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Climate changes and the newly emerged insect pests in the NENA region

The NENA region faces urgent and interconnected challenges of climate change and political instability. These factors not only weaken the agricultural quarantine and phytosanitary system but also create an environment that encourages the spread of agricultural pests across borders. In this brief editorial, I will shed light on some key insect pests that have significantly worsened over the past decade, emphasizing the need for immediate action.

Food and Agriculture Organization FAO and other organizations focus on transboundary insects that threaten crops due to their ability to spread across multiple territories and impact many crops. The most common transboundary pests of crops include desert locusts *Schistocerca gregaria*, fruit flies, red palm weevils *Rhynchophorus ferrugineus*, and fall armyworms *Spodoptera frugiperda*, which invaded maize in 2016 in West Africa. As the migration of these pests is often aided by strong winds, trades, and climatic factors, other insect pests succeeded in traveling across countries and continents, such as citrus leaf miner *Phyllocnistis citrella* in 1994 and tomato leaf miner *Tuta absoluta* (= *Phthorimea absoluta*) in 2006.

Climate change and global warming have caused many insect pests to return in larger numbers. Some pests that were previously under control are now causing harm. This resurgence can also include new pests appearing and becoming problematic for the same reasons. For instance, the *Metcalfa pruinosa* (Say, 1830) citrus flatid leafhopper was recently found in Iraq (2023-2024). *Hauptidia maroccana* greenhouse leafhopper appeared in Jordan in the last three years and was officially recorded in (2024). Both insects are entirely new to the NENA region ecosystem.

Four different species of mealybugs were recorded vis. *Dysmicoccus brevipes* pineapple mealybugs on date palm roots in Iraq (2022-2024), *Phenacoccus madeirensis* Madeira mealybug on a wide range of agricultural and ornamental plants in Jordan (2019), *P. solenopsis* cotton mealybugs severe infestation on a wide range of crops in particular hibiscus species; *Pseudaspido proctus hyphaeniacus* (Hall 1925), date palm giant mealybugs (2021).

Scale insects, such as *Dactylopius opuntiae* (cochineal scale insect), *Ceroplastes rusci* (fig scale insect), *Palmopsis phoenicis* (green pit scale insect), and *Parlatoria blanchardi* (date palm white scale insect), have emerged as potential pests in various environments. For example, *Dactylopius opuntiae* has damaged cactus plants in Morocco, Jordan, Lebanon, Syria, and recently Tunisia. *Ceroplastes rusci* has affected figs in Iraq from 2022 to 2024 and ficus species plants. *Palmopsis phoenicis*, initially registered in 1976 in Sudan, was transported to Libya through infested offshoots, causing significant damage to date palm trees



in Oasis. *Parlatoria blanchardi*, which traditionally infested weak date palm offshoots, has shifted its habitat to infest large trees, leading to substantial damage.

The presence of the Mediterranean fruit fly has exacerbated the issue of fruit flies as insect pests on different crops. Other significant pests have also arisen, such as the recent outbreak of the peach fruit fly, *Bactrocera zonata*, in Iraq. Over the last three years, the peach fruit fly has displaced *Ceratitis capitata*. Additionally, the African fig fruit fly, *Zaprionus Indianus*, has been discovered on date palm fruits and other fruit crops.

Many stakeholders have inquired about the impact of climate change on insect population abundance.

Climate change represents one of the most significant challenges for global agriculture. As temperatures rise and weather patterns shift, the dynamics of agricultural pest populations change, leading to profound implications for crop production and food security. One of the most immediate effects of climate change on agricultural pests is the alteration of their populations and distribution patterns. Rising temperatures can increase pest populations as warmer conditions enhance their reproductive rates. For instance, fall armyworm, a significant pest affecting maize and other crops, has been observed to have longer breeding seasons in warmer climates, resulting in more yearly generations. This phenomenon is evident in regions where previously minor pest outbreaks have evolved into severe infestations, putting additional pressure on farmers to implement pest control measures.

High temperatures will negatively affect the cues and pheromones released by insects and natural enemies working in a complex ecosystem network. Many agricultural pests, such as dubas bugs, *Ommatissus lybicus*, and white scale insects on date palms, have varied thermal tolerances. They can tolerate temperatures above 45 degrees Celsius, as in Jordan Valley in 2022-2024. These tolerances dictate the climates in which they can thrive. Warmer temperatures may allow pests to expand their range into previously inhospitable areas.

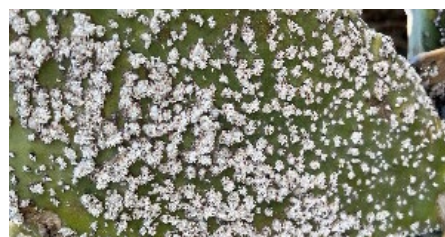
Conclusion

The effects of climate change on agricultural pests represent a significant challenge for global agriculture. Farmers should adapt their management practices accordingly as pest populations increase, shift geographically, and alter their life cycles. Understanding these changes is crucial for ensuring food security and sustainable agricultural practices in a rapidly changing climate. Ongoing research and collaboration among scientists, farmers, and policymakers will be essential to develop effective strategies for managing pests in the new environment and supporting agricultural resilience and productivity.

Ibrahim Jaddoa Al-Jboory,Ph

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Editor in Chief of ANEPPB



Crop Protection News from Arab and Near East Countries

invasive, new pests and natural enemies

Jordan

Screening cactus varieties resistant to cochineal scale, *Dactylopius opuntiae* (Cockerell) (Hemiptera: Dactylopiidae) in Jordan

The cochineal scale, *Dactylopius opuntiae* (Cockerell), is a serious pest of cactus in many parts of the world. It was first recorded in the north of Jordan in 2018 and continued to spread in the country. To use environmentally safe control methods for this invasive pest, two experiments were conducted to find cactus accessions resistant to the cochineal scale. The first experiment was conducted on twenty-six accessions in a growth chamber at 27°C ± 0.5°C and 70-80% of RH. The second experiment was conducted in the Jordan Valley and included ninety-nine accessions. All accessions were obtained from the International Center for Agricultural Research in the Dry Areas (ICARDA). Accessions from countries around the world were tested (Algeria, Argentina, Brazil, Italy, Jordan, Mexico, Morocco, South Africa, Syria, and Tunisia). All the first twenty-six accessions were found susceptible to the pest. The average duration of one generation of the insect ranged from thirty days to forty-one days, with an average of 36.3 ± 2.59 days. On the other hand, out of the ninety-nine cactus accessions, four were found resistant and showed no infestation. These were Unknown 120 and Unknown 122 from Syria, *Opuntia robusta* 1280 from Argentina, and *Opuntia robusta* 200146 from Brazil.

The most susceptible accessions were Zastron 4 and M3 Bianca di Macomer from Italy and 40-Tronzar and GS from Tunisia, with an infestation rate of more than 90%. [Razan Qasqas¹, Ahmad Katbeh-Bader^{2*}, Dajana Frasher³, Ibrahim Al-Jboory⁴, and Sawsan Hassan⁵ (Jordan),¹Mediterranean Agronomic Institute of Bari (CIHEAM), Italy; ²Department of Plant Protection, School of Agriculture, University of Jordan, Amman, Jordan; ³Mediterranean Agronomic Institute of Bari (CIHEAM), Italy; ⁴Department of Plant Protection, College of Agriculture, University of Baghdad, Baghdad, Iraq; ⁵International Center for Agricultural, Jordan Journal of Natural History, 11 (1): 43-50. 2024]. *Corresponding author: ahmadk@ju.edu.jo

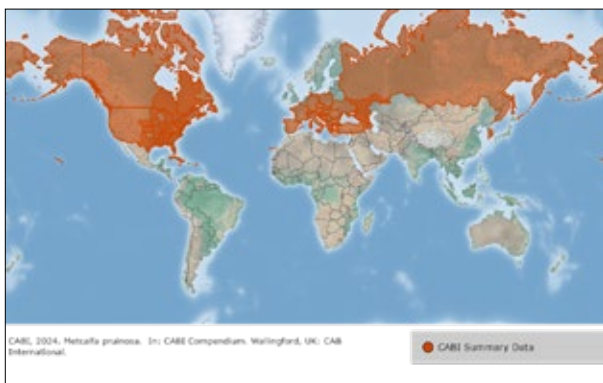
First record of the lime butterfly *Papilio demoleus* (Linnaeus, 1758) (Lepidoptera: Papilionidae) from Jordan

The lime butterfly *Papilio demoleus* (Linnaeus, 1758) (Lepidoptera: Papilionidae) is recorded from Jordan for the first time based on the identification of three specimens collected from Al Kurayyimah area in the Jordan Valley during May 2024. Its biology, ecology, and distribution are briefly discussed. [Ahmad Katbeh-Bader (Jordan), Department of Plant Protection, School of Agriculture, The University of Jordan, 2024]



New record of citrus flatid planthopper *Metcalfa pruinosa* (Say, 1830) (Hemiptera: Flatidae) in Iraq

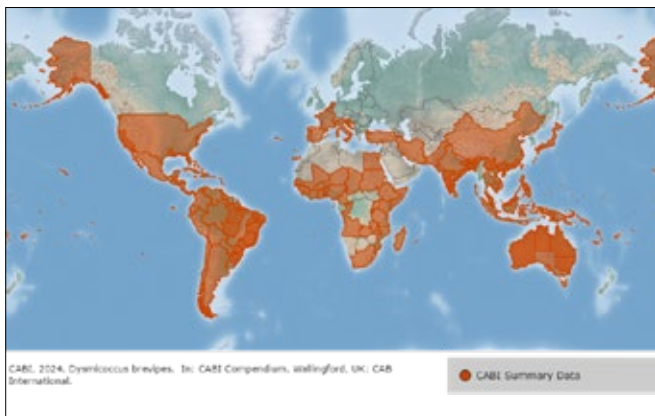
Samples of unknown nymphs collected from fallen recently thinned date palm fruits were sent to me from Iraq for identification. Initial searches in the literature have revealed that no one referred to this leafhopper on date palm fruits. Additional samples on citrus trees were received from the Sewaira area near Baghdad and Diyala province. The identification of the nymphs refers to a citrus flatid leafhopper *Metcalfa pruinosa* (Say, 1830) (Hemiptera: Flatidae), which is an insect pest that has gained attention due to its invasive nature and ability to damage a wide variety of plants. Native to North America, it became widely established across Europe in the late 1970s, including countries like Italy, France, Spain, Germany, Switzerland, Slovenia, Poland, and Asia (Korea), and was observed in the NENA region. It poses a significant threat to agricultural and ornamental plants. *M. pruinosa* is polyphagous, recognized by its pale blue to white, waxy coating, giving it a frosted appearance. Adult planthoppers are about 5-8 mm long, with wings that resemble a tent-like shape at rest. The nymphs are covered in a white, waxy secretion and feed on plant sap, which can weaken the plant. EPPO 1996 mentioned that the insect has one generation per year. Eggs are laid in September in bark crevices of many woody plant species, and the insect overwinters in this form. The first nymph hatch is in May-June, and five nymphal instars are observed. The first adults appear in summer (July). Nymphs are generally found at the underside of the leaves, and adults are aligned on the twigs in a rather characteristic way. It has been recorded on over 200 plant species across different families, including citrus, grapevines, peaches, plums, cherries, roses, ivy, poplar, blackberries, and raspberries. I believe the insect moved to Iraq from Turkey, where the insect was already recorded in 2004 by Karsavuran & Güçlü and through the imported agricultural crops. The species needs further investigation to check the impact on agricultural crops, alternative host plants, and related segments. This is the first record for *M. pruinosa* in Iraq. CABI map shows the distribution of *M. pruinosa*. [Ibrahim J. Al-Jboory, 2024, (Iraq), Arab Society for Plant Protection, University of Baghdad, ANEPPB 92 (2), 2024]





New record of pineapple mealybug *Dysmicoccus brevipes* (Cockerell, 1893) (Hemiptera: Pseudococcidae) on date palm roots in Basra, Iraq

During the research on implementing direct root nutrition to control date palm pests, we found a severe infestation of date palm roots by mealybugs in Zubair and Magal in Basra, Iraq. Samples were collected for further identification, which showed that the mealybugs belong to *Dysmicoccus brevipes* (Cockerell, 1893) (Hemiptera: Pseudococcidae), commonly known as the pineapple mealybug. It is an important pest that generally occurs in tropical and subtropical regions and primarily affects pineapple crops. It can also be found in other tropical plants, including bananas, citrus species, coffee, sugarcane, and ornamental plants. The pest has spread globally, particularly in regions where pineapples are cultivated, such as Africa, Asia, Central and South America, Hawaii, and the Caribbean. The mealybug damages plants by sucking sap from the roots, stems, and fruits. This can lead to reduced plant vigor, yellowing of leaves, and, in severe cases, plant death. Additionally, the honeydew excreted by the mealybugs attracted the ants in a dense population. Blumberg 2008 states that in the arid Arava Valley, populations of this mealybug occur throughout the year on the adventitious roots at the trunk base of date palms, apparently without damaging the palms. Nevertheless, in late summer (August–September), mealybugs occasionally wander upwards to the ripening bunches, where they infest the dates and sometimes cause total loss of bunches. Zarghami and Moghaddam, 2023 collected the pineapple mealybug *Dysmicoccus brevipes* from date palm roots in Ahvaz, Khuzestan province, Iran. Ito 1938 studied, the life history of *Pseudococcus brevipes* (= *Dysmicoccus brevipes*) in Hawaii. *D. brevipes* is recorded for the first time on date palm roots in Iraq. It is recommended that detailed insights into its taxonomy and classification, morphology, life cycle and reproduction, ecology and habitat, feeding habits, economic impact, and management strategies be conducted if needed. [**Ibrahim J. Al-Jboory¹ and Sanaa S. Abbas² 2024, Arab Society for Plant Protection, University of Baghdad¹, Iraq and Agriculture Directorate², Basra, Iraq, ANEPPB 92(2), 2024**].



First report of *Cotton bunchy top virus-1* in okra in Iraq

Okra (*Abelmoschus esculentus*), also known as lady's fingers, is one of the main vegetable crops in Iraq, being cultivated widely with two crops per season (Al-Kanani et al., 2019). In September 2023, okra plants showing extensive leaf yellowing (Fig. 1), and light green, short petioles and internodes were observed in okra fields in Baghdad Province, Iraq, with a disease incidence of 20–30%. Forty diseased leaf samples were sampled from 20 fields selected from different locations in the province. Fifteen diseased leaf samples were selected randomly and bulked together before screening for virus infection using an Illumina HiSeq (San Diego, USA).



Geneious Prime® 2024.0.4 (Biomatters; Auckland, New Zealand) with default parameters was used for bioinformatic data analysis. A total of 35,855,946 paired-end reads were obtained. The reads which were unmapped to the complete genome sequence of *A. esculentus* were *de novo* assembled using the Velvet assembler (v. 1.2.10) (Lahuf, 2021). BLASTn analysis revealed >83% pairwise nucleotide identity and coverage of 97% with the whole genome of *Cotton bunchy top virus-1* (CBTV-1) isolate 3092-1 (GenBank Accession No. MT966040.1). The average sequencing depth of the genome sequence of CBTV-1 obtained was ×10. The genome sequence of CBTV-1 isolate Iraq-1 was deposited in GenBank (PP680224.1). A specific RT-PCR primer set, CBTV-5F / CBTV-5R (Ellis et al., 2013), was used successfully to detect CBTV-1 in 18 out of the 25 remaining leaf samples previously collected, and a further 33 out of 50 diseased leaf samples collected from the same okra fields. CBTV-1 causes a severe disease of cotton (*Gossypium hirsutum*) in Australia as well as infecting other plant hosts including *Cicer arietinum*, *Euphorbia hirta*, *Gossypium sturtianum* and *Malva parviflora* (Sharman et al., 2022).

To our knowledge, this is the first report of CBTV-1 in Iraq. Subsequent investigations are necessary to verify the incidence of CBTV-1 in other Iraqi plant hosts, mainly cotton (*G. hirsutum*), and to identify the interaction with potential insect vectors in Iraq. This knowledge would be vital in the selection of practical management approaches. [**M. H. Al-Helu, A. A. Lahuf, L. Gamble (Iraq)**, New disease report, First published: 23 May 2024]. <https://doi.org/10.1002/ndr2.12282>

Two parasitic wasp species: *Ichneumon sarcitorius* and *I. ostentator* in Iraq.

This study was carried out in Karbala and Najaf cities in June 2020. A sweeping net was used to collect the specimens during the survey. Results indicated that the samples collected belong to the Ichneumonidae family (Order: Hymenoptera), one of the large and long *Ichneumon* wasps.

This is the first report on the occurrence of two *Ichneumon* species, *Ichneumon sarcitorius* (Linnaeus, 1758) and *I. ostentator* (Heinrich, 1978), in the Al-Husayniya district of Karbala and Najaf provinces in Iraq. However, more survey is needed to identify their hosts in Iraq. [**Kareem, A.A., A. Alsendi, S. Al-Zurfi, A. Alamri and R.K. Aljaafari (Iraq)**, Arab Journal of Plant Protection, 42(2): 245-247, 2024]. <https://doi.org/10.22268/AJPP-001226>

First report of *Spodoptera frugiperda* in Iran

Fall armyworm, *Spodoptera frugiperda* (Lepidoptera: Noctuidae – EPPO A2 List), is reported for the first time from Iran. In October 2023, during monitoring surveys of maize fields in the Orzuiye region (Kerman province), larvae were observed feeding on maize leaves and cobs. Several larvae were collected, reared in the laboratory, and emerging adults were identified as *S. frugiperda*. The situation of *Spodoptera frugiperda* in Iran can be described as follows: Present, not widely distributed.

Source: Naseri M, Bemani M, Alipanah H, Noorbakhsh S, Zohdi H (2024) [First report of the fall armyworm, *Spodoptera frugiperda* (Lepidoptera, Noctuidae: Noctuinae) from Iran]. *Journal of the Entomological Society of Iran* 44(1), 111-116 (in Persian). **EPPO Reporting Service 2024 no. 7** - Pests. <https://doi.org/10.61186/JESI.44.1.9>

***Cardiocondyla hashemi* sp. n., a new species of the *C. batesii* species-group (Hymenoptera: Formicidae) from Saudi Arabia, with a key to the Saudi species**

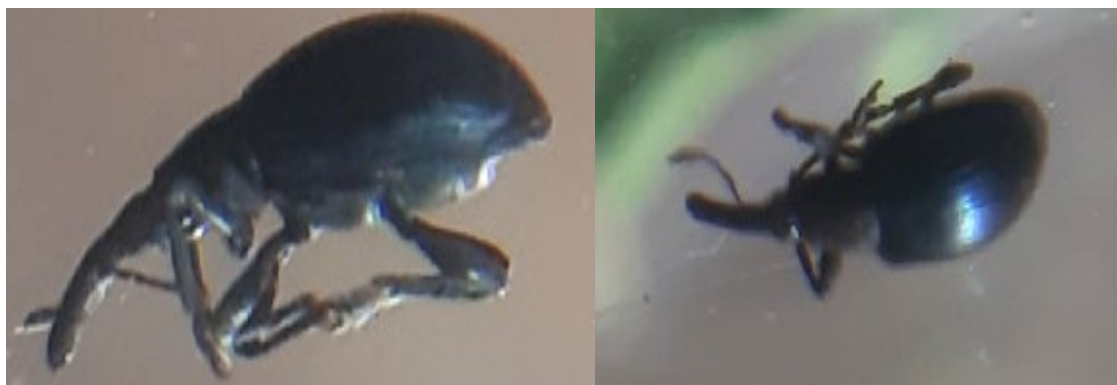
A new species, *Cardiocondyla hashemi* sp. n. is described and illustrated using a Scanning Electron Microscope (SEM) based on the worker caste. *Cardiocondyla hashemi* is a member of the *C. batesii* species-group with a resemblance to *C. tenuifrons* Seifert, 2003 from Jordan. *Cardiocondyla hashemi* can be readily distinguished by the uniform yellow body, the rare or distinctly scattered foveolae on the posterior third of cephalic surface, the broadly medially concave anterior clypeal margin, the sculptured mesosomal dorsum except for the mesonotum which is shallowly sculptured with faint longitudinal rugae, and petiolar node distinctly densely microreticulate. Ecological and biological remarks on the type locality are given. A key to the Saudi fauna of the genus *Cardiocondyla* is presented. [Mostafa R. Sharaf, Hathal Al Dhafer, Mahmoud Saleh Abdel-Dayem, Abdulrahman Saad Aldawood (Saudi Arabia), February 2024, *Zoology in the Middle East*].

[DOI:10.1080/09397140.2024.2321640](https://doi.org/10.1080/09397140.2024.2321640)

First record of the white clover beetle *Ischnopterapion (Chlorapion) virens* (Herbst 1797) in Syria

The *Ischnopterapion (Chlorapion) virens* (Herbst) beetle (Coleoptera: Curculionoidea: Brentidae: Apioninae), is one of the harmful insects that feed on clover (*Trifolium* spp.). The adult insect feeds on the host's foliage, while the larvae mining in the petioles, stems (stolons), root-crowns, and roots. in the stem, branches, stems (stolons), root-crowns, and roots. The length of the insect ranges between 1.8-2.6 mm, the body is flat and slightly convex, the color is black with a dark green or metallic reflection, the sheaths are metallic blue. Male rostrum is slightly curved and is one and a quarter time longer than pronotum. The female rostrum is longer than the male's rostrum, and its length is one and a half times longer than the propodeum. Vertex is convex and mottled. The eyes are prominent, medium in size, and almost round. The width of the pronotum is greater than its length, and it is convex and has clear ridges. Elytra have round sides, slightly convex in the

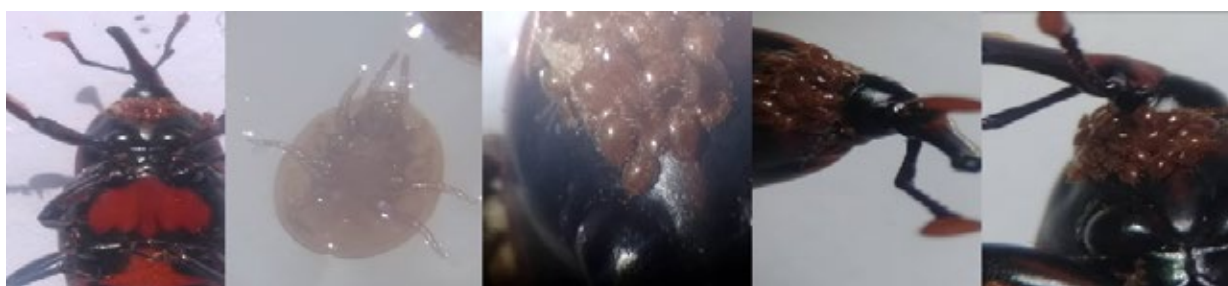
middle. The elytra have holes distributed in the form of regular lines. The legs are black with a green or bluish metallic reflection. [Houda Kawas, Abdulnabi Basheer, Mary Ali, Milad Haddad, Farah Endawe (Syria), Plant Protection, Faculty of Agriculture, University of Damascus-Syria, 2024].



White clover beetle *Ischnopterapion (Chlorapion) virens*

First record of the phoretic mite *Uroobovella marginata* (C.L. Koch, 1839) (Acari: Uropodina) from red palm weevil *Rhynchophorus ferrugineus* (Olivier, 1790), in Syria

Adults of the red palm weevil *Rhynchophorus ferrugineus* (Olivier, 1790) (Coleoptera: Curculionidae) were collected from palm trees (*Phoenix dactylifera*) that showed symptoms of infestation in Damascus and its countryside. The results of the investigation showed the presence of phoretic mite *Uroobovella marginata* (C.L. Koch, 1839) (Acari: Uropodina) associated with the red palm weevil *R. ferrugineus*. (Phoresis or phoresy is a temporary communalistic relationship when an organism (a phoront or phoretic) attaches itself to a host organism solely for travel). Phoretic deutonymphs of *U. marginata* are exposed on the weevil body (Fig. 2a, b), but tethered by a long, flexible stalk whose distal end is attached to a smooth cuticular surface. The mites are mainly found on sternum, on pygidium, on thorax and on head and rarely on legs and tarsi. [Mohamad Kanouh, Abdulnabi basheer, (Syria), Department of Plant Protection, Faculty of Agriculture Damascus University, Syria].



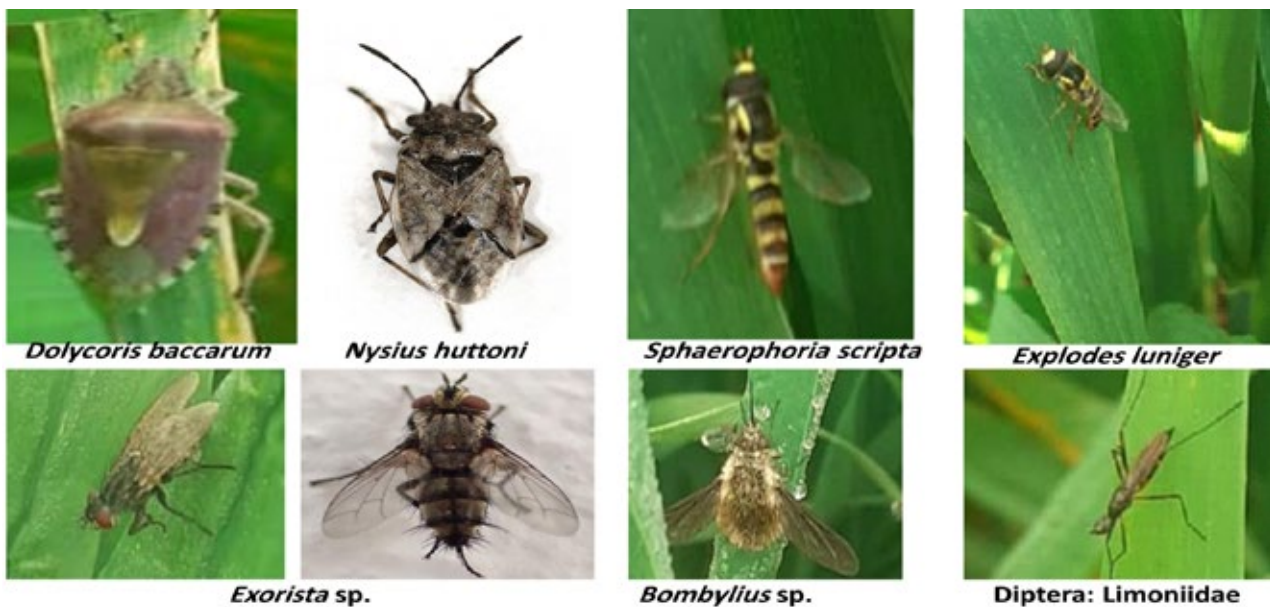
Phoretic Mite *Uroobovella marginata* (C.L. Koch, 1839) (Acari: Uropodina)

First record of some insects at the Izraa research station (ACSAD), daraa governorate, Syria.

Through periodic visits to the research station in Izraa (Daraa Governorate - Syria), affiliated with the Center for the Study of Dry Zones and Dry Lands (ACSAD), a number of insects were recorded, two species of the order Hemiptera: the hairy bug *Dolycoris baccarum* (Linnaeus, 1758) (Pentatomidae). the length of the insect is about 10-12.5 mm. The basic color of the first thorax and the half-wing is quite variable but is usually reddish-purple, while the scutellum is grey. The second type is the wheat bug *Nysius huttoni* Wite,



1878, (Lygaeidae). The adult insect is grey or black-brown, or sometimes creamy white. The apices of the femora and tibia are yellow. The body is elongated, oval, and dorsally flattened. The head is triangular, slightly narrower than the pronotum, with prominent round eyes. Pronotum trapeziform, distinctly punctate and brown. Scutellum shiny black. Hemelytra brown, variably mottled and spotted with yellow. Abdomen black, mottled with yellow. Antennae are brown to black with the first segment, sometimes yellow. There are 4 antennal segments; segments 1 and 4 are bigger than segments 2 and 3. The forelegs are thin with no spines. A long, erect pubescence covers the body. Several species of flies were recorded, two syrphid flies (Diptera: Syrphidae),. Adults visit flowers, and larvae are predators of pest insects, especially aphids: *Explodes luniger* (Meigen, 1822) and *Sphaerophoria scripta* (Linnaeus, 1758). One of the parasitoids of tachina flies (Diptera: Tachinidae), namely *Exorista* sp., was also recorded. The larvae parasitize many harmful insects, The larvae exhibit parasitic behavior and parasitize on types of bugs of the Pentatomidae family, including the sunn bug *Eurygaster integriceps*. The mosquito fly (Diptera: Limoniidae) has also been recorded. Its larvae feed on humus, decaying materials, and sap, and the bee fly, *Bombylius* sp. (Diptera: Bombyliidae). The adult insect resembles a bee and feeds on nectar. The larvae are either parasitoids or predators of other insects. [Laila Samir Aldahak, Jmeela Ali Youssef, Abdulnabi Mohamad Basheer(Syria), The Arab Center for Studies of Dry Zones and Dry Lands, ACSAD, 2024].



The first recording of the fly *Neoitamus cyanurus* (Loew, 1849) in Syria

Neoitamus cyanurus, the common awl robberfly, is a species of ‘robber fly’ belonging to the family Asilidae. The length of the adult insect ranges between 12-18 mm, the wingspan is 8-12 mm, this rather large dark elongate species has strongly angled hair beneath the eyes, mouthparts with a piercing and sucking proboscis and a gray thorax. The abdomen is very narrow compared to the thorax. The first five segments of the abdomen are gray. Abdomen of the male is shining steel-blue on the sixth and seventh segments, while in the female those segments appear narrowed to form a part of the very long ovipositor. Male genitalia are elongate oblong.

The legs are very long, nearly all black, with short, thickened bristles, but the extreme base of tarsi is orange. The adult insects perch on tree trunks, or branches waiting for other flying insects, which they then capture with their long bristly legs. Their prey is often larger

than the captor. The prey spectrum is broad including, for example, small butterflies, green lacewings (*Pseudomallada ventralis*), flies, gnats, cicadas, beetles and many more. The larvae develop in the soil and their feed on insect larvae. [Houda Kawas, Abdulnabi Basheer (Syria), Plant Protection, Faculty of Agriculture, University of Damascus, 2024].



First record of the caper fly, *Capparimyia savastani* in Syria

Larvae of different ages were observed within the buds and fruits of the caper, *Capparis spinosa* (Capparidales: Capparidaceae) in Al-Makhram area, Homs, Syria at several locations, and adult insects were captured with food traps. Based on the morphological characteristics of the adult insect, the caper fly, *Capparimyia savastani* (Martelli) (Diptera: Tephritidae) was recorded for the first time in Syria on the capers plant. This report includes morphological characteristics, life cycle, hosts, and geographical distribution. [El-Habib, A.F.(Syria), Arab Journal of Plant Protection, 42(2): 260-262, 2024].

<https://doi.org/10.22268/AJPP-001238>

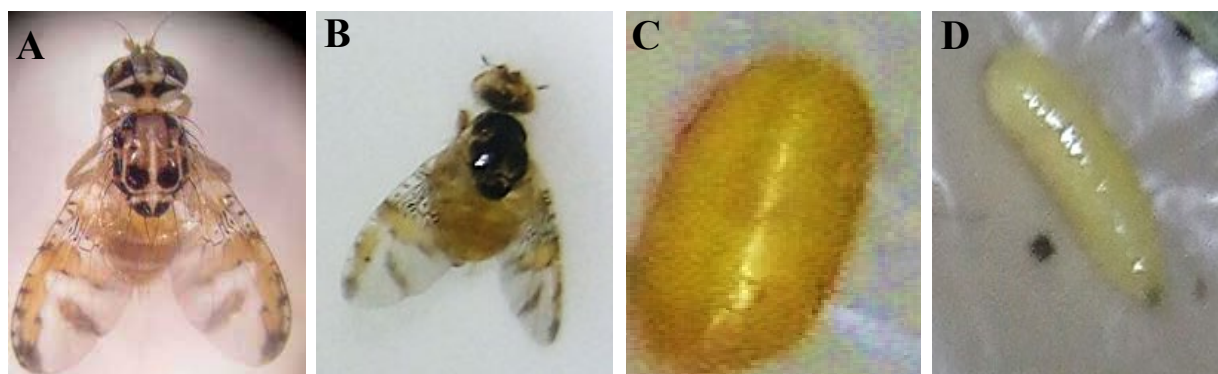


Figure 1. The developmental stages of the insect *Capparimyia savastani*, (A & B) adult, (C) pupa, (D) larva.

First record of a new species of green lacewings *Chrysopa niki* n. sp. in Syria

A field survey was conducted in several public and private gardens in the Rif Damascus governorate in 2022. Adults of green lacewings (Chrysopidae) were collected as important elements in biological control programs from pomegranate, *Punica granatum* L. (Family: Lythraceae), common jasmine, *Jasminum officinale* L. (Family: Oleaceae) and *Viburnum tinus* L. (Family: Adoxaceae). Collected insects were examined microscopically and compared with the global classification keys, to confirm the presence of *Chrysopa niki* n. sp. (Neuroptera: Chrysopoidea) for the first time in Syria.

A few biological data were studied for adults collected in July 2022 from the same plant



hosts mentioned above, placed in containers in breeding cages, and fed on sugar solution under laboratory conditions at 22-24°C and a relative humidity of 60±10%. Insects were medium in size, the body elongated and gray in color, the body length ranged between 10 and 14 mm, the wingspan ranged between 20 and 28 mm, and the antennae were long and thin (threadlike). Wings were translucent, shiny, emerald bluish, multi-veined.

The female laid eggs alone on the lower surface and the edges of the leaves. The eggs were elongated, cylindrical, light green in color that turns to bluish green and then to gray before hatching, with a short stalk around 9 mm long. Some newly emerged larvae fed on unhatched eggs. The hatching period ranged from 3 to 5 days. Adults' ages ranged between 21 and 42 days, the number of eggs laid/female was 32-112 eggs, and the hatching rate ranged between 40 and 80%. [Kawas, H. and A. Basheer(Syria), Arab Journal of Plant Protection, 42(2): 241-244, 2024]. <https://doi.org/10.22268/AJPP-001230>

Two new species of *Neomolgus* (Acari: Trombidiformes: Bdellidae) from Syria

Two new species of Bdellidae, *Neomolgus neoparacapillatus* sp. nov. and *Neomolgus syriensis* sp. nov. were collected from Al-Hekr, Hama province, Syria. *Bdella captiosa* Atyeo is reported for the first time from Syria, and *Cyta kreiteri* Barbar and Ueckermann is re-observed. [Ali Hamadi*, Ziad Barbar*, *Department of Plant Protection, Faculty of Agriculture, Al-Baath University, Homs, Syria, Acarologia, 64(3): 777-786, 2024].

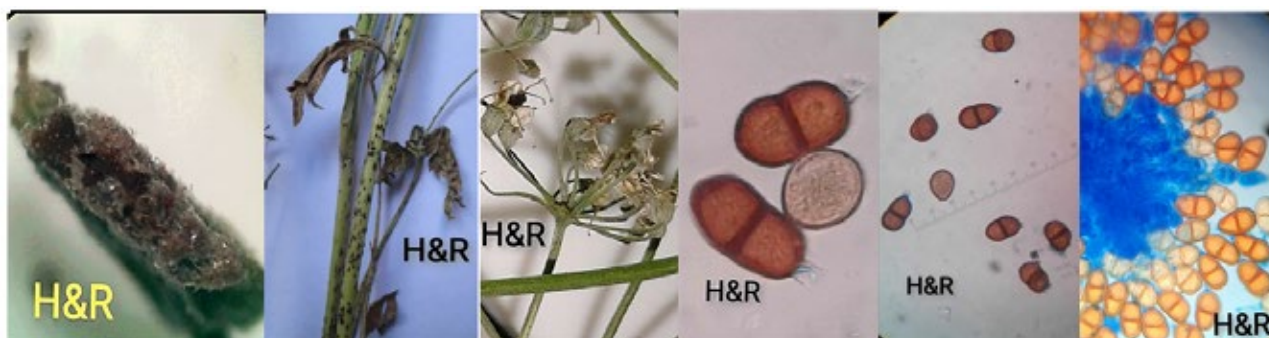
The first record of anise rust disease caused by *Puccinia pimpinellae* in Syria

In the spring of 2024, for the first time in Syria, an anise crop was infected with rust disease caused by *Puccinia pimpinellae* in the fields of the central region of Syria (Homs-Hama). The pathogen: *Puccinia pimpinellae* (Puccinomyces; Pucciniales; Pucciniaceae) It is a Autoecious, Microcyclic rust (uredial-telial in the life cycle). Uredial and Telial pustules appear on both leaf surfaces, especially the lower surface, and cause it to curl upward, dry out, and prematurely fall.

The infection extends to the stem, flowering buds, inflorescence fruit seeds, causing a decrease in the number of flowers and a decrease in the weight of the fruits and seeds, especially since the severity of the disease is at its peak in the flowering stage when the temperature is suitable for the development of the disease. The fungus can be transmitted by infected seeds and cause low germination rates.

The urediospores are globose - subglobose-oblong. Their walls are yellowish brown and have some spines; their dimensions are 21-33 x 21-28 micrometers.

The teliospores are two-celled - ellipsoid, or oblong- ellipsoid rounded at both ends; the walls are thick, smooth, chestnut-brown. Their dimensions are: 31-45 x 20-29 micrometers. The pedicel is hyaline and fragile.

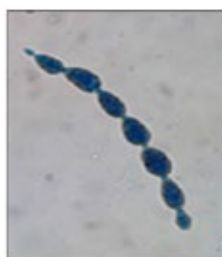


Investigating the areas where the disease appeared and its severity, it became clear that this fungus, with its first appearance in the central region this season, had spread over large areas of the Homs countryside, and the severity of the disease reached the highest degree in some fields. Finally, it should be noted that in addition to the severe damage caused by this disease to the quantity and quality of production, and since anise is an important honey crop in Syria, the disease has caused indirect damage, as it has significantly reduced the amount of honey collected by bees from infected fields.

[**Hassan Khalil, Reem Youssef, Khaled Al-Matar**. Department of Plant Protection, Faculty of Agricultural Engineering, Al-Baath University, Homs – Syria, 2024].

First record of *Alternaria alternata* causing leaf spot and blight disease on *Ailanthus altissima* in Syria

The tree of heaven, *Ailanthus altissima*, is one of the invasive trees that causes great damage to the ecosystems in the regions in which it grows; it causes many health problems for humans. The tree has a tremendous ability to colonize narrow spaces between cement blocks as its seeds germinate in the cracks of buildings and between sidewalks, producing seedlings that grow at a speed of more than a meter per season. At the end of August 2023, symptoms of leaf spots were observed on the spontaneously growing *Ailanthus altissima* on the campus of Al-Baath University - Syria. The symptoms begin in the form of small, dark brown spots on the edges of the leaf blade; these spots later coalesced and include a large area of the leaflets that resemble a blight. The affected part may separate from the leaf edges, transforming the leaflet into a fishbone shape. The infection ultimately leads to the tree being exposed. Microscopy of infected leaves showed that the fungus causing these symptoms is *Alternaria alternata*: Conidia is dark brown in simple or branched chains, 25-35 X 9-12 micrometers. It has 3-5 transverse septa and 1-2 longitudinal septa or non-existent, and Conidia was isolated from the infected plant in the pathogenicity test. According to the published information, this is the first record of *Alternaria alternata* on tree-of-heaven in Syria and the Arab region. The importance of this research lies in the possibility of using this fungus in the biological control of this invasive tree, as mechanical and chemical methods have not proven effective in controlling it. [**Hassan Khalil and Reem Youssef (Syria)**, Department of Plant Protection- Faculty of Agricultural Engineering - Al-Baath University- Homs- Syria, It will be published in the Arab Journal of Plant Protection, 43 No.3, September 2025].



سلسلة الأبواغ الكونيدية لفطر *Alternaria alternata*



أعراض الإصابة بمرض اللفحة وتبقع الأوراق على أشجار لسان القلندر

Tunisia

First report of *Dactylopius opuntiae* in Tunisia


Dactylopius opuntiae (Hemiptera: Dactylopiidae) feeds on *Opuntia* species. This scale has been used as a biocontrol agent against *Opuntia* spp. where these plants are considered weeds. However, in areas where *Opuntia* spp. are grown as crops (such as *Opuntia ficus-indica*), this scale causes severe damage. *D. opuntiae* was first recorded in the EPPO region in Spain in 2009 (EPPO RS 2014/100), in Lebanon in 2012 (RS 2017/189), in Israel in 2013, in Morocco in 2014 (RS 2016/152), in Cyprus in 2016 (RS 2017/082) and in Jordan in 2019 (RS 2019/154). The NPPO of Tunisia conducted a survey to assess the presence of *D. opuntiae* on its territory after observing suspicious symptoms in the region of Sidi Zid in 2021. The survey confirmed the presence of *D. opuntiae*. Molecular tests confirmed the identity of the pest. An official control strategy was immediately put into place to eradicate the identified outbreaks and prevent the insects from spreading to other areas. The pest status of *Dactylopius opuntiae* in Tunisia is officially declared as Present: not widely distributed and under official control. Source: IPPC website. Official Pest Reports – Tunisia (TUN-03/2 of 2024/05/02) Premier signalement de la cochenille du cactus ou *Dactylopius opuntiae* en Tunisie. [EPPO Reporting Service 2024 no.5-Pests, P7]. <https://rb.gy/yby4ke>. <https://gd.eppo.int/taxon/DACLOP/photos>



RESEARCH HIGHLIGHTS

Algeria

Influence of the region and the sap flow of orange trees on the population dynamics of *Aonidiella aurantii* (Hemiptera: Diaspididae) in Mitidja (Algeria). The objective of this work is to study the influence of the region and the sap thrust on some bioecological aspect of the red scale *Aonidiella aurantii* (Maskell) (Hemiptera: Coccothraupidae: Diaspididae). The monitoring of thlife cycle of *A. aurantii* has been conducted by periodic counting of populations on different parts of the tree such as branches and leaves during two consecutive years (2017 and 2018) in the region of Rouiba [36°44'00"N; 3°17'00"E] and Oued El Alleug [36°44'00"N; 3°17'00"E]. The study of population dynamics shows that the armored scale develops three annual generations on the orange tree in the regions of Rouiba and Oued Alleug, which also coincide with the three flushes of sap: spring, summer and autumn. The spring period also remains the most favorable for its development. In addition, it has a very marked affinity for the center orientation and the branches of the tree, which offer it the optimal conditions for its development. As for the previous species, the shift observed in the



temporal distribution depends essentially on the region (distance from the sea) but also on the triggering of sap surges. In fact, it was determined that the three periods of activity in Oued Alleug began a little later compared to those in Rouïba. In autumn and winter, the crawlers of the red scale insect are more abundant in the center of the tree while in spring and summer they shelter in the east of the tree where the climatic conditions are more favorable. The average fecundity values varied from 1 to 20 crawlers/female in Rouïba, while in Oued Alleug, from 0 to 19 crawlers/female. The analysis of variance reveals that the factor year, month, and region induce a very highly significant difference ($p < 0.0001$) in the two years in the region of Rouïba and Oued Alleug with a probability of ($p < 0.0001$). The distribution of neonate larvae was a good indicator for understanding the red scale insect behavior. The findings of this study have huge implications for *A. aurantii* control of red scale. [Aroua Khaoula, Mellal Hanane, Kaydan Mehmet Bora, Hanoun Saida, Boukhobza Lalia, Ouanes Miyada, Naili Oumaima, Aiche Mohamed Amine, Tange Denis Achiri and Biche Mohammed, Entomologia Hellenica, 33(1), 1-14. 2024].

Algeria

The dynamics of populations of *Phytophthora infestans* (Mont.) De Bary, in the central Eastern Europe, Part 1: Up To 2010.

The Oomycete *Phytophthora infestans* (Mont.) de Bary, 1876 is the most devastating pathogen on potato crop. It was an agent responsible for the Irish Famine in the 1840s. It is a heterothallic hemibiotrophic oomycete. The sexual reproduction offers the pathogen more flexibility and adaptability to the environmental conditions. Before 1980s, the populations of *P. infestans* in Europe were represented by only one clonal lineage, US-1. Later, dramatic changes have been detected in populations of this pathogen, including the introduction of the A2 mating type, and making the sexual reproduction possible. The old genotype US-1 was gradually replaced by the new ones. In this paper, we provide a description of the situation in the Central and Eastern Europe and the changes that happened after the introduction of the A2 mating type, before 2010. A detailed description for the situation in Poland, Hungary, Estonia and Romania is offered. [Abdelmoumen Taoutaou, Ioana Virginia Berindean, Constantin Botez, Lyès Beninal, Doru Pamfil, Romanian Agricultural Research, No. 41, 2024].
[/doi.org/10.59665/rar4123](https://doi.org/10.59665/rar4123)

Egypt

Biodiversity and seasonal occurrence of insect fauna associated with brassica vegetables in Menoufia and Giza governorates in Egypt.

The present study explored the diversity of the insect fauna associated with five brassica vegetables at two locations (Menoufia and Giza) in Egypt. Insects were collected from the two sites from November 2020 until January 2021. In total, 13 insect species belonging to 12 families and 6 orders were recorded from the two sites: 10 species of insect pests, 2 species of predators, and one parasitoid species. Seasonal occurrence of three caterpillars (small white cabbage butterfly, *Artogeia rapae* L., diamond-back moth, *Plutella xylostella* L. and semi loopers, *Autographa gamma* L./*Trichoplusia*

ni H. taking into consideration three weather factors (maximum and minimum temperatures, and relative humidity) were also recorded. The results obtained showed that the small white cabbage butterfly *Artogeia rapae* L. and diamond-back moth *Plutella xylostella* L. preferred cauliflower and cabbage as host plants, whereas semiloopers did not show any preference between cabbage, cauliflower and radish, and they were not recorded on turnip and rocket. [Elbadawy, A.R., H.M. Hanan and R.A.K. Salama (Egypt), Arab Journal of Plant Protection, 42(2): 162-167, 2024].

<https://doi.org/10.22268/AJPP-001223>

Egypt

Field performance of selected insecticides on cotton aphid, *Aphis gossypii* and side effects on lady beetle, *Coccinella septumpunctata*.

To evaluate some insecticide treatments against the adult stage of the cotton aphid, *Aphis gossypii* Glover (Hemiptera: Aphididae), two field trials were conducted during the cotton seasons of 2020 and 2021 in Abees, Alexandria, Egypt. The negative effects of insecticide treatments against the lady beetle, *Coccinella septumpunctata* L. larvae were also investigated. The study revealed that, in the 2020 cotton season, the neonicotinoid insecticides thiamethoxam, acetamiprid, and imidacloprid, and the organophosphorus insecticide malathion significantly ($P \leq 0.05$) exhibited the greatest initial effectiveness against cotton aphid with initial population reduction of 76.8, 76.8, 74.8, and 73.7%, respectively. Thiamethoxam, acetamiprid, imidacloprid, pymetrozine, and malathion had the highest initial cotton aphid population reduction in 2021 of 75.7, 75.4, 75.2, 73.3, and 73.2%, respectively. Pymetrozin, thiamethoxam, malathion, and spiromesifen showed the least residual reduction rates of 81.2, 91.5, 81.6 and 82.5%, respectively. In both seasons, buprofezin significantly ($P \leq 0.05$) achieved the least initial toxicity as well as the highest residual toxicity against cotton aphid with reduction rates of 44.8 and 91.9% in 2020 and 52.4 and 87% in 2021, respectively. In addition, other tested insecticides had similar residual toxicity with buprofezin. Whereas, in 2020, imidacloprid and pymetrozin showed residual reduction rates of 89.1 and 91.9%, respectively, whereas in 2021, etophenprox and acetamiprid achieved residual reduction rates of 87.3 and 90.4%, respectively. On the other hand, in 2020, malathion and pymetrozine showed the highest initial toxicity on lady beetle with reduction rates of 27.7 and 25.3%, respectively. Buprofezin also showed in both seasons the least initial side effect against lady beetle and low residual toxicity with reduction rates of 12.1 and 12.2% in 2020 and 15.6 and 14.8% in 2021, respectively. Spiromesifen achieved the highest residual reduction rate (25.6%), significantly followed by malathion (19.2%). Thiamethoxam similar to buprofezin, also achieved the least residual reduction rate against lady beetle (11.4%). In 2021, malathion and spiromesifen showed the highest initial side effects against lady beetle, with reduction rates of 26.8 and 26.6%, respectively. Spiromesifen, thiamethoxam, and malathion gave the highest residual toxicity with reduction rates of 22.8, 21.7 and 21.4%, respectively. According to the IOBC classification, all insecticide treatments were considered harmless against lady beetles, where the reduction rates were less than 50% in the field. The good selectivity feature of these insecticides makes them suitable components for IPM programs against cotton aphids. [Khalifa, M.H., A.R. Khirallah, F.I. El-Shahawi, N.A. Mansour and H.K. Abou-Taleb (Egypt), Arab Journal of Plant Protection, 42(2): 208-214, 2024].

<https://doi.org/10.22268/AJPP-001234>

Egypt

Toxicity of *Zingiber officinale* nanoparticles against the spiny bollworm, *Earias insulana* and their effects on some biological and histological aspects.

The toxicity of Ginger extract nano-sized particles (Ginger AgNPs) against the spiny bollworm (*Earias insulana*) larvae and its adverse effects on some biological and histological aspects were studied under controlled conditions of $26\pm 1^{\circ}\text{C}$ and $75\pm 5\%$ RH. LC_{50} treatment of newly hatched larvae produced larval and pupal mortality rates of 60.00 and 47.06%, respectively, compared to the control treatment (6.33 and 2.00%). Treatment resulted in significant larval and pupal deformity rates (11.00 and 13.51%, respectively) compared to the control (1 and 3%). Ginger AgNPs greatly reduced the adult emergence rate (52.94 %) with a high malformation rate (11.11%) compared to 89.0 and 0.0 % for the control, respectively. Treatment sharply affected females' fecundity (69.67%) with an acute decrease in oviposition periods and hatchability rate (66.67%) in comparison to the untreated control. The LC_{50} of Ginger AgNPs resulted in different histological alternations in the cuticle and midgut compared to the normal structure of the control. [El-Shennawy, R.M.(Egypt), Arab Journal of Plant Protection, 42(2): 202-207, 2024]. <https://doi.org/10.22268/AJPP-001237>

Egypt

The pathogenic fungus *Puccinia graminis* f. sp. *tritici* is the cause of wheat stem rust.

Twenty bread wheat varieties were assessed in the current study between 2020 and 2022 based on the final rust severity (FRS %) and the area under the disease progress curve (AUDPC). Over the course of the three seasons, the Misr-1 variety registered the greatest disease parameters (FRS% and AUDPC). The estimation of losses in the Misr-1 variety at varying infection levels (0-100%) and their relationship to the physicochemical and technological properties of wheat flour were the main objectives of this study. Compared with zero and 20% infection levels, estimated and actual losses (%) for 1000 kernel weight and yield/feddan were highest at 80 and 100% of the infection. A significant positive correlation was found between the degree of infection and the actual loss (%) of both 1000 kernel weight and yield/feddan (Ardab). The physicochemical characteristics of the wheat flour (82% extraction rate) extracted from the Misr-1 wheat variety at different levels of stem rust revealed significantly different values for 1000 kernel weight, moisture, protein, fat, and total carbohydrates contents, meanwhile, no significant difference in the ash and crude fiber contents. The hectoliter weight and flour extraction rate decreased from 83.24 to 80.14 Kg/hl and from 65 to 61%, respectively, as the infection level increased from zero to 100%. Moreover, there was a significant decrease in wet gluten, dry gluten, gluten index, and hydration ratio as the infection level increased. As well as the infection levels increased from zero to 100%, the wet and dry gluten content declined from 31.13 to 30.08% and from 10.08% to 9.88%, respectively. Concerning the rheological properties, the rust infection significantly lowered the water absorption (WA) as well as the dough development time (DDT) and dough stability time (DST) of the wheat flour. Finally, all sensory parameters of the produced balady bread, showed no significant changes, with the exception of appearance and layer separation scores, which significantly declined from 8.85 to 8.15 and from 8.85 to 8.30, respectively. This may be due to the lowering gluten content and hydration ratio. [Omara, R.I., Marie, A.M.; Abd El-Sattar, A.S. and Abdelghany, R.E (Egypt), The Future of Agriculture, 1:47-61 , 2024].

Egypt

Physio-biochemical, anatomical, and molecular analysis of resistant and susceptible wheat cultivars infected with TTKSK, TTKST, and TTTSK novel *Puccinia graminis* races.

Stem rust, caused by *Puccinia graminis* f.sp. *tritici*, is one of the most dangerous rust diseases on wheat. Through physiological, biochemical, and molecular analysis, the relationship between the change in resistance of 15 wheat cultivars to stem rust disease and the response of 41 stem rust resistance genes (Sr,s) and TTKSK, TTKST, and TTTSK races was explained. Some cultivars and Sr genes, such as Gemmeiza-9, Gemmeiza-11, Sids-13, Sakha-94, Misr-1, Misr-2, Sr31, and Sr38, became susceptible to infection. Other new cultivars include Mir-3 and Sakha-95, and Sr genes 13, 37, 40, GT, and FR*2/SRTT3-SRTT3-SR10 remain resistant. Some resistance genes have been identified in these resistant cultivars: Sr2, Sr13, Sr24, Sr36, and Sr40. Sr31 was not detected in any cultivars. Reactive oxygen species such as hydrogen peroxide and superoxide, enzyme activities (catalase, peroxidase, and polyphenol oxidase), and electrolyte leakage were increased in the highly susceptible cultivars, while they decreased in the resistant ones. Anatomical characteristics such as the thickness of the epidermis, ground tissue, phloem tissue, and vascular bundle diameter in the midrib were decreased in susceptible cultivars compared with resistant cultivars. Our results indicated that some races (TTKSK, TTKST, and TTTSK) appeared for the first time in Egypt and many other countries, which broke the resistant cultivars. The wheat rust breeding program must rely on landraces and pyramiding genes in order to develop new resistance genes that will survive for a very long time. [Alafari, H.A.; Hafez, H.; Omara, R.; Murad, R.; Abdelaal, K.; Attia, K.; and Khedr, A.(Egypt), *Plants*, 13(1045): 1-18, 2024].

Iraq

Effect of some biological agents on fungi isolated from roots and soil around it of *Cupressus* spp. Trees.

Relative occurrence of fungi associated with six root and six soil samples from the rhizosphere of *Cupressus/cypress* trees with root rot, leaf blight, or wilt symptoms were investigated. Results of the root samples (average of six samples) showed that the relative occurrence of *Fusarium culmorum* was the highest (36.81%), followed by *F. solani* (29.7%), *Alternaria. alternate* (14.19%), *F. oxysporum* (10.67%), *R. solani* (5.51%), *Pythium* spp. (1.69%), *Helminthosporium* spp. (0.85%), *Bipolaris* spp. (0.24%) and *Stemphylium herbarum* (0.18%). However, the average occurrence in the six soil rhizosphere samples was the highest for *F. solani* (41.28%), followed by *R. solani* (19.76%), *F. culmorum* (16.5%), *F. oxysporum* (8.77%), *Bipolaris* spp. (6.17%), *A. alternata* (3.99%), *Pythium* spp. (2.70%), *Stemphylium herbarum* (0.60%), and *Helminthosporium* spp. (0.27%). Results also showed that *Trichoderma harzianum* had a high antagonistic efficiency against the three studied fungi isolated from cypress tree roots and the surrounding soil, namely *F. culmorum*, *F. solani* and *Helminthosporium* spp. Based on 1-5 scale, the inhibition level was 1.0 against each of the pathogenic fungi *F. culmorum*, *F. solani*, and 2.0 against *Helminthosporium* spp. The results also showed that the use of *B. subtilis* as bacterial bio-control agent led to a significant inhibition of the growth of the three isolated fungi, *F. culmorum*, *F. solani* and *Helminthosporium* spp.

cultured on PDA medium. [**Hadeel A. Al-Ameri (Iraq)**, Biology Department, College of Sciences, Mosul University, Mosul, Iraq. Arab Journal of Plant Protection, 42(2): 224-228. 2024]. Hadsbio34@uomosul.edu.iq, <https://doi.org/10.22268/AJPP-001233>

Iraq

Morphological and molecular identification of *Fusarium tricinctum* causing fruit rot of pumpkin (*Cucurbita pepo*) in Iraq.

In November 2019, samples of pumpkin fruits with post harvest rotting symptoms were collected from farmers' stores. The causative fungus was isolated from infected pumpkin fruits. Based on morphological traits, Koch's hypotheses and molecular diagnostic tests were employed to confirm the infection and identify the causal agent. Molecular diagnosis using the polymerase chain reaction (PCR) confirmed the identity of the causal fungus. The electrophoresis results using a 2% agarose gel showed the presence of a 550 bp amplified band. The ITS sequences were found to be homologous to that of *Fusarium tricinctum* in GenBank database at a similarity level of 99%. GenBank assigned the number MZ166321.1 to the Iraqi isolate. This is the first record of *F. tricinctum* that causes post-harvest pumpkin rot in Iraq. [**Ali Hamood Thanoon(Iraq)**, Department of Plant Protection, College of Agriculture and Forestry, University of Mosul, Mosul, Iraq, Arab Journal of Plant Protection, 42(2): 168-173, 2024]. <https://doi.org/10.22268/AJPP-001241>

Iraq

Molecular identification of *Fusarium* species associated with the tissue culture date palm offshoots wilt disease and evaluation of using silver nanoparticles and *Trichoderma longibrachiatum* for its control.

This study was conducted during the period 2019-2021 with the aim of isolating and identifying the fungi associated with the tissue culture date palm offshoot wilt disease planted in permanent orchards. Molecular identification of *Fusarium* isolates based on amplification and nucleotide sequencing of the ITS1-ITS4 gene region showed that isolates F1 and F7 were identical to *F. proliferatum* with a similarity level of 100% and 98%, respectively; isolates F3 and F4 were identical to *F. fujikuroi* with a similarity level of 99.8% and 100%, respectively. As for isolate F6, it was 94.8%, similar to *F. solani*. The sequences of the identified isolates were deposited in the US National Center for Biotechnology Information (NCBI) under the numbers OM535259.1, OM535261.1, OM535264.1, OM535265.1, and OM535266.1, respectively. The results also showed that silver nanoparticles inhibited the growth of all tested fungi, and the inhibition rate range was 50-70%. On the other hand, the bio-control fungus *T. longibrachiatum* caused growth inhibition of all tested fungi with an inhibition rate of more than 80%. [**Fayyadh, M.A., A.O. Manea and Y.A. Salih. (Iraq)**, Arab Journal of Plant Protection, 42(2): 189-195, 2024]. <https://doi.org/10.22268/AJPP-001225>

Iraq

The effect of silica nanoparticles addition on removal of glyphosate residue from aqueous solutions.

The aim of this study was to evaluate herbicide Tiller 48% SL (Glyphosate) residues in aqueous water by using silica nanoparticles as an adsorption agent to remove glyphosate from aqueous solutions. Results showed that when three concentrations of 10, 15, and 20 ml/L water were used, glyphosate concentration determined immediately after treatment was 3520, 5600, and 7955 mg/L, respectively. The herbicide concentration decreased with time and reached 1203 mg/L on the tenth day after treatment. No residues were detected by HPLC 21 days after treatment. The results of the study of the use of Nano-silica as an agent for the removal of glyphosate in aqueous solutions showed that the concentration of 200 mg/L nano-silica achieved the highest rate of herbicide removal of 89.37%, outperforming the other two concentrations of 100 and 150 mg/L, which achieved 63.45 and 82.87% removal, respectively. [Al-Tharwani, W.S., M.T. Mohammadali and I.M. Abd al-Ridha(Iraq), Arab Journal of Plant Protection, 42(2): 255-259, 2024]. <https://doi.org/10.22268/AJPP-001231>

Iraq

Evaluation of the efficacy of Some pesticides and plant extracts in controlling the adults of the southern Cowpea beetle, *Callosobruchus maculatus*, under laboratory conditions.

The aim of the study was to evaluate the efficacy of Coragen, Oxymatrine, and the fruit extracts of black pepper, *Piper nigrum*, and leaves of *Eucalyptus camaldulenses* against adults of the southern cowpea beetle, *Callosobruchus maculatus*, under laboratory conditions. The results obtained showed that the use of Coragen, achieved the highest mortality rates of 80.08, 83.24, and 95.00% at concentrations of 0.10, 0.15, and 0.20 ml/L, respectively, 7 days after treatment, as compared to Oxymatrine, which caused a mortality rate of 70.00, 79.83, and 88.58%, respectively, at the same concentrations and after the same time period. Results also showed that the essential oil extract of black pepper fruits caused the highest mortality rate of adult insects at a concentration of 3 ml per liter, producing 75.00% mortality, compared to the treatment of eucalyptus extract, which produced 63.61% insect mortality, 7 days after treatment. [Kashmar, I.Z.A. and M.T. Mohammadali (Iraq), Arab Journal of Plant Protection, 42(2): 196-201, 2024]. <https://doi.org/10.22268/AJPP-001228>

Iraq

Evaluation of enhancing biochar and the fungus *Glomus mosseae* in the growth of common bean, *Phaseolus vulgaris* infected with *Rhizoctonia solani*.

The possible role of biochar and its interaction with the fungus *Glomus mosseae* in promoting the growth of the common bean plant *Phaseolus vulgaris* L., grown under biological stress of infection with the pathogenic fungus *Rhizoctonia solani*, was investigated. The results showed that the addition of biochar and the treatment with mycorrhizal fungus and the interaction between them led to a significant reduction in seedling mortality and the severity of root rot disease of the common bean plant.

The results obtained showed that the mycorrhizal traits, which included infection rate, severity of infection, and number of spores, were affected by the presence of the pathogenic fungus, as all the studied mycorrhizal traits decreased, compared to the treatment of the mycorrhizal fungus in the absence of the root rot fungus. The results obtained also showed that the decrease in the disease had a positive effect on the vegetative and root plant growth and nutrient content. The results obtained encourage the application of biochar as an alternative to chemical pesticides for the control of common bean root rot. [Abed, R.M.(Iraq), Arab Journal of Plant Protection, 42(2): 215-223, 2024]. <https://doi.org/10.22268/AJPP-001232>

Iraq

Effect of standard and Nano-urea on the inhibition of the fungus *Aspergillus flavus* growth and reduction of aflatoxin B1 production in the laboratory.

The results obtained from this study showed that the standard and nano-urea at concentrations 1, 2, and 3% inhibited the growth of *Aspergillus flavus* on PDA medium by 54.90, 72.55 and 100% for normal urea, and 60.78, 100 and 100% for nano-urea, respectively, compared with normal growth in the control treatment. The results obtained also showed that adding the most effective concentrations of normal and nano urea to corn kernels with *A. flavus* and stored for 30 days led to the inhibition of *Aspergillus flavus* growth and reduced aflatoxin production by 73.22 and 78.30%, respectively, as compared to the control treatment. In addition, results showed that adding regular urea at a concentration of 3% and nano-urea at a concentration of 2% to maize grains contaminated with AFB1 and stored for 30 days led to the reduction of aflatoxin B1 production by *A. flavus* by 78.74 and 83.36%, respectively, compared to the control treatment. [Hussein, A.H. and H.Z. Hussein(Iraq), Arab Journal of Plant Protection, 42(2): 184-188, 2024]. <https://doi.org/10.22268/AJPP-001235>

Iraq

Prevalence and distribution of viruses associated with fig mosaic disease in Iraq. To study the prevalence and the distribution of viruses associated with fig mosaic disease in Iraq, surveys were carried out in the main fig-producing regions Al-Hashemiya, Al-Diwaniyah, Al-Samawah, and Al-Suwayrah. A total number of one hundred leaf samples were randomly collected from major cultivars Aswad Dyala, Waziri, and Sultani. All collected samples were analyzed using molecular tests (RT-PCR) for detection of Fig mosaic virus (FMV), Fig leaf mottle associated virus 1 (FLMaV-1), Fig leaf mottle associated virus 2 (FLMaV-2), Fig mild mottle associated virus (FMMaV), Fig cryptic virus (FCV), Fig fleck associated virus (FFkaV) and Fig latent virus 1 (FLV-1). A wide range of foliar symptoms, including mosaic, chlorotic mottling, vein banding, chlorotic ringspots, and deformations, were observed on fig trees. Molecular analysis detected the presence of at least one virus in 81% of fig trees tested. FCV was the prevailing virus with an incidence of 45%, followed by FLMaV-1 (39%), FMV (37%), FMMaV (28%), FFkaV (16%), and FLMaV-2 (10%). Regarding cultivars, the highest infection rate was recorded for cv. Waziri (100%), followed by cv. Sultani (82.2%) and finally cv. Aswad Diyala (74%). This study represents the first report of FLMaV-1, FLMaV-2, FMMaV, and FFkaV in Iraq. [Al-Kaeath (Iraq), N., Elair, M., and Mahfoudhi, N. (Tunisia), *Tunisian Journal of Plant Protection* 19 (1): 1-11, 2024]. <https://dx.doi.org/10.4314/tjpp.v19i1.1>

Lebanon

Management of Fall Armyworm (*Spodoptera frugiperda*) on Summer Maize in Lebanon

Fall armyworm (FAW), *Spodoptera frugiperda*, is the most important insect pest of maize planted in spring and summer in Lebanon. This led to the excessive use of insecticides to combat FAW using 2 to 3 unsafe pesticides weekly. To save maize crops, a field trial was carried out during the summer of 2023 in the farmers' field to evaluate environmentally safe and low-risk insecticides recommended by FAO and the Lebanese Ministry of Agriculture to combat FAW using data from pheromone traps. The pheromone used was Z-9tetradecenyl acetate (1.96 mg), Z-7dodecenyl acetate (0.02 mg), and E-7 dodecenyl acetate (0.02 mg) produced by Sanidad Agricola ECONEX S.L., Spain. The Trap (unitrap, universal trap) was placed five days after planting in farmer's field planted with maize cv. Nour on 25 July 2023. Foliar insecticides were sprayed using the recommended dose: 2 sprays with Emamectin benzoate + Alpha-cypermethrin; 2 sprays with Indoxacarb + Alpha-cypermethrin; and one spray with Deltamethrin. The number of captured FAW male and non-FAW moths were counted two times/week starting 31 July 2023. The results obtained showed that the peak of FAW population was during August 22 - September 15. In addition, FAW damage on maize production in the field sprayed with recommended insecticides based on the data from pheromone traps was almost unobservable compared to neighboring farmers' fields, who followed their own practices. Adjusting planting date and pheromone trap based safe pesticide application is recommended to reduce the impacts of the pest on the quality and quantity of green cobs. [**Safaa G. Kumari¹, Elia Choueiri², Abdelrahman Moukahel¹, Seid Ahmed³**] (1) International Center for Agricultural Research in the Dry Areas (ICARDA), Terbol Station, Zahle, Lebanon;(2) Lebanese Agricultural Research Institute (LARI), Tal Amara, Beqaa Valley, Lebanon; (3) ICARDA, Rabat, Morocco. XX International Plant Protection Congress, Athens, Greece, 1-5 July 2024, pp. 271.

Lebanon

Integrated Management of Faba bean Viruses and their Vectors in Lebanon.

Faba bean viruses and their aphid vectors are major problems for Lebanese farmers, resulting in low faba bean productivity. Besides the direct harm, aphids (e.g. *Aphis craccivora*, *A. fabae* and *Acyrtosiphon pisum*) transmit devastating legume virus diseases. To save the crop and restore farmers' confidence in growing faba bean, a field trial was conducted in the farmers' fields to evaluate options for managing viruses and their aphid vectors during the 2023/2022 growing season. The options evaluated were: (i) three imported faba bean varieties (Italian, Moroccan, and Spanish), (ii) two sowing dates (24 November 2022 and 5 January 2023), and (iii) faba bean seeds treatment with Celest top (25g/L difenoconazole + 25 g/L fludioxonil + 262.5 g/L thiamethoxam) at the rate of 1 cc/kg of seeds with untreated seeds as control. The experiment was conducted using a split-factorial design in two replications. Results showed that the number of infected plants with viruses (yellowing, stunting, mosaic, mottling) and aphids were higher at the 2nd sowing date compared to the 1st sowing date, whereas viruses and aphids incidence were lower in the plots planted with treated seeds compared to the

plots planted with untreated seeds and for both sowing dates. Moreover, no aphids were recorded in the plots planted with treated seeds for all three faba bean varieties sown in November (1st sowing date). Serological tests of the plants associated with virus symptoms revealed that 48 % of the plants were infected with Bean yellow mosaic virus (BYMV), 32 % with Chickpea chlorotic stunt virus (CpCSV) and 19% with Faba bean necrotic yellows virus (FBNYV). FBNYV and CpCSV are transmitted by aphids in a persistent manner only, whereas BYMV is transmitted by aphids in a non-persistent manner as well as by seeds. [Safaa G. Kumari¹, Elia Choueiri², Abdelrahman Moukahel¹, Seid Ahmed³] (1) International Center for Agricultural Research in the Dry Areas (ICARDA), Terbol Station, Zahle, Lebanon; (2) Lebanese Agricultural Research Institute (LARI), Tal Amara, Beqaa Valley, Lebanon; (3) ICARDA, Rabat, Morocco. XX International Plant Protection Congress, Athens, Greece, 1-5 July 2024 pp. 271.

Morocco

Effect of plant growth-promoting rhizobacteria (PGPRs) on tuber storage of two potato varieties.

The potato (Solanaceae family) is a cultivated plant primarily valued for its tubers, which serve as a crucial food source for numerous populations worldwide. Losses due to postharvest diseases are significantly high and need to be reduced. To preserve tuber quality without relying on chemical treatments, the application of plant growth-promoting rhizobacteria (PGPR) has been employed as a means to extend the shelf life of potato tubers. The objective of this study was to assess the effect of eight PGPRs on the conservation of two potato varieties Siena and Bellini. This was carried out in two trials; in the first trial, thirty potatoes of the Siena variety were treated with PGPRs and covered with wheat straw, and in the second trial, 160 potatoes each of the two varieties Siena and Bellini were treated with PGPRs but covered with wheat straw and black plastic. Results obtained indicated that several PGPR strains performed favorably, the most promising of which was the *Aureobasidium pullulans* (Ach1.1) strain that kept 50% of the treated potatoes healthy for one month in the first trial, and 30% for six months in the second trial, as compared to the negative control where 100% of the potatoes showed signs of rot in both trials. It can be concluded from this study that the Ach1.1 strain of *Aureobasidium pullulans* could be a promising post-harvest bio-control treatment. [El-Allaoui N., A. Douira, A. Benbouazza, M. Ferrahi, E. Achbani and K. Habbadi.(Morocco), Arab Journal of Plant Protection, 42(2): 229-233, 2024]. <https://doi.org/10.22268/AJPP-001242>

Syria

Susceptibility of some chickpea cultivars/Inputs against *Fusarium oxysporum* f.sp. *ciceris* under field conditions

This study aimed to evaluate the resistance of some cultivars of winter chickpea (Ghab1, Ghab2, Ghab3, Ghab4, Ghab5), and the spring (Al-Bayyadi and Al-Marrakchi) and inputs chickpea (FLIP03-118, FLIP03-142, FLIP05-44, FLIP95-67) to infection with *Fusarium oxysporum* f.sp. *ciceris* under field conditions in Al-Ghab in 2021 and 2022, according to two scales of the degree of resistance (infection rate, disease severity DII%). The results showed that all cultivars and inputs were resistant to high resistance

(according to the two scales) during the flowering period during the two years. The resistance decreased at the maturity period, all inputs were medium resistance in 2021, and ranged between resistance to high resistance in 2022. AL-Bayyadi and AL-Marrakchi were sensitive to medium sensitivity in 2021 and resistant in 2022 (according to the two scales). Ghab1, Ghab2, and Ghab3 were sensitive to medium sensitivity, while Ghab4 and Ghab5 were medium resistance in 2021. Ghab2 remained resistant to high resistance while Ghab1 and Ghab3 were medium resistance, Ghab4 and Ghab5 were resistant in 2022, according to the two scales. FLIP03-118, FLIP03-142, FLIP05-44, Ghab4, Ghab5 and Al-Bayyadh gave high productivity during the planting seasons 2021 and 2022. [Laila Alloush^{1*}, Sabah AL-Maghribi¹ and Basima Barhom² (Syria), 1Plant Protection Department. Faculty of Agriculture, Tishreen University, Lattkia, Syria. ²Researcher. Plant Protection Department, Agricultural Scientific Research Center in Lattakia, Syria. Syrian Journal of Agricultural Research –SJAR 11(2): 400-410, 4, 2024].

Syria

Ecological parameters of numerical diversity of entomopathogenic fungi in soils of beit saber and henna, rif damascus governorate, syria.

The diversity and seasonal abundance of entomopathogenic fungi were investigated in soil samples collected from two locations (Beit Saber and Henna) in Rif Damascus Governorate, Syria, during 2020–2021. Soil samples from several agricultural orchards were collected and brought to the Biological Control Studies and Research Center laboratory (BCSRC). Fungal species diversity was assessed using two indicators: species richness (S) and Shannon index (H). Results revealed the presence of 18 species of entomopathogenic fungi, belonging to 12 diverse genera. The genus *Beauveria* was the most frequent and abundant comprising 14.3% of the total number of the isolates. The diversity indices varied between the two studied locations. The highest value of Shannon-Weiner index for diversity was recorded at Beit Saber location (2.75), whereas the lowest value was observed at Henna location (2.64). The maximum similarity index (SQ) between the two locations was 0.91 [Alshadidi, B., J. Faddoul and A. Basheer. (Syria), Arab Journal of Plant Protection, 42(2): 234-240,2024].

<https://doi.org/10.22268/AJPP-001227>

Syria

The effect of production method on local honeybee queens, *Apis mellifera* L., to determine the acceptance rate of grafted larvae and live weight of virgin queens in Latakia governorate.

This research was conducted at the Scientific Agricultural Research Center in Latakia during the 2020 season to study the effect of queen production method (with and without queens) on the acceptance rate of grafted larvae and weight of virgin queens emerging from local bee colonies under the Syrian coast conditions, using wax and plastic cups with dry and wet grafting. The acceptance rate of larvae was 83.33 and 91.66%, and weights of virgin queens were 0.178, 0.198 g in queen-rearing colonies with and without queens, respectively, in the wax cups with wet grafting and with a total number of 16 cups/colony, whereas the acceptance rate of larvae was 86.66 and 80.00 % and weights of virgin queens was 0.178 and 0.169 g, respectively, in colonies

without or with restricted queens rearing colonies, in the wax cups with wet grafting and a total number of 20 cups/colony. The difference in the average weights of queens in both methods was significant. [Asaad, M., M. Omran, N.Z. Hujeij and K. Makis.(Syria), Arab Journal of Plant Protection, 42(2): 155-161. 2024].

<https://doi.org/10.22268/AJPP-001239>

Syria

Identification of some species of the family Coccidae that infest fruit orchards in Syria.

Soft-scale insects are serious plant pests and are often small and highly cryptic. These pests are economically important in agriculture. Insect samples and infested plant parts were collected from April to June 2016 and 2017 from three locations (Al-Sanobar, Daba, and Jaba) and brought to the Biological Control Studies and Research Center (BCSRC). The following soft-scale insects of the order Coccomorpha and family Coccidae were identified: *Coccus pseudomagnoliarum* Kuwana, in Al-Sanobar and Dabba in Lattakia governorate in Java orange orchards, *Saissetia oleae* Olivier and *C. pseudomagnoliarum* Kuwana in Pomelo citrus tree in Daba locality, *Sphaerolecanium prunastri* Fonscolombe at the third site Jaba, Quneitra governorate, in almond orchards, and to our knowledge is the first record in Syria. Identification and characterization of the soft-scale insects were based on microscopic characteristics of adult females using slide-mounted specimens. Identification of pests is essential for the implementation of biological control programs.[Saleh, A.T. and A.M. Basheer(Syria), Arab Journal of Plant Protection, 42(2): 174-183, 2024]. <https://doi.org/10.22268/AJPP-001224>

Syria

The efficiency of some plant extracts in controlling the larvae of the cadelle beetle, *Tenebriodes mauritanicus* in the laboratory.

The efficacy of four acetone extracts of *Melia azedarach*, *Zingiber pupureum*, *Thymus capitata* and *Mentha viridis*, was tested as pesticides of plant origins in controlling the 4th instar larvae of *Tenebriodes mauritanicus* (L.) (Coleoptera: Tenebrionidae) under laboratory conditions. The extracts were applied at three concentrations 100, 50 and 25%. The results showed that the extract of ginger root had the highest mortality rate (90%), followed by *M. azedarach* fruits extract (83.33%), when 100% concentration was used. Meanwhile, thyme and mint leaf extracts caused 3.33 and 30% mortality, respectively, when the same concentration was used. The LC₅₀ values for the ginger and the azedarach extracts were calculated on the first day after treatment and were 41.9 and 79.99% for both extracts, respectively. The results obtained indicated that the evaluated plant extracts were effective in controlling the cadelle beetle, which makes it a potential future component for use in integrated pest management programs [Al-Saoud, N.(Syria), Arab Journal of Plant Protection, 42(2): 248-254, 2024].

<https://doi.org/10.22268/AJPP-001236>

Syria

Diapause termination of eggs of silkworm, *Bombyx mori* using hydrochloric acid and its effect on the insect's biological characteristics.

The study was carried out in the summer and fall of 2022 at silkworm laboratory of the Lattakia Agricultural Scientific Research Center to study the effectiveness of hydrochloric acid in preventing embryonic diapause and eggs hatching of silkworm, *Bombyx mori* L., and its effects on the insect's biological characteristics. The eggs were treated with hydrochloric acid solution during the summer breeding season, at 1, 12, 24, 36 and 48 hours after oviposition. The silkworm eggs were also treated in the fall season after cold storage for 45, 60 and 90 days at 5°C and 70-80% relative humidity. The results obtained showed that the highest hatchability rate was 96% when the eggs were treated at the age of 24 hours for 30 minutes. The results also showed that the highest effective rate of rearing (ERR) was 98.79% in eggs of 12 hours age. The highest average weight of the cocoon and shell was 1.64 and 0.33 g, respectively, when eggs were treated at the age of 1 hour for 30 min. Results also revealed that the effectiveness of hydrochloric acid in preventing diapause of stored eggs and the highest hatching rate was 95% of eggs stored for 90 days, and the ERR was 92.98%, 96.34% and 95.1% of eggs stored for 45, 60 and 90 days, respectively. [Okasha, I., A. (Syria), Arab and H. Al-Roz. Arab Journal of Plant Protection, 42(2): 149-154, 2024].

<https://doi.org/10.22268/AJPP-001229>

Saudia Arabia

Bioassay for evaluating the resistance level of dusky cotton bug, *Oxycarenus hyalinipennis* Costa against insecticides sprayed on cotton crop.

The dusky cotton bug (DCB), *Oxycarenus hyalinipennis*, a serious economic-sucking insect pest of cotton, is a cosmopolitan polyphagous pest with the potency to develop resistance against insecticides. The resistance was evaluated against insecticides of different chemical nature against DCB population from three cotton fields i.e., unsprayed population (Un-sp), field exposed to sucking sprays (SSp) and field exposed to bollworms sprays (BSp) using semi-opened bolls dip. Method: The DCB population showed a differential range of resistance levels against tested insecticides. These RR ratios were among susceptibility (1 fold) and tolerance to low resistance (2-10 fold) for all tested insecticides except for deltamethrin with moderate resistance (11-30 fold) for the populations of both sprayed fields. In the order of resistance for the SSp population, deltamethrin (24.4 fold) was followed by imidacloprid (6.4 fold), profenofos (4.0 fold), cypermethrin (3.2), endosulfan (2.8 fold), chlorfenapyr (2.7 fold) and chlothianidin (2.5 fold). For BSp population, RR ratios from high to low were: deltamethrin (21.2 fold) followed by imidacloprid (4.9 fold), chlothianidin (3.7 fold), cypermethrin (2.8 fold), endosulfan (2.7 fold), triazophos (2.4 fold) and profenofos (2.2 fold). Acephate was highly effective with the least LC50, followed by spinosad and dimethoate, whereas lambda-cyhalothrin was least effective. Relative toxicity (RT) order from high to low for SSp population was acephate (1.00) followed by spinosad (1.33), chlorfenapyr (2.69), acetamiprid (2.77) and dimethoate (2.85). For the BSp population, RT was sequenced as acephate (1.00) followed by spinosad (1.46), chlorfenapyr (1.67), and dimethoate (3.32). In the control unsprayed population, RT was in order as acephate < deltamethrin

< spinosad < chlorfenapyr (1.0, 1.20, 1.28, and 1.58, respectively). Lambda-cyhalothrin was the least toxic against the DCB population of all tested fields. From the results, it can be suggested that regular insecticide resistance monitoring is crucial to avoid incidence(s) in *O. hyalinipennis* and to adopt the rotational application of appropriate insecticides. [Sohail Akhtar, Javaid Iqbal, Muhammad Tahir Jan, Muhammad Ammar Yasir (Saudia Arabia), Pak. J. Agri. Sci., Vol. 60(4), 593-601; 2023].

[DOI:10.21162/PAKJAS/23.81](https://doi.org/10.21162/PAKJAS/23.81)

Saudia Arabia

Translocation and survival of trunk injected *Beauveria bassiana* (Hypocreales: Cordycipitaceae) in healthy date palm trees.

Objective: The date palm, *Phoenix dactylifera* L., is an ancient and valuable tree that provides food and other products. The date palm trees are attacked by several pests, including the red palm weevil, which is devastating to date palm plantations. Knowledge of the functionality of entomopathogenic fungi, including *Beauveria bassiana* (Balsamo) Vuillemin (Hypocreales: Cordycipitaceae) species, in the tree trunk is critical for controlling date palm weevil and other pests. The goal of this study was to assess the movement of the entomopathogenic fungus, *B. bassiana*, within the date palm tree. Methods: *Beauveria bassiana* (BbSA-4) mixed with food colors was trunk-injected using a balloon injector into healthy date palm plants. Trunks were cut into one-meter logs 2, 20, and 86 days post-injection. Each log was further dissected into four quarters to examine the presence of the fungus. The appearance of food colors and the detection of fungal spores at different heights from the point of injection revealed the translocation of *B. bassiana* within the trunk. The samples were taken from several locations where food color could be visible, and the distance traveled by the fungal spores was measured. Results: The injected palm tissue samples were cultured on PDA media in the laboratory, and the presence of fungal spores was confirmed. *B. bassiana* (BbSA-4) was found to be surviving in all treated date palm trees. The survival rate of isolate BbSA-4 averaged 70.5%, 34.9%, and 13.9% from dissected trunks examined at 2, 20, and 86 days, respectively, after injection. Isolate BbSA-4 was more apparent in the trunk after spiral injected than bottom injection. The findings revealed that using an entomopathogenic fungus as an endophytic to supplement IPM programs could be beneficial. [Mureed Husain, Koko D. Sutanto, Khawaja G. Rasool, Jawwad A. Qureshi, Abdulrahman S. Aldawood (Saudia Arabia), Journal of King Saud University, Science, Volume 36, Issue 2, February 2024, 103077].

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Saudia Arabia

A winning formula: sustainable control of three stored-product insects through paired combinations of entomopathogenic fungus, diatomaceous earth, and lambda-cyhalothrin.

This research aimed to assess the effectiveness of *Metarhizium Roberts*, diatomaceous earth (*Protect-It*), and lambda-cyhalothrin for the long-term protection of stored wheat against three destructive grain insect pests, *Rhyzopertha dominica*, *Tribolium castaneum*, and *Trogoderma granarium*. Different treatments were applied, both

alone and in paired combinations in laboratory and persistence trials. Single treatments exhibited significantly lower mortality rates than the paired treatments for all tested insect species. Among the single treatments, lambda-cyhalothrin (Lamb) resulted in significantly higher mortality rates in laboratory trials, followed by diatomaceous earth (DE) and *M. robertsii* (Mr), with insignificant differences between Mr and DE. DE exhibited the highest persistence after 120 days of storage for all insect species and initial exposures, although variations in mortality rates among treatments were mostly insignificant. Overall, the most effective treatment in terms of mortality in the laboratory, persistence trials, and progeny production was DE + Lamb, followed by Mr + Lamb and Mr + DE for all tested insect species. In general, the most susceptible insect species was *R. dominica*, followed by *T. castaneum* and *T. granarium*. This research highlights the effectiveness of *M. robertsii*, DE, and lambda-cyhalothrin in providing prolonged protection of stored wheat against all the examined grain insect species. [Waqas Wakil, Nickolas G Kavallieratos, Nikoleta Eleftheriadou, Syed Adnan Haider, Mirza Abdul Qayyum, Muhammad Tahir, Khawaja G Rasool, Mureed Husain, Abdulrahman S Aldawood (Saudia Arabia), Springer, Volume 31, pages 15364–15378, 2024]. [DOI: 10.1007/s11356-024-31824-1](https://doi.org/10.1007/s11356-024-31824-1)

Saudia Arabia

Bionomical observations of Small Carpenter Bee, *Ceratina smaragdula* Fabricius (Hymenoptera: Apidae).

The small carpenter bee, *Ceratina smaragdula* Fabricius is a non-*Apis* pollinator of many economically important crops. The nesting biology, nesting preferences, architecture, foraging, hibernation, and mating behavior of this solitary bee were investigated. Fifteen nests of *C. smaragdula* collected during summer from three nesting locations (roadsides, field sides, and near houses) were examined for the targeted attributes. *C. smaragdula* highly preferred (66.67%) field sides for nesting at a mean height of 82.74 cm from the soil surface. The nesting preference of *C. smaragdula* along roadsides and houses was 26.67% and 6.67%, respectively. The Ravenna grass (*Saccharum ravennae*) was highly preferred (66.67%) nesting material, followed by Wheat (*Triticum aestivum*) stored straw (20.00%), and common Reed (*Phragmites australis*) was the least preferred (13.33%) for nest building. *C. smaragdula* hibernated from early October to February, broke hibernation in the first week of March, and initiated mating immediately. The main reproductive period was from March to August, and the first generation emerged from late April to early May. The peak insect population was recorded from June to August. The period of foraging was from March to September. The mean nest length, nest diameter, and nest entrance diameter were 11.15 cm, 0.79 cm, and 0.53 mm, respectively. *C. smaragdula* preferred a single gallery containing 3-5 cells/gallery. Each gallery contains eggs, larvae, pupae, and adults. The development period of a generation was 4-5 weeks, with 3-4 generations per year. *C. smaragdula* started foraging early in the morning (7.27 am) and ceased in the afternoon (4.71 pm). The mean time foraging per flower was 21.67 seconds, and the bees returned to the nest after 7.48 min of their first forage. These findings might help design the artificial nesting needed to preserve *C. smaragdula*. [Hussain Ali, Javid Iqbal, Mehran Ali, Hafiz M. Khalid Abbas, Khawaja G. Rasool, Mureed Husain, Abdulrahman S. Aldawood (Saudia Arabia), *Sociobiology* 71(1): e9505, March 2024]. [DOI: 10.13102/sociobiology.v71i1.9505](https://doi.org/10.13102/sociobiology.v71i1.9505)

Saudia Arabia

Efficacy and Persistence of Entomopathogenic Fungi against *Rhynchophorus ferrugineus* on Date Palm: Host to Host Transmission.

The red palm weevil (RPW), *Rhynchophorus ferrugineus* (Olivier) (Coleoptera: Dryophthoridae), is a destructive and voracious pest of palm species worldwide. Due to environmental and regulatory concerns, ecologically safe alternatives to synthetic chemical insecticides are needed to manage this cryptic insect species. Entomopathogenic fungi have the potential to manage this pest. The scope of management and effectiveness can be improved by direct control or horizontal transmission of entomopathogenic fungal isolates. We tested in the laboratory the virulence and pathogenicity of fifteen different entomopathogenic fungal isolates belonging to the following species: *Beauveria bassiana*, *Metarhizium anisopliae*, *Beauveria brongniartii* and *Purpureocillium lilacinum*. All fungal isolates were found virulent against larvae (14.9 ± 1.06 to $81.5 \pm 1.48\%$ mortality) and adults (5.6 ± 1.12 to $51.7 \pm 1.51\%$ mortality) at 12 d post-treatment. From a screening bioassay, five *M. anisopliae* (WG-08, WG-09) and *B. bassiana* (WG-23, WG-24, WG-25) isolates were tested for their concentration response mortality against larvae and adults after 7, 14 and 21 days (d) of treatment. Mortality was found positively correlated with concentration and time. At 21 d of treatment, WG-23 and WG-25 1×10^8 conidia/mL resulted in 100% mortality against larvae, while only WG-25 1×10^9 conidia/mL caused 100% mortality of adults. Along with mortality, all the potential isolates have strong ovicidal effects that reduced 81.49% at 1×10^8 conidia/mL. The horizontal transmission bioassay indicated that the infected adults transmitted the disease to healthy individuals. Horizontal transmission of fungi from infected to non-infected adults not only caused significant mortality but also had a serious sublethal impact on insect development and fitness including reduced number of eggs/d fecundity, egg viability and neonate survival. Isolate WG-25 reduced oviposition (0.5 eggs/d), fecundity (11.7 eggs/female), and egg viability (11.6%) along with larval survival 25.9% when an infected male mated with a normal female. In semi-field trials, all fungal isolates reduced the survival of larvae found inside the palms and ultimately reduced infestations over a period of two months. The results of this study indicate that entomopathogenic fungi should be further tested for sustainable and efficient control of RPW in date palm production systems.

[Waleed S. Alwaneen, Waqas Wakil, Nickolas G. Kavallieratos, Mirza Abdul Qayyum, Muhammad Tahir, Khawaja G. Rasool, Mureed Husain, Abdulrahman S. Aldawood (Saudia Arabia), and David Shapiro-Ilan, *Agronomy*, 14(4), 642, 2024].

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Saudia Arabia

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transmission of entomopathogenic fungal isolates. We tested in the laboratory the virulence and pathogenicity of fifteen different entomopathogenic fungal isolates belonging to the following species: *Beauveria bassiana*, *Metarhizium anisopliae*, *Beauveria brongniartii* and *Purpureocillium lilacinum*. All fungal isolates were found virulent against larvae (14.9 ± 1.06 to $81.5 \pm 1.48\%$ mortality) and adults (5.6 ± 1.12 to $51.7 \pm 1.51\%$ mortality) at 12 d post-treatment. From a screening bioassay, five *M. anisopliae* (WG-08, WG-09) and *B. bassiana* (WG-23, WG-24, WG-25) isolates were tested for their concentration response mortality against larvae and adults after 7, 14 and 21 days (d) of treatment. Mortality was found positively correlated with concentration and time. At 21 d of treatment, WG-23 and WG-25 1×10^8 conidia/mL resulted in 100% mortality against larvae, while only WG-25 1×10^9 conidia/mL caused 100% mortality of adults. Along with mortality, all the potential isolates have strong ovicidal effects that reduced 81.49% at 1×10^8 conidia/mL. The horizontal transmission bioassay indicated that the infected adults transmitted the disease to healthy individuals. Horizontal transmission of fungi from infected to non-infected adults not only caused significant mortality but also had a serious sublethal impact on insect development and fitness including reduced number of eggs/d fecundity, egg viability and neonate survival. Isolate WG-25 reduced oviposition (0.5 eggs/d), fecundity (11.7 eggs/female), and egg viability (11.6%) along with larval survival 25.9% when an infected male mated with a normal female. In semi-field trials, all fungal isolates reduced the survival of larvae found inside the palms and ultimately reduced infestations over a period of two months. The results of this study indicate that entomopathogenic fungi should be further tested for sustainable and efficient control of RPW in date palm production systems. [Waleed S. Alwaneen, Waqas Wakil, Nickolas G. Kavallieratos, Mirza Abdul Qayyum, Muhammad Tahir, Khawaja G. Rasool, Mureed Husain, Abdulrahman S. Aldawood (Saudi Arabia), and David Shapiro-Ilan, *Agronomy*, 14(4), 642, 2024].

doi.org/10.3390/agronomy14040642

Saudia Arabia

Laboratory evaluation of indigenous and commercial entomopathogenic nematodes against red palm weevil, *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae).

The red palm weevil (RPW) is a significant threat to date palms. Conventional pest control has been ineffective. This study aims to evaluate entomopathogenic nematodes (EPNs) indigenous to Saudi Arabia and commercial against RPW. We used 33 soil samples collected from four areas of Saudi Arabia. The indigenous EPNs were isolated and cultured using an insect baiting method to obtain infective juveniles. Pathogenicity bioassays were conducted against different stages of RPW, including eggs, larvae, and adults. The bioassay was performed using all the isolates at 1×10^6 IJ/mL. Distilled water was used as a control. The results revealed that only 9.09% of soil samples contained positive EPNs. Through DNA sequencing analysis, the positive samples were identified as indigenous isolates belonging to *Heterorhabditis indica* and *Steinernema carpocapsae* EPN species. In pathogenicity tests, 90% mortality of RPW eggs was observed after five days. Similar mortality trends were seen in RPW larvae and adults, with 90% mortality recorded after ten days for all the EPN treatments. Mortality increased with the duration of post-EPN inoculation exposure.

The 1×10^6 IJ/mL concentrations of EPN effectively killed various stages of RPW in the laboratory. More research is needed to test EPNs against RPW in the field. [Mureed Husain, Khawaja G. Rasool, Koko D. Sutanto, Abdalsalam O. Omer, Muhammad Tufail and Abdulrahman S. Aldawood (Saudi Arabia), *Insects*, 15(4), 290, 2024]. doi.org/10.3390/insects15040290

Saudia Arabia

Freezing temperature treatments against almond moth, *Ephestia cautella* (Walker), infestation of date fruits.

Dates maintain prime importance as sources of income and as symbols of cultural heritage in Saudi Arabia. *Ephestia cautella* (Walker) is one of the most important insects that attack stored dates. In an effort to safeguard small-scale producers, temperatures of 5 °C (representing typical house refrigerator temperatures), -14 °C (representing in-house freezer temperatures), and -25 °C (representing temperatures in small factory freezers) were applied to samples of dates previously infested with *E. cautella* larvae. Exposure periods of 1, 12, 48, 120, and 240 h were considered to assess the effectiveness of freezing temperatures against stored product insect pests. The temperature of -25 °C proved to be the most effective, resulting in 100% mortality across all stages after just 1 h of exposure. At 5 °C, the pupal stage exhibited the highest tolerance, with only a mean mortality of 11% after 240 h of exposure. Conversely, at the same temperature, mean mortalities of 89% and 97% were recorded for eggs and larvae, respectively. However, when larvae were placed inside the dates, the mean mortality was only 65% after 240 h at 5 °C, complete larval mortality was achieved in 12 h at -14 °C and 1 h at -25 °C. This information can guide strategies for managing *E. cautella* in storage facilities with limited available resources. [Nora Abdul Aziz M. Aqeel, Mureed Husain, Khawaja Rasool, Koko Dwi Sutanto, (Saudi Arabia), *Journal of Plant Diseases and Protection*, May 2024]. [DOI:10.1007/s41348-024-00922-0](https://doi.org/10.1007/s41348-024-00922-0)

Saudia Arabia

Assessing the toxicity of six insecticides on larvae of red palm weevil under laboratory conditions.

Objective: The red palm weevil (RPW), is one of the most threatening pests of date palm trees worldwide, causing significant economic losses annually for date palm growers, both globally and in the Middle East, including Saudi Arabia. The primary objective of this research was to assess the insecticide market in Saudi Arabia, test various insecticides claimed to be effective against RPW, and evaluate their efficacy in laboratory settings.

This evaluation aims to inform further trials under field conditions. Methods: Six insecticides, including imidacloprid, thiamethoxam, fipronil, emamectin benzoate, deltamethrin, and fenitrothion, were tested to assess their toxicity against red palm weevil 8th instar larvae by diet incorporation under laboratory conditions.

The insecticides were applied according to the manufacturer's recommendations with dosages of 1000 µl, 0.20 µl, 7.5 µl, 0.25 µl, 0.25 µl, and 0.5 µl for imidacloprid, thiamethoxam, fipronil, emamectin benzoate, deltamethrin, and fenitrothion,

respectively. Results: The results revealed that all tested insecticides exhibited 100 % mortality against 8th instar RPW larvae, with the exception of deltamethrin. However, the time required to achieve this mortality varied. Fenitrothion caused 100 % mortality after 72 h, while thiamethoxam, imidacloprid, and fipronil caused 100 % mortality after 96 h. Emamectin benzoate and deltamethrin resulted in 100 % and 93 % mortality, respectively, after 10 days. The variability in mortality rates may be attributed to differences in their active ingredients, which show varying levels of lethality. In conclusion, all tested insecticides showed effectiveness against RPW larvae and represent viable options for controlling this pest in date palm orchards in Saudi Arabia. [Khawaja G. Rasool, Mureed Husain, Waleed S. Alwaneen, Koko D. Sutanto, Abdalsalam O. Omer, Muhammad Tufail, Abdulrahman S. Aldawood (Saudi Arabia), Journal of King Saud University, Science, Volume 36, Issue 7, August 2024, 103268].

<https://doi.org/10.1016/j.jksus.2024.103268>

Saudia Arabia

Initial evaluation of the entomopathogenic fungi *Beauveria bassiana* and *metarhizium robertsii*, and the entomopathogenic nematode *Heterorhabditis bacteriophora*, individually and in combination against the noxious *Helicoverpa armigera* (Lepidoptera: Noctuidae).

The Old-World bollworm, *Helicoverpa armigera* (Lepidoptera: Noctuidae), is a significant threat to crops worldwide and has become resistant to traditional synthetic insecticides.

The present study investigated the pathogenicity of the entomopathogenic fungi (EPF) *Metarhizium robertsii* (Hypocreales: Clavicipitaceae) strain WG-04 or *Beauveria bassiana* (Hypocreales: Cordycipitaceae) strain WG-10, and an entomopathogenic nematode (EPN) species *Heterorhabditis bacteriophora* against the second and fourth instar larvae of *H. armigera*. Both fungal species and *H. bacteriophora* were evaluated, singly or in combination. After 24 and 48 h post-application of the fungal spores (10^6 spores/mL), *H. bacteriophora* was introduced at a rate of 50 infective juveniles/mL, and mortality was observed at 3-, 5-, and 7-days post-treatment. Adult emergence, egg hatching, and percentage pupation were recorded.

The integration of both types of biocontrol agents exhibited additive and synergistic interactions in larval stages, and enhanced mortality was recorded when EPF was used in combination with the nematodes. In the individual application of all three biocontrol agents alone, the order of efficacy was *H. bacteriophora* > *B. bassiana* > *M. robertsii*; however, in joint treatments, the increase in mortality and decrease in percentage egg hatching, pupation, and adult emergence was determined to be directly linked to the exposure period of the *H. bacteriophora*. The results of this study suggest that combining *H. bacteriophora* with EPF could provide a solid foundation for an economically viable method for managing *H. armigera* larvae in chickpea fields.

[Waleed S. Alwaneen, Muhammad Tahir, Pasco B. Avery, Waqas Wakil, Nickolas G. Kavallieratos, Nikoleta Eleftheriadou, Maria C. Boukouvala, Khawaja G. Rasool, Mureed Husain and Abdulrahman S. Aldawood (Saudi Arabia), Agronomy, 14(7), 1395, 2024]. doi.org/10.3390/agronomy14071395

Sultanate of Oman

Factitious hosts for *Goniozus omanensis* (Hymenoptera: Bethyridae), a parasitoid of the lesser date moth *Batrachedra amydraula* Meyrick (Lepidoptera: Batrachedridae).

The bethylid wasp *Goniozus omanensis* has been identified as a key natural enemy of *Batrachedra amydraula* Meyrick (Lepidoptera: Batrachedridae), an important pest of date palm. Efficient rearing of natural enemies can be an important part of biological pest control programmes but cultures of *G. omanensis* are challenging to maintain on *B. amydraula*. We evaluate two readily available species of Pyralid moths, *Corcyra cephalonica* and *Galleria mellonella*, as potential factitious hosts. We find that *G. omanensis* can develop on the larvae of either species, but the probability of failure is *circa* 75% overall. Both trialled host species were approximately equally suitable, but failures were typically during the early stages of brood production when presented with *C. cephalonica* and during the later stages when presented with *G. mellonella*. This suggests that *C. cephalonica* larvae may be more difficult to suppress and that *G. mellonella* larvae may be of lower nutritional value. The average production of adult parasitoids per host provided was approximately 1 and, given the observed female biased sex ratio, the average number of females was around 0.8. We suggest potential routes to improving the efficiency of rearing *G. omanensis* on these factitious hosts. [Tarik Almandhari (Oman), and Ian C.W. Hardy, Biocontrol Science and Technology, 34(6), 499–514, 2024]. <https://doi.org/10.1080/09583157.2024.2351804>

Sultanate of Oman

Using natural enemies to control greenhouse pests.

Biological pest control, often known as biological pest control or biocontrol, is a sustainable and ecologically friendly method of pest management in agriculture. It entails using living organisms, including predators, parasitoids, and diseases, to control pest populations and reduce agricultural loss. In this research, the researcher used certain natural enemies (ladybirds, lacewings, and *Trichogramma evanescens*) to test their effects on protecting tomato and cucumber crops in greenhouses from harmful pests in the Sultanate of Oman. The results revealed that Green lacewing and Ladybirds played significant roles in eliminating whiteflies in both tomato and cucumber crops by effectively controlling their populations. [Samia Juma Al-Naabi, Department of Biocontrol Researches, Directorate General of Agriculture and Livestock Research, Ministry of Agriculture Fishers and Water Wealth, Oman] American Journal of Environmental Sciences Volume 20: 22.30.2024]. DOI: [10.3844/ajessp.2024.22.30](https://doi.org/10.3844/ajessp.2024.22.30)

Tunisia

Update on the situation of *Phyllosticta citricarpa* in Tunisia.

Phyllosticta citricarpa (citrus black spot - EPPO A1 List) was first confirmed in Tunisia in 2019 in the Governorate of Nabeul. Official measures have been applied (EPPO RS 2019/141). A survey was conducted from January to July 2021 to assess the presence of *P. citricarpa* in 11 citrus production regions in the northeastern part of Tunisia. The survey was conducted in 50 citrus orchards (12 orange (*Citrus x aurantium* var. *sinensis*))

orchards and 38 lemon (*C. x limon*) orchards) located in the area of Nabeul, and in the area of Sousse (Bouficha, Sidi Bou Ali and Chott Mariem). The surveyed orchards were not selected randomly by the extension officers but based on the likelihood of disease presence. Symptoms of citrus black spot were observed in 29 orchards in the area of Nabeul in all regions visited (3 in Menzel Bouzalfa, 4 in Benikhaled, 1 in Soliman, 14 in Bouargoub, 2 in Grombalia, 2 in Nabeul, and 1 in Dar Chaben El Fehri), and 2 in the area of Sousse (only in Chott Mariem). Symptoms were observed on fruits, twigs, and leaves in the most affected region, Bouargoub, while only fruit and leaf symptoms were observed elsewhere. Affected fruits showed symptoms resembling hard spots and false melanosis lesions. Symptoms mainly affected mature fruits but were also observed on immature fruits. The survey results showed a high disease incidence in the region of Bouargoub, the main lemon production area in Tunisia. Moderate disease incidence was observed in the neighbouring regions, whereas low disease incidence was detected in the region of Soliman. The situation of *Phyllosticta citricarpa* in Tunisia can be described as follows: **Present, not widely distributed.**

Source: Benfradj N, Mannai S, Jeandel C, Boughalleb-M'Hamdi N (2024) Geographic distribution, prevalence, and incidence of citrus black spot caused by *Phyllosticta citricarpa* in Tunisia. *Journal of Phytopathology* 172(2), e13292. Pictures *Phyllosticta citricarpa*. <https://gd.eppo.int/taxon/GUIGCI/photos>. [EPPO Reporting Service 2024 no. 4 – Diseases 2024/090].

Tunisia

Chemometric analysis of essential oils from Tunisian plants: Unravelling the antifungal potential against *Botrytis cinerea*.

Using essential oils (EOs) as bio fungicides holds paramount importance in sustainable agriculture, offering an eco-friendly alternative to synthetic fungicides. EOs, derived from plant sources, exhibit diverse and potent antifungal properties. This study presents a comprehensive analysis of EOs derived from Tunisian plants, focusing on their composition and antifungal properties against *Botrytis cinerea*. Gas chromatography-mass spectrometry analysis revealed diverse chemical profiles for each EO, with significant variations in major constituents. Laurel oil emerged as the most potent, exhibiting remarkable inhibitory effects ranging from 3.33% to 95.72% across different concentrations. Rosemary and sage oils demonstrated notable antifungal potential, especially at higher concentrations, while citrus oil displayed milder inhibitory effects. The hierarchical clustering of EOs based on inhibition percentages highlighted distinct clusters, emphasizing the superior antifungal properties of laurel, sage, and rosemary oils. Minimum Inhibitory Concentration (MIC) values further underscored the efficacy of rosemary, laurel, and sage oils, positioning them as promising agents for combating *B. cinerea*. Correlation analysis between volatile compounds and MIC values identified compounds with strong negative correlations, indicating potential key contributors to antifungal activity. This study contributes valuable insights into the antifungal potential of EOs, guiding future research on their mechanisms and applications in plant disease management. [Rguez, S., Grati-Affes, T., Yeddes, W., Hammami, M., and Hamrouni-Sellami, I. (Tunisia), *Tunisian Journal of Plant Protection* 19 (1): 13-26, 2024]. <https://dx.doi.org/10.4314/tjpp.v19i1.2>

Tunisia

Chemical composition and bio-insecticidal activity of the dill, *Anethum graveolens*, essential oils against the red flour beetle *Tribolium castaneum*.

Stored products are considered main food source for humans and domestic animals. They were always targeted by insects mainly moths and beetles. The use of natural substances such as essential oils and extracts of aromatic plants constituted an alternative to chemicals. This work aims to highlight the chemical profile of the dill, *Anethum graveolens*, and seeds and study their toxicity against the red flour beetle, *Tribolium castaneum*. The essential oils were obtained by hydrodistillation and analyzed using the GC/MS technique. A total of 45 compounds are identified in which dillapiole (37.86%), carvone (22.59%), trans-isolimonene (10.01%), dihydrocarvone (6.85%), camphor (5.06%) and α -phellandrene (2.77%) are major compounds. Dill seed essential oils exhibited an insecticidal activity against adults of *T. castaneum* which increased proportionally with the applied dose and exposure time. Fumigant bioassays resulted in lethal doses LD₅₀ of 232.89 μ l/L air and LD₉₀ of 328.28 μ l/L air after 12 h of exposure. These values decreased after 24 h of exposure to 132.57 and 202.01 μ l/L air, respectively. The insecticidal activity of these essential oils can be the result of the existence of dillapiole, carvone, isolimonene, and other compounds. Due to these promising results, the essential oils of dill seeds may be used as a natural product to manage this pest in stored products. [Soltani, R., Ktari, R., Barhoumi, L., and Chouaibi, M.H. (Tunisia), *Tunisian Journal of Plant Protection* 19 (1): 27-42, 2024].

<https://dx.doi.org/10.4314/tjpp.v19i1.3>

Tunisia

Assessment on pesticide knowledge and usage by apple farmers in Foussana delegation, Kasserine governorate, in center-west of Tunisia. Apple farmers in the center-west of Tunisia are heavily dependent on pesticides to ensure the phytosanitary protection of their orchards. The present study was carried out among the apple growers of the delegation of Foussana using face-to-face interviews to determine socio-demographic characteristics, the status of pest management, their levels of knowledge of pesticide handling, their ability to understand the displayed instructions on product labels and the use of personal protective equipment (PPE). The results showed that farmers used 3 classes of pesticides in their orchards: insecticides (47.76%), fungicides (28.36%), and acaricides (23.88%). Among them, 96.3% were purchased from local retailers. About 25.61% of farmers declared always reading pesticide labels before an application, against, 35.71% not reading them at all, and 38.68% were indifferent. About 57.3% of interviewed farmers applied pesticides in a mixture. Among them, 31.7% mixed 2 pesticides, 20.7% mixed 1 to 3 products together, and 4.9% mixed 3 products in one tank. When mixing pesticides, the majority of farmers do not respect the prescribed dose because of the lack of suitable graduate instruments. Only 3.7% of the interviewed disposed of and used full PPE during pesticide spraying, against 89.9% of them who used partial PPE. Regarding how to dispose of empty containers, 89.65% of farmers destroyed them by incineration against 11.2% who discarded them in nature. These results indicated the unawareness of farmers about the hazards linked to pesticide use. For that, it is important to implement measures to support and raise farmer's awareness. [Soltani, R. (Tunisia), *Tunisian Journal of Plant Protection* 19 (1): 43-62, 2024]. <https://dx.doi.org/10.4314/tjpp.v19i1>.

Plant Protection News in the Arab and Near East Countries

Graduate Students Thesis (M.Sc. and Ph.D.)

Isolating and Identifying of fungi associated with the leaves of some species tree *Eucalyptus* sp in Libya and Tunisia

The main objective of this study is to compare the adaptation of *Eucalyptus* species including *Eucalyptus woodwardii*, *E. stricklandii*, *E. gillii*, *E. torquata*, *E. camaldulensis* and *E. odorata* in three arboretums of Tunisia and Libya to observe their response to diverse climatic on arid conditions, also isolation and identification of leaf-associated fungi. The findings indicated that the soil composition in 'Ghardabia' consists of a mixture of clay, sand, and coarse and fine particles at various depths. This composition helps to explain the slow decomposition process of *Eucalyptus* matter. The study also identified several fungi species present on the leaves of *Eucalyptus*, including *E. camaldulensis*, *E. stricklandii*, *E. torquata*, *E. gillii*, *E. woodwardii*, and *E. microtheca*, with varying attack rates ranging from 22.91% to 100%. In Tunisia, *Neofusicoccum mediterraneum* was found to be responsible for leaf spots on *Eucalyptus gillii*, while in Libya, *Neofusicoccum cryptoaustrale* based on the pathogenicity experiments was identified as the cause of leaf blight on *E. torquata*, *E. gillii* and *E. odorata*. Seven different species of fungi associated with *Eucalyptus* trees also have been isolated and identified, each has showing different symptoms. These species include *Alternaria* spp., *Stemphylium* spp., *Rhizoctonia* spp., *Helminthosporium* spp., *Aspergillus niger*, and *Humicola* spp. Among these, *Helminthosporium* spp. was the most significant, accounting for 81% of leaf spot diseases.

The remaining species had infection rates of 3%, 1%, 6%, 4%, and 5% respectively. At the plant level, the attacks on the leaves were observed to be 85.5%, with variations ranging from 27.7% to 43.5% from top to bottom. The survey revealed a 100% attack rate on the surveyed trees. Additionally, the presence of the *Harknessia eucalypti* was found to be 80%. The growth of this fungus was influenced by temperatures of 20, 25, and 30°C, while temperatures of 35 and 40°C were found to be lethal to the fungus. The virulence of the *Harknessia eucalypti* was confirmed through its successful pathogenicity on the leaves of *E. camaldulensis*. The growth of the fungus *Neofusicoccum mediterraneum*, which was found on the leaves of *E. gillii* in the Hajeb Layoun arboretum, is influenced by the culture medium and temperature. Various temperatures ranging from 20 to 35°C and different culture media such as CDA, MEA, PDA, and PSA were tested. It was observed that the pathogenesis of *N. mediterraneum* was more pronounced on the PSA and CDA media at a temperature of 35°C. However, the growth of the fungus completely ceased at a temperature of 40°C in all the culture media tested.

These findings highlight the importance of considering culture medium and temperature when studying the growth and pathogenesis of *N. mediterraneum*. [**F.A. Abou Zakhar**^{1*}(Libya), **A.B F.El-Yanki**^{2,3} and **M.H B.E. Bin-Jameaa**². ¹Plant Protection Department, National Institute of Agriculture in Tunisia, Tunis, Tunisia. ²Laboratory of Forest Resources, National Institute of Rural Engineering, Water Resources and Forestry in Tunisia, University of Cartage, Tunis, Tunisia; ³Laboratory of Nano-biotechnology and Medical Plants Resources, National Institute of Applied Sciences and Technology, University of Cartage, Tunis, Tunisia. (Doctorate, 2024)]. farhatabouzkhar@gmail.com

Monitoring and managing yellow rust disease and identifying Yr genes in some wheat cultivars under rain-fed conditions in Sulaimania province

The emergence of highly virulent *Puccinia striiformis* f. sp. *tritici* (Pst) races resulted in overcoming resistance of most yellow rust-resistant wheat cultivars in Iraq. The disease survey showed the presence of yellow rust in all the visited fields. Halabja fields experienced higher infection and disease severity. Most of the tested wheat cultivars were susceptible to the disease, except cv. Alaa, which showed moderate resistance. Rezan showed no infection in all the surveyed fields. The primary inoculum of Pst was observed in Bakrajo wheat fields, Sulaymaniyah, in March 2022 and 2023. However, the first yellow rust infection was observed on April 15, 2022, and April 10 in 2023. Uredospores numbers gradually increased with the disease progress, reaching its peak of 51.3 spores/cm² on May 7, 2022, and 187.3 spores/cm² on May 9, 2023. However, uredospore number was decreased by the first week of May.

The natural population of Pst showed virulence against the known Yr resistant genes Yr6, Yr7, Yr8, Yr9, Yr17, Yr18, Yr27, Yr35, Yr37, Yr57 Yr4BL, YrCV, YrSP, YrAld and YrA in yellow rust differential lines in Sulaymaniyah during 2021-2023 growing seasons. While no virulence's were found on Yr1, Yr5, Yr10, Yr15, Yr24, Yr26, Yr33, Yr34, Yr51 and YrKK. Genotyping of yellow rust samples at GRRC revealed from identification of race PstS14 which was completely dominate in all Iraqi Yr samples in 2021. This report represents the first detection of this race in Asia. PstS14 showed virulence against resistant genes Yr2, Yr3, Yr6, Yr7, Yr8, Yr9, Yr17, Yr25, Yr32, YrSp and Avocet S at seedling stage under control conditions.

Iraqi bread wheat and triticale cultivars showed a wide variations against yellow rust during 2021-2023 seasons. Most of the cultivars were susceptible. The mean coefficient of infection of the cultivars ranged from 0.23 in cv. Sarah to 83.33 in Hsad. However, Alwand, Kalar 1, Rezan, and Sarah showed resistance to yellow rust, while Al-Rashid, Charmo, Faris 1, Maarooof, Rabiea, and Iratom demonstrated moderate resistance reaction. The average yellow rust severity was higher in 2023 as compared to 2022. Rezan and Sarah significantly surpassed in plant height, number of spikelet/spikes, spike weight, grain weight per spike, weight of 1000 kernels, biological yield and grain yield, while Kalar 1 significantly surpassed in awn length compared to other cultivars. Maarooof recorded the maximum number of grains per spike (95.13) in the second year and the average of both years (76.6) and maximum grain weight per spike (4.11g) in the second year, while Hawler 2 produced the highest grain yield in the first year (731.94g/m²). Yellow rust control using Amistar Xtra and Plant Growth Cleaner, showed that Amistar Xtra significantly reduced the mean coefficient of yellow rust infection in the susceptible cultivars Hsad and Tamuz 2. Amistar Xtra resulted in 86.54 % and 93.85% reduction of yellow rust severity at both applications, respectively, in Hsad, while Tamuz-2 resulted in 79.28% and 91.43% reductions of yellow rust severity at both applications, respectively.

PGC had varying effects on the mean coefficient of infection of both cultivars. Molecular





techniques were utilized to map the known identified yellow rust resistance genes *Yr2*, *Yr5*, *Yr7*, *Yr9*, *Yr10*, *Yrvav*, *Yr15*, *Yr17*, *Yr18*, *Yr24*, *Yr26*, and *Yr32* in 46 bread wheat and triticale cultivars. The analysis revealed that cv. Alwand possesses the highest *Yr* genes, including *Yr2*, *Yr5*, *Yr7*, *Yr9*, *Yrvav*, *Yr15*, *Yr24*, *Yr26*, and *Yr32*. Similarly, Sulaymaniyah 2 exhibited eight *Yr* genes, *Yr2*, *Yr5*, *Yr7*, *Yr9*, *Yr15*, *Yr24*, *Yr26*, and *Yr32*, while Iratom and Tamuz 3 displayed only one resistant gene. Furthermore, the study identified *Yr2* as the most prevalent gene, accounting for 87.0% of the tested cultivars, followed by *Yr7* (76.09%) and *Yr9* (73.91%). [Sarkawt Muhammad Salih Ali (IKR, IRAQ), Supervised by prof. Dr. Emad Mahmood Al-Maaroof, College of Agricultural Engineering Science, University of Sulaimani, (Doctorate, 2024)].

Isolation and identification of fungi associated with date palm fruit rot (*Phoenix dactylifera*) disease and their biological and chemical control


This study was conducted in the Department of Plant Protection / College of Agriculture / University of Basra with the aim of isolating and identifying fungi associated with palm fruit rot disease. The results of the field survey showed that the incidence of palm fruit rot disease in Basra orchards ranged between 5-27%.

The results of the study showed the isolation of several fungi from palm fruits, the most important of which are *Alternaria alternata*, *Aspergillus flavus*, *A. parasticus*, *A.niger*, *Penicillium expansum*, *Stemphylium* spp., *Nigrospora* sp, *Pestalotia* sp, *Ulocladium* sp, *Curvularia lunata*, *Bipolaris* sp and others. They were identified morphologically based on the approved taxonomic keys and molecularly based on amplification of the ITS1-ITS4 gene region. The results of quantitative estimation using HPLC technology showed that most of the date samples were contaminated with aflatoxin B1 toxins in quantities ranging from 20-90 ppb, while the quantity of ochratoxin toxins ranged from 11-44 ppb. The results of the field experiment also showed that treating palm fruits in the Kamri stage with chitosan and silver nanoparticles reduced the incidence of palm fruit rot disease from 40% to 4.6%. [Muntaha J. Kadium (Iraq), Plant Protection, College of Agriculture, University of Basra, Supervised by Prof Dr.Mohammed A.Fayyadh and Yehya A.Salih (Doctorate, (2024)].

Integrated control of head blight disease on wheat plant (*Triticum aestivum* L.) caused by some species of the genus *Fusarium* spp. in southern Iraq

This study was conducted in the Department of Plant Protection ,College of Agriculture, University of Basra with the aim of isolating and identifying fungi associated with head blight disease on wheat. The results of the field survey showed that the incidence of head blight disease in the southern region of Iraq ranged between 20.13 - 59.12%. The results of isolation and identification of fungi associated with head blight disease in wheat showed that they are *Fusarium* spp. Among them are the fungi *Fusarium pseudograminearum*, *F.graminearum*, *F.culmorum*, *F.boothii*, *F.arcuratisporum*, *F.asiaticum*, *F.cerealis*, *F.equise* and *F.incarnatum* and others. They were phenotypically identified based on the approved taxonomic keys, and some of them were molecularly identified based on the amplification of the gene region. ITS1-ITS4.

The results of the field experiment also showed that treating wheat plants with biological control elements represented by the fungi *Trichoderma viride* and *Penicillium commune*, the bacteria *Pseudomonas fluorescens*, and the pesticide Basten reduced the incidence of head blight from 75% to 10% and increased growth and production indicators. The results of screening eight wheat varieties showed that the variety Buhuth 22 showed the



lowest disease severity under artificial infection conditions with the fungus *Fusarium pseudograminearum*, reaching 33.3%, while the variety Babel showed the highest disease severity, reaching 80%. [**Sabah Safi Jassim, (Iraq)**, Department of Plant Protection, College of Agriculture, University of Basra, Supervised by Assistant Prof. Dr. Diaa Salem Ali. (Doctorate, 2024)].

Study of the diversity of clones of the cultivar Taqerbucht (*Phoenix dactylifera* L.) and their behavior towards *Fusarium oxysporum* f. sp. *albedinis* (Hansen and Snyder) Gordon

In Algeria, the date palm (*Phoenix dactylifera* L.) is threatened by a severe disease known as “bayoud” caused by a soil-borne fungus called *Fusarium oxysporum* f.sp. *albedinis*. To combat this disease, the use of resistant varieties remains the most effective means. The accessions of the Taqerbucht variety, namely Tq.Hamra, Tq.Safra, Tq.Beïda and Tq.Kahla, are known for their natural resistance against this devastating disease. To highlight their genetic and morphological profiles, morphometric and molecular characterization was implemented. For this, eighty-four phenotypic characters and 16 molecular type markers (SSR) were used. The results of Principal Component Analysis (PCA) and Multiple Correspondence Analysis (MCA) suggested that the four accessions can be classified into two groups. One group contains Tq.kahla, while the other contains the other three accessions. The qualitative characteristics of the seed and fruit made it possible to differentiate the 4 accessions.

The analysis of the genetic results showed that only 13 markers made it possible to detect 31 allele loci with an average of 2.38 alleles/locus. Based on phylogenetic analyzes and sequence comparisons, the cultivar Tq.kahla which has 7 private alleles appears to diverge from all other accessions. Finally, field surveys made it possible to establish the epidemiological map of bayoud epidemics in the department of Adrar, and the artificial inoculations of seedlings of the different accessions proved reliable. [**Saïd Boudeffeur (Algeria)**, National Higher School of Agronomy -El Harrach - Algiers, Supervised by Professor Dr. Lakhdar Khelifi, (Doctorate, 2024),

Potential biocontrol agents: interaction of endophytic Fungi with cyst nematodes and their impact on sugar beet and wheat growth

Plant-parasitic nematodes significantly impact agriculture, causing an estimated average of \$165 billion in damage annually. The full extent of their effect is often underestimated and underreported. Various management strategies are used to control these nematodes, such as tolerant/resistant cultivars, crop rotation, and nematicides. However, due to increasing restrictions on chemical nematicides, alternative control methods are needed. Biological control is a proposed option that, while effective, requires further research. Many fungi, especially endophytic fungi species, have been found to infect the eggs and females of endo-parasitic nematodes.

This study examined the interaction of *Ijuhya vitellina*, *Niesslia gamsii*, and the Pleosporalean strain *Polydomus karssenii* against the beet cyst nematode *Heterodera schachtii* and the cereal cyst nematode *Heterodera filipjevi*, as well as their effect on sugar beet and wheat growth under controlled conditions. The fungi, originating from infected eggs of *Heterodera filipjevi*, and under *in vitro* conditions demonstrated antagonistic properties against nematode eggs. The experiments were conducted under controlled conditions specific to each crop and lasted 4 months. Plant morphometric data and



cyst nematode evaluations were recorded. Additionally, indole-3-acetic acid (IAA) levels produced by the fungal strains were assessed using Salkowski's colorimetric assay. Sugar beet results indicated that plants inoculated with *Polydomus karssenii* and *Niesslia gamsii* had increased total and root biomass of the plants, while those inoculated with *Polydomus karssenii* and *Heterodera schachtii* showed higher shoot biomass. Wheat results showed that plants treated with any of the three fungi had longer shoots, spikes, and peduncles, and higher biomass than control and nematode control plants. Regarding *Heterodera schachtii* and *Heterodera filipjevi* cyst formation, initial results showed no difference between control and plants treated with the endophytic fungi.

However, when comparing these results with other parameters, the findings indicated increased tolerance to nematode infection in both sugar beet and wheat. *Ijuhya vitellina* and *Niesslia gamsii* produced distinct levels of IAA, while *Polydomus karssenii* didn't show any levels of IAA production. The morphometric results indicate that the fungal strains can be a source of other phytohormones that influence plant growth promotion. There is a potential for practical application of these strains as a management strategy against plant-parasitic nematodes. [Osameh Atiya, Niğde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies, Niğde, Turkey, Supervisors: Prof. Dr. Halil Toktay, Dr. Abdelfattah A. Dababat, Dr. Wolfgang Maier, Dr. Samad Ashrafi (Doctorate, 2024)].

Identification of the molecular group and determining the incidence of phytoplasma that causes Stolbur disease on eggplant crops grown in Aleppo Governorate


The eggplant plant is one of the ancient world crops that are currently grown over all the world for its fruits and used in cooking, and it is one of the important types of vegetables grown in Aleppo governorate for the same purpose.

A field survey of eight fields planted with eggplant was conducted in Tel Aran, Al-Safira, and Al-Hader in 2022, of which 22 plant samples showing symptoms of phytoplasma infection were collected. Phytoplasma was detected by Nested PCR and determination of the molecular group using the PCR-RFLP technique with six endonuclease restriction enzymes. The average incidence of plants in the fields of Al-Safira area was 2.7%, while the incidence rate was 1% in both Tel Aran and Al-Hader regions. The results of the polymerase chain reaction showed that all of the collected samples were infected with phytoplasma. The result of enzymatic digestion comparing to the revised classification scheme for RFLP analysis of the gene 16S rRNA, showed that the phytoplasma in eggplant belonged to the species Pigeon pea Witches-broom phytoplasma and matched the 16SrIX Witches-broom group and sub group 16SrIX-A. and this is the first report of the disease on eggplant in Syria. [Mohammad.Saab (Syria), postgraduate student, department of plant protection, Faculty Of Agricultural Engineering, University of Aleppo. Fateh Khateb, associate Prof., Department of Plant Protection, Faculty of Agricultural Engineering, University of Aleppo. (Master, 2024)]. Mohammad.Saab1995@gmail.com

Occurrence and partial genetic characterization of cucumber green mottle mosaic virus (CGMMV) infecting cucurbits in Jordan

Cucurbits are one of the major vegetable crops grown in Jordan. Cucurbits are infected with at least 59 viruses worldwide, among of them is Cucumber green mottle mosaic virus (CGMMV). CGMMV is highly concentrated in plants and stable virus. It is transmitted by mechanical means and through seeds.

This research was conducted to study the distribution and occurrence of CGMMV in



cucurbit fields, wild cucurbits and alternative hosts. The study also was carried out to further investigate the genetic variations of CGMMV isolates. ELISA-results revealed that CGMMV was prevalent only in cucumber in total number of 63 out of 700 collected samples from 6 out of 48 different cucurbit fields and restricted in 3 different geographical regions. The overall percentage of CGMMV-infection in the tested samples was 9%. CGMMV was not detected in other tested cucurbits or weeds. Biological assays showed no difference in symptoms for the 5 tested isolates of CGMMV on cucumber and other indicator plants. Ninety-five samples were tested by PCR for CGMMV and other 10 cucurbit viruses. Nine out of 95 RT-PCR-tested samples were found positive for CGMMV.

Phylogenetic analysis for partial CP gene sequences of CGMMV isolates indicated presence of two major clades.

Jordanian isolates were highly similar to each other (98-100%) and were closely related to an isolate from Occupied Palestine. This study highlighted the significance of re-evaluating the phytosanitary status of cucurbit viruses in Jordan. [**Areej Akram Ali Hussein (Jordan)**, Department of Plant Protection, School of Agriculture, The University of Jordan, **Supervisor Dr. Nida' Salem** (Master, 2024)].

Efficacy of thiamethoxam, imidacloprid, and fipronil insecticides against different red palm weevil, *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae) larval instars and their field efficacy using trunk injection method

The efficacy of insecticides against the RPW is critical to facilitate making a good decision for control in infested fields. The current study aims to evaluate the three insecticides (Imidacloprid, Thiamethoxam, and Fipronil) against the 4, 8, and 11th instar of the RPW larvae stage under laboratory conditions using the feeding method.

The efficacy assessment showed that fipronil, most efficient against 4th instar larvae, ensures 100% mortality after 48 hours. Following thiamethoxam resulted in 100% mortality after 72 hours, and imidacloprid achieved 87% mortality after 96 hours.

However, on 8th instar larvae, fipronil achieved 100% mortality after 96 h of exposure, followed by thiamethoxam, showing 100% mortality on RPW 8th instar larvae after 72 h, and imidacloprid didn't ensure 100% mortality at all test concentrations. More importantly, on 11th instar larvae, fipronil at lower concentrations resulted in 90% mortality, and thiamethoxam resulted in 100% mortality after 96 h; imidacloprid resulted in only 40% mortality after 96 h. The second aim is to evaluate the efficacy of the studied insecticide trunk injection against RPW-infested date palm trees in the field. The insecticides were injected in four points drilled around the trunk at 25, 50, 75, and 100 cm above ground level in a spiral manner. The treatment effectiveness was monitored using an acoustic sensor for ten months with daily and monthly recordings.

After two months, the results reveal that fipronil injection resulted in decreases in the RPW impulse burst rate to the level of 0.68, which indicates low survival of RPW. Imidacloprid and Thiamethoxam injections decreased the mean burst impulse to levels of 2.58 and 3.58, respectively, indicating the continued presence of RPW infestation. However, three months after insecticide treatment, the burst impulse decreased to zero, indicating no RPW infestation. [**Abdelsalam Osman Ali (Saudi Arabia)**, Plant protection department, college of food and agriculture sciences, king saud university, Supervisors: Prof. Dr. Abdulrahman S. Aldawood C-Supervisor: Dr. Hattan A. AlHarbi,(Master, 2024)].



Molecular and biological study of the nursing worm (*Spodoptera frugiperda*) on the yellow maize crop (*Zea mays* L.) in the Nimrud District with reference to its chemical control

The results of the molecular and life history diagnosis study of the fall armyworm, *Spodoptera frugiperda*, from the family Noctuidae and the order Lepidoptera, showed a match between the Iraqi strain taken from cornfields in the Nimrod district in Mosul and global strains as per the diagnosis manual issued by NCRI and numbered OP776797.1. The life cycle study of the insect revealed that the average number of eggs laid by the insect was 66,856 eggs, and the insect has six larval instar stages with an average duration of 19.89 to 20.18 days per instar. Larval instar stages 4, 5, and 6 were the most feeding-intensive stages. The pupal stage lasted an average of 10 days. The results also showed that the male's full lifespan was 4.66 days, while the female's lifespan was 7.66 days, with a sex ratio of 1:1 in the laboratory.

The results indicated that pheromone, light, and adhesive traps were effective in attracting adult insects. The pheromone trap significantly outperformed the light and adhesive traps, with an overall average of 62.31, 10.03, and 4.45 insects per trap, respectively. The results of pest control using the pesticide deltamethrin and the growth regulator methoxyfenozide (Lufenuron) showed that both pesticides effectively reduced infestation rates after 24 and 48 hours in laboratory and field conditions, respectively. **[Omar Saleh Mohammed Al-jboury (Iraq)**, plant protection, The Council Of The College Of Agriculture and Forestry University of Mosul, Supervised by **Dr. Sahl Kawkab Al-Jamil** (Master, 2023)]

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

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

5-8/8/2024 Rabat-Morocco

The annual regional workshop among member countries of the Near East and North Africa (NENA) region commenced in a hybrid modality in Rabat, the Kingdom of Morocco. The purpose of the workshop is to build phytosanitary capacity, raise awareness of all activities related to the International Plant Protection Convention (IPPC), exchange experiences at the regional level, and finally, promote regional and international cooperation. The workshop is organized by the IPPC Secretariat in collaboration with the Food and Agriculture Organization's Regional Office for the Near East and North Africa (FAORNE), the Near East Plant Protection Organization (NEPPO), FAO Morocco, and the National Office of Food Safety (ONSSA) at Ministry of Agriculture, Fisheries, Rural Development, Water and Forests, Morocco.

Thirty-three participants from 11 IPPC contracting parties and non-contracting parties, including Egypt, Jordan, Libya, Mauritania, Morocco, Palestine, Qatar, Saudi Arabia, Oman, Tunisia, and Yemen, as well as representatives from the Commission on Phytosanitary Measures (CPM) Bureau, the Standards Committee (SC), and the Implementation, and the Capacity Development Committee (IC), are attending the four-day meeting. Additionally, representatives from the US NPPO (APHIS/USDA) are participating as observers. Under

the theme “**PLANT HEALTH, SAFE TRADE, AND DIGITAL TECHNOLOGY**”, the workshop is prioritizing discussions on current and emerging plant health challenges, with a focus on discussing the latest IPPC drafts standards and guidelines presented for regional consultations, and efforts to implement capacity development programs. These discussions will be crucial in strengthening the regional efforts to protect plant resources and facilitate safe trade. <https://www.fao.org/maroc/actualites/detail-events/en/c/1708517/>



FAO Developed Four Proposed Protocols and Standards for Phytosanitary Measures to Control the Red Palm Weevil in Collaboration with NEPPO

24-25/06/2024 Hammamet-Tunisia

The Regional Office for the Near East and North Africa (RNE) of the Food and Agriculture Organization of the United Nations (FAO), along with the Near East Plant Protection Organization (NEPPO), collaborated with the Ministry of Agriculture, Water Resources, and Fisheries in Tunisia to organize a regional workshop. The workshop focused on strategies for the prevention, early detection, and control of Red Palm Weevil (RPW) and took place on June 24-25, 2024, in Hammamet, Tunisia. The meeting was part of the activities outlined in the Letter of Agreement (LoA) signed between FAO and NEPPO under the framework of the FAO regional program for RPW (Red Palm Weevil) management “GCP/RNE/012/MUL” in the NENA (Near East and North Africa) region. The agreement entails the preparation of four drafts of phytosanitary protocols.

1. A protocol for producing certified date palm plants that are free of RPW.
2. Effective phytosanitary treatments for date palm offshoots and ornamental seedlings at the border to prevent the spread of RPW.
3. Protocol for creating RPW-free zone areas.
4. Standard for harmonized phytosanitary measures against RPW

This technical meeting is intended to discuss the draft protocols developed as part of the activities under the LoA mentioned earlier. The goal is to enhance the national action plans for monitoring and controlling Red Palm Weevil (RPW) programs in the NENA countries. The meeting program included presentations on the latest innovations in RPW

early detection, the guidelines for the movement of infested palms within the country and between countries, RPW phytosanitary measures, the date palm certification scheme, cost-effective treatments of date palm offshoots and protocol for Pest Free Area (PFA) for RPW.

A session was also dedicated to the farmers' field schools being conducted as part of the project in the Gafsa and Tozeur regions of Tunisia. The aim is to highlight their significance in empowering small-scale farmers in date palm production and pest management.

"The two-day meeting facilitated an exchange of experiences and national programs among participants for monitoring, early detection, and control of the Red Palm Weevil (RPW). Participants also discussed how to adopt and implement the developed guidelines and protocols under the project and formulate harmonized RPW phytosanitary legislation and control strategies," stated **Thaer Yaseen**, the Regional Plant Protection Officer at FAO RNE. The agenda included a technical visit to Nabeul, Tunisia, to learn about the Tunisian national RPW management program. This visit showcased field practices by Tunisian technical teams in detection and injection, and innovations for adapting control methods to urban infestations of canary palms.

FAO RPW eradication program, "GCP/RNE/012/MUL," is a five-year initiative to enhance RPW management efforts in the Near East and North Africa (NENA) region. The project focuses on developing strategies, plans, tools, and technologies to assist NENA countries in sustainable RPW management through three main areas: governance, capacity building, and the transfer of knowledge and technology. <https://shorturl.at/Y6EJa>



Regional Training of Trainers (ToT) Workshop on the SusaHamra App: a digital system for monitoring and early warning for Red Palm Weevil (RPW)

03/06/2024 - 06/06/2024 Muscat (Oman),

The Food and Agriculture Organization of the United Nations (FAO) organized a regional Training of Trainers (ToT) workshop on the "SusaHamra App": a digital system for collecting and analyzing data on monitoring and surveillance of Red Palm Weevil (RPW) from June 3 to 5 in Muscat, Oman with the participation of specialists and officials from 7 Gulf

countries, including Saudi Arabia, Bahrain, the United Arab Emirates, Kuwait, Qatar, Yemen, and Oman. Under the framework of the RPW eradication “GCP /RNE/012/MUL programme, a three-day workshop is organized by the FAO Regional Office for the Near East and North Africa (RNE), FAO’s Plant Production and Protection Division (NSP), and in collaboration with Oman’s Ministry of Agriculture,



Fisheries, and Water Resources. The workshop agenda addressed the latest updates of the FAO regional strategy for RPW management, presenting the national plans for RPW monitoring and management in the participating countries and identifying existing gaps in the current monitoring systems and ways to improve them in the future.

The workshop aimed to enhance the technical capacities of participants on RPW visual inspection protocols, trapping techniques, and data collection using the “SusaHamra” App and platform. Additionally, the participants gain knowledge about validating, processing, and analyzing the collected data, as well as mapping the spread of the insect. They also learn how to utilize the platform to support decision-making related to control programs and improve future planning of the necessary resources. Mr. Thaer Yaseen, FAO’s Regional Plant Protection Officer for the Near East and North Africa (NENA) and the organization’s officer-in-charge for Oman, emphasized that raising awareness, enhancing capacities, and facilitating coordination and information are the basic pillars of prevention, monitoring, and early warning strategies as well as sustainable management of the RPW.

“We value the contributions of all participants, particularly Oman’s Ministry of Agriculture, Fisheries, and Water Resources, and we look forward to achieving positive outcomes that will benefit the date palm sector in the region. This workshop underscores our commitment to fostering regional cooperation in combating and managing RPW as part of our ongoing efforts to address the RPW and develop effective strategies to protect the health of palm trees,” added Yaseen.

Mr. Salem Al Khatri, Director General of Agricultural Development at the Ministry of Agricultural Wealth, Fisheries and Water Resources, Oman, stated that RPW is one of the threatening pests that affect palm trees. It was recorded for the first time in the Sultanate of Oman in 1993 AD and is categorized as a quarantine pest. Hence, for over 25 years, an integrated management program was developed to eradicate or limit its dissemination. This program includes several legislative, awareness, and applied technical aspects, as well as community aspects related to the participation of civil society in general, farm owners, and other relevant stakeholders. This program has effectively managed the pest population and contained it in the northern regions, hence preventing its expansion into other unaffected areas in the central and southern regions.

Mr. Maged Elkahky, Agricultural Officer, FAO- NSP, confirmed that the Susa-Hamra App is a new monitoring system designed by the FAO that includes a mobile App to collect field

data related to visual inspection and management of pheromone traps in date palm fields, in addition to A cloud platform for processing, analyzing and mapping collected data. “The adoption of the Susa-Hamra App and platform as a national system for monitoring and surveying the red palm weevil is an important step in combating the RPW and supporting officials and stakeholders in making informed decisions to manage it.

<https://shorturl.at/4vQWm>



FAO officially launches the SusaHamra application and platform as a digital monitoring and early warning system to manage the red palm weevil in Jordan

30/05/2024, Amman-Jordan

The Regional Office for the Near East and North Africa (RNE) of the Food and Agriculture Organization of the United Nations (FAO), in collaboration with the Ministry of Agriculture in Jordan, concluded a Training of Trainers (ToT) Workshop on the SusaHamra application and platform under the framework of the FAO Red Palm Weevil (RPW) Eradication “GCP/RNE/012/MUL” program. The workshop took place in Amman from May 28 to 30 and was attended by 50 officials from six NENA countries (Egypt, Iraq, Jordan, Lebanon, Palestine, and Syria). The workshop aimed at improving participants’ technical skills in RPW visual inspection, trapping techniques, and data gathering and validation by the “SusaHamra” app and platform. The workshop program focused on discussing the most recent updates of the FAO regional strategy for RPW management, presenting the national strategies for monitoring and managing RPW, identifying gaps in the current monitoring systems, and proposing ways to enhance them. In addition, discuss the possibility of enhancing and adopting the “SusaHamra” app and platform as a national monitoring system in the other participating countries.

The workshop witnessed the official launch of the SusaHamra tool in Jordan as an official national RPW monitoring system. With this, Jordan becomes the second country in the region after Tunisia to adopt the SusaHamra system. The FAO RPW eradication program

“GCP/RNE/012/MUL” is a five-year project that aims to contribute to the ongoing efforts to manage the RPW in the Near East and North Africa (NENA) region. The project was designed to develop the necessary strategies, plans, tools, and technologies to assist NENA countries in sustainably managing the RPW through three major thematic areas: i) governance ii) capacity building; and iii) transfer of knowledge and technology.

<https://rb.gy/lyrdss>



FAO supports Middle Eastern Countries with modern technologies for monitoring and early warning of red palm weevil date infestation

28/05/2024, Amman-Jordan

The Food and Agriculture Organization of the United Nations (FAO) is holding a Training of Trainers (ToT) Workshop on the Susa-Hamra App: a digital system for monitoring and early warning for Red Palm Weevil (RPW), from May 28 to 30 in Amman, with the presence of representatives of the ministries of agriculture in the countries participating. Under the framework of the FAO RPW eradication “GCP /RNE/012/MUL programme, a three-day workshop is organized by the FAO Regional Office for the Near East and North Africa (RNE), FAO’s Plant Production and Protection Division (NSP), and in collaboration with the Jordanian Ministry of Agriculture. The workshop will be attended by 50 participants from 6 NENA countries, including Egypt, Iraq, Jordan, Lebanon, Palestine, and Syria. The workshop aims to strengthen the technical capacities of the participating officials on RPW visual inspection protocols, trapping techniques, and data collection using the SusaHamra app. In addition, participants will acquire knowledge on data validation using the PlantVillage Platform and employ the RPW platform for mapping and analysis. Date production is a major contributor to the Jordanian agricultural sector’s income, accounting for around a hundred million Jordanian Dinars of the entire agricultural income. Annually, the production of dates amounts to around 33,000 tonnes. Red palm weevil is a key quarantine pest that represents a threat to date palm sustainable production and is negatively impacting farmer livelihoods and the environment, not only in Jordan but also in most NENA countries. Weak quarantine measures and challenges in the early detection of RPW-infested plant materials have contributed to its rapid spread in the NENA region”

“stated Eng. Nabil Assaf, the FAO Representative in Jordan. Eng. Ayman Al-Oran, Assistant Secretary-General for Plant Wealth at the Ministry of Agriculture, added that the Red Palm weevil was recorded for the first time in Jordan in 1999, and during the last ten years, its infections have increased steadily.

The Ministry recognized the necessity of formulating a comprehensive national strategy to halt the spread of the red palm weevil and limit its economic damage. The plan was developed for three years and aimed at using the available innovative technologies for early detection and control of RPW, with the participation of stakeholders and in cooperation with experts from the FAO and the private sector. The national plan will target the Jordan Valley, Azraq, Aqaba, and Al-Safi regions. Mr. Thaeer Yaseen, the regional officer of plant protection at FAORNE, stressed that RPW has not been effectively managed despite efforts and resources provided by the authorities in NENA countries. There was broad recognition that the risk of RPW cannot be addressed only at the national level and that its challenges must be addressed urgently at national, regional, and global levels. Also, enhanced solidarity and cooperation between countries and regions are required to harmonize the monitoring and control strategies. FAO developed the regional Trust Fund program for RPW eradication in the NENA region as one of the most affected regions. The RPW eradication project “GCP/RNE/012/MUL” is a five-year project that aims to contribute to the ongoing efforts for the eradication of the RPW in the Near East and North Africa (NENA) region. The project is designed to develop the necessary strategies, plans, tools, and technologies to assist NENA countries in sustainably managing the RPW through three major thematic areas: i) research, ii) capacity development, and iii) transfer of knowledge and technology.

“FAO designed a new monitoring system that includes a mobile app for field collecting data through visual inspection and checking pheromone traps, in addition to a cloud platform for processing, analyzing, and mapping the collected data,” said Mr. Maged Elkahky, Agricultural Officer, FAO NSP. He added that the beta version of the mobile application “Susa-Hamra App” was released at the end of 2018, and the field use of the system was officially launched in December 2023. The system was presented and validated in the Maghreb countries in a previous workshop. Tunisia has adopted the new digital tool as a national system to monitor and survey the RPW in the affected areas. Susa-Hamra App and the platform mark a significant step forward in the fight against RPW and support the officials and stakeholders in making informed management decisions.

<https://shorturl.at/oSMe9>



Red Palm Weevil management in eleven Farmer field Schools in four Egyptian governorates to enhancing date palm production

17/05/2024 Cairo, Egypt

Eleven Farmer Field Schools (FFS) in four Egyptian governorates have been used to improve date palm management and effectively control Red Palm Weevil (RPW) through a learning-by-doing approach and other capacity development activities for Egyptian farmers. The Food and Agriculture Organization of the United Nations (FAO), under the regional programme “The Eradication of RPW in NENA Region” and in collaboration with the Ministry of Agriculture and Land Reclamation (MALR), seeks to enhance the role of farmer field schools as an extension tool based on FAO’s approach, that contributes to improving agricultural productivity, efficient use of water, and reducing the use of fertilizers, pesticides, and energy.

These FFSs were established in the governorates of Giza (one school), New Valley (four schools), Marsa Matrouh (three schools), and Aswan (three schools). “The FFS is a participatory education approach where a group of small-scale farmers gathers to discuss their problems and find solutions based on sustainable agriculture practices,” said Thaer Yaseen, Plant Protection officer in the FAO regional office for the Near East and North Africa. “During one year of date palm plantation, experimental fields are made for each school in which all agricultural and pest control practices are carried out by the farmers and under the supervision of skilled FFS facilitators,” he added. The main outcome of the FFSs is to provide farmers with the knowledge and skills they need to become experts in their fields and to improve their ability to make smart decisions that would help their farming become profitable and sustainable. At the end of each FFS, the farmers will witness the difference between the experimental fields compared to what they do in their farms. RPW is a key transboundary pest of date palm that causes negative impacts on date production, farmer livelihoods, and consequences on food security and rural communities. FAO has provided substantial technical assistance to strengthen the capacities of the farmers for the management of RPW in most NENA countries.

<https://www.fao.org/egypt/news/detail-events/en/c/1682596/>



The Green Evil: Controlling the Water Hyacinth Invasion in Syria

Under the Italian-funded project (OSRO/SYR/031/ITA), FAO organized a technical backstopping mission in Syria from 30 June to 5 July 2024. The mission's objectives were to discuss the work plan, brief the project progress, and provide technical guidance on how to improve the Syrian national program for the sustainable control of the invasive water hyacinth. The mission also included an assessment visit to the biological control lab in Hama to evaluate its needs and its rehabilitation plan.



Books published

Protocols for producing natural enemies and entomopathogenic agents to control fall armyworm in the Near East Region and North Africa.

This book actively contributes to raising environmental awareness by applying concepts and programs of biological control as part of integrated pest management and achieving sustainable development. It is based on scientific and knowledge facts related to the fall armyworm and its biological enemies, as well as methods of production in specialized biological laboratories in the Middle East and North Africa. It also covers maintenance methods, conservation strategies, and the mechanisms used for releasing them in fields affected by pests for control purposes. This book stands out from others by providing unique and comprehensive protocols for rearing and increasing biological enemies that specialize in controlling the fall armyworm. It delves into the egg parasitoids *Telenomus remus* and *Trichogramma* spp., their research, and production facilities, offering a wealth of knowledge and practical guidance. These protocols include a morphological description, life cycle, and the role of the parasitoid/predator in biological control. They also cover storage methods, packaging, and recommended release rates per unit area. It also provides precise descriptions of rearing methods, techniques, and production technologies, along with successful field applications of biological enemies on corn fields affected by the fall armyworm. Chapter seven covers the production of entomopathogenic agents, including *Bacillus thuringiensis* bacteria and a microbial biopesticide containing fungal germs. It also discusses the importance of the insect-pathogenic fungus *Beauveria bassiana*, its mechanism of action, and its role in controlling the fall armyworm. This includes its



production using solid fermentation techniques, from the selected environments to fungal spore preparation, hydration and drying stages, milling and shaping into a wettable powder, and finally, packaging and labelling processes.

Previous chapters set the stage for another chapter that provides advanced information on genetic improvement and artificial selection of biological enemies manufactured within rearing facilities. It discusses the genetic deterioration of quantitative traits and the multiple genetic factors of biological enemies resulting from internal rearing applications within confined and closed conditions. The chapter includes a Quality Control protocol for biological enemies, crucial for the performance success of beneficial species in the field and their ability to reduce infection levels after meeting a set of general quality control standards for rearing biological enemies in quantity and field-specific standards. Furthermore, it discusses production standards and quality control for fungal disease agents. It also comprehensively describes quality control tests for the predator green lacewing as a model for predators and the parasitoid *Trichogramma* as a model for parasitoids. It further introduces some centres for producing biological enemies in the Middle East, focusing on the mass rearing of biological enemies and biopesticide production with brief overviews of the sections and tasks of these centres in both Egypt and the Syrian Arab Republic. This book is a valuable resource for all stakeholders in plant protection. It benefits professionals in biological control production centres, graduate students, researchers, farmers, environmental and health enthusiasts, and policymakers. By reading this book, they can gain in-depth knowledge and advance their understanding of the optimal use of biological control agents, contributing to their professional growth and the advancement of sustainable practices. <https://doi.org/10.4060/cd0974ar>

Sustainable Practices for Improving the Date Palm Value Chain in Sudan

The idea of preparing this book came during the implementation of a project to improve the value chain of date palm products and secondary products in Sudan, entitled **Development of Date Palm Products and By-products Value Chains in Sudan (TCP/SUD/3703)**, Which was implemented by the Food and Agriculture Organization of the United Nations (FAO) in Sudan in cooperation with the Federal Ministry of Agriculture and Natural Resources. The project experts, including Sudanese researchers and their Arab counterparts, agreed in one of the project's coordination meetings on 4/14/2021 to prepare a book to cover all the targeted topics and axes set as chapters for this book. This book is essential for serving the palm and date sector in Sudan. It is prepared in a practical, applied manner and simple language. It has been emphasized and directed to the target groups of technicians, farmers, producers, manufacturers, marketers, investors, planning or executive employees, and all other stakeholders related to the palm cultivation sector, production, marketing, manufacturing, and trade of dates in Sudan. The book **Sustainable Practices for Improving the Date Palm Value Chain in Sudan** has twelve chapters, and 26 articles prepared individually or jointly by an elite group of specialists experienced in the palm and date sector, including the current status of the palm and date sector and future prospects cultivation, manufacturing, marketing, and pest protection. The agricultural practices and their role in improving the productivity and quality of palm fruits, as well as technical guidance for controlling major pests and some physiological and abnormal phenomena spread in date palm orchards. Date palm by-products, and manufacture, marketing of dates and their products, the value-added chain of date palms, investing in the palm and date sector in Sudan, and



institutional regulations and their role in developing the palm and date sector, and the annual agricultural practices program for the date palm under Sudan's different climatic conditions.

Questions and answers about the use of wet and dry pheromone traps and visual inspection procedures for the red palm weevil

The regional project for managing the red palm weevil in the Near East and North Africa aims to address common errors in early detection through visual inspection and pheromone traps. The approach focuses on using simple and adaptable methods to manage the red palm weevil sustainably. For instance, visual inspection, traditional traps, and the SusaHamra application can effectively address the issue. The project also involves providing information in a question-and-answer format, enabling farmers and technicians to implement integrated, sustainable programs. Additionally, the project explores various detection methods, including acoustic, smell, vibration, microwave, and remote sensing inspection. It also emphasizes the importance of making traditional pheromone traps. This publication covers topics related to date palms and the canary ornamental palm.



Farmer field schools and their role in managing the red palm weevil

One of the key aspects of the **FAO Regional Project for Managing the Red Palm Weevil in the NENA region** is to enhance the skills of farmers and stakeholders and improve access to sustainable management practices for RPW. This is crucial for promoting growth and development in agricultural production sectors. Practical agricultural guidance plays a vital role as it bridges the goals of various scientific bodies. It facilitates the transfer of information, knowledge, technologies, practices, and research results to farmer communities in a clear and straightforward manner, leading to improved farming practices and the voluntary adoption of new methods. Additionally, it helps communicate the challenges farmers face to the relevant authorities for research and solution development, subsequently delivering these solutions back to the farmers. Agricultural extension employs various approaches tailored to different societies' social, economic, and cultural conditions. These include traditional systems with central authorities controlling information flow and extension services and the training and visit approach, where specialists train individuals who relay the information to farmers. **The Farmer Field School approach**, a method that instills confidence and capability in farmers, is often implemented through a series of seasonal meetings or workshops. Here, farmers gather to learn and practice new techniques. They are encouraged to observe, experiment, and analyze the results of their actions in the field under the guidance of facilitators or agricultural experts. The emphasis is empowering farmers to make informed decisions based on evidence and observations rather than relying solely on traditional knowledge or external recommendations. This book summarizes the steps of establishing FFS and evaluating them on the farmer and governmental levels.





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 during July 2024

The Desert Locust situation was calm during July. More locusts were seen moving south along the northern Nile Valley of Sudan where locusts had arrived from southern Egypt as spring breeding was finished. During the summer, rainfall began in June in some areas in the northern Sahel between Mauritania to western Eritrea, followed by more rain in July. Scattered adults and a few small groups have probably moved further south in the interior near eastern Sudan, western Darfur, and northeast Chad. The first generation of summer breeding in these areas probably started after mid-July with laying.

Desert Locust Forecast up to Mid-September 2024

The forecast indicates that hatching and hoppers are expected in August, followed by new immature adults from about mid-September onwards. Similarly, a generation of breeding will also occur in southern and central Mauritania, northeast Mali, Niger, and western Chad of West Africa but numbers will be more limited. In the Arabian Peninsula, above-normal rain is expected in August along the Yemen interior and perhaps parts of the Red Sea coast where there will be a generation of breeding. For the Indo-Pakistan border, good rains fell in July and should continue during August where one generation of limited breeding will occur and numbers are not expected to increase significantly.



Master's Program in Desert Locust Sciences

In July 2024, a high-level delegation from the FAO visited the Hassan II Institute of Agronomy and Veterinary Medicine in Agadir, Morocco, to assess the Master's program in Desert Locust Sciences for agricultural engineers from member states of the Desert Locust Control Commissions in the central and western regions. The program aims to improve the management capabilities of desert locust control operations in member states by developing scientifically and practically qualified human resources, which will serve as future assets in managing locust operations in all countries.

The institute officials participated in the evaluation process, which included assessing the theoretical and practical courses and finding ways to update them in line with the latest developments in desert locust management and control. They also discussed organizing a scientific forum on desert locusts in February 2025 titled “Innovative Technologies for Sustainable Locust Management”. Additionally, they agreed to begin the procedures for sending the second group of students to the Master’s program for the academic year 2024/2025.



Exchange of experiences between locust control commissions member countries

In July 2024, a delegation from the Ministry of Agriculture, Fisheries and Water Resources in the Sultanate of Oman, and a delegation from the National Center for the Prevention and Control of Plant Pests and Animal Diseases (Weqaa) in the Kingdom of Saudi Arabia visited the National Center for Locust Control in the Kingdom of Morocco - Agadir. These visits come within the framework of enhancing cooperation between the Desert Locust Control Commissions member states in the Central and Western Regions.



The delegations met with the centre’s officials to understand the workflow and progress of activities related to locust research and fieldwork. They also gained insight into the organizational structure and workflow within different administrative and technical departments, including information and early warning, pest control, environmental health and safety, and locust research. Furthermore, they visited the warehouses for vehicles, sprayers, and pesticides.



Use of biopesticides against locust hoppers

To mitigate the environmental impact of pesticides for locust control, the Commission for Controlling the Desert Locust in the Central Region is exploring alternative methods. A key strategy involves the use of biopesticides. In May 2024, the Commission conducted a field trial of the biopesticide *Metarhizium acridum* (NOVACRID®) against locusts in Oman in collaboration with the Ministry of Agriculture, Fisheries, and Water Resources. This experiment assessed the biopesticide's effectiveness on a 30-hectare area heavily infested with locusts in Dhofar Governorate.



Similarly, a joint effort between the Central and Western Commissions for controlling Desert Locust Control led to a field trial of NOVACRID® against locust hoppers in Abu Ramad, Egypt, in March 2024. Considering the results obtained in this study, the use of barrier treatments with the biocide *Metarhizium acridum* can lead to a significant reduction in control process costs of up to 75%.



ASPP participation in the 20th International Plant Protection Congress in Athens, Greece

The 20th IPPC congress was organized in Athens during the period 1-5 July 2024. It was a successful scientific event and provided an excellent platform for exchanging information and updating the achievements in plant protection. It offered a valuable opportunity for lively presentations, recognizing efforts, and very rewarding to scientists. Over 56 concurrent sessions, 11 plenary keynote presentations, and 220 posters were presented from multi-ethnic and multidisciplinary research communities, representing nearly 70 countries from around the world. It was a great achievement to attract nearly 800 attendees under difficult conditions. More than 300 graduate students and postdocs attended the congress, exchanged current scientific experiences, and established connections for their future careers. Unfortunately, participation from Arab countries was very low.

The Arab Society for Plant Protection was invited to participate in a special session on research collaboration organized by EUPHRESKO. A presentation entitled "The Role of the Arab Society of Plant Protection in Enhancing Plant Health Research Coordination and Collaboration in the Arab Region" was authored by Safaa Kumari, Khaled Makkouk, and Ibrahim Al-Jboory and presented in this session by Dr. Safaa Kumari, the ASPP President. The presentation was well received by the audience. In addition, Dr Safaa Kumari, Head of ICARDA Seed Health Lab/Plant Virologist, presented an oral presentation entitled 'Management of emerging and invasive pests of food legumes and cereals germplasm in CWANA region' and 2 Posters presentations: (i) Management of fall armyworm on summer maize in Lebanon, and (ii) Integrated management of faba bean viruses and their vectors in Lebanon.

Training on Tissue Blot Immunoassay (TBIA) for Plant Virus Detection in Nepal

Dr. Safaa Kumari, Head of ICARDA's Seed Health Lab/Plant Virologist (ASPP President), empowers Nepalese researchers with Tissue blot immunoassay (TBIA) training to identify plant viruses under the project "Survey of Lentil Viral Diseases in Nepal". The training courses was organized by the National Plant Pathology Research Centre, Nepal Agricultural Research Council, Khumaltar, Lalitpur, Nepal (May 13-25, 2024), and funded by the Australian Centre for International Agricultural Research (ACIAR), Australia.



Safaa Kumari announced as EUPHRESKO III Scientist of the Month - July 2024

EUPHRESKO has been nominated Dr. Safaa Kumari, Head of ICARDA's Seed Health Lab/Plant Virologist and president of the Arab Society for Plant Protection, as a Scientist of the Month for July 2024 appreciated for her excellent contributions to the Europ-South & the Mediterranean region. Each month Euphresco celebrates a Scientist of the Month on their social media (Twitter/X). This initiative aims to enhance the visibility of plant health scientists and highlight their important contributions to the field. <https://x.com/Euphresco/status>



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



Dear colleagues,

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



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

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

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



We look forward to welcoming you to Algeria in the fall of 2025.

The Arab Society for Plant Protection The Organizing Committee of the Congress in Algeria

Congress themes

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

Congress Language

Arabic (official language) , and English(the symposium sessions only).

Registration fees

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

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

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

Correspondence

Secretariat of the 14th Arab Congress on Plant Protection (ACPP2025)

Email:

Website:

Mob/WhatsApp: 00213 78 21 39 401

Important Dates

Deadline for registration 30 :September2025

Deadline for abstract submission 30 :March2025

Notification of abstract acceptance 30 :May2025

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

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

Symposia Program

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

Monday, 3 November 2025	
Keynote address in the opening session	
The role of plant protection in achieving food security in the Arab region.	Dr. AbdulHakim Elwaer , Assistant Director-General, Regional Representative for Near East and North Africa, Cairo, Egypt.
Symposium One: Use of artificial intelligence and other new 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 <i>Xanthomonas oryzae</i>.	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. Effects 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 Shamsheer , 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. Charles Manceau , Better Training for a Safer Food Academy, France. Email: charlesrene.manceau@gmail.com
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@yahoo.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: claudette.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

Near East Plant Protection Organization Bulletin



Near East Plant Protection Organization Bulletin (NEPPO)

This bulletin is a communication tool to provide information to member countries of the Organization, the countries of the Near East and North Africa region and those who follow plant protection, about the activities of the Near East Plant Protection Organization (NEPPO). It also provides information, technical data and statistics regarding pests harmful to agricultural crops and, quarantine pests. The bulletin exposes the most important development and events at the regional and international levels. The Bulletin is issued every three months. This 6th issue of the bulletin regroups the most important activities during the three months (April/May and June) of the year 2024. [Editor: **Ben Jamaa Mohamed Habib**, Executive Director, Bulletin no: 6,2024, NEPPO].



News of the Near East of Plant Protection Organization (NEPPO) May_August 2024

Executive Committee virtual Meeting of NEPPO

The meeting was held in May 14th 2024 (Rabat, Morocco) during which the Executive Director of the Organization, Mr. Mohamed Habib BEN JAMAA gave information on the most important activities of the Organization for the first 4 months of 2024:

- » The specialized working groups,
- » The region's experts in the specialized teams of the International Plant Protection Convention,
- » The Arabic Language / International Plant Protection Convention review team,
- » The program African Phytosanitary Program,
- » Meetings/activities organized by the NEPPO or in which the organization participated
- » The 18th session of the International Standards Body (IPPC#).
- » The organization's work program for the rest of the year 2024

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

The meeting organized by the Food and Agriculture Organization of the United Nations (FAO) and The Near East Plant Protection Organization (NEPPO), was held during 24 & 25 June 2024 (Hammamet, Tunisia). It aims to enhance cooperation between partners

and participating countries and to review the latest outputs and updates of private sector, stakeholders, participants and other between FAO and the NEPPO in order to:

- » Present the regulations and guidelines for the movement of infested palms within the country and between countries and improve the knowledge of stakeholders on the national phytosanitary legislation of RPW.
- » Enhance the implementation of phytosanitary (quarantine) measures for the movement of planting materials.
- » Improve the final protocols for the production of certified date palm propagation materials.
- » Formulate harmonized control strategies and common action plans for RPW.



Workshop on International Standards for Phytosanitary Measures (ISPMs)

This workshop was held on July 10th & 11th 2024 (Rabat, Morocco) at the headquarters of the Near East Plant Protection Organization. The main goals of this workshop were:

- » Understanding the importance of the ISPMs and raise the level of technical teams and workers in plant protection.
- » Proposing recommendations from member countries to develop new phytosanitary measures adapted to the region.
- » Working on standards specific to countries in the region.
- » Translating standards into Arabic and contribute of the countries for the translation.
- » Working on the Online Comment System (OCS) / application and adding comments



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

This workshop was held from 5 to 8 August 2024 (Rabat, Morocco). The Executive Director of the Near East Plant Protection Organization presented the goals and tasks of the organization, the member states, the organizational structure and the Executive Committee, and the most important activities of the Organization for the year 2024:

- » Near East Plant Protection Organization's participation in the eighteenth session (CPM18) from 15 to 19 April 2024 (Rome, Italy).
- » Participation in the thirty-seventh session of the Food and Agriculture Organization's Regional Conference for the Near East and North Africa on March 4-5, 2024 (Amman, Jordan).
- » The African Phytosanitary Program.

The Executive Director concluded his speech by giving information about preparing the work program for the years 2025-2026, specifying the initial and strategic activities for the period 2025-2035 in coordination with the working groups of NEPPO.



The 8th National Congress of the Italian Society of Virology (SIV-ISV), July 7-9, 2024 Bologna, Italy

The SIV-ISV National Congress represents the annual forum for Italian scientists working in the different areas of virology (molecular virology, veterinary virology, environmental, and plant virology), taking advantage of the most advanced technological platforms. Special attention has been given to Young Investigators whose participation has been encouraged by Scholarships. From the Arab Society of Plant Protection, Dr. Raied About Kubaa, member also of the SIV-ISV, has participated in the conference, presenting two different research topics as follows:

- Investigating the relationship between high titers of grapevine pinot gris virus and leaf mottling and deformation symptoms in grapevines.
- High-throughput sequencing analysis revealed the occurrence of a new Tymo-like virus in peach in the United States.

Training course on modern techniques

In collaboration between the Foundation Plant Services (FPS) in the Department of Plant Pathology at the University of California, Davis, USA, and the Ministry of Municipality in the State of Qatar, represented by the Agricultural Research Department, FPS hosted Dr. Mona Al-Balushi and Mr. Ahmed Al-Jabr for a training course on modern techniques in detecting and diagnosing plant diseases from July 1 to July 9, 2024.



The course covered several topics and activities, where the trainees followed all the activities and workflow within FPS. This started from the reception of samples and plant introduction to California, through the visual inspection process, followed by laboratory tests using molecular techniques. A detailed explanation on the High-Throughput Sequencing (HTS) technology was provided, starting with the extraction of total nucleic acid from samples, quality and quantity assessment of RNA, library preparation, data processing and the use of bioinformatics for comprehensive virus detection in each plant sample. The course also included field visits to FPS's fields and experimental orchards, showing how to protect them from disease infections.

The activities included presentations on propagation methods in greenhouses, grafting on indicator plants for virus detection, and methods for virus elimination through meristem tissue culture.

Evaluation of methyl salicylate, limonene, and thymol as potential biocidal against *Trogoderma granarium* everts larvae

The investigation of plant-based natural products, especially essential oils, as insecticide alternatives, responds to challenges as induced resistance and environmental drawbacks linked to prolonged synthetic insecticide use. Although essential oils demonstrate promising activity, their utilization faces hurdles related to standardization. In this study, contact/fumigation properties of three molecules (methyl salicylate, limonene and thymol) known for their activity against stored product beetles, were tested in laboratory bioassays toward young and old larval stages of *Trogoderma granarium*.

The experiment revealed significant differences in their effects based on larval age and chemical concentration. Methyl salicylate exhibited concentration-dependent effects on both young and old larvae, with higher concentrations leading to accelerated mortality rates. For instance, young larvae exposed to 10 mg displayed an LT50 of 33.75 h, while old larvae showed an LT50 of 39.07 h. Similarly, at a concentration of 5 mg, young and old larvae exhibited LT50 values of 72.79 and 79.68 h, respectively, after treatment. Limonene also exhibited concentration-dependent effects, although with lower potency compared to methyl salicylate. Thymol showed efficacy only against young larvae of *T. granarium*. Statistical analyses confirmed the significant impact of each chemical on larval survival time, with tested chemicals displaying significant concentration-dependent variations in mortality rates. These findings suggest the potential of methyl salicylate, and to a lesser extent limonene and thymol, as effective biocidal agents against *T. granarium* larvae.

[**Mokhtar Abdulsattar Arif^a, Salvatore Guarino^{b, a}**Plant Protection Directorate, Ministry of Agriculture, Abu-Ghraib 10081, Baghdad, Iraq. ^bInstitute of Biosciences and BioResources (IBBR), National Research Council of Italy, Via Ugo La Malfa 153, 90146, Palermo, Italy,2024].
<https://www.sciencedirect.com/science/article/abs/pii/S0022474X24001231>

Dr. Mokhtar Abdulsttar Arif

From 2005 to the present, he has been an employee in the Plant Protection Directorate, Ministry of Agriculture, Baghdad, Iraq.

Education

Bachelor's degree from the College of Agriculture, Department of Plant Protection, Baghdad, Iraq, in 2005, a Higher Diploma and Master's degree in Integrated Pest Management, Mediterranean Agronomic Institute of Bari (CIHEAM), Bari, Italy, 2016. a PhD degree - in semiochemical interaction, University of Palermo, Palermo - Italy. 2020.

Research interests

My research interests focus on studying safe alternatives to pesticides, such as using pheromones, insect traps, and natural products, and developing them to obtain the best results in controlling many insect pests. I have conducted many studies on interactions between plants, insects, and their natural enemies. I have experience operating many automated chromatographic analysis instruments, such as GC-MS, HPLC, GC, etc., and I have supervised many master's and doctoral students.





Mazen Alazem participation in international conference

The American Society for Virology held its annual international conference from June 24-28, 2024, in Columbus, Ohio, hosted by Ohio State University at the Greater Columbus Convention Center. The annual meeting of the American Society for Virology provides a forum to enhance discussion and collaboration among scientists active in all aspects of virology. Attendees had the opportunity to learn about virology, share their research, and network with other scientists from many countries, with over two thousand participants attending. From the ASPP, **Dr. Mazen Alazem**, a full member of the American Society for Virology, gave an oral presentation in the Plant Viruses session on the role of plasmodesmata and hormones in regulating the movement of plant viruses between plant cells. The presentation was titled: "The Role of Viral Movement Proteins in Modulating Plasmodesmata-Associated Proteins to Regulate Permeability and Formation of Plasmodesmata in Plants, 2024]



The presentation was titled: "The Role of Viral Movement Proteins in Modulating Plasmodesmata-Associated Proteins to Regulate Permeability and Formation of Plasmodesmata in Plants, 2024]

General News

Annual Meeting of the American Phytopathological Association

Plant Health 2024, Memphis, Tennessee, July 27-30-2024. The annual meeting of the American Phytopathological Society (APS), uniting nearly 1,100 dedicated scientists at the forefront of advancing plant health, was held. Spanning diverse backgrounds, from diagnostics to groundbreaking research, our attendees collaborated on vital agricultural, food safety, and food security issues. Plant Health 2024 offered targeted networking events, over 700 technical abstracts, engaging hot topic roundtables, hands-on workshops, and more than 60 invited speakers. From the ASPP, **Dr. Maher Al Rwahnih**, director of Foundation Plant Services (FPS), participated in this event, presenting research entitled: Evidence of rapid infection of four sweet potato potyviruses in a commercial field in California.



Challenges for Sustainable Citrus Production in the NENA Countries Conference, Algeria

Given the socio-economic importance of the citrus sector in Algeria, the official authorities are willing to rehabilitate this important crop by developing a sustainable and efficient strategy.



1st NENA Region
Citrus Conference
CHLEF 2024



However, this strategy needs to address the problems induced by climate change, which profoundly affects the sustainability and profitability of citrus production in several NENA countries. The climatic changes negatively impacted the phenology, management, and development of citrus orchards, including the emergence of diseases and the development of harmful pests. The impact of these adversities in recent years is of particular concern to scientific and technical institutions, especially professionals in the citrus sector. [**Malika Meziane (Algeria), 2024** <https://www.univ-chlef.dz/nena/>

Activities of Plant Protection and Phytosanitary Directorate ,Jordan

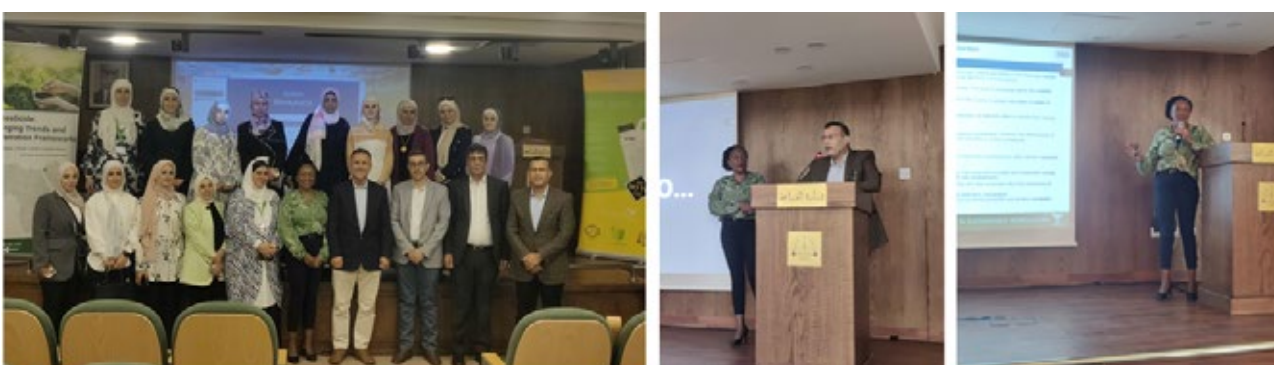
Workshop on Biopesticides: Emerging Trends and Registration Frameworks

The Directorate of Plant Protection and Phytosanitary has organized a workshop entitled “Biopesticides: Emerging Trends and Registration Frameworks” in collaboration with CropLife Africa Middle East and The Agricultural Materials Traders & Producers Association of Jordan (AMATPA). The workshop was held in the Ministry building (Farmer Hall) on Tuesday, June 25, 2024. Topics covered included the definition of biopesticides, instructions for registering biopesticides in Jordan, the role of the specialized technical committee in reviewing and updating these instructions, factors affecting the use and effectiveness of biopesticides, challenges facing this sector in Jordan, biopesticides registered in Jordan, and a presentation on a farmer’s experience in applying biopesticides for pest control. Additionally, the workshop discussed the latest developments in biopesticide manufacture and trade globally.



Workshop on “Combating the trade in illicit and counterfeit pesticides”

The Directorate of Plant Protection and Phytosanitary has organized a workshop entitled “Combating the trade in illicit and counterfeit pesticides” in cooperation with CropLife Africa Middle East and The Agricultural Materials Traders & Producers Association of Jordan (AMATPA). The workshop was held in the Ministry building (Farm Hall) on Wednesday, 6/26/2024. The workshop topics included the definition of counterfeit and illegal pesticides, their risks, methods of combating illicit and counterfeit pesticides, and the measures taken by the Ministry to combat illegal and counterfeit pesticides. Invited speakers from international experts via audio-visual communication technology, Zoom platform, presented ways to identify counterfeit and illegal pesticides, their most important types and forms, and the role of the authorities concerned with international trade in procedures to combat the trade in illegal and counterfeit pesticides and overcome the obstacles.





Training workshop on the pesticide registration instructions in force in the Ministry of Agriculture

The Pesticide Registrations Section in the Plant Protection and Phytosanitary Directorate implemented training workshops in cooperation with Agricultural Engineers Association to introduce the instructions in force for pesticides registration in the Ministry of Agriculture. This workshop aims to raise the level of awareness among newly graduated agricultural engineers about the pesticide registration instructions in force in the Ministry of Agriculture. The speakers reviewed an introduction to the safe use of agricultural pesticides, the process of registering agricultural chemical pesticides, how to submit registration applications, the legal and scientific requirements for registering pesticides, the bases for accepting registration applications, the reasons and procedures for prohibiting the registration of some pesticides. The speakers also reviewed the official platform for registered pesticides on the Ministry of Agriculture's website. A general discussion on registering bio-pesticides and legal requirements, providing information on the active ingredients and other components, environmental and health safety studies, the biological and chemical effects of the pesticide, and instructions for safe and effective use were made. At the end of the introductory workshops, many topics were discussed regarding the registration of pesticides and pesticide labels, and the importance of carrying out field trials on bio-pesticides before registration to demonstrate their effectiveness in combating targeted pests.

Preparing draft instructions for organizing, storing, transporting, and treating organic fertilizer

The specialized technical committee began its work to prepare instructions for organizing, storing, transporting, and treating organic fertilizer in line with the latest developments and developing local legislation regulating this sector. The committee includes representatives of relevant official bodies such as the Ministry of Environment and the Royal Department of Environmental Protection. The draft instructions include several articles related to regulating the procedures and operations of storing, transporting, and treating organic fertilizer resulting from animal waste or a mixture of animal and plant waste in organic fertilizer factories, their collection places, and places designated for collecting organic fertilizer until it is manufactured or resold to user farms. The processed organic fertilizer is subjected to fermentation, drying, and sterilization processes through heat treatment, while the mineral organic fertilizer is the processed organic fertilizer added to the mineral elements that fertilize the soil.

Implementing campaigns to combat house flies in the Jordan Valley

Based on the national plan to combat house flies, which was launched by the Ministry of Agriculture in cooperation with the relevant official authorities, which included several measures to limit the spread of house flies, the of Plant Protection and Phytosanitary Directorate, in cooperation with the directorates of agriculture in the Jordan Valley, the Northern Jordan Valley, and the Southern Jordan Valley, implemented a campaign to combat house flies in different areas of the Jordan Valley



especially the baptism site and the hotels at Dead Sea area. With active support from the municipalities spread throughout all areas of the Jordan Valley, specialized pesticides were used to spray sheep pens, swamps, and garbage containers in residential areas, as well as waste dumps, slaughterhouses, and workers' housing spread in the areas targeted by the control operations. The control operations included liquid spraying, fumigation, and the use of pesticides designed to paint containers and places where flies gather and breed.

Launching the regional workshop to train trainers on implementing the “Red Weevil” application and platform

The Food and Agriculture Organization (FAO) Launched the regional workshop to train trainers on the “Red Weevil” application and platform, which is a digital system for monitoring and early warning for the management of the Red Palm Weevil, during the period 28-30/5/2024 in Jordan, with the participation of five Arab countries in addition to Jordan (Egypt, Iraq, Syria, Lebanon, Palestine). The participating international experts presented the importance of the palm sector in Jordan, the most important challenges and problems facing this sector, and the efforts of the Ministry of Agriculture in combating this pest and measures to limit its spread. Methods of integrated management of this pest and the national plan to combat the Indian red palm weevil were also presented. Representatives of the participating countries also presented a summary of the current situation of the pest in their countries and plans to manage this pest. The participants engaged in a rich dialogue about this pest and the methods of detection and control that have been examined. During the workshop, the results of the first phase of the national campaign to combat the pest and methods for manufacturing Kairomones that attract the pest were presented, as the Ministry of Agriculture manufactures these materials through the palm weevil laboratory in the Jordan Valley. Jordan's experience has received attention and praise from the participating countries.



Implementing training courses for farmers on integrated pest management in olives

Within the plan of the of Plant Protection and Phytosanitary Directorate to raise the capabilities of farmers on integrated management in combating agricultural pests, the



Agricultural Pest Control Division, in cooperation with the Directorate of Human Resources Development and Management, implemented many training courses for farmers in different regions of the Kingdom on integrated management of combating insect, fungal and bacterial pests that affect olive trees and fruits. The total number of farmers participating in the training courses reached 200 farmers, and they were provided with the necessary brochures and traps were distributed to them. The training courses included theoretical and practical sessions in integrated management for combating insect, fungal and bacterial pests that affect olive trees and fruits. The participating farmers were trained on how to use different traps to combat the olive fruit fly pest.

Implementing a mass control campaign for date palm dubas bug and the white scale on palm trees in the Jordan Valley region

Within the plan of the Plant Protection and Phytosanitary Directorate to raise the capabilities of farmers regarding integrated management in combating agricultural pests, the Agricultural Pest Control Division, in cooperation with the relevant agricultural directorates in the Jordan Valley, implemented several mass control campaigns for date palm pests. About 350 palm farmers benefited from the control campaigns that were implemented on an area of 7,000 dunums, and more than 500 liters of pesticides specialized in date palm dubas bug and the white scale insect were used to limit the spread of the pests and reduce their damage.

Implementing a campaign to combat cochineal scale insect infestation on prickly pear cactus (aloe vera) plants

The Agricultural Pest Control Division carried out many field trips in several areas in Al-Balqa Governorate, "Ain Al-Basha, Al-Harsha, Al-Kassarar, and Tal Al-Rumman." During the visits, technical guidance was provided to farmers about the cochineal insect pest on the prickly pear (cactus) crop and the measures taken by field work teams at the Ministry of Agriculture to limit the spread of this dangerous pest, which poses a real threat to the cactus plant in various regions in Jordan.



Implementing a campaign to combat the pomegranate moth in different areas in Irbid Governorate

The Agricultural Pest Control Department launched and implemented a campaign to combat the pomegranate moth in various areas in Irbid Governorate, with an area estimated at 2,300 dunums. The launch began in the areas of Ain al-Barda and Ain Sasal in the Beni Kenana district, according to the previously prepared work plan. The campaign will continue in the coming days in other areas of the Beni Kenana District. It is worth noting that the Irbid Agriculture Directorate and the Bani Kenana District are working together to provide all the necessary pesticides and tools to make the campaign a success.

Selected Research Papers

- **Assessment of Attractant Combinations for the Management of Red Palm Weevils (*Rhynchophorus ferrugineus*) in the United Arab Emirates.** Su-Mi Na, Gue-Il Im, Woon-Seok Lee and Dong-Gun Kim, *Insects*, 15(4), 218, 2024. <https://doi.org/10.3390/insects15040218>
- **Control Potential of Multiple Nucleopolyhedrovirus (SfMNPV) Isolated from Fall Armyworm in Nigeria (West Africa).** Ghislain T. Tapa-Yotto, Ouorou Kobi Douro-Kpindou, Précieux Sèna Bonaventure Koussihouédé, Abissi Marc Adjaoké, Jeannette K. Winsou, Ghislain Tognigban and Manuele Tamò, *Insects*, 15(4), 225, 2024. <https://doi.org/10.3390/insects15040225>
- **Biological Control and Habitat Management for the Control of Onion Thrips, Thrips *tabaci* Lindeman (Thysanoptera: Thripidae), in Onion Production in Quebec, Canada.** Annie-Ève Gagnon, Anne-Marie Fortier and Carolane Audette, *Insects*, 15(4), 232, 2024. <https://doi.org/10.3390/insects15040232>
- **Dual Effects of Cold Storage and Stored Host Eggs of *Spodoptera frugiperda* (Smith) (Lepidoptera: Noctuidae) on the Reproductive Capacity of *Telenomus remus* Nixon (Hymenoptera: Scelionidae).** Ranran Qiu, Jun Li, Nicolas Desneux, Liansheng Zang, Xiaofang He and Xin Lü. *Insects*, 15(4), 233, 2024. <https://doi.org/10.3390/insects15040233>
- **Allelopathic weed management in wheat (*Triticum aestivum* L.) through essential oil emulsions and aqueous botanical extracts-based novel bioherbicides.** Pooja Maurya, Nihal Dwivedi, Abdul Mazeed, Dipender Kumar, Birendra Kumar, Chandan Singh Chanotiya, Kapil Dev & Priyanka Suryavanshi, Volume 131, pages 445–458, 2024.
- **Early detection of bacterial wilt in bananas caused by *Ralstonia solanacearum* using reflectance spectroscopy.** Juan Carlos Marín-Ortiz, Verónica Botero-Fernández, Lilliana María Hoyos-Carvajal, Volume 131, pages 523–531, 2024.
- **Efficiency of spinetoram on biological, biochemical, and histological parameters in the invasive fall armyworm *Spodoptera frugiperda* (Lepidoptera: Noctuidae) in Egypt.** Sherehan A. R. Salem, Ebrahim M. E. Alhousini, Zeinab Al-Amgad & Mervat A. B. Mahmoud, Volume 131, pages 489–499, 2024.
- **Survey on *Aculops lycopersici* and operational factors potentially affecting successful pest management among 50 tomato producers in Germany.** Alexander Pfaff & Elias Böckmann, Volume 131, pages 501–513, 2024.
- **Net blotch (*Pyrenophora teres* Drechsler): An increasingly significant threat to barley production.** Andrija Tomić, Vojislav Trkulja, Slavica Matić, Nenad Trkulja, Renata Iličić, Marco Scortichini, Tatjana Popović Milovanović, *Plant Protect. Sci.*, **60(1):1-30, 2024.** DOI: [10.17221/122/2023-PPS](https://doi.org/10.17221/122/2023-PPS) fgg
- **Antifungal effect of fresh and stored olive mill wastewater and its ethyl acetate extract against plant pathogenic fungi.** Raja Jarboui, Mona Saber Azab, Hallouma Bilel, Shaima M.N. Moustafa, *Plant Protect. Sci.*, , 60(1): 65-79, 2024. DOI: [10.17221/91/2023-PPS](https://doi.org/10.17221/91/2023-PPS)



- **The effect of conidia density and application frequency of the entomopathogenic fungus *Aschersonia aleyrodis* in controlling silverleaf whitefly (*Bemisia tabaci*) on tomato (*Solanum lycopersicum* Linnaeus).** Sudarjat, Fitri Widiyanti, Yula Salsabila, Syariful Mubarak, **Plant Protect. Sci.**,60(1):80-88, 2024. [DOI: 10.17221/74/2023-PPS](https://doi.org/10.17221/74/2023-PPS)
- **Indirect effects of plasma-activated water irrigation on *Tetranychus urticae* populations.** Patrice Jacob Savi, Anil Mantri, Haleh Khodaverdi, Yugeng Zou, Gilberto José de Moraes & Christian Nansen, *Journal of Pest Science*. doi.org/10.1007/s10340-024-01791-0
- **A note on the predatory hybotid fly genus *Crossopalpus* found at the Kerkini National Park in Greece with an illustrated key to the species occurring and expected in Greece.** Patrick Grootaert and Paul L. T. Beuk, *Entomologia hellenica*, Vol. 33 No. 1, 2024.

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BIOLOGY

Study of the Biology of the Cochineal Scale Insect, *Dactylopius opuntiae*

W. Alhousa, A.N. Basheer and Z. El-Naser (SYRIA)

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<https://doi.org/10.22268/AJPP-001240>

Diapause Termination of Eggs of Silkworm, *Bombyx mori* Using Hydrochloric Acid and its Effect on the Insect's Biological Characteristics

I. Okasha, A. Arab and H. Al-Roz (SYRIA)

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<https://doi.org/10.22268/AJPP-001229>

The Effect of Production Method on Local Honeybee Queens, *Apis mellifera* L. to Determine the Acceptance Rate of Grafted Larvae and Live Weight of Virgin Queens in Latakia Governorate

M. Asaad, M. Omran, N.Z. Hujeij and Khalil Makis (SYRIA)

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<https://doi.org/10.22268/AJPP-001239>

ECOLOGY

Biodiversity and Seasonal Occurrence of Insect Fauna Associated with Brassica Vegetables in Menoufia and Giza Governorates in Egypt


A.R. Elbadawy, H.M. Hamada and R.A.K. Salama (EGYPT)

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Morphological and Molecular Identification of *Fusarium tricinctum* Causing Fruit Rot of Pumpkin (*Cucurbita pepo*) in Iraq



Ali Hamood Thanoon (IRAQ)
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Identification of Some Species of the Family Coccidae that Infest Fruit Orchards in Syria

A.T. Saleh and A.M. Basheer (SYRIA)
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Effect of Standard and Nano-Urea on the Inhibition of the Fungus *Aspergillus flavus* Growth and Reduction of Aflatoxin B1 Production in the Laboratory

A.H. Hussein and H.Z. Hussein (IRAQ)
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Molecular Identification of *Fusarium* Species Associated with the Tissue Culture Date Palm Offshoots Wilt Disease and Evaluation of Using Silver Nanoparticles and *Trichoderma longibrachiatum* for Its Control.

M.A. Fayyadh, A.O. Manea and Y.A. Salih (IRAQ)
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Evaluation of the Efficacy of Some Pesticides and Plant Extracts in Controlling the Adults of Southern Cowpea Beetle, *Callosobruchus maculatus* Under Laboratory Conditions.

I.Z.A. Kashmar and M.T. Mohammadali (IRAQ)
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Toxicity of *Zingiber officinale* Nanoparticles Against the Spiny Bollworm, *Earias insulana* and Their Effects on Some Biological and Histological Aspects.

Rania M. El-Shennawy (EGYPT)
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Field Performance of Selected Insecticides on Cotton Aphid, *Aphis gossypii* and Side Effects on Lady Beetle, *Coccinella septempunctata*.

M.H. Khalifa, A.R. Khirallah, F.I. El-Shahawi, N.A. Mansour and H.K. Abou-Taleb (EGYPT)
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BIOLOGICAL CONTROL

Evaluation of Enhancing Biochar and the fungus *Glomus mosseae* in the Growth of Common Bean, *Phaseolus vulgaris* infected with *Rhizoctonia solani*.

R.M. Abed (IRAQ)
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Effect of Some Biological Agents on Fungi Isolated from Roots and Soil around it of *Cupressus* spp. Trees.

Hadeel A. Al-Ameri (IRAQ)

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Effect of Plant Growth-Promoting Rhizobacteria (PGPRs) on Tuber Storage of Two Potato Varieties.

Nadia El Allaoui, Allal Douira, Abdellatif Benbouazza, Moha Ferrahi, El Hassan Achbani and Khaoula Habbadi (MOROCCO)

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<https://doi.org/10.22268/AJPP-001242>

NATURAL ENEMIES

Ecological Parameters of Numerical Diversity of Entomopathogenic Fungi in Soils of Beit Saber and Henna, Rif Damascus Governorate, Syria.

B. Alshadidi, J. Faddoul and A. Basheer (SYRIA)

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<https://doi.org/10.22268/AJPP-001227>

First Record of a New Species of Green Lacewings *Chrysopa niki* n. sp. in Syria.

H. Kawas, H. and A. Basheer (SYRIA)

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<https://doi.org/10.22268/AJPP-001230>

Two Parasitic Wasp Species: *Ichneumon sarcitorius* and *I. ostentator* in Iraq.

Ali A. Kareem, Ayad Alsendi, Siena Al-Zurfi, Alaa Alamri and Raad K. Aljaafari (IRAQ & IRAN)

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PLANT EXTRACTS

The Efficiency of Some Plant Extracts in Controlling the Larvae of the Cadelle Beetle, *Tenebriodes mauritanicus* in the Laboratory.

N. Al-Saoud (SYRIA)

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RESIDUES

The Effect of Silica Nanoparticles Addition on Removal of Glyphosate Residue from Aqueous Solutions.

W.S. Al-Tharwani, M.T. Mohammadali and I.M. Abd al-Ridha (IRAQ)

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NEW PESTS

First Record of the Caper Fly, *Capparimyia savastani* in Syria.

A.F. El-Habib (SYRIA)

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<https://doi.org/10.22268/AJPP-001238>

First report of cardona pear, *Opuntia streptacantha* (Caryophyllales: Cactaceae), naturalized in Spain

Since 2017, naturalized populations of cardona pear, *Opuntia streptacantha* (Caryophyllales: Cactaceae), were observed in Spain. This is the first report of *O. streptacantha* naturalized in Spain. *Opuntia streptacantha* is native to central and southern Mexico and Guatemala. It grows outside of cultivation in Italy and is naturalized in Australia, where it is an environmental weed that invades natural areas and forms dense monocultures. *Opuntia streptacantha* spreads by vegetative fragments and fruits that are dispersed by animals and water. It is not known to be naturalized in the United States.

References:

Verloove, F., D. Guillot Ortiz, A. Guiggi, E. Martí Colomer, and L. Serra. 2024. New naturalized populations of *Opuntia streptacantha* (Cactaceae) from Spain. *Bouteloua* 36:314-320. Last accessed June 20, 2024, from

https://www.friscris.be/files/7134288/Bouteloua_36-314-320.pdf.

EPPO. 2024. *Opuntia streptacantha* in Spain. European and Mediterranean Plant Protection Organization (EPPO). May 1, 2024. Last accessed June 20, 2024, from

<https://gd.eppo.int/reporting/article-7870>.

First report of tomato leafminer, *Phthorimaea absoluta* (Lepidoptera: Gelechiidae), as an experimental vector of the tobamovirus *Tomato brown rugose fruit virus*.

Country: Italy

Source: Entomologia Generalis

Recently, laboratory experiments in Italy showed that tomato leafminer, *Phthorimaea absoluta* (synonym: *Tuta absoluta*) (Lepidoptera: Gelechiidae), can transmit the tobamovirus *Tomato brown rugose fruit virus* (ToBRFV) in *Solanum lycopersicum* (tomato) plants. The experiments showed that pupae and adults can carry the virus and that adult insects can transmit inoculum to healthy plants. *Phthorimaea absoluta* is an economically important pest of Solanaceae. *Phthorimaea absoluta* is native to South America and has been reported from parts of Africa, Europe, the Middle East, Asia, Central America, and the Caribbean. It is not known to occur in the United States. ToBRFV is an economically important pest of *Solanum* spp. and *Capsicum* spp. (pepper). ToBRFV has been reported from Albania, Turkey, China, Mexico, and parts of the Middle East and has been detected in parts of Europe, the Middle East, Egypt, New Zealand, and the United States. Tobamoviruses can be transmitted mechanically and by seed, and ToBRFV can also be transmitted by the bee *Bombus terrestris*, which is not known to occur in the United States.

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EVENTS OF INTEREST

2-6 /9/2024	X Symposium of EurAAc in Athens, Greece. https://www.euraac2024athens.com/
18-20/9/2024	VI. International Conference on Agricultural, Biological and Life Science Edirne, Turkey, www.agbiol.org
10-13/10/ 2024	XV International Agriculture Symposium "AGROSYM 2024. Jahorina, Bosnia and Herzegovina. Agrosym_(ues.rs.ba)
30 /10 - 1/11 2024	II. International Biological and Life Sciences Congress (BIOLIC) , Megasaray Westbeach Hotel, Antalya, Turkey. www.biolic.org
31/10/- 2/11/2024	International Congress on Edible and Oil Seeds, Megasaray Westbeach Hotel, Antalya, Turkey, www.ediboil.org
30-31/12/ 2024	International Conference on Agricultural Entomology and Pest Management ICAEPM in Paris, France. https://rb.gy/txwji8
28-29/1/ 2026	International Conference on Plant Pathology and Plant-Microbe Biology in Istanbul, Türkiye. https://shorturl.at/fmqSY

Aonidiella orientalis, family Diaspididae, the Oriental yellow scale on citrus trees and the parasitoid ***Aptis melinus*** in Iraq, collected and photographed by **Dr. Basem Hasson Hasan**, Ministry of Higher Education, Agricultural Research Center, to whom we express our great appreciation.



The Editorial Board of The Arab and Near East Plant Protection Bulletin Highly Appreciates the Contribution of Several Arab Scientists in This Issue, namely:

Abdulnabi Basheer(Syria), Houda Kawas (Syria), Mohamad Kanouh(Syria), Farhat Abouzkhari(Libya), Naima Boughalleb-M'hamdi (Tunisia), Omar Saleh Mohammed Al-jboury (Iraq), Mohammad.Saab (Syria), Adnan Lahuf(Iraq), Ziad Barbar(Syria), Mokhtar Abdulsttar Arif(Iraq), Nida' Salem(Jordan), Ben Jamaa Mohamed Habib(NEPPO), Hassan Khalil (Syria), Malika Meziane (Algeria), Amani Alawamleh (Jordan), Nabeel Al-Kaeath(Iraq), Manel Elair (Tunisia), Naima Mahfoudhi (Tunisia), Reda Omara (Egypt), Reem Youssef (Syria), Tarik Almandhari (Oman), Samia Al-Naabi(Oman), Emad Mahmood Al-Maarroof(Iraq), Elia Choueiri(Lebanon),

Mostafa Sharaf(Saudia Arabia), Mazen Alazem(USA), Maher Al Rwahnih (USA), Osameh Atiya(Turkey), AlSarai Alalawi Mamoon (FAORNE), Heba Tokali (FAO-Egypt), Yosra Ahmed (FAORNE), Essam Khlifah (FAO).

The bulletin's editorial board invites the society members to send their scientific findings and news related to plant protection in Arab countries and elsewhere. We also invite scientists studying abroad to share their information and achievements with colleagues in this bulletin.

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