611.4277


RESEARCH HIGHLIGHTS

Algeria

Eco-friendly extract derived from *Dittrichia viscosa* (L.) Greuter 1973, from Algerian arid region, antioxidant evaluation and biopesticide use.

To investigate the effects of *Dittrichia viscosa* L. Greuter 1973 extract as a biopesticide on beneficial entomofauna in a greenhouse setting in the Biskra region, the study was conducted at the experimental site (CRSTRA). The aerial parts of *D. viscosa* were collected, dried, and analyzed in the laboratory. The antioxidant potential of the plant extract was assessed by using 2, 2-diphenyl-1-picrylhydrazyl (DPPH), alkaline DMSO superoxide, O-phenanthroline che- lating (Phen) and iron-reducing power (RP) methods. Enzyme inhibition was studied using the iodine/potassium iodide method. A 200 m² greenhouse was established in November 2021 and planted with tomato (Cecilia), divided into four blocks, each equipped with sticky traps for monitoring entomofauna from May 1st to June 1st. The pulverized *D. viscosa* extract was applied at different concentrations (D1 = 5 ml/l; D2 = 10 ml/l; D3 = 15 ml/l) every 10 days. Analysis of the hydro-methanolic extract of *D. viscosa* revealed significant antioxidant activities and effective □-amylase inhibition, indicating its potential as a free radical scavenger and a useful therapeutic agent for addressing radical-related pathological damage. Additionally, the biopesticidal effects of the extract on beneficial insects were evaluated. Results showed a total richness of 75 species across 7 orders and 44 families, with the most abundant species belonging to Hymenoptera (37 species), Coleoptera (14 species), and Diptera (11 species). The predominant categories included parasitoids (29%), predators (24%), pests (15%), and pollinators (11%). As a biopesticide, the extract proved effective in reducing pest populations by 50% at the highest concentration (15 ml/L). The Pielou evenness index values (H5 ml/L = 0.8787, H10 ml/L = 0.8506, H15 ml/L = 0.836, compared to the control = 0.4179) in- dicated a nearly homogeneous distribution of individuals among species. The Shannon diversity index suggested that increasing concentrations of *D. viscosa* extract (E5 ml/L = 0, E10 ml/L = 1.33, and E15 ml/L = 0.5623) did not significantly impact the presence of pollinator species in the tomato greenhouse in the Biskra region.[**Belhamra Youcef Islam, Deghiche Diab Nacima, Saad Somia, Ouamene Tarek Abdelmoneim, Karoune Samira, Djoudi Madjed, Kechebar Mohamed Seif Allah, Djazouli Zahr Eddine** (Algeria), Journal of Ecological Engineering, Volume 26, Issue 1, 2025]. DOI: https://doi.org/10.12911/22998993/195185

Pathogenicity of *Ascochyta nigripycnidia, Didymella pinodella* and *Boeremia exigua* isolated from *Trifolium alexandrinum* in Algeria and assessment of their host range on some Fabaceae.

Berseem clover (*Trifolium alexandrinum* L.) is an important forage crop for livestock farming in Algeria. This crop is susceptible to many fungal diseases that can affect yield and forage quality. Surveys carried out in several regions of Algeria enabled us to collect a large number of diseased samples from berseem crops showing symptoms of leaf spot and stem/root necrotic diseases, commonly known as Ascochyta Blight (anthracnosis). Among the fungal species isolated and identified, three

species *Ascochyta nigripycnidia*, *Didymella pinodella*, and *Boeremia exigua* were considered in this study. To assess the pathogenicity and the host range of these three species, eight isolates (3 *A. nigripycnidia*, 3 *D. pinodella*, and 2 *B. exigua*) were selected and inoculated on the above and below-ground parts of berseem, alfalfa, vetch, pea, chickpea, and faba bean. Disease incidence and severity were assessed on leaves, epicotyls and roots of the inoculated plants. All these fungal species had caused serious symptoms on the organs of the Fabaceae studied, with varying levels of attacks according to the species and the isolates tested. *A. nigripycnidia* caused severe attacks on berseem and chickpea, but showed little severity on alfalfa, vetch, and pea. This is the first evidence that *A. nigripycnidia* is not specific to vetch, but can attack other Fabaceae. *D. pinodella* showed no specialization, and attacked indifferently all inoculated organs of the tested species. In the end, *B. exigua* was the least aggressive pathogen on the legumes tested and was more pathogenic on berseem leaves and roots. [**Naouel Ghiat, Hayet Meamiche-Neddaf , Alessandro Infantino, Christophe Le May, Abdelaziz Keddad, Abdelmoumen Taoutaou, Manu Afichard, Zouaoui Bouznad** (Algeria), J Plant Pathol ,2025. https://doi.org/10.1007/s42161-025-01885-3

Egypt

Thermal requirements and seasonal abundance of spiny bollworm based on variable field temperature derived from satellite images in Qaluobiya, Egypt.

The spiny bollworm (SBW), *Earias insulana* is one of the most serious cotton pests in Egypt and worldwide. The impact of temperature on this insect pest biology was investigated, with a focus on the duration of the various developmental stages. The rate of development, the lower temperature threshold and the heat unit accumulations needed to complete each life stage (egg, larvae, pupa, pre-oviposition) and generation period of SBW were determined under laboratory conditions. The insect population, seasonal abundance and field generation forecasting were studied by using remote sensing techniques, especially satellite images, to investigate the impact of temperature on insect population growth in the field. Results obtained showed that SBW had four seasonal generations in addition to the overwintering generation for each of the three cotton seasons (2020, 2021 and 2022). The observed peaks and the predicted peaks of generations per season were detected, and the predicted peaks were noticed earlier than the observed peaks, as the average deviation days were -3, -7 and -4 days for 2020, 2021 and 2022 cotton seasons, respectively. An earlier prediction of the SBW could be helpful in designing an integrated management program against this pest. [**El Hoseny, M.M., H.F. Dahi, A.M. El Shafei and M.S. Yones** (Egypt), Arab Journal of Plant Protection, 43(1):25-32,2025]. https://doi.org/10.22268/AJPP-001295

Evaluating the effectiveness of treating wheat flour with ECO2FUME® Fumigant, gamma irradiation and microwave heating in controlling adults and larvae of the Saw-toothed grain beetle, *Oryzaephilus surinamensis* and the effect of these treatments on some flour components.

The aim of this study was to evaluate the effectiveness of treating wheat flour with ECO2FUME® fumigant (mixture of phosphine and carbon dioxide), gamma irradiation, and microwave heating in controlling adults and larvae of the Suriname sawfly beetle.

Wheat flour was exposed to ECO2FUME®in Shona Qalyoub (Qalyubia Governorate, Egypt), and flour samples were exposed to gamma irradiation at the National Centre for Radiation Research and Technology, and A microwave oven under laboratory conditions. ECO2FUME® fumigant was used at a concentration of 25, 30, 40 and 50 g/m3, with exposure for three days. The mortality rate was 100% for adults and larvae, when applied at a rate of 50 g/m^3. The decline rate in the number of adults in the first generation was 100%, and there was no emergence of adults when treatment was made at the larval stage. Gamma irradiation was used at doses of 200, 400, 600, and 800 Gray. The highest mortality rate was 100% when adult insects were exposed to 800 Gray, ten days after treatment, and the larval mortality rate was 100%, five days after treatment at the concentrations of 800 and 600 Gray. In addition, population decrease rate (%) of adults of the first generation and larvae was 100% with all concentrations used. Microwave energy was used against adults and larvae of the Suriname saw beetle by exposing it to three different microwave powers, namely 180, 300, and 450 watts, for different exposure durations (20, 40, 60, 80, 100 and 120 seconds). The death rate reached 100% within 120 seconds with 450 watts. Regarding the effect of previous treatments on the main chemical components of wheat flour, the results generally showed slight differences in the protein, carbohydrates and fats content in wheat flour treated with gas at 50 g/m^3 and gamma rays at 800 Gray. Whereas, in the case of microwave treatment at 450 W, significant differences in protein, carbohydrate and fat content were recorded when compared with the control treatment.[**Ayad, E.L. and H.T. Abd Elhalim (Egypt),** Arab Journal of Plant Protection, 43(1):80-86, 2025]. https://doi.org/10.22268/AJPP-001285

Fumigant toxicity of four essential oils against two major stored date fruit insects and microbial load.

Dates are among the most important fruits with high nutritional value. These fruits are exposed to many pests that reduce their market value, including *Oryzaephilus surinamensis* (L.) (Coleoptera: Silvanidae), *Plodia interpunctella* (Hübner) (Lepidoptera: Pyralidae), in addition to a microbial load. This work aimed to investigate the effect of four crude essential oil fumigants: lavender (*Lavandula officinalis*), orange (*Citrus sinensis*), marjoram (*Majorana hortensis*), and eucalyptus (*Eucalyptus citratus*), as a safe alternative to manage these pests. Five concentrations of each oil (62.5 to 1000 mg/L of air) were evaluated at 3, 5, and 7 days after treatment. Results obtained indicated that the fumigant toxicity increased with the increase of oil concentration and exposure time. *L. officinalis* essential oil had the highest toxic effect against the 4th larval stage of *P. interpunctella* and the *O. surinamensis* adults, followed by *C. sinensis*, which was much more toxic as a fumigant than *M. hortensis* oil, whereas *E. citratus* oil was the least effective on the two tested insects. Results obtained also indicated clearly that Surinam adults were more tolerant to the four tested essential oils than the Plodia larvae. The four tested essential oils had high antibacterial and antifungal activity in the treated stored date fruits. This work clearly confirmed that lavender, orange, marjoram and eucalyptus oils can be used to protect stored date fruits due to their ability to control *P. interpunctella* and *O. surinamensis* insects as well as their ability to act as antibacterial and antifungal agents on stored date fruits. [**El-Shafei, W.K.M. and L.M. Lewaa. (**Egypt), Arab Journal of Plant Protection, 43(1):87-95, 2025]. https://doi.org/10.22268/AJPP-001289.

Evaluating host preference and the population dynamics of insect pests, spider mite and their associated predators on solanaceous crops.

Experiments were carried out at the experimental farm of the Faculty of Agriculture, Kafr El-Shiekh University, during the 2020 and 2021 summer seasons. The objectives were to observe population fluctuations of some arthropod pests and their preference for three solanaceous crops: eggplant, tomato and pepper. The study also examined the correlation between predators and certain pests. In addition to the spider mite, *Tetranychus urticae* Koch and *Tuta absoluta*, five piercing-sucking insects infested each of the vegetable crops: *Aphis* spp., *Thrips tabaci* Lindeman, *Bemisia tabaci* (Genn.), *Empoasca* spp. and *Phenacoccus hirsutus* Green. Results obtained revealed that eggplant was the most preferred solanaceous host that harboured 81.17% of the total aphids, *B. tabaci* (87.07%), and *Empoasca* spp. (53.51%), *P. hirsutus* (65.78%) and *T. urticae* (95.33%). The second preferred host was tomato, which had 58.17 and 88.83% of the total populations of *T. tabaci* and *T. absoluta*, respectively. Pepper plants were the least preferred host. Five predatory species were found associated with the above-mentioned pests. These arthropod predators were spiders, *Scymnus* spp., *Orius* spp., *Chrysoperla carnea* and *Coccinella* spp. Highly significant positive correlations were found between aphids and each of *Scymnus* spp. and *Coccinella* spp. In addition, the correlations between *T. tabaci* and *Orius* spp., and between *Empoasca* spp. and spiders were highly positively significant. Results highlighted that eggplant was the most infested by the piercing-sucking insects and the spider mite *T. urticae* compared to tomato and pepper. [**Abou-Attia, F.A.M., H.S. Hamouda, S.A. Kassem and O.M. Rakha. (**Egypt), Arab Journal of Plant Protection, 43(1):102-112, 2025]**.** https://doi.org/10.22268/AJPP-001290

Evaluating the effectiveness of rhizobacteria producing 1-aminocyclopropane-1-carboxylic acid deaminase in inhibiting tumor formation by *Agrobacterium tumefaciens.*

Crown gall is one of the most dangerous bacterial diseases affecting the production of fruit tree nurseries in Egypt and many countries of the world. In the present study, ten isolates of 1-aminocyclopropane-1-carboxylic acid (ACC) deaminase-producing rhizobacteria were isolated from the rhizosphere of apricot (*Prunus armeniaca* L.) and plum (*Prunus domestica* L.) trees to evaluate their ability to decrease tumor formation by *Agrobacterium tumefaciens* (synonym *Rhizobium radiobacter*). The ten isolates were identified as *Pseudomonas* strains based on 16S rRNA gene sequence analysis and deduced protein sequences obtained from a partial ACC deaminase structural gene (*acdS*) sequence. Co-inoculating castor bean (*Ricinus communis* L.) and kalanchoe (*Kalanchoe* sp.) plants with *A. tumefaciens* and four ACC deaminase-producing *Pseudomonas* isolates decreased tumor formation. However, six ACC deaminase-producing *Pseudomonas* isolates produced varying results in these two plant species. The results showed that isolates of *Pseudomonas vancouverensis* reduced tumor formation when co-inoculated with *A. tumefaciens* in castor bean and kalanchoe plants. However, the isolate *P. putida* inhibited tumor formation in castor bean plants but did not achieve the same effect in kalanchoe plants. Additionally, isolates of *P. frederiksbergensis* and *P. kilonensis* decreased tumor formation in kalanchoe plants while increasing tumor formation in castor bean plants. The results showed that ACC deaminase-producing *P. vancouverensis* is a promising biocontrol agent against

A. tumefaciens. [**Iman Amer Abdelhafiz Amer[1], Maurice Sabry Mikhail[1], Maryan Makram[1], Ashraf Fathy Abd El-Rahman[2] (**Egypt),[1]Plant Pathology Department, Faculty of Agriculture, Cairo University, Giza 12613, Egypt. [2]Bacterial Disease Research Department, Plant Pathology Research Institute, Agricultural Research Centre (ARC), Giza 12619, Egypt. Journal of Plant Diseases and Protection, 131:1907–1923, 2024].

Iraq

Mitogenomic variation of five *Apis mellifera* subspecies populations using mitochondrial protein-coding genes.

Honeybees are essential to both the preservation of biodiversity and the security of the world's food supply. Identifying genetic variation is a crucial step in preserving diversity. The current study used thirteen mitochondrial coding protein genes to characterize molecular genetic variation among populations of five *Apis mellifera* subspecies. The results obtained showed that the populations of both subspecies, *Apis mellifera mellifera* and *Apis mellifera jemenitica*, had a higher mean in genetic diversity features such as nucleotide diversity, the number of pairwise differences, and polymorphic sites. While the *Apis mellifera ligustica* subspecies population had the lowest mean of the same parameters. The patterns of genetic differentiation and gene flow revealed that *Apis mellifera scutellate*, *Apis mellifera capensis*, and *Apis mellifera mellifera* populations were the most closely related in terms of their mitogenomic sequences, whereas *Apis mellifera jemenitica* and *Apis mellifera ligustica* populations were the most distant mitogenomically within and between populations. Phylogeny, PCA, and haplotype network analysis revealed that some individuals in different subspecies had the same haplotypes. These findings imply that the genetic integrity of native honeybees is threatened as individuals from several subspecies that share the same mitogenomics. **[Bebane, P.S.A. (Iraq),** Arab journal of plant protection,43(1):38-45, 2025]. https://doi.org/10.22268/AJPP-001294

The effect of some isolates of Fungi that cause melon root rot disease on the germination of melon (*Cucumis melo* L.) seeds and seedlings.

This study was conducted at the Plant Diseases Laboratory of the Agricultural Pest Control Section, Agricultural Protection Directorate, Ministry of Agriculture, Baghdad, Iraq, and aimed to isolate and diagnose the common fungi associated with melon root rot disease and test their pathogenic ability to inhibit melon seed germination and infect seedlings. Isolation and diagnosis of fungi associated with root samples from melon plants that showed symptoms of discoloration, root rot and plant wilting from five regions in Iraq: Samarra, Dujail, Balad, Abu Ghraib and Al-Yusufiah, identified 38 isolates (F1 – F38) belonging to the fungi *Alternaria alternata, Curvularia lunata, Fusarium* spp., *Macrophomina phaseolina, Monosporacus* sp., *Pythium aphanidermatum* and *Rhizoctonia solani*. Results of testing the pathogenicity of the isolates on melon seeds by using water agar (WA) culture medium showed differences among isolates in their ability in reducing the germination rate of melon seeds, with a significant difference to the control treatment. , and the isolates F23 and F24 of *M. phaseolina* and F8 and F34 of *R. solani* differed from all other isolates due to their high pathogenicity, as they completely inhibited seed germination, with a highly significant difference from the control treatment, where germination rate reached 93.33%. Testing the pathogenicity

of the most pathogenic isolates in pots and under shade conditions confirmed that the two isolates of the fungus *R. solani* (F8 and F34) produced significantly the highest incidence and severity of infection, reaching 100% for both isolates. [**Slebi, E.A. and H.H. Al-Juboory (Iraq),** Arab Journal of Plant Protection, 43(1):46-53, 2025]**.** https://doi.org/10.22268/AJPP-001301

Evaluating field management protocol of the invasive pest red palm weevil, *Rhynchophorus ferrugineus* at Basrah, Iraq.

Monthly monitoring of the red palm weevil (RPW), *Rhynchophorus ferrugineus* populations was conducted using pheromone traps (RHYFER700). A six-year evaluation (2017-2022) assessed the effectiveness of a twice-yearly chemical control program. This protocol involved aerial spraying and injection of the insecticides imidacloprid and deltamethrin at Safwan County of Basrah, Iraq. The results obtained showed that the infestation levels of RPW across the studied orchards varied in 2017. However, in the year 2022, a noticeable reduction in infestation was observed, suggesting that the control protocol used was effective. The captured numbers of RPW adults per pheromone trap exhibited notable fluctuations during the study years. The monthly population of captured RPW also showed significant variation; the highest mean numbers of captured adults per trap were 2.06 and 2.47 weevils/trap in March and April, respectively. However, the lowest average number of captured weevils was 0.51 and 0.54 weevils/trap in January and December, respectively. Consistently, the sex ratio of RPW populations in Safwan County exhibited a bias towards female weevils. The study emphasized the need for continuous monitoring, which is essential for the adaptive pest management strategies of RPW infestations in date palm orchards. [**Alderawii, M.M., A.A. Alyousuf, S.A. Hasan, R.A. Abood, S.S. Abbas and R.T. Abdullah (Iraq),** Arab Journal of Plant Protection, 43(1):75-79,2025]. https://doi.org/10.22268/AJPP-001300

Effectiveness of some insecticides against Thrips (*Thrips tabaci*) on three onion (*Allium cepa* L.) varieties.

Thrips, *Thrips tabaci* L. (Thysanoptera: Thripidae), is an important insect pest that attacks the onion crop. Experiments were carried out to evaluate the effectiveness of different insecticides on thrips management by using three onion varieties: "Red" (Red Grano), "Yellow" (Yellow Creole), and "White" (White Grano). Four insecticides were used at the full and half recommended concentrations. Experiments were carried out using randomized complete block design with six treatments (three varieties, two doses (3 and1.5 ml/L), and three replications for each insecticide. The results obtained showed that the number of thrips was statistically significant between treatments. The dose of 3 ml/L was more effective than the 1.5 ml/L for all varieties, 14 days after treatment. The efficacy rate of Vertimec® insecticide reached 27.37, 27.34 and 26.73% at the dose of 3 ml/L for the three varieties, respectively. The efficacy of Actara® insecticide reached 53% with the yellow onion variety at the concentration of 3 ml/L. The Pinto® insecticide was more efficient on the red onion variety at the same concentration. The highest efficacy of Decis® insecticide was obtained on yellow onion variety 44.3%, using the same concentration of 3 ml/L. [**Majeed, Q.H. and M.S. Mansor (Iraq),** Arab Journal of Plant Protection, 43(1):69-74, 2025]. https://doi.org/10.22268/AJPP-001288

The Role of some fungi associated with the nile water hyacinth, *Eichhornia crassipes* as a biological control agents and assessment of disease development rate.

This study was carried out in the laboratories of the Ministry of Science and Technology, Agricultural Research Directorate, to detect fungi associated with the Nile water hyacinth *Eichhornia crassipes* spread on the banks of the Tigris River in the Zafaraniyah area, Baghdad, Iraq, and evaluate their efficiency as biological control agents and determine the rate of disease development (r). The results indicated that there were thirteen fungi associated with the Nile water hyacinth, namely: *Acremonium* sp. *Alternaria* sp., Aspergillus *flavus, Aspergillus niger, Cladosporium* sp., *Drechslera* sp., *Fusarium oxysporum, Mucor* sp., *Penicillium* sp., *Pythium aphanidermatum, Rhizoctonia solani, Rhizopus* sp. and *Ulocladium* sp. with relative occurrence of 3.45-50.7 %. The results indicated that the most common fungi were *Alternaria* sp., *F. oxysporum* and *R. solani,* with relative occurrence of 50.7, 34.57 and 30.50%, respectively. This is the first record of the presence of *F. oxysporum* on the leaves of the Nile water hyacinth in Iraq. The results also showed that the rate of disease development varied from one fungus to another when the weed was treated with fungi in the presence or absence of wounds on the leaves. The fungus *Alternaria* sp. was the most effective in both treatments. The highest rate of disease development was 0.650, 21-28 days after leaf wounding treatment, and 0.170, 21-28 days after the non-wounded leaf treatment. [**Al-Juboory, H.H. and A.J.M. Al-Shammary (Iraq),** Arab Journal of Plant Protection, 43(1):96-101, 2025]. https://doi.org/10.22268/AJPP-001298

Susceptibility of some potato (*Solanum tuberosum*) varieties to soft rot disease caused by *Enterobacter cloacae* and its relationship to the biochemical contents of its tubers.

This study investigated the susceptibility of 30 potato varieties to soft rot disease caused by the bacterium *Enterobacter cloacae* and its effect on the starch, potassium, and ascorbic acid content of tubers. The results showed that the Elmundo variety was the most susceptible to the disease, with the diameter of the inhibition zone reaching 8.90 cm within 6 days, followed by the Burren variety (7.87 cm), with a significant difference to all other varieties. The varieties most resistant to bacterial soft rot disease were Lady Rositta and Amarin, with a significant difference from all other tested varieties, as the inhibition zone reached 0.33 and 0.37 cm, respectively. The results obtained also showed that the tubers of the "Lady Rositta" variety were significantly superior in starch content, which reached 23.02%, whereas the lowest starch content was in the "Donata" variety, which reached 4.52%. The "Universa" potato variety had significantly the highest potassium content, which reached 4.645%. The "Lady Rositta" potato variety had the highest ascorbic acid content, which reached 0.84%, with a significant difference from all other varieties. The "Fandango" variety had the lowest content of ascorbic acid of 0.06%. Increase in starch, ascorbic acid and potassium content in the tubers has a role in giving their cell walls strength and rigidity, makes them resistant to infection with bacteria that cause the soft rot disease. In addition, potassium is an important nutrient for plant growth in general and has a major role in increasing the cell wall thickness , which makes the latter resistant to harsh conditions. [**Al-Aboudi, H.R.D. and F.A.A. Al-Rikabi (Iraq),** Arab Journal of Plant Protection, 43(1):113-125, 2025]. https://doi.org/10.22268/AJPP-001299

Estimating the degradation of the pesticides acetamiprid and thiamethoxam in the agricultural soil of the cabbage crop using HPLC technique.

The study focuses on the degradation of two pesticides, Thiamethoxam and Acetamiprid, that belong to the Neonicotinoid chemical group. This group is known for its water solubility, making these pesticides possible pollutants in agricultural settings. A research study aimed to estimate the residues of the pesticides Acetamiprid and Thiamethoxam in the soil of the Cabbage crop. Fields on the cabbage crop, Globe master variety, with an area of 30´5 m^2. The soil was preparedand the seedlings were moved from the appellant to the experimental field in three rows, during the autumn season for year 2023, Were used in the experiment Two concentrations of the pesticide acetamiprid, the recommended concentration 0.5 g/L and double the concentration 1 g/L, For Thiamethoxam, used at concentrations of 0.3 g/L and 0.6 g/L. The findings revealed that Acetamiprid, at concentrations of 0.5 g/L and 1 g/L, decreased significantly over time. One hour post-application, the residues measured 21.46 mg/kg for the lower concentration and 38.10 mg/kg for the higher concentration. These amounts further declined to 5.83 mg/kg on the ideal full degradation day, and the device could no longer detect the pesticide in subsequent days. After ten days, the highest detectable residue was 3.76 mg/kg. While Thiamethoxam, the residues one hour after application were 1.41 mg/kg and 8.87 mg/kg, respectively. These levels continued to decrease, reaching 5.2 mg/kg by the fifth day. After seven days, only a double concentration of 9.9 mg/kg remained detectable. The recovery rates for Acetamiprid and Thiamethoxam were 90% and 86%, respectively, indicating the efficiency of the methods used to analyze the pesticide residues in the soil samples. **[Ahmed. B. Abu-Duka, M.T. Mohammadali , Noor. A. Al-Ghazali, L.A. Kamel** (Iraq), University of Kerbala, Faculty of Agriculture -Department of Plant Protection, Karbala, Iraq. Agricultural Science Digest, 2025]. DOI: 10.18805/ag.DF-681

Quality and yield of potato seed tubers as influenced by plant growth promoting rizobacteria.

Using chemical fertilizers in agriculture increases production and improves the quality of the product; however, their higher usage globally has brought damage to ecosystems. Using biofertilizers is a better strategy to reduce the use of chemical fertilizers and ultimately increase soil fertility. This study aimed to isolate, identify, and characterize bacteria from the soil rhizosphere of medicinal plants (*Rumex tuberosus* L. and *Verbascum* sp.) for *in vivo* screening. Nitrogen fixation, phosphate solubilization, HCN, ammonia levels, Lipase, protease, catalase and side-rophore production biochemical tests were also conducted. The two isolates that gave positive results from the biochemical tests were chosen out of 25 for further experiments. Based on 16S rRNA sequencing analysis the isolated organisms were identified as *Alcaligenes faecalis* Go1 (Accession No. OP001725) and *Bacillus subtilis* T11 (Accession No. OP218376). The compound fertilizer NPK was used as the positive control for field experiments, while selected strains were individually and in combination were tested on potato crops as inoculum over two successive cropping seasons. Plant height, number of tubers per plant, chlorophyll content, and tuber weight all increased for both isolated bacterial strains. The quality of the potato tubers was checked through visual observation for the presence or absence of disease symptoms. The treated tubers exhibited excellent quality, remaining free from any signs of disease, however, the control tubers showed

infections with (*Streptomyces scabiei, Fusarium* sp., *F. solani* and *Erwinia amylovora*). The soil analyzed after harvesting both bacteria increased percentages of P, Ca^{2+}, Mg^{2+}, Na+, K+, SO4, total nitrogen content and total organic matter. The findings showed that the tested bacterial isolates could replace the use of chemical fertilizers in the production of potatoes. [**Muhammad Raqib Rasul, Tavga Sulaiman Rashid** (Iraq-Erbil), Department of Plant Protection, College of Agricultural Engineering Sciences, Salahaddin University, Erbil, Iraq. Biocatalysis and Agricultural Biotechnology 62, 103440, 2024].

Bioactive constituents in *Rhus coriaria* l. fruit extract and their antibacterial activity against *Xanthomonas vesicatoria*

The antibacterial activity of the acetone (70%) extract from *Rhus coriaria* was studied using a disk diffusion assay, and minimum bactericidal concentrations (MBC) and minimum inhibitory concentrations (MIC) were studied. Additionally, Gas Chromatography–Mass Spectrometry (GC–MS) was used for the detection of components, and selected compounds were checked for their antibacterial properties. The tested bacterium was *Xanthomonas vesicatoria* (KU661975), the causal agent of tomato bacterial leaf spot. *R. coriaria* extract exhibited superior outcomes against the tested bacterium compared to Streptomycin. Scanning electron microscope (SEM) observations revealed damage to the bacterial cell wall caused by the crude extract. Based on the GC–MS results, fifty chemical constituents were identified, including four compounds in the high peak region: malic acid (22.02%), 2–5-furandione (7.72%), succinic acid (6.10%), and hepta-2,4-dienoic acid (6.12%). The four selected compounds were purchased and tested for their antibacterial activity, with 2,5-furandione and malic acid found to be the most effective antibacterial components in *R. coriaria*. The outcomes of this research carry implications not only for the understanding of *Rhus coriaria* L. as a source of bioactive compounds but also for the development of novel strategies in combatting bacterial diseases in agricultural settings. [**Tavga Sulaiman Rashid and Hayman Kakakhan Awla**(Iraq). Eur J Plant Pathol 170, 1013–1021,2024]. https://doi.org/10.1007/s10658-024-02952-8

Lebanon

Sanitary assessment of the Lebanese germplasm collection and some introduced rootstocks of *Prunus* species.

A comprehensive survey was conducted in spring 2020 in the germplasm collection of the Lebanese Agricultural Research Institute (LARI) in Tal Amara, in order to assess the sanitary status of the main Lebanese cultivars of *Prunus* species, as well as of three introduced rootstocks, GF677, Myrobalan 29/C and Garnem propagated by tissue culture techniques and maintained at the Plant Biotechnology Department of LARI. A total of 82 samples were collected from peach, apricot, plum and cherry cultivars, in addition to all plantlets regenerated from meristem tip cultures of rootstocks. All collected samples were tested by ELISA for the presence of apple mosaic virus (ApMV), Prunus necrotic ringspot virus (PNRSV), plum pox virus (PPV), prune dwarf virus (PDV), apple chlorotic leaf spot virus (ACLSV), tomato ring spot virus (ToRSV), tobacco ringspot virus (TRSV), Arabis mosaic virus (ArMV), strawberry latent ringspot virus (SLRSV) and raspberry ringspot virus (RpRSV) and by PCR for the detection of *Ca.* Phytoplasma

phoenicium. After tests, 23 samples were infected by at least one virus, with the highest infection rate in peach cultivars (66.6%), followed by cherry (55.5%), apricot (40%) and plum (10.4%). PDV was the prevailing virus (22%), followed by ApMV (4.8%), ACLSV (3.6%) and PNRSV (3.6%). None of the other viruses and phytoplasmas tested were detected. In addition, all plantlets regenerated from meristem tip culture were free of viruses and phytoplasmas. In addition, also the bacterium *Xylella fastidiosa* (Xf) was not detected by another ELISA test performed in August on all cultivars in the germplasm collection. The 59 candidate "pathogen-free" clones identified in this study, added to the good health status of the new introduced rootstocks, represent a potential promising basis to produce certified plant propagation material in Lebanese nurseries. [**Elia Choueiri[1], Fouad Jreijiri[1], Souheir El Zammar[1], Ahmad Elbitar[2], Ali Chehade[2], Raied Abou Kubaa[3] and Michele Digiaro[4]** [1]Department of Plant Protection, Lebanese Agricultural Research Institute, Tal Amara, P.O. Box 287, Zahlé, Lebanon; [2]Department of Plant Biotechnology, Lebanese Agricultural Research Institute, Tal Amara, P.O. Box 287, Zahlé, Lebanon; [3]CNR Istituto per la Protezione Sostenibile delle Piante, Via G. Amendola 165/A, Bari, Italy; [4]Istituto Agronomico Mediterraneo di Bari, Via Ceglie 9, 70010 Valenzano, BA, Italy; Acta Horticulturae 1413: 159-164.2024]. https://doi.org/10.17660/ActaHortic.2024.1413.20

Micropropagation via nodal and internodal explants of Russian olive (*Elaeagnus angustifolia* L.) in Lebanon

Russian olive (*Elaeagnus angustifolia* L.) can tolerate and survive a wide variety of environmental conditions. In addition, it can be used in different therapeutic applications. The propagation of this species using traditional methods is often difficult. Therefore, this study aimed to develop an efficient in vitro propagation protocol in order to overcome this difficulty. Nodal segments and internodes sections, taken from 10-year old trees, were first sterilized before being successfully introduced in vitro for cultures establishment. Two basic mineral compositions, Murashige and Skoog (MS) and Lloyd & McCown Woody Plant Medium (WPM), supplemented with different plant growth regulator combinations. The medium supplemented with 1 mg L-1 of BAP and 0.1 mg L-1 of NAA presented the highest average number of shootlets, 1.75. Callogenesis of internodes sections was successful (83.33%) on MS medium plus 2 mg L-1 of zeatin and 0.1 mg L-1 of NAA. The best proliferation rate (3.81) was recorded on MS or WPM media devoid of growth regulators at the end of second subculture. Regenerated shootlets were transferred onto 12 rooting media consisting of either full or half-strength MS or WPM macro-elements supplemented with different concentrations of IBA (0, 1, and 2 mg L-1). Shootlet rooting was possible on full or half strength MS and WPM macro-elements without growth regulators, while the different concentrations of auxin failed to induce rooting. Rooted shootlets were all successfully acclimatized under the greenhouse conditions. [**Ahmad Elbitar[1], Zeinab Chamas[2], Ali Chehade[1], Elia Choueiri[1], Hussein Diab[2], Yolla Ghorra[3] and Zeinab Fahs[3]** [1]Lebanese Agricultural Research Institute, P.O. Box 287 Zahle, Lebanon, [2]Lebanese University, Faculty of Sciences, Beirut; Lebanon, [3]Université Saint-Joseph, Ecole Supérieure d'Ingénieurs d'Agronomie Méditerranéenne, Zahle, Lebanon; Acta Horticulturae 1413: 143-148.2024] https://doi.org/10.17660/ActaHortic.2024.1413.8

Micropropagation via shoot tips and nodal segments of ancient local pomegranate (*Punica granatum* L.) in Lebanon.

Lebanese pomegranate is threatened and the number of its individuals is decreasing. The propagation of this tree by traditional methods is a tedious procedure. Therefore, this study was conducted with the aim of determining an adequate micropropagation technique in order to overcome these difficulties as well as the preservation of local germplasm. The effect of two sterilization treatments and different plant growth regulator combinations were tested on two types of explants (shoot meristems and nodal segments) taken from two nearly 100 years old trees of pomegranate ('Hamod' and 'Lefani'). Sterilization of explants with sodium hypochlorite proved to be more effective than mercury chloride for the control of fungal and bacterial contaminations, the reduction of losses by means of oxidation as well as explant survival. MS medium supplemented with two antioxidants, ascorbic acid and PVP and different concentrations of the plant growth regulators BAP and NAA were investigated. Shoot meristem cultures on MS medium supplemented with 2 mg L-1 BAP and 0.5 mg L-1 NAA gave rise to shoots with high percentages, 93.3% for 'Hamod' cultivar and 90% for 'Lefani'. These shoots were healthy but relatively small that quickly became totally engulfed by callus formations with a vitrified appearance. As for the culture of nodal explants, the best percentage of reactive explants was recorded for 'Hamod' at 72%, and the mean number of shoots produced was 3.6 for 'Hamod' and 2.9 for 'Lefani'. Shoots showed high rates of callogenesis and vitrification even after decreasing the concentration of BAP. [**Ahmad Elbitar[1], Rim Al Hajj Sleimane[2], Ali Chehade[1], Elia Choueiri[3] and Aline Kadri[2]** [1]Department of Plant Biotechnology, Lebanese Agricultural Research Institute, Tal Amara, P.O. Box 287, Zahlé, Lebanon; [2]Faculty of Sciences, Lebanese University, Zahlé, Lebanon; [3]Department of Plant Protection, Lebanese Agricultural Research Institute, Tal Amara, P.O. Box 287, Zahlé, Lebanon. Acta Horticulturae 1413: 77-88.2024]. https://doi.org/10.17660/ActaHortic.2024.1413.9

Syria

Laboratory study of some biological parameters and life table of Opuntia Cochineal Scale Insect, *Dactylopius opuntiae* in Syria.

Opuntia cochineal scale insect, *Dactylopius opuntiae*, caused rapid, serious damage to the cactus *Opuntia ficus-indica* in Syria, after the first report in 2019. This study was carried out to study some biological parameters and the life table of the insect under laboratory conditions. The developmental durations of nymph 1 and nymph 2 were on average 7.39 and 8.47 days, respectively. The development was completed in 15.86 days. The average pre-oviposition and oviposition periods were 15.1 and 36.3 days, respectively. The average fecundity of females was 566.1 individuals. The average egg incubation period was 33.9 minutes. The hatching rate was 82%. In males, the developmental duration of nymph 1, nymph 2 and pupa were 8.15, 7.39 and 7.91 days, respectively. The insect development was completed in 23.28 days. The adult males lived only 3.3 days (on average) and the sex ratio (males:females) was 1:3. Life table investigations showed that the survival average (lx) was 0.55, the net reproduction rate (Ro) was 188 females/female, the mean generation time (T) was 50.42 days, the intrinsic rate of increase (rm) was 0.104 females/female/day, the finite rate of increase (□) was 1.11 females/female/day and the duration of doubling time (DT) was 6.67 days. Based on these results, it was concluded that *D. opuntiae* had a potential to colonize

the cactus plant rapidly, and the results obtained could be useful to understand pest biology and its dynamics in order to develop appropriate IPM programs. **[Asaad, F., Z. Chikh-Khamis and M. Bufaur (Suria)**, Arab Journal of Plant Protection, 43(1):1-9, 2025]. https://doi.org/10.22268/AJPP-001287

Effect of some nutritional supplements on biological and productive characteristics of Silkworm, *Bombyx mori* L.

The silkworm, *Bombyx mori* L. is an important silk-producing insect. Mulberry leaves are considered the only nutritional source of carbohydrates, proteins, amino acids, fats, and minerals needed for this insect to produce silk. This study was conducted during the summer 2022 at Silkworm Laboratory of the Scientific Agricultural Research Center in Latakia. It aimed to investigate the effect of fortifying mulberry leaves with aqueous extracts of some nutritional supplements: *Citrus* sp. pollen, probiotic fortified with vitamins, *Althaea* sp. extract, *Azolla* sp. extract and *Aloe vera* extract on biological characteristics and productivity of silkworm *B. mori.* Fourth and fifth instar larvae were fed mulberry leaves treated with nutritional supplement extracts. The results obtained confirmed the effectiveness of nutritional supplements in improving biological characteristics and productivity compared to the control. The highest larval weight (5.44 g) was for silkworms fed with mulberry leaves fortified with pollen. The highest effective rearing rate (ERR%), cocoon weight and female fecundity rate were 97.70%, 1.81g, 618.2 eggs/female, respectively, in response to probiotics treatment. In addition, all fortified feeding treatments were significantly superior to the control in terms of silk ratio, filament length, weight, and size which reached 19.18-19.88%, 1389-1511 m and 1.85-1.929 denier, respectively.[**Oukash, I., A. Arab and H. Al-Roz.(Syria),** Arab Journal of Plant Protection, 43(1):10-16, 2025]. https://doi.org/10.22268/AJPP-001297

Using cumulative degree-days model for prediction of olive fruit fly, *Bactrocera oleae* generations as an important element in the IPM program in Tartus, Syria.

Seasonal population density of the olive fruit fly, *Bactrocera oleae* (Diptera: Tephritidae) and its relationship to cumulative degree-days using McPhail traps containing ammonium phosphate 3% as attractant during the two successive years 2021 and 2022, was studied in an olive field in Tartous Governorate, Syria. The traps were placed from the beginning of May and data were collected on a weekly basis until the olive fruit fly disappeared. The results showed that the fly activity started from late May until early December in 2021 and from early July to late November in 2022. The highest density for *B. oleae* was in July as it averaged 165 and 114.67 insect/trap in 2021 and 2022, respectively. According to the cumulative degree-days, it was found that *B. oleae* has 4 generations in the two seasons with a fifth partial generation in 2021 and with a thermal constant that reached in the first season 848.75, 956.25, 917.5, 879, 589.75 DD for each generation, respectively, and in the second season 869.5, 909.5, 878, 804 DD for each generation, respectively, without significant differences between the two seasons (x^2 = 7.21, P = 0.06 and x^2 = 6.86, P = 0.07), respectively. However, according to the model followed, a simplified table was proposed to calculate the cumulative degree-days instead of using mathematical models, based on the daily maximum and minimum temperatures. [**Nameh, G., M. Al-Samara and S. Faskha.(Syria),** Arab Journal of Plant Protection,43(1):17-24,2025]. https://doi.org/10.22268/AJPP-001292

The effect of temperature on development and fecundity of citrus leafminer, *Phyllocnistis citrella.*

Citrus leafminer, *Phyllocnistis citrella* (Lepidoptera: Gracillaridae), recently has become a serious pest in Syria, especially in citrus nurseries. Development and fecundity of *P. citrella* were recorded at four constant temperatures ranging from 20, 25, 30, 35±1˚C, 70±10% relative humidity and photoperiod of 14:10 hours (L:D) and on seedlings of *Citrus sinensis* cultivar Valencia as host. This study was carried out in the laboratories of Latakia Center for Breeding and Applications of Biological Enemies during 2022. Results obtained indicated that the developmental time (egg to adult) of *P. citrella* decreased with increasing temperatures, ranging from 20.82 days at 20˚C to 10.25 days at 35˚C. Results also showed significant reduction in the incubation period from 7.58 days at 20˚C to 2.66 days at 35˚C, and mortality rate increase from 13 to 22% at 20 and 35˚C. respectively. The larval period was 9.44, 5.24, 4.48 and 4.0 days and pupal period was 9.22, 6.84, 5.76 and 4.78 days at 20, 25, 30 and 35˚C, respectively. The highest mortality rate in egg, larval and pupal periods was observed at 35˚C (22.00, 11.50 and 15.94%, respectively). At all temperatures studied the females lived significantly longer than the males. Both females and the males lived longer at a temperature of 20˚C (the female 13.3 and the male 11.5 days) and shorter at 35˚C (5.8 days for females and 4.5 days for males). The study showed that the preoviposition period was very short. Results showed significant reduction in Oviposition period, ranging from 8.43 to 5.52 days at 20 and 35˚C, respectively. The fecundity was found to be 27.74, 46.413, 57.8 and 49.5 eggs/female at 20, 25, 30 and 35˚C, respectively. The sex ratio for the offspring was 1:1.2, 1:1.4, 1.0: 1.5 and 1:1 male: female at 20, 25, 30 and 35˚C, respectively. It can be concluded from this study that the temperature of 30˚C was optimal for *P. citrella* development. [**Mihoub, S., A. Basheer and H. Alsayeda (**Syria), Arab Journal of Plant Protection, 43(1):33-37,2025]. https://doi.org/10.22268/AJPP-001293

Identification of physiological races for *Fusarium oxysporum* f. sp. *lycopersici* causing tomato *Fusarium* wilt in greenhouses along the Syrian coast.

This study aimed to identify the physiological races of the fungus *Fusarium oxysporum* f. sp. *lycopersici* (FOL), the causal agent of tomato *Fusarium* wilt, in greenhouses along the Syrian coast. The greenhouses in Latakia and Tartous governorates were surveyed during the period 2019-2020. The wilted tomato plant samples were collected during the late stage of plant growth. The pathogenic fungus was isolated from infected plant stems, and the causal agent species was identified according to colony and microscopic characteristics. The pathogenicity of the isolates was confirmed on a susceptible tomato hybrid. The physiological races were identified by the polymerase chain reaction (PCR) analysis of fungus DNA using specific primer sets (SP13 and SP23). The results obtained showed that all isolates belonged to race 1, and based on our knowledge, this is the first report of FOL race 1 along the Syrian coast**. [Sbieh, A., W. Choumane, M. Matar and Q. Al-Rhayeh. (Syria),** Arab Journal of Plant Protection, 43(1):54-61**,** 2025]. https://doi.org/10.22268/AJPP-001283

Saudia arabia

Acoustic sensor-based field efficacy evaluation of three different insecticides–Trunk injections against the red palm weevil, *Rhynchophorus ferrugineus*

Red palm weevil (RPW) is one of the major pests that has caused significant losses in date palm production worldwide in recent years. Effective management of RPW is important to minimizing its impact on date palm yields. Conventional techniques utilized to manage RPW have shown minimal effectiveness. The study aimed to evaluate the efficacy of the insecticides Fipronil, Imidacloprid, and Thiamethoxam against RPW by applying a trunk injection technique in naturally infested date palm fields. Additionally, the study monitored the efficacy of the insecticides for ten months post treatment using an acoustic sensor. After treatment with Fipronil, Imidacloprid, and Thiamethoxam, the mean burst rate impulses from RPW sound activities inside the date palm trunk was reduced, confirming the gradually mortality of RPW. The RPW impulse burst rate was decreased within 1–2 months post-treatment with these insecticides, while it increased in the control treatment. The results reveal that Fipronil reduced the RPW impulse burst rate from 0.50/s on day 0 to 0.07/s after 50 days post-treatment. In comparison, Imidacloprid reduced the RPW impulse burst rate to 0.07/s after 70 days post-treatment, which indicates a low level of infestation. Similarly, Thiamethoxam reduced the impulse burst rate from 0.97/s on day 0 to 0.08/s after 70 days of treatment. After 4 months of insecticide treatments, the RPW impulse burst rate dropped to zero which indicates the complete cessation of the RPW sound activities. The results suggest that a balloon injector may aid in delivering insecticides directly into the date palm trees, reaching the target more effectively. Furthermore, the acoustic sensor proved to be an effective tool for detecting and monitoring RPW activities in date palms. [**Omer, A. O., Alharbi, H. A., Husain, M., Rasool, K. G., Alwaneen, W. S., & Aldawood, A. S**.(Saudia Arabia). Sound & Vibration, 59(1), 1787-1787, 2025]. https://doi.org/10.59400/sv1787

Abundance and population dynamics of the major insect pests of date palm under the date palm-forage intercropping system.

This study aimed to investigate the influence of blue panic (*Panicum antidotale* Retz.) and alfalfa (*Medicago sativa* L.) growth around palm trees on insect pests. Four experimental treatments were employed to develop fodder around date palms in the field: alfalfa, blue panic, a combination of alfalfa and blue panic, and a palm monoculture without fodder. Each treatment consisted of six replications, resulting in a total of 24 date palms examined. Insect pests were collected monthly utilizing light and pitfall traps from January to December 2020. A one-way ANOVA was used to evaluate the effect of fodder treatments on the number of pests collected. Additionally, an ANOVA with repeated measures was used to analyze the impact of time on the quantity of insects collected across various fodder treatments. Each of these analyses was performed through SAS version 9.2. The study's findings demonstrated that most palm pests, such as *Oryctes elegans*, *Phonapate frontalis*, *Sphenophorus parumpunctatus*, *Xyleborus perforans*, and *Tenebroides mauritanicus*, significantly decreased with the introduction of fodder cultivations around the examined date palms. Additionally, the data demonstrated a highly significant difference over time in the fodder treatments for several insect pests, including *P. frontalis*, *X. perforans*, and *O. elegans*. [**K. A. A siry, N. A. H. Alkenani, H.A. Alshehri,** (Saudi Arabia). Iraqi Journal of Agricultural Sciences, (Special Issue) 56:311-320, 2025]

Emamectin benzoate residues in fruits and fronds of date palm trees following trunk injection.

Red palm weevil (RPW) is one of the most dangerous insect pests of the date palm. It primarily infests the palm trunk and, less frequently, the palm top. This study, conducted in the Kingdom of Saudi Arabia, is a continuation of previous work that demonstrated trunk injection with undiluted emamectin benzoate in date palm apically infested with RPW, resulting in approximately 91% complete healing. The same trunk injection achieved a 100% success rate in killing all RPW instars inside the palm trunk. In the present experiment, the same insecticide was injected at various intervals (between 1 and 12 months) into the trunks of healthy date palms, and subsequently, the residues of emamectin benzoate in fruits and fronds of the palm trees were analyzed. RPW larva rearing was conducted in the laboratory inside cut frond bases (karabs) of the injected palms. Results obtained indicated the absence of emamectin benzoate residues in the fruits at all maturation stages: early ripening (Bisr) in late June, mid-ripening (Rotab) in mid-August, and final ripening (Tamr = Date) in late-September. As for the insecticide residues, significant residues of emamectin benzoate (0.054 mg/kg) were detected in karabs after a trunk injection of only one month. In addition, RPW larva rearing inside the karabs, one month after trunk injection, gave a significant high larva mortality rate 83.3%. This study indicated that with the injection of the palm trunk by the undiluted pesticide emamectin benzoate, no pesticide residues were found in the palm fruits, and if the injection was made one month earlier, it provided significant protection to the bases of the fronds against the red palm weevil.[**Nasraoui, B., Y. Al-Fehaid, Z. Musallam, A. Al-Shawaf, E. Al-Matar, H. Al-Touirgui, M. Al-Blikhi, W. Bessadok, A. Al-Shareedi, M. Asiri, M. Al-Nasr and M. Al-Khriji and A. Al-Ghamdi (** Saudi Arabia), Arab Journal of Plant Protection, 43(1):132-136,2025]. https://doi.org/10.22268/AJPP-001302

Sudan

Effect of traps directions on the density of the peach fruit fly, *Bactrocera zonata* in Gezira state, Sudan.

In Sudan, the production of horticultural crops is affected by fruit flies (*Bactrocera* spp.) that may play a major role in reducing production and limiting the exportation capabilities. The objective of the present study was to investigate the effect of trap direction on the density of peach fruit fly, *Bactrocera zonata* in Gezira State, Sudan during 2016/2017 growing season. Three locations were selected in the study area and three sites were selected at each location. An orchard was randomly selected at each site and five directions for each orchard were determined. Methyl Eugenol trap was used to estimate the seasonal abundance of the fly among locations, sites and directions. Data were subjected to descriptive analysis and regression analysis. There were significant ($P \leq 0.05$) differences in the density of the fruit fly (*Bactrocera zonata*) among the directions in Alkamleen location. However, there were no significant differences in the density in Wad Medani and Elhagabdallah, Gezira State locations during the 2016/2017 growing season. In general, the highest density of the insect (13.14 insects per trap) was recorded in the west direction followed by the east direction (12.74 insects per trap), south direction (10.39 insects per trap) and center direction (10.11 insects per trap), whereas the lowest density (8.74 insects per trap) of the insect was recorded in the north direction. These findings could be useful in monitoring fruit flies (*Bactrocera* spp.) in the agro-ecological system of Gezira State, Sudan. [**Fadul, R.E.H., F.E.E. Salah**, **H. Abdelgader**, **A.A. E. Omer and A.B. Dafaallah (Sudan),** Arab Journal of Plant Protection, 43(1):137-142,2025]. https://doi.org/10.22268/AJPP-001284

GRADUATE STUDENTS THESIS (MSC AND PHD)

Etiological and epidemiological study of fig mosaic disease (*Ficus carica* L.) in Iraq

The prevalence of fig mosaic disease (FMD) was studied in southern, central and northern Iraq and in fig growing areas in Iraq (Najaf, Al-Hirah, Al-Diwaniyah, Samawah, Al-Hashimiyyah, Dhu Al-Kifl, Al-Suwayrah, Karbala, Tuwairij, Abu Ghraq, Shahraban, Tikrit and Sulaymaniyah). The symptoms observed are mosaic, yellow spots, vein bands and deformities, and the incidence rates vary between cultivars and geographical areas. The first survey of fig mosaic disease was conducted using RT-PCR technique on about 100 leaf samples collected in 2020. Six viruses were detected: (*FMV*), (FLMaV-1), (FLMaV-2), (FMMaV), (FFkaV), and the fig cryptic virus (FCV) was recorded, this is the first report of the presence of this virus in Iraq, . The second survey was conducted in the main fig production areas in Iraq in 2021, collecting 135 leaf samples for five cultivars (Aswad Diyala, Sultani, Waziri, Muslimawi, Shankali). FCV was detected in all areas with an overall incidence rate of 44.4%, the highest incidence rate in the country. . Six FCV samples were sequenced, and the corresponding sequences (OU452323-, OU452328, OU452327, OU452326, OU452325, OU452324) were deposited in GenBank. The Iraqi isolates are 96% to 100% similar to the Italian isolate BN13. The third screening of fig viruses was conducted in 2023 using high-throughput sequencing (HTS) or (NGS) technology to identify viral infections on fig trees. Genomic DNA and RNA were sequenced.. Total genomes of symptomatic fig leaf samples using the Illumina platform revealed the presence of Badna Virus 1 (FBV-1), Grapevine Badna Virus 1 (GBV-1), Citrus Exocortis Viroid (CEVd), and Apple Dimple Fruit Viroid (ADFVd). FBV-1 and GBV-1 genomes encode an open reading frame containing five protein domains. Phylogenetic analyses showed that FBV-1 is related to Iranian isolates, while GBV-1 is similar to Russian isolates. CEVd is related to other Iraqi isolates, while ADFVd is closely related to a Spanish isolate. This is the first report of these viruses and viroids in Iraq. An endogenous virus (EPRV Caulimovirus-Fca1), measuring 7556 bp, was found in RNA transcripts at a low level of expression and is considered the first global record of this virus on figs, and all of them were registered in GenBank. The Sultani cultivar (82.2%) had the highest infection rate, followed by Aswad Diyala cultivar (74%), and Shankali cultivar had the lowest infection rate. This study is the first report of the presence of infections by several types of viruses and viroids that play a role in the emergence of FMD on fig trees in Iraq. [**Nabeel Abdalla AL Kaeath (Iraq-Tunisia),** Al-Muthanna University - College of Agriculture, Department of Plant Protection. Supervisor: Ms. Naima Mahfoudhi, Professor, INRAT, University of Carthage (Doctorate, 2025)]. nabeel_kaeat@mu.edu.iq

Study of genetic variation and behavioral-based control of Termites *Microcerotermes diversus and Amitermes vilis* in date palm orchards in southern Iraq

The current study was conducted in 2022-2024 AD in southern Iraq on genetic variation in termites that infest palm trees and control it by adopting safe behavioral methods. For molecular genetic variation, a field survey was conducted in three governorates in southern Iraq, Basra, Maysan and Dhi Qar, which included sixteen areas to collect samples of termites that infest palm trees, with 26 samples. Each sample included 60 individuals of termites. The genetic study results showed the presence of two species of termites that infest palm trees: *Microcerotermes diversus* and *Ametermes vilis*. , *M.*

diversus showed noticeable genetic variation through the appearance of a subcluster during the drawing of the genetic evolutionary tree, which indicates the development of another species from the original species or subspecies. The species *M. diversus* was also recorded for the first time in GenBank within the sequence of the COX11 gene. Field and laboratory studies are also conducted on termites, the results showed that Deir and Zeraji district had the highest incidence of termite infestation, at 90% and 88%, respectively, Khadrawi and Shukr date palm varieties were more sensitive to termite infestation, with an average of 52.19 and 48.45 termites/frond base, respectively termites build their colonies at the bases of palm fronds that are more than 20 years old at a rate of 32.88 termites/frond base compared to palms that are less than 20 years old, and at the edges of the orchard at a rate of 74.35 termites/frond base. These colonies were built on the south side of the palm tree trunk at a rate of 123.54 termites/frond base compared to other geographical directions (east, west, north). The outbreak of termite infestation of palm trees occurs during the months of the year when temperatures are appropriate. In January, the termite intensity reached 115.59 termite /frond base, but it was decreased in April to 13.93 termite /frond base. The rates of winged individuals in Basra and Maysan governorates in 2023 and 2024 reached 787 and 265.2 winged individuals/light trap, respectively.

A study was also conducted on the preference of termites for palm varieties in orchards and determining the relationship between them and the severity of infestation in those varieties, the results of the study showed that termites prefer the Kadrawi variety due to the high carbohydrate content which reached 4.27 mg/ml, and the protein percentage, which reached 0.75 %, and the low percentages of phenols 3.46 mg/ml and lignin 0.58g /1g ,while it was the least possible in the Brim and Barhi. aboratory experiments were conducted to evaluate the effectiveness and repelling of some essential oils that extracted from six plants(Eucalyptus, jojobe, Dammas ,Basil, Mint, Arugula) that they most planted in orchards . The results showed that the eucalyptus oil *Eucalyptus camaldulensis* had a half-lethal concentration (LC50) reach to 16 ml/L, and the highest mortality rate for termites' workers reached 88.6 %.

The toxicity of three insecticides fipronil, bifenthrin and cypermethrin was also evaluated in the laboratory according to the recommended doses, laboratory results showed that LC50 values 0.61, 0.65 and 3.05 ml/100 ml, respectively, in general toxicity was very high, the pesticides were able to kill all termite workers within 24 hours. Therefore, they were all used in orchard experiments in three ways: spraying, toxic baiting and soil treatment. At the recommended doses, the results showed that the spraying of fipronil caused a 100% mortality in termite colonies after one week, while bifenthrin and cypermethrin caused mortality in termite communities to reach 93.04% and 82,15%, respectively.For the toxic trunk bait stations experiment the results was that eliminated termite colonies after three weeks in 100% for traps that treated their bits with fipronil but other pesticides and eucalyptus oil did not show promising results in reducing the termite population.

As for the soil treatment, it did not make a significant difference in eliminating termites the reduction rate of the termite community for the three pesticides fipronil, bifenthrin and cypermethrin was 33.17% ,16.87% and 13.10 % respectively after one month. It is noteworthy that the ground bait traps were not invaded by termites throughout the experiment period. The pheromone extracted from the abdominal region of alate termites was also evaluated for the first time, the results of the laboratory evaluation showed that the extraction of the sexual pheromone compound attracts alate individuals in rate 41.67%, Which contains a concentration of 17.63 of the unsaturated aliphatic alcohol, which is: (Z) 6,(Z)9Pentadecadien-1-ol, as shown by gas chromatography (GCMS) analysis, which may be attributed to the process of attracting alate individuals. It was also evaluated in the orchard after loading the extracted pheromone compound on polymeric materials, cellulose and pure paraffin in stick delta traps. The results showed that the compound loaded on cellulose fibers achieved a higher attraction rate than the compound loaded on paraffin. The average number of attracted individuals reached 32.6 and 13.4 alates after a week, respectively. [**Aqeel Abedulrazak Kraidi (Iraq),** Plant Protection, Prof. Dr. Aqeel Adnan Alyousuf and Prof. Dr. Muslim Ashor Abdulwahed (Doctorate,2025)].

Genetic diversity of Seed-Borne pathogenic fungi in wheat crops of Karbala governorate and their management using Integrated control strategies

The study aimed to isolate and diagnose fungi transmitted via wheat grains in Karbala and evaluate the efficacy of biological and chemical control methods. Sixty-nine samples were collected from wheat fields (2022–2023), yielding 172 fungal isolates dominated by Alternaria (74%), followed by Stemphylium (10%) and Cladosporium (6%). Pathogenicity tests showed germination inhibition rates of 55.55–100%. Molecular diagnostics revealed high genetic homogeneity (>99%) in *A. alternata* and *A. chlamydosporigena* isolates, while *A. sorghi* isolates varied regionally. Metagenomics and whole-genome sequencing (WGS) were applied for the first time in Iraq, enabling the assembly of genomes for three pathogenic fungi and identification of their virulence genes. The biopreparation BioHealth (85.85–86.5% efficacy) outperformed EM1 (11.02–22.45%) and chemical pesticides (Raxil: 78.1%, Swarm: 78.02%) in fungal inhibition. In field trials, BioHealth combined with biopriming significantly reduced infections compared to integrated treatments. The results emphasize adopting BioHealth as a sustainable alternative to chemical pesticides and developing wheat varieties resistant to seed-borne fungi. This study is the first in Iraq to apply advanced genomic techniques for pathogen diagnosis, establishing a foundation for more effective disease control strategies. [**Zainab Lateef Hameed Al-Tamimi (Iraq),** The Council of the College of Education for Pure Sciences, University of Karbala-Iraq. (Doctorate**,** 2025)].

Bioecology and differential Gene expressions of Fall armyworm, *Spodoptera frugiperda (J. E. Smith) (Lepidoptera: Noctuidae)*, in Jordan.

Spodoptera frugiperda (J. E. Smith) (Lepidoptera: Noctuidae), commonly known as the Fall Armyworm (FAW), is a new destructive pest to Jordan that is native to the Americas. It is one of the major problems for agriculture, feeding on leaves and stems, which harms and adversely affects crop production.

This highly polyphagous pest has attacked more than 353 plant species, including maize and various vegetable crops. In September 2020, it was first recorded in Jordan. The devastating damage is evident in corn, and it can potentially extend to a wide range of other vegetables, which would have significant economic impacts on farmers. *S. frugiperda* is a significant invasive species due to its life cycle and ability to disperse and reproduce when climatic conditions become favorable. In this study, host preference, insect response to plants, and the efficacy of different chemical, botanical, and biological pesticides (indoxacarb, emamectin benzoate, azadirachtin, and *Bacillus thuringiensis*) were among the aspects assessed in field experiments. Moreover, RNA extraction was performed from several developmental stages of *S. frugiperda* (adult, larvae, and pupa) to analyze differential gene expression.

The results showed that corn was significantly the most preferred crop, with 45 out of 375 plants infested, and accounting for 32% of the total larvae, followed by tomato at 25%. eggplant and pepper showed intermediate levels of attraction, with 17% and 14%, respectively.

Squash was the least preferred host, attracting only 12% of the larvae, with an average latency of 2.5 minutes. In terms of pest control, azadirachtin exhibited the highest impact one day after application, while indoxacarb began showing effectiveness on the first day and continued to be effective until day six, reaching its peak by the end of the week. However, azadirachtin degraded after seven days, most likely due to UV degradation.

For gene expression, HSP 29 was highly expressed in the adult stage and then in group 2 (instar 3-4), indicating that it plays a major role in response to specific conditions. HSP binding protein was most up-regulated during group 2, followed by the pupa and group 3 (instar 4-5), with expression levels of 63, 39, and 19, respectively, compared to the control. Meanwhile, HSP70 and its isoform X2 exhibited similar expression patterns. These results highlight the need for integrated pest management approaches combining chemical and biological controls to sustainably manage *S. frugiperda*.

The alternative safe and effective substitutes for synthetic chemical insecticides, azadirachtin and Bt., were effectively utilized in the present study. The silencing of the HSP29 gene of *S. frugiperda* by RNA interference results in a greatly impaired response of the stress tolerance mechanisms of the insect, particularly when faced with thermal and oxidative stress. This interference diminishes the pest's adaptation to its host environment and consequently decreases fitness, survivorship, and feeding efficacy. [**Wafaa R. Isleem (Jordan),** Supervisor: Dr. Tawfiq M. Al-Antary, Prof. Co-supervisor, Dr. Monther T. Sadder, Prof. (Doctorate, 2025)].

Effect of resistance inducers on growth and productivity of tobacco plants and their role in preventing downy mildew disease

This research was aimed at increasing resistance to two different tobacco cultivars using the resistance inducer BTH in addition to two strains of PGPR bacteria (*Bacillus subtillis* FZB27 and *Pseudomonas chlororaphis* Ma342) under conditions of artificial infection with the fungus *Peronospora hyoscyami* f. sp. *tabacina*, the cause of downy mildew on tobacco.

The results showed that both BTH and the bacterial strain MA342 together were significantly superior to the rest of the studied treatments in stimulating growth indicators of weight and leaf area traits of the cultivar Virginia both in plants treated together in the field and in the nursery and in plants treated in the nursery only in percentage terms (98.1%, 81.3%) and (52.8% and 42%), respectively, compared to the untreated control. While the growth indicators for the traits of leaf weight and area were significantly superior to the plants of the local variety (Shak al-Bint) treated in the field and in the nursery together with the FZB27 strain bacterium by a percentage of (46.5%, 47.6%), and the nursery-treated plants only by a percentage (29.1%, 29.4%) in terms of leaf weight and area compared to the untreated control.

Plants treated in the field and in the nursery together with resistance inducers showed a clear superiority in both varieties over plants treated only in the nursery. In addition, when examining the disease severity, it was found that in plants treated with resistance inducers (BTH, BTH with MA342 bacteria, BTH with FZB27 bacteria), no infection symptoms were observed in plants of the Virginia variety treated both in the field and in the nursery.

Plants of the same variety did not show any symptoms of infection in the nursery when treated with resistance inducers (BTH, FZB27 bacteria, BTH with FZB27 bacteria). Plants of the local variety (Shak Al-Bint) treated with resistance inducers (BTH, BTH with MA342 bacteria, BTH with FZB27 bacteria) in the field and the nursery did not show any symptoms of infection, while the disease severity was 0% in the plants treated in the nursery only with the resistance inducer BTH during the different stages. [**Hassan Mansour (Syria),** Department of Plant Protection, Faculty of Agriculture, Damascus University, Supervisor: Prof. Dr. Ahmad M. Mouhanna, Co-supervisor: Prof. Dr. Walid Naffa (Master, 2025)].

Effect of aqueous extracts of *Phytolacca americana* plant on the honey bee immune system and determining its role in protecting it from pests

This research was conducted during 2021 and 2024 in the Biodiversity Laboratory of the National Commission for Biotechnology (NCBT) and the laboratories of the Plant Protection Department at the Faculty of Agricultural Engineering at Damascus University. This study aimed to detect some chemical compounds of *Phytolacca americana* L., and the effect of aqueous extracts of *Phytolacca americana* on the life span and stimulation (strengthening) of the immune system of the honey bee worker *Apis mellifera*, and combating the *Varroa destructor* Oud parasite.

Several bee samples were collected from the apiary of the Faculty of Agriculture at Damascus University between March and September of the years 2021 to 2023. A set of primers specialized in detecting the most widespread honey bee viruses in the world were used. The results of the chemical analysis of the aqueous extracts of the plant parts (leaves - fruits - roots - branches) of *Phytolacca americana* L. showed that all extracts contained

varying proportions of Phenols, Tannins and Saponins. The highest content of phenols and tannins was recorded in the aqueous extract of the leaves of *Phytolacca americana*, reaching 128 µg / ml and 79.2 µg / ml, respectively. The aqueous extracts of the different plant parts of Phytolacca americana showed a significant positive effect on the average life span of the honey bee worker compared to the control.

There were no significant differences between the two treatment methods, whether spraying or feeding. The highest effect was for the leaf extract at a concentration of 100 ppm, where the average number of workers that remained alive was 76%. The average increase in the life span of the honey bee worker was 52.6% compared to the untreated control. The leaf extract at a concentration of 100 ppm also gave positive results by spraying to control Varroa mites, with an average relative effectiveness of 83.3% compared to the control treated with distilled water spraying.

The average ratio between pre- and post-application shedding (double), which is the number of times the number of Varroa mites falling after 24 hours of treatment compared to the average natural shedding before treatment, was 6.2 times compared to the control, which was 1.6 times.

The ratio between the average shedding after one hour of treatment compared to the average total shedding after 24 hours of treatment was 54.2%. In addition to the above, when studying the efficiency of the leaf extract at a concentration of 100 ppm in stimulating the immune system of honey bee workers through the appearance of antimicrobial peptides (Hymenoptycin, Abasin, Defensin and Apidisin), it showed positive results in increasing the number of honey bee workers that remained alive and which were added to the feeding solution with a suspension of DWV virus and the plant extract, as they remained alive for 12 days compared to workers that were fed on a sugar solution only, as they remained alive for 10 days, and workers that were fed on a sugar solution and a virus suspension lived for only three days. [**Mai Omar Sharaf (Syria),** Department of Plant Protection, Faculty of Agriculture, Damascus University, Supervisor : Prof. Dr. Ahmad M. Mouhanna and Co-supervisor: Nawras Al-Abrass, (Master, 2024)].

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

FAO Strengthens Pesticide Governance at OECD Workshop in Egypt

Cairo, Egypt | 15–17 April 2025

The Food and Agriculture Organization of the United Nations (FAO), represented by Mr. Thaer

Yaseen, FAO Regional Officer for Plant Protection, FAO RNE, participated in the Workshop on Pesticide Risk Reduction held in Cairo from 15 to 17 April 2025. The event was organized in collaboration with the Organization for Economic Co-operation and Development (OECD), the Ministry of Planning, Economic Development, and International Cooperation, and the Ministry of Agriculture and Land Reclamation in Egypt. The workshop brought together policymakers, regulatory authorities, and inspectors from various Egyptian government entities, focusing on enhancing Egypt's efforts toward safer and more sustainable pesticide management. The goal was to raise awareness and provide technical guidance over three days, each targeting specific groups: policy makers on the first day, regulatory authorities on the second, and field inspectors, including customs officers and agricultural inspectors, on the third. The event began with welcome remarks from Professor Dr. Mohamed Abdel-Mageed, Chairman of Agricultural Pesticide Committee and the OECD, followed by an overview of the programme.

The discussions centered around the OECD's role in pesticide regulation, legal frameworks, and recommendations on combating the illegal pesticide trade, risk indicators, and protecting proprietary rights. Egypt also presented its national pesticide management framework, outlining policies and implementation efforts. Later sessions covered key topics such as monitoring pesticide poisoning, prevention strategies, and drone-based pesticide risk management, with insights from international experts.

The workshop underscored FAO's role in supporting national pesticide governance. In this context, Mr. Thaer Yaseen delivered a keynote presentation on the FAO Pesticide Registration Toolkit and FAO Pesticide Specifications, emphasizing their importance in strengthening national regulatory frameworks and promoting the safe and sustainable

use of pesticides. Mr. Yaseen expressed appreciation for the collaborative spirit of the workshop. He reiterated FAO's commitment to supporting Egypt and all NENA countries in improving pesticide regulatory frameworks and inspection systems for a healthier, more sustainable agricultural sector.

The workshop served as a capacity-building and knowledge-sharing platform, marking a significant step toward enhancing pesticide governance and fostering cooperation among stakeholders to ensure safe agriculture, public health, and environmental protection.

Strengthening plant health and resilience: Highlights from CPM-19

21/03/2025 Rome

The Nineteenth Session of the Commission on Phytosanitary Measures (CPM-19) took place from March 17 to 21, 2025, at the Food and Agriculture Organization of the United Nations (FAO) Headquarters in Rome. The event gathered international experts, policymakers, and stakeholders to discuss the future of global plant health. The event included plenary sessions, side events, and technical discussions, fostering knowledge exchange among IPPC contracting parties. The FAO regional office for NENA contributed significantly to adopting International Standards for Phytosanitary Measures (ISPMs), crucial for global plant health and safe trade.

During CPM-19, Mr. Thaer Yaseen, Regional Plant Protection Officer for the Near East and North Africa (NENA) region engaged with international experts, policymakers, and stakeholders to discuss and adopt crucial International Standards for Phytosanitary Measures (ISPMs). These standards are vital for strengthening global plant health and facilitate safe trade practices. "Our collective efforts in adopting and implementing robust phytosanitary measures are essential for safeguarding plant health in our region, ensuring a stable and healthy food supply for its growing population, hence enhancing food security, and promoting sustainable agricultural development," said Mr. Yaseen."

Key highlights included the adoption of the IPPC ePhyto Solution, with 136 countries registered and over seven million ePhytos exchanged. Progress was made in developing commodity-specific ISPMs, managing e-commerce pest risks, and assessing climate change impacts on plant health. The CPM-19 has approved a new draft standard titled "Safe Provision of Humanitarian Aid in the Phytosanitary Context." This standard seeks to prevent the introduction or dissemination of plant pests through relief shipments during humanitarian crises, hence safeguarding agriculture and biodiversity.

The launch of the IPPC Plant Health Campus during the CPM-19 represented a significant advancement in global plant health capacity building, providing a complimentary digital e-learning platform for NPPOs, governmental bodies, and plant health experts. This initiative was created as part of the "Strengthening Food Control and Phytosanitary Capacities and Governance" project, funded by the European Union. This extensive educational platform aims to fortify international phytosanitary systems, improve food security, facilitate safe trade, and safeguard biodiversity. During the session, participants engaged in fruitful discussions on critical issues related to plant health and biosecurity, emphasizing

the importance of international cooperation in combating plant pests and diseases. Key topics included strengthening international standards for pest risk analysis, promoting sustainable agricultural practices, and enhancing capacity building for developing countries. The session also addressed pressing plant health issues and promoted innovative solutions for managing pest risks

https://www.fao.org/neareast/news/details/strengthening-plant-health-and-resilience--highlights-from-cpm-19/en

FAO Unveils innovative strategies for Red Palm Weevil management in Egypt

Workshop highlights knowledge sharing and team collaboration to combat red palm weevil

21/03/2025, Egypt

In a pioneering step, the Food and Agriculture Organization (FAO) unveiled innovative strategies to combat the red palm weevil during a workshop held in collaboration with the Ministry of Agriculture and Land Reclamation at the Dakhla Centre in New Valley Governorate from March 17 to 21, 2025. The workshop saw extensive participation from agricultural experts and pest management specialists, all united in facing this destructive pest, reflecting FAO's commitment to achieving food security and sustainability in agriculture. The workshop focused on showcasing a range of innovative solutions and contemporary techniques in red palm weevil management. Participants emphasized the importance of these strategies in protecting palm cultivation, a major income source for many farmers in Egypt. The workshop aimed to equip participants with the knowledge and tools necessary to combat the red palm weevil through sustainable practices. Key highlights of the workshop included:

- Regional Knowledge Sharing: Participants discussed the outcomes of the regional program for red palm weevil management in the Near East and North Africa. Best practices and advanced techniques developed during the project, including integrated pest management strategies and advanced detection techniques, were exchanged, contributing to reducing the spread of the red palm weevil.
- Awareness and Education: The workshop aimed to raise participants' awareness about FAO's efforts to combat the red palm weevil in Egypt and the region. It provided a comprehensive analysis of the challenges associated with this pest and the importance of coordination among different entities to address it.

- Innovative Solutions: Participants explored advanced research on innovative detection methods, monitoring techniques, and effective control strategies. Discussions highlighted this pest's economic and social impacts, stressing the need for coordinated responses.
- Capacity Building: The workshop served as a comprehensive training platform for pest control engineers and agricultural advisors, including a field visit to a farm infested with the red palm weevil. Participants learned the importance of applying good agricultural practices, regular inspections, visual checks on palm trees, stages and symptoms of red palm weevil infestation, preventive measures, and optimal use of traps and other control methods such as injections. This practical training enhanced participants' practical knowledge, strengthening their capabilities in managing risks associated with the red palm weevil.
- Farmer Empowerment: The workshop focused on introducing the concept of farmer field schools, designed to enhance participatory practical training. It emphasized the role of these schools in encouraging farmers to actively participate in red palm weevil management programs and adopt good agricultural practices. The importance of this approach was stressed to ensure the successful transfer of modern techniques and innovative methods to combat this pest in a participatory and simplified manner for local farmers.

This event is part of the activities of FAO's regional program on red palm weevil management in the Near East and North Africa. The program aims to support national efforts and assist countries in improving sustainable red palm weevil control strategies and programs. The program seeks to reduce the spread of this pest and eliminate it by providing stakeholders at both national and regional levels with the necessary tools for sustainable weevil control. https://www.fao.org/neareast/news/details/fao-unveils-innovative-strategies-for-red-palm-weevil-management-in-egypt/en

New Publication

Sustainable management of Palm and Date Pests: concepts and techniques

The idea for writing the book "Sustainable Management of Date Palm Pests: Concepts and Techniques" emerged from discussions and requests made by date palm farmers, facilitators, and stakeholders during the Farmer Field Schools organized as part of the Red Palm Weevil Eradication Programme in the Near East and North Africa, coordinated by the Food and Agriculture Organization of the United Nations for the period 2019-2024. This book offers a comprehensive understanding of the foundations and concepts of managing the most significant pests affecting date palms, including dubas bugs, white and green scale insects, trunk and frond borers, red palm weevils, and dust spider mites, as well as insects that affect stored dates and others. Additionally, the book reviews various control methods, ranging from traditional practices to the latest biotechnologies and sustainable agricultural approaches. It emphasizes integrated pest management and biological techniques that minimize negative environmental impacts. This publication serves as a valuable reference for farmers, researchers, and anyone interested in palm cultivation. It provides insights that facilitate more efficient and sustainable decision-making. Adopting sustainable solutions for palm pest management is essential for ensuring sustainable agricultural production, protecting environmental resources, and achieving food security for future generations. Alongside the lead author, 27 co-authors contributed to enriching part of the book's content.

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

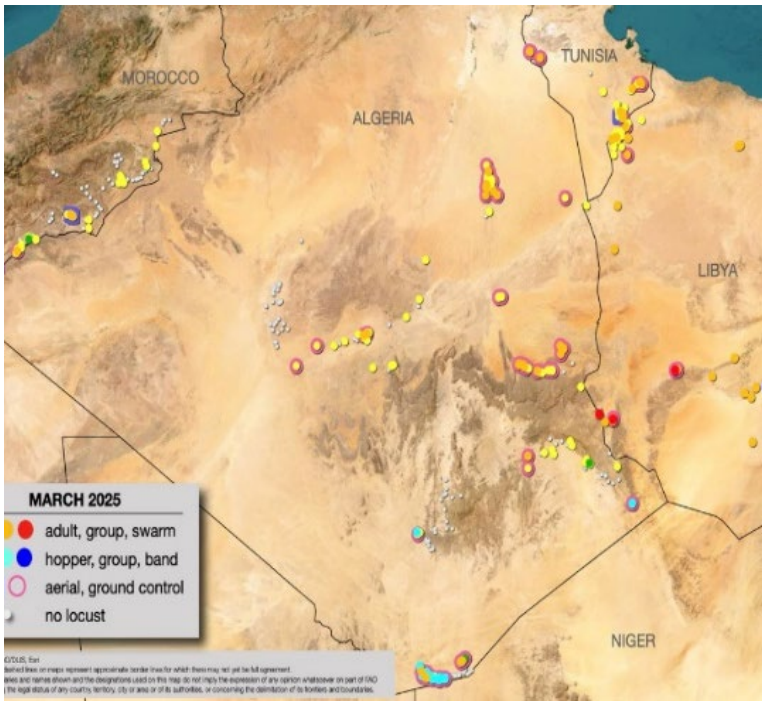
Desert Locust Situation

Desert locust situation in March 2025

In March, the desert locust outbreak expanded from sub-Saharan Africa to northwest Africa. Adult groups reached several locations in Algeria, Libya, and Tunisia, and to a lesser extent, Morocco. Spring breeding began in these countries where rains had fallen, and small adult groups and hopper bands began to appear by the end of the month. Hopper groups and adults persisted in southern Algeria, and hopper bands were also found in Chad. Breeding of scattered adults occurred in Morocco. Locust numbers declined along the Red Sea coast of Sudan and Egypt, where some hopper bands and groups were present. In the Nile Valley of southern Egypt and northern Sudan, swarms and adult groups persisted, and spring breeding began. Hopper bands continued to occur along the northern coast of Saudi Arabia. Control operations continued but declined compared to February.

Forecasting desert locusts up to mid-May 2025

Spring breeding is expected to continue in northwest Africa, particularly in central Algeria and western Libya, as well as in Morocco and southern Tunisia. Adult groups and small swarms will breed, increasing hopper bands and groups. Some locusts may persist in northern Niger, Mali, and Chad. In the Nile Valley, swarms and adult groups will continue to breed, particularly near irrigated crops in northern Sudan and southern Egypt. In Saudi Arabia, locusts will move from the Red Sea coast to interior areas for a full generation of spring breeding. Control operations will remain essential in these areas. Significant developments are unlikely in the eastern region. Concerned countries should continue surveying and early control of any locust populations.



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

1. Advanced Field Training Workshop Boosts Desert Locust Control Capacities in Egypt

As part of the project "Emergency Response to the Desert Locust Outbreak in Egypt" (TCP/EGY/4001), a field-based training workshop was organized by FAO in collaboration with Egypt's Ministry of Agriculture and Land Reclamation, represented by the Central Administration for Pest Control and the General Administration for Desert Locust and Agricultural Aviation. The workshop was held at the Abu Ramad station from 19 to 23 January 2025.

The training targeted 20 specialists from various desert locust stations, aiming to enhance their skills in field surveillance and control through simulation exercises and the use of advanced tools like eLocust3 and eLocust3mPro.Participants received hands-on training on GPS use, ULV pesticide sprayer calibration, biological control methods, safe pesticide handling, and planning control operations.

During field simulations, participants were divided into groups to simulate desert locust outbreaks using wooden models placed in valleys, recording data and uploading it via the eLocust3M app. Pre- and post-training assessments showed a significant improvement in knowledge and practical skills, reflecting the success of the training in strengthening national locust management efforts.

2. Joint Technical Trial by Central and Western Region Locust Commissions to Evaluate Spray Drone Use Against Desert Locusts.

Mauritanian, Nouakchott, 09 – 14 December 2024

As part of the ongoing collaboration between the Commission for Controlling the Desert Locust in the Central Region (CRC) and its counterpart in the Western Region (CLCPRO), a joint field trial was conducted in Mauritania to test the efficiency of Uncrewed Aerial Spray Systems (UASS) for ultra-low volume (ULV) pesticide application against desert locust infestations. The test used the *Micron U16* hexacopter drone, equipped with a high-resolution gimbal-mounted camera to capture real-time visuals of spray operations. Fluorescent tracer dyes and oil-sensitive cards (26x75 mm) were used to assess droplet distribution and deposition rates.

Spray trials were conducted at altitudes and two forward speeds to evaluate effective swath width and rotor downwash effects. Sampling lines extended up to 250 meters downwind.

The drones demonstrated clear advantages in reaching inaccessible terrain such as dry riverbeds, wetlands, mountains, and dense brush—where conventional ground vehicles or manned aircraft are ineffective. This trial highlights a growing technical synergy between regional commissions. A second enhanced trial is planned for April 2025 in Oman to validate recent system upgrades under realistic locust control scenarios in desert conditions.

3. Marrakech Hosts Regional Dialogue to Strengthen Desert Locust Control Cooperation.

High-ranking delegations from ten member countries of the FAO Commission for Controlling the Desert Locust in the Western Region (CLCPRO) convened in Marrakech, Morocco, for the Joint Meeting of the 11th Session and the 17th Executive Committee of the Commission.

The meeting came at a crucial time as several member states, including Niger and Algeria, continue to battle renewed desert locust infestations. Delegates shared national responses and challenges, reinforcing the need for a collective and coordinated approach. A key highlight was the emphasis on building national capacities through two newly launched programs: a Master's in Acridology at the Hassan II Institute in Morocco, in collaboration with the Central Region Commission (CRC), and a Senior Technician program in Algeria.

Participants discussed strategies to strengthen regional cooperation between CLCPRO and CRC, particularly in the areas of staff training, biological control methods, and modern information and data management.

The application of drone technology for locust survey and ULV pesticide spraying was a major point of discussion, with calls for organizing dedicated workshops for drone

maintenance, flight operations, and environmental data analysis. The expansion of the Commission was also addressed: The Gambia officially joined in November 2024, and Cape Verde has formally requested membership, signaling growing interest in regional collaboration.

One of the major outcomes of the meeting was a reaffirmation of the critical importance of regional solidarity in combating desert locusts, enhancing preventive control measures, and ensuring food security across the Sahel and North African regions. The Commission resolved to seek new partnerships and coordinate with financial institutions. A future visit to the Islamic Development Bank was proposed to present a joint initiative aimed at scaling up preventive control systems across both Western and Central Region member states.

4. Oman Enhances Desert Locust Response Capacity through Advanced Aerial Control Training

As part of ongoing national efforts to combat desert locust infestations, the Commission for Controlling the Desert Locust in the Central Region (CRC), in collaboration with the Ministry of Agriculture, Fisheries, and Water Resources in the Sultanate of Oman, organized a specialized training course on Aerial Control Techniques. The course took place in Muscat from 16 to 20 March 2025.

The training targeted 23 plant protection engineers and technicians from the Ministry, aiming to enhance their competencies in aerial surveys, ULV (Ultra-Low Volume) spraying operations, adherence to safety protocols, and field-based decision-making during control campaigns.

The course adopted a highly participatory approach, combining interactive lectures and group discussions with both theoretical and practical components. Key topics covered included droplet behaviour, swath width calculations, types of aerial spraying equipment, and the calibration of pesticide flow rates.

On the sidelines of the training, dedicated sessions were held with aerial spray pilots involved in previous control campaigns. These sessions aimed to identify field challenges, address critical technical issues, and offer practical recommendations to improve the efficiency and precision of aerial operations in future campaigns.

The training received strong institutional support, with high-level meetings held with H.E. Dr. Ahmed bin Nasser Al Bakri, Undersecretary of the Ministry, and Dr. Salem bin Ali Al Khatri, Director-General of Agricultural Development. Discussions focused on future avenues for technical cooperation and experience exchange between national and regional partners.

The course concluded with a set of recommendations emphasizing the need to continue and expand such specialized training programs to ensure high field readiness and further develop national capacities for proactive and effective desert locust management.

5. "The launch of the Ismailia Regional Locust Training Center coincides with a specialized regional workshop to enhance sprayer maintenance skills."

In a regional effort to strengthen technical capacities in combating desert locusts, the FAO Commission for Controlling the Desert Locust in the Central Region (CRC), in collaboration with Egypt's Ministry of Agriculture and Land Reclamation, organized a specialized regional workshop on sprayer maintenance and repairs in Ismailia, Egypt, from 23 to 27 February 2025.

The workshop coincided with the official reopening of the rehabilitated Ismailia Locust Base, now upgraded to serve as a regional training center. The opening ceremony was attended by Mr. Ayman Omer, Senior Field Programme Officer at FAO-RNE, Mr. Mohamed Yacoub, Assistant FAO Representative in Egypt, and the Director General of Locust Affairs and Agricultural Aviation.

23 participants from various countries — including CRC members and non-members such as Kenya, Uganda, and South Sudan — took part in the training, which blended theory with intensive hands-on sessions. The training focused on the maintenance, repair, and calibration of key sprayer models such as ULV+, AU8000, ULVAMAST, and AU8115MS.

The theoretical component included the principles of sprayer function and common mechanical issues, while the practical sessions offered experience in troubleshooting, repair techniques, and a simulation exercise of a locust control operation. Strong emphasis was placed on safety protocols for pesticide handling and equipment use.

Participants highly valued the practical nature of the training and shared experiences across countries, fostering regional collaboration. They recommended the continuation of similar workshops in their home countries to maintain the efficiency and readiness of spraying equipment. CRC was encouraged to support such national efforts upon request.

6. CRC Enhances Coordination between Egypt and Saudi Arabia through Joint Field Training Programs

As part of its pivotal role, the Commission for Controlling Desert Locust in the Central Region (CRC) organized a series of mutual training programs between Egypt and the

Kingdom of Saudi Arabia. These initiatives aimed to strengthen national capacities and promote technical collaboration in the fight against the desert locust threat.

In December 2024, Egypt hosted an advanced training program for five Saudi locust officers. The program was implemented in coordination with the General Directorate of Locust Affairs and Agricultural Aviation of the Egyptian Ministry of Agriculture. It included practical training on survey and control tools in key breeding areas in southern Egypt, the use of modern information systems, and reporting via the eL3m application. The program also featured environmental awareness sessions, and a field visit to the main information center. Evaluation results revealed a significant improvement in participants' performance.

Also, CRC coordinated a second field training program in Saudi Arabia, held from 9 to 20 February 2025. This program targeted seven Saudi locust officers and involved actual surveys in winter breeding areas, practical training on calibration and spraying techniques, and technical feedback to operational field teams.

These efforts led to noticeable improvements in the skills of the trainees and resulted in several recommendations to enhance the efficiency of locust control teams. These included forming dedicated survey units, providing advanced equipment, and organizing training-of-trainers (TOT) programs to prepare new national trainers. These joint programs highlight CRC's active role in fostering collaboration among member states and stand as a successful model of regional cooperation in building the capacities of desert locust response teams.

Applied research

Field trial using the entomopathogen *Metarhizium acridum* (NOVACRID) against desert Locust in KSA.

In response to concerns over synthetic chemicals in agriculture, the Commission for Controlling Desert Locust in the Central Region (CRC) is promoting initiatives to reduce health and environmental risks. As part of this effort, CRC conducted a field trial in Saudi Arabia to evaluate the effectiveness of the biopesticide *Metarhizium acridum* as a safer alternative for managing desert locust infestations.

Figure 1: Symptoms of infection by *M. acridum*, and Sporulation of the fungus on dead nymph

The study was carried in collaboration with the National Center for the Prevention and Control of Plant Pests and Animal Diseases (Weqaa Centre), Saudia Arabia and took place near Badr City during the desert locust winter breeding season targeting L3 and L4 locust instars infestations. *Metarhizium acridum* (NOVACRID) was mixed with diesel and applied using backpack sprayers in ultra-low volume (ULV) spray technique (ULV), at a rate of 75gm/ha. An unsprayed control plot was included for comparison, and trial plots were separated to prevent spray drift.

This field treatment targeting the desert locust represents is the first application of the biopesticide Novacrid® (*Metarhizium acridum*, strain EVCH077) in Saudi Arabia. Our results confirmed that locusts were successfully infected by the fungal spores (figure 1). In cages, mortality rates reached 100% 8 days after treatment (Figure 2). In the field, the treated locust band had completely disappeared after one week.

Based on the findings of this trail, the application of the biopesticide *Metarhizium acridum* demonstrates significant potential for the effective management of desert locust populations in Saudia, Arabia, particularly during the winter breeding season.

These innovations, supported by the authority, are crucial for reducing the environmental and health risks of traditional pesticides, and play a key role in achieving a preventive and sustainable desert locust control strategy in the central region.

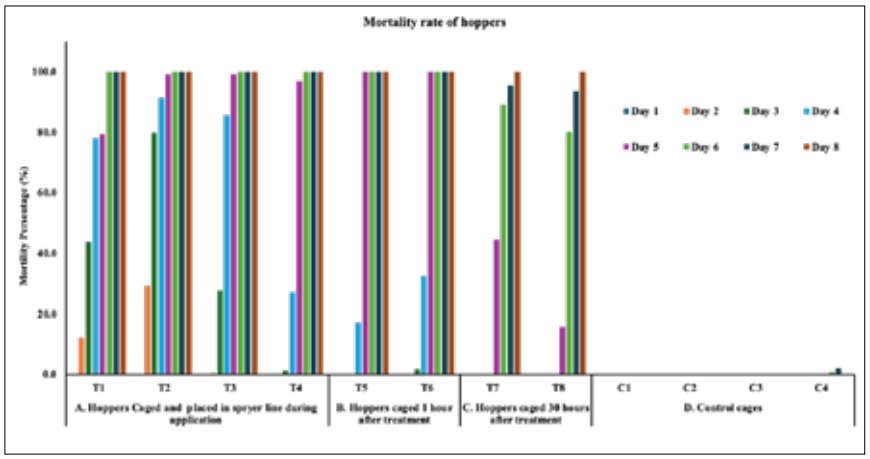


Figure 2: Mortality rate of caged treaded/ or undertreated hoppers

The 14th Arab Congress of Plant Protection, Algiers, November 3-7, 2025

Important information and extending the deadline for submitting abstracts to April 30, 2025

The Arab Society for Plant Protection, in collaboration with the Local Organizing Committee of the 14th Arab Congress of Plant Protection (ACPP 2025), is honored to invite all professionals in the field of plant protection in the Arab region and abroad. This includes academics, researchers, students from various universities, and individuals working in research centres.

We encourage you to attend the 14th ACPP 2025, which will be held in Algiers from November 3 to 7, 2025. This year's congress theme is «Plant Health for Sustainable Food Security«. The Organizing Committee announce that the deadline for submitting abstracts has been extended to April 30, 2025.

You are kindly invited to visit the congress website https://acpp-aspp.com . Registration is made by filling out the online registration form or by downloading the form, filling it out and sending it to the congress secretariat: info@acpp-aspp.com . The abstract should be submitted via the congress email address: info@acpp-aspp.com and by using the form available on the conference website .

Important Dates

Deadline for registration 30 :September2025

Deadline for abstract submission:30 April 2025

Notification of abstract acceptance 30 :May2025

You can also follow all the news related to the conference (Hotel reservation, request for partial support to attend the conference) through the congress website .For any inquiries please contact the congress secretariat via info@acpp-aspp.com or WhatsApp: 00213 78 41 43 115

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

The current exchange rate is 1 US Dollar = 135 Algerian Dinars.

More information about special programs for accompanying persons and the agricultural tourist trip will be announced later in the third announcement of the congress in August

14th Arab Congress of Plant Protection 3-7 November 2025, Algeria: Invited Speakers

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

New book ''Sustainable Management of Palm and Date Pests: Concepts and Techniques

Sustainable Management of Palm and Date Pests: Concepts and Techniques

Dr.Ibrahim Al-Jboory, ASPP executive committee member, is the main author and editor for the new book ''Sustainable Management of Palm and Date Pests: Concepts and Techniques,'' which is under the process of publication by the Food and Agriculture Organization of the United Nations. The book contains the most significant pests of date palms and dates. It focused on the principles of sustainable components and elements of IPM. Alongside the lead author, 27 co-authors from different countries contributed to some of the book's content.

Participation of the Arab Society for Plant Protection in a panel debate at the University of Sulaimani, Iraq.

A panel discussion titled "Challenges Facing Strategic Crops Production and Ways to Overcome them in Iraq" was organized by the University of Sulaimani's College of Agricultural Engineering Sciences on Thursday, April 10, 2025. In addition to representatives of the Ministry of Agriculture and Farmer associations, about 150 participants from various scientific, academic, research institutes and nominated farmers were joined the panel discussion. Professor Behzad Hama Saleh Mustafa, the college's dean, gave a speech to kick off the program, and there were two main sessions for the panel discussion**.** The first topic covered plant protection, natural resources, and biotechnology and the development of strategic crops. While the second topic covered the areas of food and quality control, agricultural extension, rural development, and agricultural mechanization. The Panel hosts the administrative member of the Arab Plant Protection Society, Professor Dr. Emad Al-Maaroof, Professor Dr. Nariman Saleh, Assistant Professor Dr. Muhammad Tahseen Marouf, Dr. Sonia Othman and the model farmer Mr. Faridoun Mansour in the first topic, while the second topic was served by Assistant Professor Dr. Fawzi Faydullah, Assistant Professor Dr. Chawan Mohammed, Dr. Mohammed Farooq, and Mr. Jotyar Khalid, Assistant Director General of Sulaimaniyah Agriculture, as the hosts. The panel discussion offered a great platform for discussing important issues pertaining to local, regional, and global agriculture, the environment, and economic sustainability. Throughout the meeting, professional issues pertaining to challenges were discussed, ideas were shared, and efforts were made to find the best solutions through scientific research and the skills of both local and international researchers. Additionally, actions were taken to increase agricultural product quality and productivity.

Researcher Spotlight

Fatma Ezzahra Besbes Investigates Insect-Vectored Diseases in Vineyards

The Arab & Near East Plant Protection Bulletin is pleased to feature the innovative research of Fatma Ezzahra Besbes, a PhD candidate in the joint Entomology-Plant Pathology program at the University of Wisconsin-Madison, who is making significant contributions to our understanding of pest-pathogen dynamics in agricultural systems.

Current Research: Social Wasps and Vineyard Diseases

Besbes' current doctoral research explores the complex ecological interactions between social wasps and cluster rot infections in vineyards. Under the joint supervision of Dr. Christelle Guédot (Entomology) and Dr. Leslie Holland (Plant Pathology), she is investigating how these insects facilitate the transmission and development of pathogenic fungi in grape clusters. This work addresses critical knowledge gaps in understanding vector-pathogen relationships that impact vineyard health and productivity. Her preliminary findings were recently presented in November 2024 at the Entomological Society of America Annual Meeting in Phoenix, Arizona, where she shared insights on the mechanisms through which social wasps may transport and introduce pathogens into grape tissues. This research has significant implications for developing targeted, sustainable management strategies that consider the ecological complexities of vineyard systems rather than relying solely on conventional chemical controls.

Red Palm Weevil Management Research

Before her doctoral studies, Besbes conducted significant research on the Red Palm Weevil (*Rhynchophorus ferrugineus*), one of the most destructive palm pests in the Mediterranean region. Her Master's thesis, completed through a collaboration between the National Institute of Agronomic Research of Tunisia (INRAT) and CIHEAM Bari, focused on developing early detection methods and semiochemical-based management strategies for this invasive pest on Canary Palms (*Phoenix canariensis*).

This work was presented at the Food and Agriculture Organization (FAO) Red Palm Weevil 12th Meeting for National Focal Points in 2022, highlighting its regional importance. Her research evaluated the efficacy of pheromone-based trapping systems and "Push and Pull" strategies to contain *R. ferrugineus* populations in Northern Tunisia while preventing their spread to economically valuable date palm oases. She was working under the supervision of Pr. Sonia Boukhris-Bouhachem (INRAT), Pr. Khaled Djelouah (CIHEAM Bari), Nayem Hassan and Shams Usmani (Russell IPM), Besbes tested various semiochemical formulations and trap designs to optimize attraction rates and monitoring efficiency. The project established practical protocols for implementing integrated control approaches that reduce dependence on conventional pesticides while providing effective protection for ornamental and commercial palm species.

Educational Background

Besbes brings a strong international foundation to her current research, having earned her engineering degree in Agronomic Sciences with specialization in Plant Health from the National Agronomic Institute of Tunisia, followed by a Master of Science in Precision Integrated Pest Management from CIHEAM Bari in Italy. Her multidisciplinary training encompasses entomology, plant pathology, integrated pest management, and molecular diagnostic techniques - skills that now inform her holistic approach to studying complex agricultural systems. With her commitment to sustainable agriculture and expertise in entomological and pathological crop protection, Fatma Ezzahra Besbes represents the emerging generation of researchers developing innovative solutions to plant protection challenges across diverse agricultural contexts across the Mediterranean region and beyond.

Near East Plant Protection Organization Bulletin

NEPPO
منظمة وقاية النباتات للشرق الأدنى
Near East Plant Protection Organization

Near East Plant Protection Organization (NEPPO)

This bulletin provides information about the activities of NEPPO to member countries of the Organization, the countries of the Near East and North Africa region and other plant protection organization. It also provides technical data and statistics regarding pests harmful to agricultural crops and, quarantine pests of member countries. The bulletin gives news and events at the national, regional and international levels.

This 9th issue of the bulletin regroups the most important activities of NEPPO and member countries during the three months (January/February and March) of the year 2025.

This issue is dedicated to the olive tree

Olive tree El Akkarit, Douiret, Tataouine Governorate (southern Tunisia)

The largest olive tree in Tunisia and the Mediterranean region in terms of age and area.

This olive tree dates back to the Roman era and is approximately 900 years old. Its circumference is 116 meters and it covers an area of approximately 1,300 m². In 1992, it produced more than 1,500 liters of olive oil.

The Africa Phytosanitary Programme (APP)

The Africa Phytosanitary Programme (APP) is an initiative of the IPPC Secretariat and the African Union Commission on Agriculture, Rural Development, Blue Economy, and Sustainable Environment (ARBE). It aims to strengthen the resilience of Africa's phytosanitary systems against plant pests of regulatory, economic and environmental significance. It aims also, to improve the early detection of pests and to position national and regional plant protection organizations (NPPOs and RPPOs) to prepare for, respond to and recover from plant pests in a timely manner.

During the first quarter of 2025, two workshops under the slogan *Pest monitoring and detection information management* were organized:

The first workshop 20-24 January 2025 in Douala, Cameroon

The workshop was conducted in Frensh. More than 60 participants from Cameroon, the Democratic Republic of Congo, Guinea-Bissau, Mali and **Morocco** assisted in the workshop.

The second workshop 27-31 January 2025 in Nairobi, Kenya

The workshop was conducted in English. More than 80 participants from **Egypt**, Kenya, Sierra Leone, Uganda, Zambia, and Zimbabwe assisted in the workshop.

The 19th Session of the Commission on Phytosanitary Measures (CPM-19)

The Pre-CPM meeting of NEPPO

Framework

In light of the Nineteenth Session of the Commission on Phytosanitary Measures that will be held at FAO headquarters in Rome from 17-21 March 2025. The Near East and North Africa Plant Protection Organization (NEPPO) organized a Pr-CPM 19 side meeting in Wednesday, February 26th, 2025, from 8:00 AM to 10:30 AM (Moroccan time).

Meeting

The program included five presentations:

- Review of the CPM 19 agenda and key recommendations, Dr. Mohamed Habib Ben Jamâa, ED NEPPO
- Implementation of the International Plant Protection Convention (IPPC) Strategic Framework, Eng. Driss Barik, Regional Representative to the Commission on Phytosanitary Measures.
- Key Standards Topics at CPM 19, Dr. Nader El-Badri, Regional Representative to the Standards Committee.
- Key Implementation Topics at CPM 19, Dr. Ahmed Abdel-Mottaleb, Regional Representative to the Implementation and Capacity Development Committee.

Key Outcomes

- The importance of countries' participation in this 19th session of the Commission on Phytosanitary Measures, and that country representation (IPPC focal point or delegation) be aware of plant health topics.
- The importance of reviewing the Guide for Participation in the International Plant Protection Convention's Committee on Phytosanitary Measures.

» The importance of unified views and positive country participation.
» The importance of reviewing the topics presented in Rabat.
» Reviewing the proposed changes to the topic proposal forms.
» The importance of international harmonization of phytosanitary measures to achieve global cooperation in facilitating safe trade and protecting crops from the invasion of invasive and transboundary pests.
» The importance of participating in submitting objections.

The side meeting of NEPPO and representatives of NENA region countries

Framework

In light of the Nineteenth Session of the CPM-19 held in FAO headquarters in Rome from 17-21 March 2025. The Near East Plant Protection Organization (NEPPO) organized a side event for NENA region countries, Monday, 17 March 2025 in Nigeria Room from12:00-13:45.

Goals

1. Introduce NEPPO to the non-member countries and to invite them to join the organization
2. Present the strategy of NEPPO for the next decade (2025-2035).
3. Other subjects.

Meeting

The Executive Director of NEPPO presetned:

1. The strategic plan of NEPPO for the next decade, 2025-2035.
2. The latest news of NEPPO.

This meeting provided an opportunity for attendees to discuss several points related to the CPM-19. The Key topics included:

» Funding for ePhyto
» The role of the region in the IPPC
» Reviewing the credentials of all countries, which must be signed by the minister, head of government, or the country's permanent representative to FAO.
» Addressing the funding issue for the APP, which benefited Egypt and Morocco (2023-2024), Tunisia and Algeria (2024-2025). The final phase of the project also benefited Mauritania and Libya (2025-2026).
» The importance of countries' participation in CPM sessions, and that country representation (IPPC focal point or delegation) be aware about plant health issues, that views be unified, and that participation be positive.

» The international meeting of donors and agriculture ministers from the NENA region, to be held on May 12, 2025, in Puglia, Italy, was discussed. The meeting will address the risks of *Xylella* bacteria and ways to eradicate it. It was agreed to send letters to countries via embassies from Rome to expedite procedures.
» Currently, NEPPO has a vision and mission, and therefore must shift to the added value that can only be achieved through the cooperation and collaboration of member states.
» The maritime container team was also discussed.

Key Outcomes

» The importance of positive participation of countries during this session.
» Working to develop standards specific to the region:
» Certification system for date palm propagation materials.
» Certification system for citrus/citrus propagation materials.
» Certification system for olive propagation materials.
» The importance of the remaining countries to join NEPPO, in order to unify countries issues.
» The importance of countries' participation in the nomination at the CPM20.
» The importance of countries' participation in the Strategic Planning Group (SPG).
» For the first time in the organization's history, representatives from the region were present on all teams.
» The importance of the Pre-meeting held virtually on February 26, 2025.

The side meeting NEPPO/IPPC secretariat

Framework

In light of the Nineteenth Session of the CPM-19 held at FAO headquarters in Rome from 17-21 March 2025. The Near East Plant Protection Organization (NEPPO) organized a side event Tuesday, 18 March 2025 in Nigeria Room from13:00-14:00. This meeting joined NEPPO Secretariat, CPM bureau, FAO-RNE and IPPC.

Discussion

» The strategic plan of the Near East Plant Protection Organization (NEPO) for the next decade (2025-2035).
» Updating the organization's name.
» Financial support for members of the Commission on Phytosanitary Measures (CPM) by the IPPC
» Translation of guidelines and protocols.
» Regional meeting of the International Plant Protection Convention (IPPC).
» Discussing the implementation of the electronic phytosanitary certificate (e-Phyto) in the NENA region
» Strengthening the relationship between the IPPC and the Near East and North Africa region.

Recommendations of the CPM19

The meeting report is available at https://www.ippc.int/en/commission/cpm/cpm-sessions/cpm-19/

- ✓ World Plant Health Day, 12 May 2025. Theme for 2025: "The Importance of Plant Health for a One Health Approach."
- ✓ Members and potential replacements of the CPM Bureau, Standards Committee, and Implementation and Capacity Development Committee.
  - Mr. Driss Barik (Morocco) was elected Vice-Chair of the CPM Bureau for 2026-2027.
  - Updated list of committee memberships (CPM2025/CRP/12_REV2).
- ✓ Academy for Phytosanitary Training
- ✓ E-Certifications
- ✓ Phytosanitary Capacity Assessment

News of countries

Libya

January 2025

Training course on the quick decline disease on olive trees *Xylella fastidiosa*

Engineers affiliated to The National Center for Agricultural Prevention and Quarantine participated on a training on the quick decline disease on olive trees *Xylella fastidiosa* in Italy

February 2025

Monitoring of Red Palm Weevil *Rhynchophorus ferrugineus*

An outbreak of the RPW was declared in the city of Awjila. An emergency meeting was held in the Awjila municipality and was attended by a team from the Libyan government's Ministry of Agriculture, representatives from the Agricultural Police, and members of the National Center for Agricultural Prevention and Quarantine. The meeting discussed ways to control RPW and the need for urgent action to limit its spread to other farms in the city.

Monitoring of cochineal insect *Dactylopius opuntiae*

A campaign to control the cochineal insect *Dactylopius opuntiae* on prickly pear plant in Al-qarbouli and Al-maya area was conducted by the National Center for Agricultural Prevention and Quarantine

Tunisia

Organisation of two training sessions for technicians and farmers, along with the establishment of Farmer Field Schools (FFSs)

Within the framework of project TCP/TUN/4001, entitled "Emergency Assistance for the Management of the Cactus Cochineal in Tunisia", in collaboration between the General Directorate of Plant Health and Control of Agricultural Inputs and the Food and Agriculture Organization of the United Nation (FAO), two training sessions were organized for technicians and farmers, along with the establishment of Farmer Field Schools (FFSs) in the governorates of Nabeul (24–25 February 2025) and Kasserine (26–27 February 2025). The Objectives of the Workshop were:

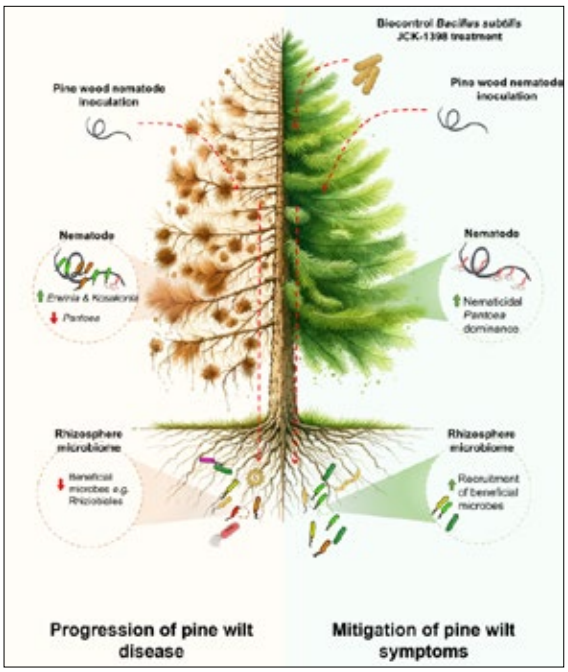
- Strengthen the capacity of technicians and farmers in the early detection and management of the cactus cochineal (*Dactylopius opuntiae*);
- Establish and support the operationalization of Farmer Field Schools (FFSs);
- Promote sustainable cactus cultivation through the adoption of Good Agricultural Practices (GAPs).
- The training sessions enabled participants to:
- Improve early detection capabilities and enhance the responsiveness of technicians and farmers to the presence of the pest.
- Ensure the effective functioning of the Farmer Field Schools in the targeted areas.
- Raise awareness among participants on the importance of sustainable and integrated pest management approaches.
- Strengthen collaboration among key stakeholders (FAO, the General Directorate for Plant Health and Agricultural Inputs Control, Technical Centers, Agricultural Extension and Training Agency, Research Institutes, and farmers) for effective control of the cactus cochineal.

To ensure the sustainability of the achievements made through this training, it is recommended to:

- Conduct regular follow-up of the established FFSs to assess their impact and adjust control strategies as needed;
- Enhance the production and dissemination of awareness-raising and training materials (practical guides, brochures, videos);
- Encourage research and innovation in cactus cochineal control, particularly by exploring appropriate biological and genetic solutions.

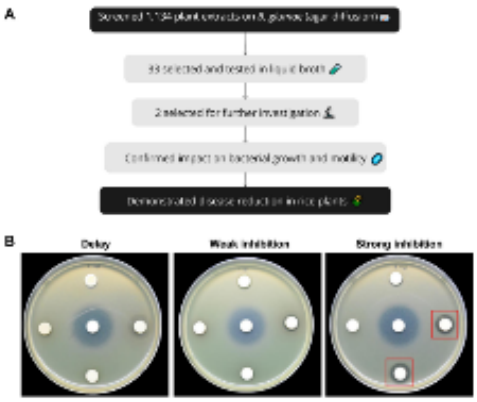
ASPP MEMBER NEWS

Microbial allies recruited by *Bacillus subtilis* JCK-1398 to defend pine trees against the pinewood nematode.



Pine wilt disease (PWD) is a devastating disease caused by the pinewood nematode (*Bursaphelenchus xylophilus*). Its substantial ecological disruption harms global forestry and poses serious economic challenges. Although previous research has demonstrated that *Bacillus subtilis* JCK-1398 has the potential to induce systemic resistance in pine trees, the ecological mechanisms underlying its biocontrol efficacy remain underexplored. This study investigated how JCK-1398 treatment influences rhizosphere- and nematode-associated microbial communities to mitigate PWD. Metabarcoding analyses revealed that JCK-1398 treatment increased the abundance of beneficial microbial taxa, such as Nocardioides and Mesorhizobium, in the rhizosphere microbiome. Concurrently, nematode-associated microbial communities became dominated by *Pantoea*, a genus known for its nematicidal properties. The isolation and characterization of *Pantoea dispersa* BC11 confirmed that it significantly limits nematode viability. These findings highlight the multifaceted defense that JCK-1398 offers, not only inducing systemic resistance but also orchestrating beneficial microbiome dynamics. This study emphasizes the potential of manipulating a microbial holobiont for eco-friendly and sustainable disease management. The ability of JCK-1398 to recruit and enhance microbial allies offers a novel framework for developing biocontrol agents, with implications for managing PWD and other plant-pathogen systems. [**Mohamed Mannaa, Ae Ran Park, Jin-Cheol Kim, Young-Su Seo,** Journal Scientific Reports, 15, Article number: 9670 ,2025]. https://doi.org/10.1038/s41598-025-94434-y

High-Throughput Screening of Plant Extracts for Targeted Control of *Burkholderia glumae*, Causing Rice Sheath and Panicle Blight.



Rice (*Oryza sativa*), a staple crop worldwide, is severely threatened by bacterial panicle blight caused by *Burkholderia glumae*, leading to substantial yield losses. The lack of effective chemical treatments and resistant rice cultivars highlights the urgent need for alternative solutions. In this study, 1,134 plant extracts were screened for antibacterial activity against *B. glumae* using agar disc diffusion and liquid broth assays. Thirty-three extracts exhibited significant growth inhibition on agar plates. These 33 extracts were further tested in Luria-Bertani broth, where five showed notable activity, and two extracts—*Trapa*

japonica (FBCC-EP312) and *Rumex crispus* (FBCC-EP487)—were selected for detailed analysis. Both extracts significantly reduced bacterial motility and disease severity in rice while having no effect on non-target bacteria such as *Escherichia coli*. These findings highlight the potential of these plant-derived compounds as effective biocontrol agents, offering an eco-friendly alternative to synthetic pesticides and promising applications in sustainable agriculture. .[**Seungchul Lee, Yong Tae Jeong, Seokhun Jang, Taeho Jung, Buyng Su Hwang, Ji Su Choi, Young Taek Oh, Mohamed Mannaa*, Young-Su Seo*** (*Corresponding authors), The Plant Pathology Journal, 41(1):112-119 2025]. https://doi.org/10.5423/PPJ.NT.10.2024.0167

Insecticidal activity of single essential oil constituents against two stored-products insect pests

The exploration of plant-based natural products, particularly essential oils (EOs), as alternative control methods, arise due to challenges associated with the prolonged reliance on synthetic insecticides. Despite their promising activity, EOs use faces some challenges, mainly related to their standardization. This study investigates the exploration of some single chemical compounds commonly present in several EOs with insecticidal activity as candidate insecticides, specifically limonene, citral, □-caryophyllene, and methyl salicylate. Chemicals wer tested in toxicity bioassays toward *Stegobium* (*St.*) *paniceum* and *Sitophilus* (*Si.*) *oryzae*. The results showed that, among chemical tested, methyl salicylate and citral consistently exhibited high toxicity toward both the tested species. Calculated Lethal Time 50 (LT50) at the dose of 1 mg, for *St. paniceum* was 9.13 and 27.36 h from the treatment for citral and methyl salicylate respectively. Differently, for *Si. oryzae* the LT50 was higher than seven days at the 1 mg dose. However, the LT50 of adults treated with 10 mg dose of methyl salicylate was inferior to one hour, while for citral was of 4.45 h. The study reveals a dose-dependent impact on mortality, underscoring the compounds' potential for targeted pest management and offering crucial insights into their nuanced insecticidal effects for the development of tailored formulations with enhanced reliability and effectiveness in pest control strategies. [**Salvatore Guarino, Loredana Abbate, Mokhtar Abdulsattar Arif (Iraq), Ezio Peri**, Springer, 2025]. https://link.springer.com/article/10.1007/s42690-024-01417-z

Investigating Huanglongbing disease in citrus plantations: A study in North Al-Batinah Governorate, Sultanate of Oman

Huanglongbing (HLB), commonly known as citrus greening disease, is among the most severe diseases affecting the Citrus genus. It is caused by three species of the *Candidatus Liberibacter bacterium: Candidatus Liberibacter asiaticus* (LAS), *Candidatus Liberibacter africanus* (LAF) and *Candidatus Liberibacter americanus* (LAM). This study aimed to investigate the presence of Huanglongbing (HLB) in various citrus varieties exhibiting suspected symptoms within the citrus gene bank in Suhar, Oman. Samples were collected and subjected to Polymerase Chain Reaction (PCR) amplification using two primer sets, CN265/CN266 and OI1/OI2c, followed by restriction enzyme analysis with XbaI endonuclease to differentiate between Las and Laf species. Results confirmed the presence of the LAS species in Clementine, Grapefruit, Lime and Orange varieties. [**Mohammed Al Sadrani[1], Saif Al Kaabi[2], Ahmed Al Fahdi[1], Ali Al Adawi[1], Raied Abou Kubaa[3], Ramalingam Dharmalingam[4]*** [1]Ghadafan Agriculture Research Station, Ministry of Agriculture, Fisheries Wealth and Water Resources, P.O Box 204, Suhar, 311, Oman;[2]Department of Crop Sciences,

College of Agricultural and Marine Science, Sultan Qaboos University, PO Box 34, Al-Khoud, 123, Oman;[3]Department of Plant Pathology, University of California, Davis, CA 95616, USA;[4]Department of Information Technology, Majan University College, Muscat, Oman. Journal of Plant Pathology & Microbiology., Vol. 16 Iss. 1 No: 741, February 2025].

Experts from the Foundation Plant Services at the University of California, Davis, visit the Sultanate of Oman to strengthen agricultural research collaboration.

A delegation from the Foundation Plant Services (FPS), University of California, Davis, visited the Sultanate of Oman from December 19 to 29, 2024, at the invitation of the Ministry of Agricultural, Fisheries, and Water Resources. The visit aimed to strengthen research collaboration in sustainable agriculture and plant disease diagnostics. The delegation conducted field visits to research stations and farms, participated in specialized workshops, and provided hands-on training on advanced diagnostic techniques. A major workshop was organized by the Directorate General of Agricultural and Animal Research, bringing together experts from various sectors, including plant quarantine, plant protection, agricultural laboratories, academia, and private industry. The workshop featured four key lectures: **Dr. Maher Al Rwahnih** discussed the role of establishing a national network for the production of healthy plants. At the same time, **Dr. Raied Abou Kubaa** addressed the risks of pest introduction and its impact on food security. **Dr. Abdulhamid Al-Riyami** presented on nursery management and the propagation of healthy plants. Dr. **Ali Al Adawi** highlighted the role of agricultural research laboratories in inspecting plant shipments and preventing pest entry. The workshop concluded with discussions on enhancing research cooperation and strengthening diagnostic capabilities in Omani laboratories.

Grapevine leafroll-associated virus 3: A global threat to the grape and wine industries but a gold mine for scientific discovery

Grapevine leafroll disease is the most damaging viral disease afflicting global grape and wine production. Of the five viruses likely associated with the disease, grapevine leafroll-associated virus 3 (GLRaV3) is believed to be the predominant agent, albeit its role as the causal agent has remained uncertain. GLRaV3 (species *Ampelovirus trivitis*, genus *Ampelovirus*, family *Closteroviridae*) has the third-largest single-stranded, positive-sense RNA genome among plant viruses at ~18.5 kb, only surpassed by two other members of the family *Closteroviridae*, citrus tristeza virus, and GLRaV1. GLRaV3 is unique among plant viruses in several ways including the size of its genome, the long non-coding regions, and its association with the outer mitochondrial membrane for viral replication. Unfortunately, our understanding of the molecular mechanisms governing GLRaV3 genome replication, gene expression and virus-host interactions is poor due to many factors, including the unavailability of infectious cDNA clones and effective experimental system to initiate grapevine infection with viral clones until recently. In this review, we capture some recent advances in GLRaV3 research towards the establishment of infectious clones, grapevine inoculation systems, as well as approaches towards elucidating the function of GLRaV3-encoded proteins. We also present a working model to explain GLRaV3 pathogenesis.[**Catherine Fust, Patrick Lameront, Mehdi Shabanian, Yashu Song, Raied Abou Kubaa, Rachelle Bester, Hans J Maree, Maher Al Rwahnih, Baozhong Meng**. Department of Molecular and Cellular Biology, University of Guelph, Guelph, Ontario, Canada; Department of Genetics, Stellenbosch University, Stellenbosch, South Africa. Department of Plant Pathology, University of California, Davis, California, USA. Department of Plant Protection,

School of Agriculture, the University of Jordan, Amman, Jordan. Journal of Experimental Botany, February 2025; eraf039, https://doi.org/10.1093/jxb/eraf039

Biological efficiency of *Calotropis procera* extracts against the growth of selected fungal plant pathogens for sustainable agroecosystem development

Plant secondary metabolites and plant-based fungicides appear to be one of the better alternatives as they are known to have negligible environmental impact and health hazard to consumers, compared with synthetic pesticides. This study aimed at assessing the antifungal activities of crude extracts obtained from leaf, stem bark, and roots of *Calotropis procera* against the fungal pathogens *Aspergillus niger, Fusarium oxysporum*, and *Fusarium solani*. The stems, roots, and leaves of the selected plant species were shade-dried and ground to powder, and the bioactive components were extracted using ethanol (99.5%), hexane (99.8%), and distilled water. The antifungal activity of the extracts against the three selected pathogens were evaluated using the agar-well diffusion method and inhibitory zones were measured in millimeters at four different concentration levels (30, 40, 50, and 60 mg/ml). Carbendazim and sterile distilled water were used as positive and negative controls, respectively. Among the selected plant materials, stem bark extracts showed the highest yield (10.45%) in ethanol crude extracts, whereas, the lowest yield (1.45%) was for water crude extract from the roots. The bioassay studies revealed that the crude extracts of ethanol, hexane and water had antifungal activity on all three fungal species at all concentrations and with all solvents. Ethanol extracts had the highest growth inhibitory effects as compared to those of the hexane and water crude extracts. In this study, the selected solvent crude extracts had fewer antifungal activities than carbendazim. *A. niger, F. oxysporum* and *F. solani* growth was highly affected by ethanol leaf extract as compared with hexane and water extracts. Conversely, stem bark hexane extract showed higher antifungal activity only against *F. oxysporum*. Thus, among the selected plant parts of *C. procera,* leaves showed the highest antifungal activity compared with stem bark and root extract. **[Yirgashewa, A., K. Ameha and M. Manikandan (Ethiopia),** Arab Journal of Plant Protection, 43(1):126-131, 2025]. https://doi.org/10.22268/AJPP-001291

Entomopathogenic *Beauveria bassiana* as a traditional biocontrol insecticide and endophyte for plant protection against various plant pests

Two isolates of *Beuveria bassiana* were found in Sudan, subsequently identified wherein at the Department of Plant Protection, College of Food Science and Agriculture, King Saud University, which assisted in the extraction of DNA of the two fungi and submitted them to NCBI with the following codes Sahar-1987OP616114 and Elbashir-1976OP616115 https://www.ncbi.nlm.nih.gov/nuccore/2315901160

The isolates were bioassayed on several agricultural insect pests, such as desert locust and fruit flies, and stored pests exemplified by the khabra beetle. The two isolates were also bioassayed against public health insects such as houseflies and mosquitoes. The research results of the aforementioned fungi were published in the form of M.Sc. and Ph.D. thesis and scientific papers, in addition to local and international conferences and journals. These isolates were also established as endophytes in various crops such as date palm variety Majhool, cotton, Dura, Maize, tomato, eggplant, orange, grape, groundnut, and okra. The aforementioned plants were treated using the following methods: seed soaking, spray, drenching, seed coating and injection. The injection method was applied to date palm seedlings. The percentage of establishments reached 100% in the case of eggplant,

whereas when the fungus was sprayed on the leaves of seedlings of date palm, the establishment reached 90% and remained up to 12 months after that, and it deteriorated. The deterioration shows that the fungus needs to be augmented, and opens the door for more studies.

In this context, it is worth mentioning that 12 M.Sc. and Ph.D. students were trained in this discipline under the supervision of Dr. Mohammed Ibrahim Elbashir, who was the principal investigator for the project titled (Endophytes as plant growth promoters and biological control agents against major date palm pests in Sudan). The project was funded by the Ministry of Higher Education and Scientific Research. The findings of this project have proved that the two isolates were successfully established in the seedlings of the date palm variety Majhool and remained there for 12 months. We can go further in this research and evaluate the impact of this fungus on the main insect pests of date palm, such as Red Palm Weevil and other important pests. So as to produce date palm seedlings in which *Beauveria bassiana* lives as an endophyte to protect the tree against different pests and avail nutrients to it, besides assisting the plant against environmental stress. [Dr. Mohammed Ibrahim Elbashir Ali,(Sudan), Department of Bio pesticides and Bio fertilizers, Environmental and Natural and Desertification Research Institute, National Centre for Research, Ministry of Higher Education and Scientific Research, Khartoum, Sudan. fataloope@yahoo.com

General News

Dubas bug control campagne in Oman

March 13, 2025




Over the past years, the dubas bug control campaign in Oman has been characterized as one of the best, most carefully studied campaigns based on accurate and thoughtful pest management principles. The campaign begins with reading insect numbers in areas under pressure before and after the spraying process to measure control efficiency and determine the effectiveness of spraying systems by measuring the diameter and number of pesticide droplets. It is worth noting that the Ministry of Agriculture, Fisheries and Water Resources pays special attention to these campaigns and provides pesticides early. It also contracts with companies that carry out aerial spraying operations. This year, it was unique in introducing drones to some villages, and they have proven highly efficient. The number of date palm trees in Oman exceeds nine million, of varieties known in the Gulf countries for their early ripening and high prices. Deltamethrin, a pesticide from the producer company, is still the most widely used and effective pesticide for control. For a few years, the Sultanate has been unique in using one of the plant extracts, oxymetrine, as a safe pesticide for the biological enemies of dubas and the lesser date moth(Homera). The Ministry publishes all instructions on its website, and its Facebook page can be consulted regularly.**(Ibrahim Al-Jboory).**

The aerial spraying campaign to combat the Dubas palm weevil (spring generation 2025) has been launched in the Sultanate of Oman in villages whose date palm trees are infested with the Dubas weevil at the governorate level. The Ministry of Agriculture, Fisheries and Water Resources is implementing the campaign as an annual program to eradicate the weevil. The Ministry called for implementing good agricultural practices that reduce infestation levels with this insect and increase control efficiency through aerial spraying. Reducing agricultural density by adhering to the recommended agricultural distances of 7-8 meters between rows and about 10 meters between lines. This allows the passage of sunlight and air, which limits the reproduction of this insect, contributes to reducing the levels of infection and enhances the efficiency of aerial spraying operations.

The Ministry emphasized the importance of pruning palm trees and cleaning farms of dry fronds and old clusters, which contributes to reducing infestation levels. It also noted the need to remove infested offshoots to reduce insect hotspots, as these offshoots increase environmental humidity. To enhance palm trees' resistance to pests, the Ministry emphasized the importance of proper farm maintenance, including removing weeds, applying balanced fertilization, and irrigating to avoid excess moisture.

The ministry also warned the farmers to take necessary precautions during aerial spraying operations, such as keeping beehives at least 15 km away and not harvesting fruits or mowing animal fodder for a week after spraying. It also stressed the importance of covering drinking water during the campaign, if exposure to the pesticide, washing containers and clothing, and removing the affected person from the sprayed area. The ministry announces the villages that will be sprayed according to the plan specified by it through the media and the ministry's official platforms.

Drone technology enhances efforts to combat the palm weevil in Al Dakhiliyah and North Al Sharqiyah Governorates.

As part of the preparations for the aerial spraying campaign to combat the Dubas palm weevil, His Excellency the Undersecretary of the Ministry of Agriculture, Fisheries and Water Resources for Agriculture conducted an inspection visit to follow up on the technical preparations and equipment of the aircraft and spraying equipment before the launch of the aerial spraying program, where helicopters and drones will be used to carry out the spraying work. His Excellency also witnessed the signing of a partnership agreement between Energy Services Company - the company contracted by the Ministry to implement the work - and Eastern Airlines to carry out the aerial spraying work. This agreement is considered an added local value, as Eastern Airlines will be the first Omani company specialized in entering the field of agricultural aerial spraying.

Reference: Website and Facebook of the Ministry of Agriculture, Fisheries and Water Resources

Population explosion of peach fruit fly *Bactrocera zonata* (Saunders, 1841), on various fruit trees in Iraq

In recent years, extraneous species of fruit flies have spread in some Arab countries, especially in countries where agricultural quarantine systems have been subjected to collapses or weakness at border crossings due to changing political systems or personal interests and administrative corruption, as this facilitated the entry and import of fruits, vegetables and unlicensed trees as a business out of control and agricultural quarantine laws, for example, cucurbit flies of the two species and in 2016 the peach fly *Bactrocera*

zonata, which occupied the first place among the qurantine pests that threaten the cultivation of fleshy fruit trees in Iraq after they were previously unknown and currently attack all species of fruit such as peaches, apricots and citrus (grapefruit, sour orange, orange) and lately recorded on dates.

The authorities concerned are combating them using pheromone and sticky traps, food baits, insecticides and natural entomopathogenic fungi, but their population exceeds what can be counted. Several master's and doctoral theses completed during the past years can be used and added to the control strategies for the insect. Fruit flies belong to the family Tephritidae, which is one of the most dangerous agricultural pests in the world, as it causes heavy economic losses in fruit production worldwide, and is a major concern for workers in quarantine departments in most countries, for example, in Valencia, fruit production losses are estimated at 30 percent, in Africa about $ 2 billion annually, and in Australia $ 4.8 billion (FFIPM Bulletin, ISSUE 01, September 2020). The family of Tephritidae includes more than 4400-5000 species, and the genus Bactrocera is the most dangerous with approximately 440 species described, of which the most economically important are *B. zonata* and *B. invadens* and *B. dorsalis* among other species. It infects more than 40 hosts, especially soft fruit. *B. zonata* is a serious pest on tropical and subtropical fruits, native to tropical Asia. It is widespread in 20 Southeast Asian countries (India, Thailand, Philippines, Pakistan, Vietnam, Sri Lanka, Bangladesh, and Nepal). In India alone, it causes between 25 and 100 percent damage in some seasons on peaches, apricots, guava and figs. In Pakistan, it causes guava crops to be damaged by 25-50 percent.

Damage to fruit begins when the female punctures the soft skin fruit with the long and sharp egg-laying ovipositor. Bacteria and yeast enter through the wounds, and the fruit begins to decay and then falls. Most fruit flies carry bacteria on the egg-laying ovipositor to facilitate the rapid decay of the fruit, and thus, the food necessary for the growth of the larvae becomes available. The damage of the insect arises from the number of eggs laid by the female, where it exceeds 500 eggs with the multiplicity of generations of the insect during the season in addition to adapted to low, moderate and hot temperatures as it has the ability to fly where it was found at a distance of 40 km.

The insect is registered in Saudi Arabia, the Sultanate of Oman, Egypt, Libya, Yemen and Iran and is found in other countries. Unfortunately, many countries have not announced the presence of B. zonata, which could harm their agricultural exports. The genus

Bactrocera is known globally as an aggressive colonizer of new environments, and this is what happened in Iraq in 2023-2024, which may be due to the expansion of international trade by importing fruit varieties from various origins, in addition to poor phytosanitary measures. Detecting any fruit flies in a particular country requires a warning from the concerned authorities. I am aware of the measures taken by Italy when a few individuals of *Bactrocera dorsalis* were detected, where they took deterrent measures and surveillance until its eradication. However, these measures did not deter the spotted wing drosophila *Drosophila suzukii*, which is native to East Asia and Japan and recorded in Europe in the warm part of Spain, France, Slovenia and Italy in 2008 and caused losses to all species of Berries **[Ibrahim Al-Jboory, prepared for ANEPPB,94(1): 2025].**



Libyan agriculture between the "palm weevil" and the desert locust: threat to environment and economic security

April 13, 2025 Libyan Witness Newspaper - Mohamed Ibrahim

April 13, 2025, Alshahid Newspaper by Mohamed Ibrahim

Libyan agriculture faces a dual environmental and economic threat: the outbreak of the red palm weevil in the eastern oases of Awjila, coinciding with the invasion of desert locusts on southern farms, especially in Traghan. While the nature of the two threats varies, they intersect in their catastrophic impact on the livelihoods of thousands of farmers and are one of the most important pillars of the local economy in a country already suffering from protracted political and security crises. In the ancient palm oases of Awjila, the danger does not sound however it flows in deadly silence, as the red palm weevil, which has crept from Southeast Asia into the heart of Libyan oases, has begun to expand rapidly, threatening more than 900,000 palm trees, according to Ahmed Mohamed Batroun, mayor of Awjila municipality. In the absence of effective official intervention from the governments of Tripoli and Benghazi, farmers confronted a pest that ravages their trees from within and destroys them within a few months. Activists on social media expressed the despair of farmers who feel that they have been left alone in an unequal battle, especially in light of the limited capabilities of the Agricultural Control Authority, intermittent initiatives to spray pesticides and demands for a comprehensive national plan. These date palm trees account for more than 10 million palms with an annual production of more than 180 thousand tons on the brink of silent extinction. In contrast, the danger in the south took on weeks ago, swarms of desert locusts began invading Traghan farms, in a scene reminiscent of environmental disasters in Libya in 2012. While thousands of families rely on agriculture as their main income source, anxiety becomes panicked as the pest spreads geographically. In response to the threat, the Libyan authorities launched a national campaign to monitor and destroy locust hotspots, as confirmed by Almahdi Mohammed Targhi, spokesman for the campaign. Still, despite the efforts, logistical and

geographical obstacles, especially in remote areas such as Murzuk and Traghan, continue to threaten to torpedo what has been achieved and make the fate of farmers dependent on interventions that are still insufficient. What unites the crises in Awjila and Traghan is not only their close timing, but also the intersection of their repercussions on Libya›s food and economic security, as both the palm weevil and the desert locust represent a direct threat to limited agricultural resources, and expose the fragility of agricultural infrastructure, and weak institutional coordination in the face of environmental disasters. Between the deadly silence in Awjila and the creeping invasion in Traghan, the Libyan farmer is in the first line of fire, while the state delays in calling its tools.



During the red palm weevil management program implemented by the Food and Agriculture Organization of the United Nations from 2019 to 2024, I became acquainted with a group of qualified engineers from Tripoli, Tobruk, Awjila, Jufra, Hun, and other areas who are passionate about their work and their country. They received training in managing the RPW in Aswan, Egypt, the United Arab Emirates, and Tunisia, gaining exceptional skills in agricultural practices, especially concerning the RPW and more. In light of the above article, I add my voice to the author as a former president of the Arab Society for Plant Protection and a former consultant to the FAO, urging the administration in the country to communicate with the FAO to develop an emergency response project for RPW. Given my strong rapport with Eng. Ahmed Bashash from Awjila, I consistently advise him to take the necessary actions to prevent the spread of the RPW. Regarding the locust swarms issue, I have communicated with Engineer Bashir Imbarek, a member of the management committee of the National Centre for Prevention and Agricultural Quarantine and Head of the Central Region Branch. This has been ongoing since locust swarms entered the areas mentioned in the report, posing a significant danger, particularly in the valleys regarded as natural pastures for camels and other livestock. I recommended to controlling the insects by using a mixture of insecticides, and the results were highly satisfactory. [**Ibrahim Al-Jboory, PhD].**

PLANT BIOSECURITY RESEARCH INITIATIVE EUPHRESCO III CABI CIHEAM BARI

17th Congress of the Mediterranean Phytopathological Union (MPU2025)

Take advantage or share with person who may be interested

Award: Win a two-week internship with expenses covered

“Showcase Your Talent: Plant Health Video Contest” [**Video Contest Call**]

Under the framework of the **International Day of Plant Health 2025**, we would like attract your attention to an important **Video Contest Call** as follows:

Introduction

Following the declaration by the United Nations General Assembly of the **International Day of Plant Health (IDPH)**, every **12th of May**, the plant health community celebrates the importance of plant health by organizing events to raise awareness and to mobilize international communities.

In order to give visibility to national and international research and development activities carried out by plant health scientists and their organizations, the Euphresco III network, the International Centre for Advanced Mediterranean Agronomic Studies of Bari (CIHEAM Bari), the Plant Biosecurity Research Initiative (PBRI) and CABI are pleased to launch the fourth edition of the video contest 'Plant Health TV - Promoting the importance of Plant Health research".

The winning video will be broadcast at international events organized for the celebration of the **2025 IDPH**, and other events such as the **17th Congress of the Mediterranean Phytopathological Union (MPU2025).** https://ciheambaricongressmpu2025.org/

Prupose

The purpose of the video contest is to:

- **Increase the visibility of plant health research activities and raise awareness** among non-scientific communities of the importance of protecting plant health.
- **Celebrate the work and dedication of early career researchers** (MSc, PhD, Post-Doctoral fellows and young scientists) in plant health.
- **Bring together people and organizations** from around the world.

Scope

Interested early career researchers (**up to 35 years old**) are invited to submit a short video (**up to 90 seconds**) on the research they are conducting on quarantine pests which are considered of a priority importance for any country/region.

Award

The winner of the contest will be invited to take part in a two-week **internship hosted by PBRI (Australia), NIPHM (India), or CIHEAM-Bari (Italy).**

The award covers transport, board and lodging expenses with sponsorship from PBRI-Australia, CIHEAM Bari – Italy and the EUPHRESCO III project.

Competition entry conditions

- The video should address plant health research topics on quarantine priority pests of any country/region.
- One video per applicant is allowed.
- The video and audio should be high quality.
- The video should educate viewers on the overall objective of the plant health activity. The video should be understandable by a non-expert audience.
- Applicants are invited to make creative videos in English.
- English subtitles must be included**.**
- Videos must be up to **90 second** long.

Application process

- Applicants must submit an Expression of Interest (see Annex I) by the due date. The video should be uploaded to YouTube, with notification to the Secretariat (jassmine.zorrilla@euphresco.net)
- The video must comply with the entry conditions to be eligible.

Important dates and deadlines

- **15 January 2025** the call for videos is launched.
- **17 February 2025 (12:00 am GMT)** Expression of Interest submitted to the Secretariat.
- **28 April 2025 (12:00 am GMT)** Videos are uploaded on YouTube and the Secretariat is informed via e-mail.
- **12 May 2025** The winner is officially announced.

Important dates

The evaluation will be performed using the following criteria:

- Relevance: how well did the video address plant health research on quarantine priority pests for a country/region **40 Points**
- Communication: was the research topic and its significance communicated appropriately to a non-expert audience? **25 Points**
- Originality: was the information presented in a creative way? **25 Points**
- Social media interest: did social media (YouTube) like the video? **10 Points**

The applicant with the highest score will win.

Inquiries and more information

For further information and inquiries, please contact the Secretariat (jassmine.zorrilla@euphresco.net).

ANNEX I : Expression of Interest Download document here: LINK

Watch the promotional video here: https://www.youtube.com/watch?v=rdWmZXRJYdQ

Let's spread the word about the importance of plant health research

With best regards from CIHEAM Bari Alumni Network (FTN)

Neem trees in Yemen are an economic resource for farmers and a safe way to control pests.


My relationship with Yemen dates back to 1997 when the University of Aden, Nasser College of Agricultural Sciences, invited me to prepare and launch the postgraduate program. Later, I taught and supervised Yemeni students attending the University of Baghdad for their preliminary and postgraduate studies. I was supportive of them, and they excelled

at that time in the field of plant protection and other agricultural sciences. In recent years, agricultural pests have multiplied due to scarce resources and the introduction of unlicensed materials, facilitating the spread of some pests, including the fall armyworm. The Food and Agriculture Organization of the United Nations (FAO) adopted an emergency project in 2019 to support farmers and encourage them to invest in and use the neem plant to combat the insect during Farmer Field School programs. Indeed, farmers have been creative in implementing simple methods using neem branches and fruits to combat the fall armyworm, and this initiative has become one of the success stories promoted by FAO. The neem tree (sage tree), known scientifically as Azadirachta indica, is one of the environmentally and agriculturally important trees that has spread its cultivation in several regions in Yemen, and belongs to the family Meliaceae.Ba- angood et al., 1996) indicated that the content of neem seeds grown in Yemen of oil reaches 47.85% when analyzed in the laboratory for the analysis of azaderactin at the University of Giessen, Germany, it was found that the average content of active azadracin exceeds the rates of samples that reach for analysis from India and some African countries that are famous for cultivating Neem tree. Using neem products in farms and residential facilities began when Dr.Elham Al-Amodi did her PhD research in 2010 on implementing Neem products on termite control. Later on one of the beneficiaries received support from the Strengthening Community Protection in Emergencies and Combating Corona program, funded by the International Development Association of the World Bank, in partnership with the United Nations Development Program and the implementation of the Small and Micro Enterprises Development Agency, the main objective was to promote sustainable agriculture and the use of natural alternatives to chemical pesticides.

The Small and Micro Enterprises Promotion Services (SMEPS) was established in 2005, believing in development and positive change. SMEPS is the subsidiary of the Social Fund for Development (SFD), which is considered one of the leading national organizations working in development since 1997. The Social Fund for Development contributes to achieving and aligning its programs with the goals of the national social and economic development plans for poverty reduction. SMEPS was established to support economic development through private sector development under three main components: Value Chain Development, Business Development Services and Entrepreneurship. SMEPS works to achieve its goals by pursuing “creative strategies for Micro, Small and Medium Enterprises (MSME) of diversity and growth through the market-oriented approach”. In keeping with this approach, SMEPS interventions seek to build and facilitate the economic and technical capacities of market-driven private-sector parties, including the MSMES themselves, rather than acting as a significant direct service provider to MSMES (https://smeps.org.ye/about).

Thanks to this support, farmers began to use neem oil extracted and Neem cake, later processed to powder (residues of the pressing and extraction process) from the tree seeds as an effective natural insecticide against agricultural pests. This enabled the beneficiary to produce oil and neem cake commercially. Today, neem cultivation and the extraction of neem products represent an additional source of income, in addition to contributing to the protection of the environment and enhancing food security in the region.
A mature tree aged 5 years and over produces between 30-50 kg of fruits per season, the net seed rate after the separation of the shell is about 40 to 50 percent of the weight of the fruits, one tree can produce approximately 15 to 25 kg of seeds per season, the fruiting of neem trees begins after 3 to 5 years of planting and the best productivity is recorded at the age of ten years or more.

Ali Mahfouz Abda Mesharaa, the owner of the neem oil extraction factory, indicated during my communication with him: “This product is natural and environmentally friendly and does not cause any harm to the environment. It is better than the natural pesticides imported from abroad. Our natural neem trees are distinguished from others. Through experiments conducted by Dr. Elham Al-Amoudi and Dr. Ba Anqood, they proved that neem seeds (Marimra) contain 47 percent oil when pressed. The neem pesticide (Mraimr) was produced commercially for sale after neem oil was extracted locally. There is a great demand because it is a friend of farmers and the environment. I will not hold back from providing you with the information you want about this natural pesticide that the world is turning to get rid of chemical pesticides that are the cause of many cancerous diseases among humanity.”

Neem is not grown commercially in Yemen, but rather is naturally found in the valleys of Abyan, Lahj, Shabwa, and Hodeidah, in the coastal plains, Hadhramaut Valley, and areas close to the coast, and other areas where the environment and weather in Yemen are conducive to cultivation and production. This is an invitation to international organizations to help farmers distribute neem seedlings to expand their cultivation and investment in it.[**Elham Al-Amodi(Yemen),Ibrahim Al-Jboory,prepared for ANEPPB 94(1):2025]**

New Books

Dictionary of Acarology with references to economically important species



Acarology is a branch of zoology that studies the systematics, morphology, phylogeny, biology, ecology, and ontogeny of mites and ticks.

The present dictionary provides a comprehensive acarological terminology which could be applied to several groups of the class Arachnida (mites and ticks). There is no dictionary of mite terminology that appeared more than thirty years ago, and most acarological books present and define terms according to the aims and subjects included in these books. The present dictionary is a result of collecting, grouping and simplifying terms already sporadically existing in numerous high-quality books, scientific papers, and electronic database sites of some groups of Acari that appeared particularly in the last three decades and constitute the main references of the present work. In addition to the acarological vocabularies, a lot of terms concerning several scientific sections (biology, ecology, taxonomy, morphology, physiology and behavior, entomology, plant protection, agricultural, medical, and veterinary pests) were also included. These terms could be divided in three main groups: (1) sigla (letters, numbers, abbreviations, and signs) refer to the morphological characters for many diversified taxa and are usually used in the identification of mites; (2) English terms (about 2000 terms) which are generally written as they were present in their original references, and taxonomic hierarchy of the mite taxa. These terms form more than 50% of the vocabulary presented in this dictionary. They refer to species of mites and ticks that have an importance in agriculture, stored products,

medicine, veterinary, biological control, phoresy, and those involved in the decomposition of animal carcasses and human corpses. A large number of species of the sub-class Acari are grouped in this dictionary. These species form the most important species of Acari in the world, which may constitute more than 5% of the described species. The dictionary also included (1) biographies of the most famous acarologists in the world, (2) laboratories, institutes, universities, and societies that are interested in the field of acari, and (3) Information about useful internet sites, journals, and textbooks interested in Acarology. The originality and simplicity of this dictionary make it with wide appeal to scientific and ordinary people. It is of high value for graduate and post-graduate students, researchers and taxonomists in acarology, zoology, and plant protection sciences. **[Authors: Walid Kaakeh, Ziad Barbar, Hany El-Kawas, Publisher:** Noor Publishing, November 25, 2024, Page number: 633 page in Color,First Edition – 2025,].

Phytoplasma and spiroplasmatheir biological and molecular properties, nomenclature and classification

This book came to shed light on plant virology and the extent of development and accuracy of modern techniques used in isolating, purifying and diagnosing plant viruses. The Next Generation Sequencing technique was adopted to diagnose new strains and types of viruses for the first time in the Iraqi environment on tomato, lettuce, eggplant, fig, bean, cucumber and other plants. The development of molecular methods followed by researchers and graduate students in Iraqi universities in detecting viruses, whether they are inside the cytoplasm of the plant cell or integrated within host's genome in the chromosomes, in addition to avoiding the biases imposed on them by other diagnostic methods by focusing on one or more viruses without including all viruses expected to be present in the infected plant has become an urgent necessity to obtain a diagnosis closer to reality and without errors. Sequencing methods mean determining the sequence of nucleotide bases in a piece of DNA. Today, with the availability of appropriate equipment and materials to do so, the process of reading the sequence of a piece of DNA has become somewhat simple, while reading the entire DNA sequence (all the DNA of a living organism) remains a complex process. Therefore, modern technologies such as next-generation technology have moved towards breaking the DNA that makes up the genetic material of the living organism into many short parts, followed by reading the sequences of those parts and then assembling them by linking them to a reference sequence (Assembling) and producing a long sequence that represents "Consensus". The process of reading DNA sequences is now faster and less expensive due to the reading methods that have been developed over the past two decades. The four chapters of this book deal with everything related to plant viruses that were diagnosed for the first time in Iraq using next generation technology, starting from their external symptoms on plants in the field to the methods of work that include their isolation, purification, and reading their sequences, ending with their most

important results, constructing their phylogenetic trees, and depositing them in the Genbank. In addition, reference is made within each chapter (the text) to the sources that were collected from master's and doctoral theses, scientific books, published research, and Internet information that were used in writing this book. The book also includes a number of appendices to clarify how the readings obtained are related to the reference sequence and virus registration pages provided by the Genbank. [**AuothorsProf. FadhalAbedalhusseinAlfadhal, Dr.OsamaNadhimAlisawi, Dr.Hawraa Ismail Abbas Al-Yasiri,**Republic of Iraq Ministry of Higher Education and Scientific Research University of Kufa Faculty of Agriculture, 2025].

Selected Research Papers

- **Genomic analysis of 'candidatus liberibacter africanus' strain from Zimbabwe reveals unique virulence and prophage characteristics compared with 'Ca. L. asiaticus'.** Yongqin Zheng, Wenxia Huang, Runyanga Tinashe Josiah, Tauya Clemence, Shumbayaonda Chiyedzo Vernon, Takawira Enklebert, Xiaoling Deng, and Zheng Zheng, Published Online:4 Jan 2025. https://doi.org/10.1094/PDIS-05-24-1141-SC
- **Cucurbit leaf crumple virus is seed transmitted in Yellow squash (Cucurbita pepo).** Dalvir Kaur Dhadly, Saritha Raman Kavalappara, Theodore McAvoy, Paul M. Severns, Alvin M. Simmons, Rajagopalbabu Srinivasan, and Sudeep Bag**,** 4 Jan 2025. https://doi.org/10.1094/PDIS-06-24-1330-RE
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- **A Review of the Psyllid genus *Epipsylla* (Hemiptera, Psyllidae) from the Chinese mainland with phylogenetic considerations and the description of a New species.** Zhixin He, Daniel Burckhardt,Xinyu Luo, Rongzhen Xu, Wanzhi Cai and Fan Song, Insects , 16(1), 99, 2025. https://doi.org/10.3390/insects16010099
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- **Comparison of fecundity and gall-forming of the horned-gall aphid, *Schlechtendalia chinensis* (Hemiptera: Aphididae) from different populations.** Xin Xu, Zhaohui Shi,Chang Tong, Shuxia Shao, Hongyuan Wei and Zixiang Yang, Insects , 16(1), 100; 2025. https://doi.org/10.3390/insects16010100
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- **Age-stage, two-sex life table of leptinotarsa decemlineata (Coleoptera: Chrysomelidae) experiencing cadmium stress.** by Bingyu He,Jiebo Zhang,Yang Hu,Yi Zhang,Jianan Wang andChao Li Insects 2025, 16(1), 73- 13 Jan 2025. https://doi.org/10.3390/insects16010073
- **Genomic analysis of '*Candidatus* liberibacter africanus' strain from zimbabwe reveals unique virulence and prophage characteristics compared with '*Ca.* L. asiaticus'**.Yongqin Zheng, Wenxia Huang, Runyanga Tinashe Josiah, Tauya Clemence, Shumbayaonda Chiyedzo Vernon, Takawira Enklebert, Xiaoling Deng, and Zheng Zheng,4 Jan 2025. https://doi.org/10.1094/PDIS-05-24-1141-SC
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- **Green guardians: bacterial endophytes in protecting vegetable crops against pathogens.** Sagarika Medari, Krishnan Kalpana, Muthusamy Ramakrishnan, Aravindaram Kandan, Subbiah Ramasamy, Karuppiah Eraivan Arutkani Aiyanathan, Sankarasubramanian Harish, Andithevar Beaulah, Rangaswamy Anandham, Narayanan Manikandaboopathi, Marimuthu Ayyandurai, Plant Protect. Sci.,61(1):21-43, 2025**.** DOI: 10.17221/38/2024
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- **Toxicity effect of *Ricinus communis* methanolic extracts against *Bactrocera cucurbitae* (Diptera: Tephritidae)**. Sadia Manzoor, Rasheed Akbar, Afaq Hussain, Amjad Ali, Brekhna Faheem, Maid Zaman, Abid Farid, Ijaz Hussain, Imtiaz Ali Khan, Kahkashan Perveen, Najat A. Bukhari, Jianfan Sun, Plant Protect. Sci., 61(1):77-88, 2025. DOI: 10.17221/46/2024-PPS
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- **Comparative study of the diversity and structure of plant-pollinator interactions in forest and agricultural landscapes in Northwestern Morocco.** Amine Samih, Sergi Trócoli, Latifa Rohi, Hassan Fougrach, Mohammed Hsaine, Noureddin Maatouf, Eur. J. Entomol. 121: 400-412, 2024. DOI: 10.14411/eje.2024.044

ECOLOGY

Influence of Different Citrus Cropping Systems on Insect Diversity in the Northern West of Algeria
S. Ali-Arous, Z. Labdaoui, M. Benelhadj-Djellloul and K. Djelouah (Algeria & Italy)
Pages 406-418
https://doi.org/10.22268/AJPP-001263

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EVENTS OF INTEREST

June 1 -14,2025	XVII Meeting of the Working Group 'Biological and integrated control of plant pathogens' From single microbes to microbiomes targeting One Health, in Torino, Italy. https://www.iobctorino2025.org/
July 6-10,2025	17th Congress of the Mediterranean Phytopathological Union, CIHEAM Bari-Italy. https://ciheambaricongressmpu2025.org/
June 16 18-, 2025	Biotechnologies for a Sustainable Future: Driving Agrifood Systems Transformation. FAO HQ, Rome, Italy. https://www.fao.org/events/detail/fao-biotech-conference-2025/en/
June 29-July 2, 2025	International Conference On Urban Pests. ICUP 2025 - in Lund, Sweden. https://tinyurl.com/y3j2fxj9
September 7-10, 2025	Agbiol, VII. International Conference on Agricultural, Biological & Life Science, Istanbul, Turkey. www.agbiol.org
October 8-11,2025	9th Meeting of the IOBC-WPRS WG "Integrated Control of Plant-Feeding Mites". Izmir, Türkiye. https://iobc-wprs.org/meeting/9th-meeting-iobc-wprs-wg-integrated-control-of-plant-feeding-mites/
January 28-29, 2026	International Conference on Plant Pathology and Plant-Microbe Biology in Istanbul, Türkiye. https://shorturl.at/fmqSY

Appreciation

I would like to express my sincere gratitude to **Professor Glenn Wright** for writing the insightful editorial on one of the most critical diseases affecting citrus. His emphasis on the importance of staff awareness among ministries and agricultural personnel regarding such threatening diseases is invaluable. Raising awareness is vital for effective management and collaboration in combating the challenges posed by diseases like Huanglongbing. Thank you for highlighting this essential issue.

The Editor-in-Chief expresses his gratitude to **Dr. Elia Choueiri**, principal virologist at the Lebanese Agricultural Research Institute, LARI, for his continuous support of the bulletin and the journal despite his large responsibilities. He did not hesitate to be with us to serve plant protection workers in the Arab region.

A special thanks to **Dr. Mohamed Mannaa**, the young plant pathology scientist who regularly contributed to the bulletin with his scientific findings. Dr. Manaa has published more than 50 peer-reviewed articles in high-impact factor journals. He also established a distinguished research collaboration with the Korean institutes where he completed his Ph.D.

The Editorial Board of The Arab and Near East Plant Protection Bulletin greatly appreciates the contributions of several Arab scientists in this issue.

Nabeel Abdalla AL Kaeath (Iraq), Fadhal Abedalhussein Alfadhal (Iraq), Wafaa R. Isleem (Jordan), Mokhtar Abdulsattar Arif (Iraq), Abdulrahman S. Aldawood (Saudi Arabia), Ahmad Mouhanna (Syria), Tavga Sulaiman Rashid (Iraq-Erbil), Aqeel Abedulrazak Kraidi (Iraq), Ahmed. B. Abu-Duka(Iraq), Deghiche-Diab Nacima(Algeria),

Wael Almatni(Syria), Iman Amer Abdelhafiz Amer (Egypt), Mohamed Mannaa (Koria-Egypt), Elia Choueiri (Lebanon), Glenn C Wright (Arizona), Zainab Lateef Hameed Al-Tamimi(Iraq), AlSarai Alalawi Mamoon (FAORNE), Heba Tokali (FAO-Egypt), Yosra Ahmed (FAORNE), Lidia AbdelShahid (FAORNE), Mohammed Ibrahim Elbashir (Sudan), Emad Al-Maaroof(Iraq), Fatma Ezzahra Besbes(Tunisia-USA)

The bulletin's editorial board invites society members to submit their scientific findings and news related to plant protection in Arab countries and beyond. We also encourage scientists working abroad to share their information and achievements with colleagues through this bulletin.

Aphid invasions of cucumbers grown in greenhouses during the spring season of 2025. Different kinds of insecticides have been used without significant results.

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