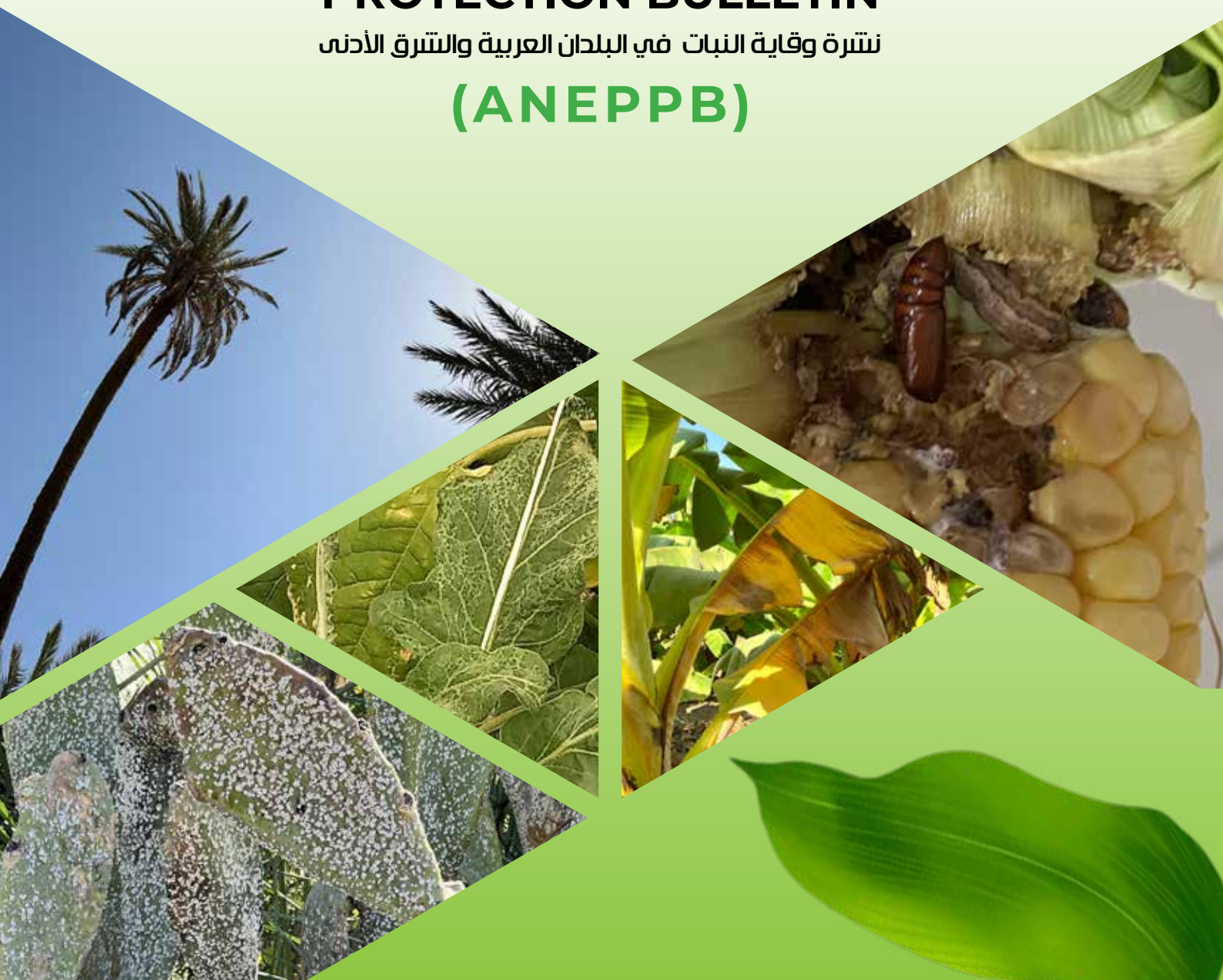
Food and Agriculture Organization of the United Nations

الجمعية العربية لوقاية النبات
ARAB SOCIETY FOR PLANT PROTECTION

ARAB AND NEAR EAST PLANT PROTECTION BULLETIN

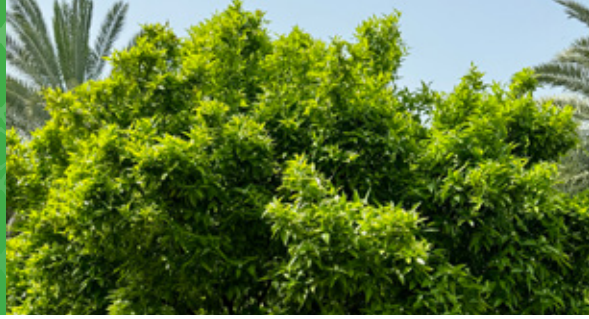
نشرة وقاية النبات في البلدان العربية والشرق الأدنى

(ANEPPB)



ARAB AND NEAR EAST PLANT PROTECTION BULLETIN (ANEPPB)

ISSUE 91 , April 2024



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All correspondence should be sent by email to the Editor (aneppnl@gmail.com).

Contents

ISSUE 91 , April 2024

EDITORIAL

A Revolution in plant diagnostic technology: using high throughput sequencing for detection of plant disease

It has long been recognized that diseases cause production losses in perennial crops such as fruit trees and grapevines. To screen for detrimental diseases in these crops, plant quarantine and protection programs first made use of biological indicators. These indicators are specific plant species or varieties that are known to display symptoms when exposed to certain disease agents. Herbaceous indicators are used by spreading the sap of the plant being tested across the leaves of the indicator plant. This process may be completed in days or weeks. Woody indicators are used by grafting the material of the subject plant to a variety known to display symptoms if infected. After the grafting is complete, disease agents present in the subject plant are expected to infect the indicator, which would display symptoms. Indicators are only known to display symptoms for certain agents; it is possible that an indicator may show no symptoms, but a disease agent is still present. It can take many years for woody indicators to establish and show symptoms. Diagnostic technology evolved to ELISA and PCR molecular methods, often in conjunction with indicator plants. ELISA and PCR are advancements over biological indexing because they allow the determination of specific disease agents, and typically require less time to complete testing.

There are also drawbacks to these conventional disease detection methods. Biological indicator indexing is time-consuming, does not detect all pathogenic viruses, suffers from unreliable plant performance, cannot specifically identify pathogenic viruses, and demands large amounts of space and labor. Conventional molecular tests like ELISA and RT-PCR are limiting because they require prior knowledge of the pathogen and are incapable of detecting variants. In comparison to these conventional methods, the latest diagnostic tool we can employ is high throughput sequencing (HTS). HTS provides an advantage because it gives a comprehensive picture of the entire microbial profile in a sample without prior knowledge of the pathogen. Many scientists have recognized the value of HTS, and there is a growing list of published research

demonstrating its advantages over biological indicators. To replace biological indicators with HTS for regulatory testing requires thorough validation of diagnostic protocols after proving its advantages.

Foundation Plant Services (FPS), established at the University of California, Davis in Davis, California, USA, in 1958 is a source of elite propagation materials grape, fruit trees (stone and pome fruits), olives, nuts, strawberries, roses, and sweetpotatoes. FPS facilitates the introduction, quarantine, and release of imported grapes and fruit trees in the US under a Controlled Import Permit (P588) from the United States Department of Agriculture, Animal Plant Health Inspection Service, Plant Protection and Quarantine (USDA APHIS PPQ). In addition to the federal oversight, the state agency California Department of Food and Agriculture (CDFA) must also approve the release of plant materials from quarantine. USDA APHIS PPQ and CDFA regulations have required the use of conventional disease detection methods, including indexing on biological indicators, ELISA, and RT-PCR. FPS-supplied propagation materials are typically planted to create nursery increase blocks, from which the nurseries will distribute to growers. It is important that plant material distributed by FPS is thoroughly screened for viruses using a method with the lowest possible false negative rate.

FPS first began evaluating HTS for plant disease detection in 2007. Through side-by-side comparison of biological indexing and HTS, FPS determined that HTS was the superior method for disease detection. In order for USDA APHIS PPQ and CDFA to approve HTS for use in diagnostic testing, further validation was required. At FPS, the validation followed a two-phase process: first, validation of the methods used in house, then, validation in inter-laboratory trial to confirm reproducibility. FPS integrated the validation research knowledge into a protocol that employs the most reliable and efficient techniques using HTS and RT-qPCR/qPCR (Figure 1). The protocol requires informative testing on source material, followed by initial and final testing of two types.

tissue, separated by at least six months and a dormancy period. USDA-APHIS-PPQ and CDFA have approved the use of this revised diagnostic testing protocol to replace biological indexing with a combination of HTS and PCR testing for the release of plant material.

To my knowledge, the US is the first country to adopt HTS for the release of plant material from quarantine; I hope it does not stay this way for long. There are several factors that are slowing the adoption of HTS, but each may be overcome, many with collaboration:

- High cost of equipment, which may lead to a high price per sample if testing volume is low. This can be overcome by collaboration with other programs, establishing shared central laboratories, or sending samples to a third party on pay-for-service analysis.
- Bioinformatic infrastructure requiremenare for computer programs and processing power. These costs may also be reduced by sharing computing resources with others or hiring a third party for services. As HTS technology has advanced, desktop software options are now more easily accessible and affordable.
- Sample preparation. Testing requires high-quality nucleic acid, which can be challenging to generate from some plant hosts.
- Data analysis: First, one must separate the background noise from the true virus and host source sequences. Second, a trained virologist should be employed to evaluate the results and determine if infection is truly present and poses a risk.
- HTS technology is so new, most regulations predate its use and do not contemplate it as acceptable technology. This must be changed and can only be done so as more nations validate protocols that are sensitive, specific, repeatable, and reproducible.

I am confident that with the continued work of other scientists around the world to validate HTS protocols, it will soon be employed in pathogen-regulating programs worldwide.

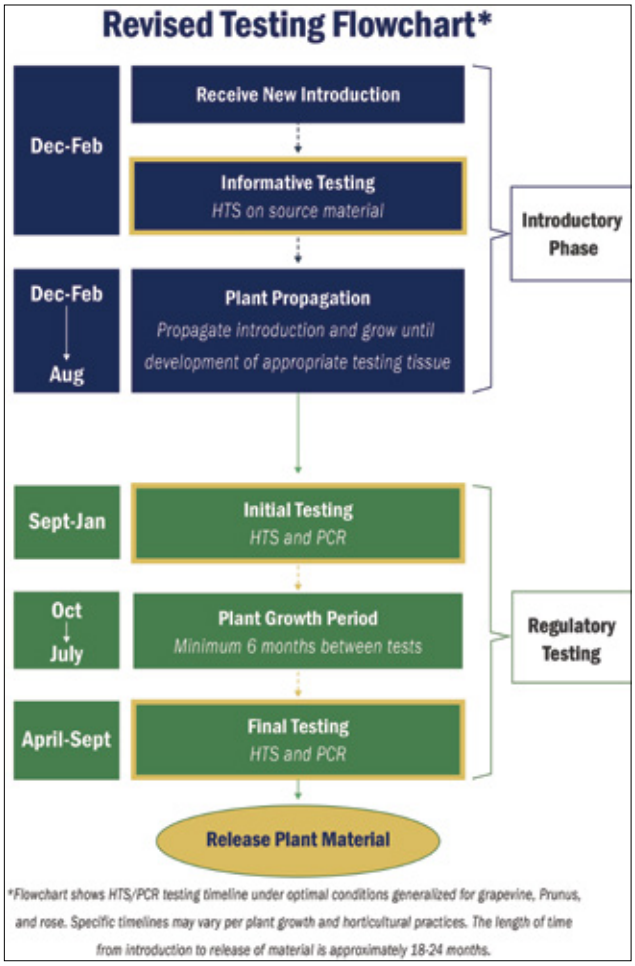


Figure 1 Flowchart showing HTS/PCR testing timeline for plant material at FPS under optimal conditions. Specific timelines may vary per plant growth and horticultural practices. The length of time from introduction to release of material is approximately 18-24 months

Maher Al Rwahnih

FPS Director

malrwahnih@ucdavis.edu

Iraq

First finding of Psilochalcis elegantula (Masi, 1929) (Hymenoptera: Chalcididae) in Iraq.

During the survey in the orchards of Al-Husiniya in Karbala in June 2019, specimens of *Psilochalcis elegantula* (Masi, 1929) were collected using a sweep net. It is the first record of the genus *Psilochalcis* Kieffer, 1905, and *P.elegantula* from Iraq. The important morphological characters are illustrated and discussed. An updated list of the Chalcididae species in Iraq is also provided including ten species in six genera. **[Ali A. Kareem[1]*, Hossein Lotfalizadeh[2], Ayad Alsendi[1], Sienaa Al-Zurfi[1] and Raad K. Aljaafari[1] (Iraq),** [1]Plant Protection Department, Agriculture College, University of Kerbala, Iraq. ,[2]Insect Taxonomy Research Department, Iranian Research Institute of Plant Protection (IRIPP), AREEO, Tehran, Iran. [3]Plant Protection Department, Agriculture College, University of Karbala, Iraq. J. Crop Prot.12 (4): 415-422, 2023]. ali.kareem@uokerbala.edu.iq

First record of endophytic fungi *Trichoderma asperellum* on *Oryza sativa* in Iraq

The detection of *Trichoderma* spp. is a great challenge as attention in the past four decades has mainly focused on endophytic fungi in terms of agricultural benefit. Therefore, the aim of the current study is to emphasize the extent of the presence and spread of *Trichoderma asperellum* on rice in Iraq. The activity of isolated fungi was studied by diagnosing it morphologically and molecularly. Results showed that the Tr5 isolate exceeded the number of live units and gave 2.6 × 108 CFU.g-1 as well, and the highest rate of germination reached 100%. Based on the microscopic and molecular identification, the Tr5 isolate was diagnosed as *Trichoderma asperellum* which was registered in GenBank under the accession number OQ378987. The genetic affinity in the phylogenetic tree indicated that Tr5 isolate was segregated into unique clade as the percentage of genetic compatibility reached 91% with two isolates from India and China. This research will provide the basis for future studies within the biology and ecology of endophytic fungi, including *T. asperellum* in Iraq. **[Raad T. Toman and Bashar K. H. Al-Gburi (Iraq),** Department of Plant Protection, Faculty of Agriculture, University of Kufa, Najaf, Iraq, 2024]. https://iopscience.iop.org/article/10.1088/1755-1315/1262/3/032024

First detection of cucurbit yellow stunting disorder virus in Iraq

During the 2022 growing season in Al-Yusufiyah, Baghdad Province, Iraq, courgette plants exhibited symptoms of foliar yellowing, including leaf mottle and interveinal chlorosis, with green veins. *Bemisia tabaci*, a common whitefly, was notable among the affected plants in all investigated fields. To understand the underlying cause, fifty symptomatic leaf samples were randomly collected from multiple courgette fields. Three representative samples were sent to Macrogen in Seoul, South Korea, for high-throughput RNA sequencing. Analysis of the assembled genome revealed the presence of cucurbit yellow stunting disorder virus (CYSDV) in the samples, with high pairwise nucleotide identity (99.23-99.84% for RNA1 and 97.58-97.92% for RNA2) to global CYSDV isolates. The sequences were deposited in GenBank under accession numbers OQ685958.1 and OQ685959.1 for RNA1 and RNA2, respectively. Phylogenetic analysis indicated a close relationship between CYSDV isolate Iraq-1 and isolates from various regions, notably the United States and Spain. While CYSDV

has been reported in Europe, Asia, and North America, this is the first documented case in Iraq. Previous occurrences have been recorded in Spain, France, Iran, Jordan, the United States, and Mexico. This discovery highlights the global spread of CYSDV and underscores the need for vigilant monitoring and management strategies to mitigate its impact on courgette and other cucurbit crops in Iraq and beyond. **[Mohammed S. Mohammed, Adnan A. Lahuf (Iraq),** Journal Plant Health Progress Vol. 25, No. 1, PP. 95-97.

A New species of *Norbanus* Walker (Hymenoptera: Pteromalidae) and six new records from Iraq

Based on the collection from Karbala, southern Iraq, seven species belonging to six genera of the family Pteromalidae were identified. All the genera are recorded for the first time and added to the fauna of Iraq. *Norbanus tabatabaeii* Lotfalizadeh and Alsendi sp nov**.** was described from Iraq and compared with closely allied species of the genus in the Palaearctic region. Six species were recorded for the first time in Iraq: *Catolaccus crassiceps* (Masi), *Goidanichium atrum* Bouček, *Merisus splendidus* Walker, *Notanisus vanharteni* Gibson, *N. versicolor* Walker, and *Systasis encyrtoides* Walker.[**Ayad Alsendi, Hossein Lotfalizadeh and Ali A. Kareem (Iraq),** Zoology in the Middle East, 2024].

DOI: 10.1080/09397140.2024.2333076

Jordan

First record of glasshouse leafhopper, *Hauptidia (Hauptidia) maroccana* (Melichar, 1907) (Hemiptera: Cicadellidae), from Jordan

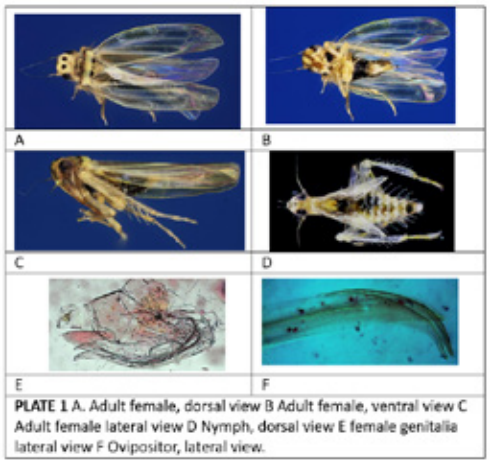


PLATE 1 A. Adult female, dorsal view B Adult female, ventral view C Adult female lateral view D Nymph, dorsal view E female genitalia lateral view F Ovipositor, lateral view.

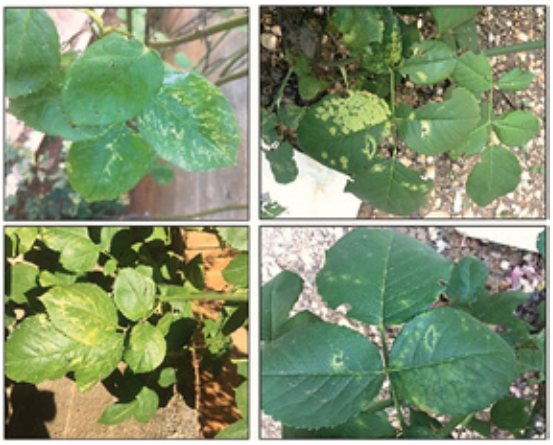
The Glasshouse leafhopper, *Hauptidia (Hauptidia) maroccana* (Melichar, 1907), is recorded for the first time in Jordan. It was found infesting indoor basil plants, tomato, pepper, peppermint, celery, and parsley in ʻAmmān. Adult genitalia slide mounts were prepared, and voucher specimens were preserved at the University of Jordan Insects Museum. Original images for nymph, adult male and female genitalia, distribution data, and infestation symptoms on the hosts are provided. Further investigations are needed to determine the distribution, host range, role in disease transmission, biology, and ecology of the pest in Jordan**. [Ahmad Katbeh Bader[1] and Ibrahim Al-Jboory[2] (Jordan),** [1]Department of Plant Protection, School of Agriculture, The University of Jordan, Amman, Jordan. [2]Department of Plant Protection, College of Agriculture, University of Baghdad, Baghdad, Iraq, EPPO Bulletin, 00:1–4, 2024]. DOI: 10.1111/epp.12996, ahmadk@ju.edu.jo

Lebanon

First report of prunus necrotic ringspot virus infecting rose (*Rosa* spp.) in Lebanon

Rose is the most popular ornamental plant with high economic and cultural importance as garden plant and raw material in the perfume industry in Lebanon as well as worldwide. During spring 2021, rose mosaic disease RMD symptoms consisting of chlorotic zigzag

pattern, squiggly discoloration with jagged edges on leaves and/or ringspots were observed on several red rose plants (Rosa spp.) in Douris, Zahle, Kab-Elias and Saghbine (Beqaa valley), Lebanon Prunus necrotic ringspot virus (PNRSV) was detected in several rose plants showing RMD in Lebanon. PNRSV was found in 29 plants by molecular and serological analyses, while other viruses associated with RMD were absent. Although PNRSV is known to have a wide host range, the present paper reports the first occurrence of PNRSV on rose plants in Lebanon.



[Raied Abou Kubaa, Elia Choueiri, Fuoad. Jreijiri, Angelantonio. Minafra (Lebanon), CNR Istituto per la Protezione Sostenibile delle Piante, via Amendola, Bari, Italy. Department of Plant Pathology, University of California–Davis, Davis, CA. Department of Plant Protection, Lebanese Agricultural Research Institute, Tal Amara, P.O. Box 287, Zahlé, Lebanon, Hellenic Plant Protection Journal 17(1):31-34, 2024]. https://sciendo.com/article/10.2478/hppj-2024-0002

First report of bell pepper endornavirus in pepper in Syria and Lebanon

Bell pepper endornavirus (BPEV) has a single linear single-stranded RNA genome and belongs to the genus *Alphaendornavirus*, family *Endornaviridae*. This virus has been reported in cultivated peppers (*Capsicum* spp.) worldwide and, most recently, in North Africa (Nahdi et al., 2023). In this context, total RNA was isolated from greenhouse-cultivated sweet pepper plants showing virus-like symptoms in the coastal regions of Syria (Tartous) and Lebanon (Byblos) and tested for viruses by RT-PCR. Incidence of symptomatic plants ranged from 8 to 15% in both locations. Results revealed the presence of tomato brown rugose fruit virus, as previously reported (Abou Kubaa et al. 2022). Subsequent RT-PCR screening with specific primers dBPEV-12,632 F/dBPEV-13238R (Toma□echová et al. 2020) revealed also the presence of BPEV. This virus was found in 12 symptomatic samples and three asymptomatic samples. To confirm the presence of BPEV, a new primer pair (BPEV_13526F:GCGCAAAACAAGCTGACTTACA and. BPEV_13996R: ATCGTCATGCACCCCTAACA) was designed in the BPEV-encoded RNA-dependent RNA polymerase gene to amplify a 471 bp fragment in RT-PCR. DNA amplicons of the expected size were obtained from the 15 positive samples. To verify the nature of the DNA products, one representative RT-PCR amplicon from a Syrian sample and from a Lebanese sample was directly sequenced in both directions. BLASTn analyses showed 99.6% identity between the Syrian and the Lebanese BEPV isolates, and up to 100% nucleotide sequence identity with other isolates for which information is available in GenBank. Sequences determined in this study were deposited in GenBank as accession numbers OQ657983 (isolate SYR.08 from Syria) and OQ657984 (isolate LEB.15 from Lebanon). This is the first report of BEPV in pepper plants in the Middle East. **[Raied Abou Kubaa, Maria Saponari, Khaled Heinoun, Fouad Jreijiri and Elia Choueiri (Lebanon),** CNR Istituto per la Protezione Sostenibile delle Piante (IPSP), Bari, Italy. Department of Plant Pathology, University of California, Davis, CA, USA Ministry of Agriculture and Agrarian Reform, Department of Plant Protection, Damascus, Syria. Department of Plant Protection, Lebanese Agricultural Research Institute, Tal Amara, Zahlé, P.O. Box 287, Lebanon. Journal of Plant Pathology, Published 23 February 2024]**.** https://doi.org/10.1007/s42161-024-01610-6

Morocco

First records of *Dacus frontalis* in Algeria and Morocco

Dacus frontalis (Diptera: Tephritidae, EU A1 Quarantine Pest as *Dacus* spp.) is an important pest of cucurbit fruits in many parts of Africa and the Middle East. It was first recorded in Tunisia in 2014 (EPPO RS 2015/137), and more recently in Algeria and Morocco. In Algeria, it was reported to cause severe damage in *Cucumis melo* and *Cucurbita pepo* crops in North-Western Algeria, which is an arid area. In Morocco, it was found in the Souss-Massa-Drâa region. No data is available on its pest status. In a recent article Hafsi *et al*. (2024), note that *D. frontalis* is likely to further invade other areas in the Mediterranean Basin and Europe as the minimum temperature threshold of this species is lower than that of *Ceratitis capitata* which has spread to many European countries. **Source: Benras H., Ali Ahmed A., Benghedier A., Guezoul O.** (2023) Note on *Dacus frontalis* Becker (Diptera: Tephritidae) presence as a pest of cucurbit fruits in Timimoun, Algeria. *Journal Algérien des Régions Arides* **15**(1), 61-63. El-Harym Y, Belqat B (2017) First checklist of the fruit flies of Morocco, including new records (Diptera, Tephritidae). *Zookeys* **702**, 137–171. Hafsi A, Abbes K, Duyck PF, Chermiti B (2024) Life-history traits of *Dacus frontalis* Becker (Diptera: Tephritidae) reared at four constant temperatures. *Phytoparasitica* **52**(1), 16. Kettani K, Ebejer MJ, Ackland DM, Bächli G, Barraclough D, Barták M, Carles-Tolrá M, Černý M, Cerretti P, Chandler P, Dakki M (2022) Catalogue of the Diptera (Insecta) of Morocco—an annotated checklist, with distributions and a bibliography. *ZooKeys* 1094, 1-466. [EPPO Reporting Service 2024 no. 2 –Pests,2024] https://doi.org/10.3897/zookeys.1094.62644

Syria

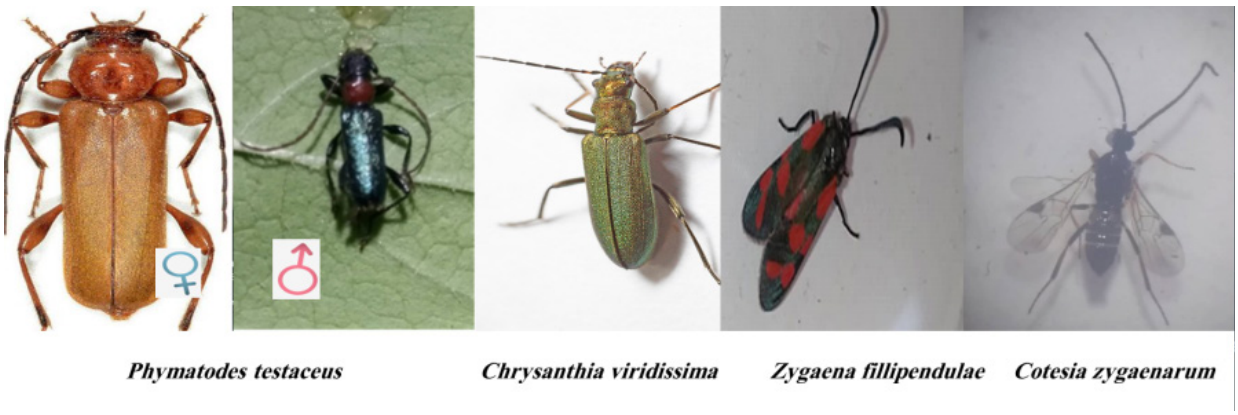
First recording of the genus *Xyonysius* Ashlock and Lattin, 1963 on olive trees

Xyonysius is a genus of seed bugs of the order Hemiptera and Lygaeidae family. There are about eight described species in *Xyonysius*. The species of this genus are distinguished by their high ability to move during summer. They lay their eggs in the soil, have diapause behavior, and can migrate to overwintering sites during the cold season. Temperature and photoperiod are critical factors for survival, development, and reproduction, including geographical distribution. Temperatures and length of the day are factors that affect the sex ratio, as the number of males is greater than the number of females at low temperatures and short days, and conversely, the number of females is greater than the number of males at high temperatures and long days. **[Abdulnabi Basheer, Mohamad Kanouh (Syria),** Department of Plant Protection, Faculty of Agricultural Engineering, University of Damascus, Syria, 2024].

Figure 1. The genus *Xyonysius* in Diapause on olive trees

The first recording of some insects in some Abu Jerash fields in Damascus governorate (Syria)

Some species of insects have been recorded in some fields in the Abu Jerash area in Damascus. It includes pests and beneficial insects. One of the pest insects is *Phymatodes testaceus* (Coleoptera: Cerambycidae) (commonly known as the tanbark borer or the violet tanbark beetle), is a transpalearctic polymorphic species of beetle. The *P. testaceus* imago is 6–16 mm in length. Larvae of the species are 10–18 mm long and 2.1 mm wide. Pupa are 9 mm long, and the abdomen is 2.8 mm wide. Larvae develop in and under the bark of various deciduous tree species, causing damage. The second insect is *Chrysanthia viridissima* Linneaus, 1758 (Coleoptera: Oedemeridae). The adult is about 6-8 mm long and has a metallic green colouration. This colour is due to the presence of micro-sculptures diffused on the entire cuticle. The antennae are long and filiform, formed by 11 antennomeres. The head is elongated forward and has two pairs of mandibles with labial palpi on the second pair of bifid and soft (they have a tactile function) mandibles whilst the eyes are placed laterally. The pronotum is narrow, elongated, and heart-shaped. The elytra are laterally bent downward and only slightly narrowed backward. Figure (1). The third species is *Zygaenid filipendulae* (Lepidoptera: Zygaenidae) has a wingspan of 30–40 mm. The sexes are similar. The fore wings are dark metallic green with six vivid red spots (sometimes the spots are merged, causing possible confusion with other species). Occasionally, the spots are yellow or even black. The hind wings are red with a blackish fringe. The larva is plump and hairy with variable markings, usually pale green with rows of black spots. It is an aposematic moth because it is distinguished by its colors as toxic to predators like birds and lizards. If attacked, it emits a liquid containing cyanide. Record on the larvae of *Zygaena fillipendulae*, the endoparasitoid *Cotesia zygaenarum* (Marshall, 1885) (Hymenoptera: Braconidae). **[Mohamad Kanouh, Abdulnabi Basheer (Syria),** Department of Plant Protection, Faculty of Agricultural Engineering, University of Damascus, Syria 2024].

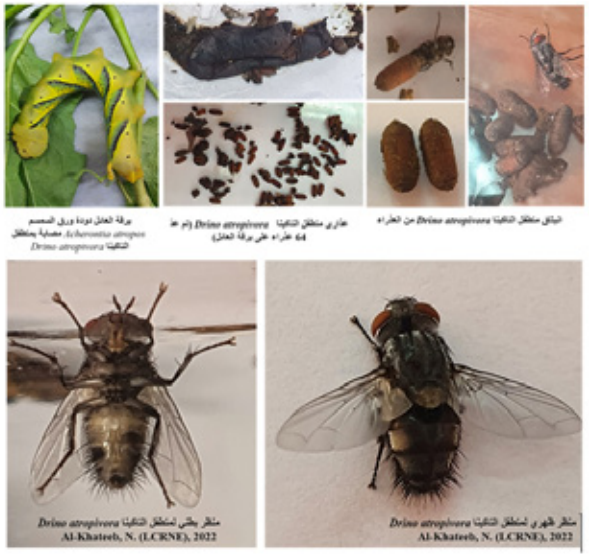


Insects recorded in Kharabo area (Damascus)

First record of Tachinid parasitoid *Drino atropivora* (Robineau-Desvoidy 1830): (Diptera: Tachinidae) on *Acherontia atropos* (Linnaeus, 1758) (Lepidoptera: Sphingidae) in Syria

The Tachinid parasitoid *Drino atropivora* (Diptera: Tachinidae) was recorded for the first time in Lattakia-Syria and was obtained from *Acherontia atropos* larvae collected from eggplant in greenhouses during October and November 2022 and emerged from pupa *D. atropivora* is a gregarious parasitoid, adult is dark gray, ranging in length from 8–9 mm

with two black spots on the fourth abdominal segment in male, lower third of scutellum is light brown. Wing cell r4+5 is closed. The median vein "M" strongly bends before the end of the wing and without extension. The pupa is cylindrical in shape and dark brown in color (length 6.2 mm, width 2.4 mm). A total of 64 adults were counted, and 64 adults emerged from pupae on the larva host. **[Nadia Ibrahim Al-Khateeb[1], Jounar Aziz Ibrahim[1],Esraa Mahmoud Ahmad[2].** [1]Lattakia Center for Rearing Natural Enemies, Directorate of Agriculture, Lattakia, Syria. [2]Department of Plant Protection, Faculty of Agriculture, Tishreen University, Lattakia, Syria,2024]. alkh.nadia@gmail.com



First record of four doryctine wasps from Syria

In the present study, four doryctine wasps, *Dendrosotinus* (*Dendrosotinus*) *ferrugineus* (Marshall, 1888), *Euscelinus sarawacus* Westwood, 1882, *Leluthia* (*Euhecabolodes*) nr. *ruguloscolyti* (Fischer, 1962), and *Monolexis fuscicornis* Foerster, 1863 (Braconidae), are recorded here for the first time for the Syrian fauna. All were reared from larvae of the grape borer beetle, *Amphicerus bimaculatus* (Olivier) (Bostrichidae), attacking *Punica granatum* L. (Lythraceae) in Homs (Syria). Both *E. sarawacus* and *M. fuscicornis* were formerly recorded as parasitoids of *Amphicerus bimaculatus* (Olivier) (Bostrichidae) attacking *Punica granatum* L. (Lythraceae). The other two, *D. ferrugineus* and *L. nr. ruguloscolyti*, are here recorded for the first time in association with *A. bimaculatus* and *Punica granatum.* The newly recorded species are here diagnosed and illustrated. **[Alaa T. Saleh [1] and Neveen S. Gadallah[2].** [1]Biological control studies and Research Center, Plant Protection Department, Faculty of Agricultural Engineering, Damascus University, Syria. [2])Entomology Department, Faculty of Science, Cairo University, Giza, Egypt. Journal of Natural History. 58(13-16): 449-470, 2024]. https://doi.org/10.1080/00222933.2024.2314967

Uzbekistan

First report of tomato brown rugose fruit virus on tomato (*Solanum lycopersicum* L.) in Uzbekistan

Tomato (*Solanum lycopersicum* L.) is one of the main agricultural crops cultivated on 60,000 hectares in Uzbekistan. Tomato brown rugose fruit virus (ToBRFV), a recently identified tobamovirus, was initially reported in Jordan (Salem et al. in 2016). Since its discovery, this virus has posed a significant threat to tomato and pepper crops worldwide. In spring 2021, and during an official survey for tomato diseases in Uzbekistan, viral symptoms that resemble those caused by ToBRFV (mosaic and discoloration symptoms on the leaves and brown spots on the fruits) were observed on greenhouse-cultivated tomato plants of cultivar 'Alamina' in Zangiota, Qibray and Chirchiq districts, Tashkent region. Incidence of symptomatic plants ranged from 15 to 20% in the three visited locations. Leaf samples were collected from 30 symptomatic (10 per location) and 6 asymptomatic plants and analyzed by DAS-ELISA with antibodies to ToBRFV, pepino mosaic virus and

tomato spotted wilt virus, (Loewe Biochemica, Germany). All symptomatic plants tested positive for ToBRFV only. Furthermore, total RNA was extracted from selected ELISA-positive samples, and the presence of ToBRFV was further confirmed by RT-PCR using ToBRFV-F/ToBRFV-R (Alkowni et al. 2019) and F-3666/R-4718 (Luria et al. 2017). To ascertain the nature of the amplified DNA, one representative RT-PCR amplicon was sequenced in both directions, and the sequence was deposited in GenBank as accession number OR501605. Bioinformatics and BLAST analysis of the sequenced amplicon showed 100% nucleotide identity with ToBRFV isolates from the USA, Turkey, and the Netherlands (MT002973, MT107885, and MN882058, respectively). Very likely, ToBRFV was introduced to Uzbekistan on imported 'Alamina' seeds that were infected. To our knowledge, this is the first ToBRFV report in Uzbekistan. **[Munira Bakhtiyorova, Tokhirbek Norov, Sevarakon Khodjaeva, Nasiba Botirova, Fabrizio Cillo and Raied Abou Kubaa.** Central Phytosanitary Laboratory, Plant Quarantine and Protection Agency, Tashkent, Uzbekistan. CNR Istituto per la Protezione Sostenibile delle Piante (IPSP), Bari, Italy. Department of Plant Pathology, University of California, Davis, CA, USA. Journal of Plant Pathology, Published 26 February 2024]. https://doi.org/10.1007/s42161-024-01609-z

RESEARCH HIGHLIGHTS

Algeria

Endophytic fungi from salt-adapted plants confer salt tolerance in barley.

Endophytic fungi are known to improve plant tolerance under stressful conditions, including salt stress. Considering this, the endophytic fungi, *Alternaria chlamydospora*, *Embellisia phragmospora*, *Phomabetae*, *Chaetomium coarctatum*, *Fusarium equiseti* , and *Fusarium graminearum*, was isolated from roots of plants growing in salt environments and then, evaluated for their contribution in conferring salt stress tolerance in barley plants. The influence of inoculation with endophytic fungi on germination, root, and shoot lengths of barley seeds under different NaCl levels (0, 200, 300, and 400 mM) was investigated. Results showed that seed germination and root and shoot lengths were higher in seeds pretreated with endophytic fungi cultures than in their controls under saline conditions. This study suggests that the tested endophytic fungi might be applied as a strategy for mitigating the stress-imposed salt in plants and, therefore, improving crop growth and productivity. **[Kouadria, R., Bouzouina, M., and Lotmani, B. (Algeria),** Tunisian Journal of Plant Protection 18 (2): 63-70, 2023]. https://doi.org/10.4314/tjpp.v18i2.2

Algeria

Diversity of citrus tristeza virus strains in Chlef Valley (Algeria).

Citrus crops in Chlef Valley showed many cases of decline and other typical symptoms of tristeza disease in old and young trees grafted on various rootstock and seedlings acquired from multiple origins in the valley. In order to decipher the reasons for this citrus quick decline syndrome, a large-scale survey of citrus tristeza virus (CTV) and its aphid vectors was carried out from the spring of 2016 to the autumn of 2019 in order to evaluate its current situation in term of distribution and strains. Samples collected from

93 orchards located in 21 localities were tested by DTBIA/DAS-ELISA. The analyses have confirmed the presence of CTV in 54 samples throughout the study area. Some of the CTV sources were chosen for further molecular genotype characterization associated with the CTV isolates now spreading in the Chlef area. Characterization with multiple molecular markers M.M.M.s and CP gene sequencing showed the presence of the T30 and VT genotypes. This result allowed confirmation of the presence of a virulent strain belonging to the VT genotype. The other CTV isolates were close to those recorded in Mitidja region, with nucleotide identity of 98,6 to 99,1% with the worldwide T30 mild CTV isolates.

This early finding of a strain belonging to the severe VT genotype beside to efficient aphid vectors is an issue for Algerian citrus producers and needs rapid actions to be taken by the National phytosanitary services, extending the surveillance to other citrus production regions and uprooting the infected trees. **[Samir Ali-Arous[1]*, Malika Meziane[1], Abdellah Nabil Benturquia[1], Khaled Djelouah[2] (Algeria),** [1]Laboratory of Production and Protection of Crops of Chlef region, University of Hassiba Ben Bouali, Ouled Fares, (Chlef), Algeria. [2]International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), Mediterranean Agronomic Institute of Bari, Valenzano (Bari), Italy. Agrofor International Journal, Volume 9, Issue 1, 2490-3442, 2024]. https://agrofor.ues.rs.ba/paper.php?id=498

Algeria

The life cycle of potato cyst Nematode, *Globodera rostochiensis*, and effect of population densities on potato growth and yield in Algeria.

The present work aimed to investigate the life cycle and the effect of different initial population densities of *Globodera rostochiensis* on potato yield and growth of the susceptible potato cultivar, Spunta, in Algerian environmental conditions. The life cycle length of *G. rostochiensis* differed among growing seasons and was 72 days or 699 DD6.2 2 for potatoes planted in early November. A significant reduction in growth and potato yields was observed.

The increase in initial Population densities (Pi) of *G. rostochiensis* was associated with a significant reduction in plant growth and potato yields. The maximum yield and plant height reductions were 85 and 75%, respectively, at the highest *Pi* of 512 eggs g-1 soil. The final nematode population density (Pf) increased with the increase of the initial population densities. The Reproductive factor (Rf) initially increased with the increase of *Pi* up to 4 eggs g-1 soil and then decreased for Pi≥ 4, suggesting an intraspecies competition. Results contribute to the knowledge of *G. rostochiensis* thermal time requirements in Algerian environmental conditions and can be a valuable tool to develop appropriate potato cyst nematode control strategies, considering that the nematode can also cause severe damage and yield losses at very low *Pi* densities.

[Safia Berrahia and Samira Sellami (Algeria), Laboratory of Phytopathology and Molecular Biology, Department of Botany, National High School of Agronomy, El-Harrach, Algeria. J. Agr. Sci. Tech. Vol. 24(4): 977-988, 2023].

Algeria

The Armored scales (Homoptera Diaspididae) of Algeria.

Diaspididae (Hemiptera Coccomorpha) is one of the largest and most diverse families of scale insects, and it contains many agricultural parasites worldwide. The study collected data from those previously reported in the literature over the period of 123 years. The inventory includes armored scales collected from field samples in several regions of Algeria as well as from a bibliographic survey. A critical review of the literature on armored scales in Algeria revealed the presence of 114 species, with mainly a palearctic distribution belonging to 48 genera distributed in four tribes. The Diaspidini tribe is the most abundant (50 species, 24 genera), followed by the Aspidiotini (47 species, 18 genera) the Parlatorini (13 species, 4 genera), and finally, the Odonaspidini (2 genera, 2 species). According to our survey, conducted between 1987 and 2020, 79 species were recorded, belonging to 37 genera distributed in four tribes. Compared to the Maghreb countries, Algeria has a significant coccidological richness in relation to the total number of species.

[**Mohammed Biche, Khaoula Aroua, Nesrine Medani, Rachida Belguendouz, Lalia Boukhobza, Insaf Zaabta, Kaci Zakia, Lydia Dahmani, Cansu Ercan, Denis Achiri Tange, Mehmet Bora Kaydan and Abde rahmane Chebli (Algeria),** Biodiversity Journal,13 (3): 495–514, 2023].

Egypt

Comparative study of alternative and traditional Fungicide combinations in the management of banana root rot disease.

The field study was conducted during two successive seasons of Williams banana Cv., grown in loam soil under a surface flood irrigation system, located at Al-Daqahlia and Domietta Governorates, and in sandy soil at Beheira Governorate Wadi Alnatroon, under drip irrigation system in Egypt. Our study investigated the relationship between the application of alternative fungicides and chemical fungicides alone and combined the severity of fungal root rot disease and their effects on banana tree growth. Disease reduction was observed by using inducer compounds, i.e., ascorbic acid, citric acid, and salicylic acid, and fertilizers, i.e., potassium and copper combined with protective fungicide (copper oxychloride).

The chemical fungicide of copper oxychloride, followed by the organic acids and nutrients fertilizers, reflected the higher reduction in the percentages of frequency occurrences of fungal pathogens, revealing 10%,5%,0%, and 0%frequency of *Fusarium oxysporum*, *Macrophomina phaseolina* , *Verticillum* sp, and Botrydiplodia sp. respectively Though, the alternative fungicides in combined with protective fungicide is safety strategy for control banana root rot disease, which will defense banana trees against fungal root rot disease infection. On the other hand, the economic aspect plays a major role in this respect. **[S. A. El Sharkawy, Fatma A. Mostafa, Asmaa M Alkolaly and Maklad. T. N (Egypt),** Journal of Desert and Environmental Agriculture, 3 (1): 76-87, 2023]. DOI: 10.21608/jdea.2023.207324.1019

Egypt

Quick PCR detection of *Ustilago tritici* for early control of loose smut in wheat using TiO_2 and ZnO_2 nanoparticles. Loose smut disease, caused by *Ustilago tritici*, is a significant disease of wheat. Embryo examination and PCR detection were used to detect Ustillago tritici in seeds. The disease was controlled using TiO2 and ZnO2 nanoparticles. Out of 12 wheat cultivars, three—Sakha-61, Sakha-93, and Gemmeiza-11—had highly significant percentages of embryos infected with *U. tritici*, up to 65%, with infection severity values up to 15.3%. Sakha-95, Sids-14, Misr-1, Misr-2, and Misr-3 cultivars exhibited no infection in the lab; however, in the field, the infection rate reached 30%. A modern technique using PCR biotechnology has been developed to enhance the detection of infected seeds. This method has revealed that embryos in cultivars previously considered uninfected based on laboratory tests are infected. From another perspective, TiO_2 and ZnO_2 nanoparticles reduced the mycelial radial growth of U. tritici, decreasing the infection from 87% to less than 10% compared to the control, and performed comparably to Hattrick fungicide under greenhouse conditions. The treatment increased the expression profile of TaPR5 compared to untreated plants. The findings of this study provide compelling evidence of the high efficacy of these nanoparticles in promoting plant development and suppressing disease. These potent nanoparticles could replace traditional methods of plant growth enhancement and disease management. **[Reda I. Omara**, **Mohamed D. Sehsah, Dalia M. K. Shaheen, Heba I. Saad El-Din, Rady Abdelghany, Aiman M. Mandour and Shahin A. Atef (Egypt)**, Plant Pathology Research Institute, Agricultural Research Center, 12619, Giza, Egypt. Egyptian Journal of Agricultural Research· December 2023]. redaomara43@arc.sci.eg, DOI:10.21608/EJAR.2023.242715.1448 ,

Egypt

Integrated control program of powdery mildew on mango trees in Egypt using foliar sprays of fungicides combined with fertilizers.

The powdery mildew of mango caused by *Oidium mangiferae* has become a serious and widespread problem in many parts of Egypt. A field experiment was conducted for four seasons 2019-2022 to investigate the efficacy of four fungicides, COBOX 50% WP (Copper Oxchloride), TOPAS 10% EC (Penconazole), PUNCH 40%EC (flusilazole and Carbendazim), and KEMAZED 50%WP (Carbendazim) along with control (water spray) against mango powdery mildew on the most popular cv. Taimour. Each fungicide was sprayed in 15-d-intervals with dipotassium phosphate, mono-potassium phosphate, and calcium phosphate alone in one season in 2019 at two governorates (Aldaqahlia and Domietta). Under ALmansoura condition, the best treatment was TOPAS, which recorded 15.75 and 26.25% disease severity compared with control which recorded 67.5 and 74.25% disease severity on the leaves and blooms, respectively. The integrated control program combined the fertilizers with fungicides in three successive seasons 2020, 2021 and 2022. This program was decreasing the disease and also was decreasing the number of sprays fungicides so this study gained eco-friendly methods to control a serious disease and cost saving and the most important is decreeing the residual effect of pesticides in fruits. **[Sahar Ahmed Sharkawy, Taha Nageeb Maklad, Fatma Abdel-Motaleb Mostafa, Asmaa Mahmoud Alkolaly (Egypt), Alex. J.** Agric. Sci. Vol. 68, No.2, pp. 101-107, 2023]. DOI: 10.21608/alexja.2023.210045.1037.

Egypt

The antiviral activities of Egyptian ethanolic propolis extract and honey bee venom against honey bees infected with multiple viruses in vitro.

Honey bees (Apis mellifera) are important contributors to plant variety and agricultural environments. Honey bee products include venom, propolis, royal jelly, honey, pollen, and wax. Currently, the production of honey bee venom (HBV) holds a significant position among other honey bee products.

The peptide melittin is the most vital component that makes up about half of HBV as the antibacterial, antiparasitic, and antiviral properties of HBV. In addition, propolis, a resinous material gathered by bees and includes distinct biological activities. A minimum of 24 viruses were identified in the honey bees, and seven viruses are common, with most of them belonging to the order Picornavirales. High picornavirus levels are frequently overwhelmed by collapsing colonies infected with Varroa. The bee cell culture using an L-15 medium facilitated the isolation and screening of viruses to quantify their loads from the confluent sheet of culturing cells.

Different scientific techniques for the characterization of honey bee venom by FTIR and Enzymatic activities and Propolis ethanolic extracts using GC-MS and HPLC were used. Additionally, quantified viral loads of honey bee cell cultures were detected by using RT-qPCR.

The results revealed the first identification of methyl gallate and phthalic acid using GC-MS and HPLC. HBV and EP showed antiviral activity against honey bee cell lines infected with the deformed wing virus, black queen cell virus, Varroa destructor virus-1, and Kakugo virus. Also, cell proliferation was determined after incubating with HBV and EP, cells were produced with no evidence of cell death up to 1 g/L for HBV and 5 g/L for EP, despite cytotoxicity that was determined at higher doses of both treatments. The data demonstrated that EP and HBV exhibited a significant reduction of all identified viruses in the cultured cell.

These findings suggest that HBV and EP in low concentrations could be used as potential supplements and antiviral drugs in honey bee apiaries.

[Emtithal M. Abd-El-Samie[a], Heba Seyam[b], Ayman El-Deeb[c,d], Sawsan ElMohandes[b], Mohamed S. Badr[e], Antony Surano[f] and Raied Abou Kubaa[f,g] a Entomology Department, Faculty of Science, Cairo University, Giza, Egypt; b Honey bee Research Department, Plant Protection Research Institute, Agricultural Research Center, Egypt; c Department of Virology, Faculty of Veterinary Medicine, Cairo University, Giza, Egypt; d Faculty of Veterinary Medicine, King Salman International University, El-Tor, Egypt; e Medical Research Center, Faculty of Medicine, Ain Shams University, Cairo, Egypt; f Institute for Sustainable Plant Protection (IPSP), National Research Council (CNR), Bari, Italy; g Department of Plant Pathology, University of California, Davis, CA, USA, Journal Of Apicultural Research, 2024]. https://doi.org/10.1080/00218839.2024.2321424

Iraq

The efficiency of *Trichoderma viride* and *T.koningii* in increasing tomato plant resistance to *Alternaria alternata* that causes Alternaria spot disease. This study showed the ability of two isolates of the pathogenic fungus *A.alternata* in the water agar medium. The isolate of fruits had the most effect on the severity of infection of tomato seeds in the dish, reaching 59% compared to isolate the leaves, which amounted to 47%. The results of the antagonism test for *T.viride* and *T.koningii* in PDA culture medium had a high antagonistic ability against *A.alternata* by spot method, the inhibition zone reached (2.3, 1.8), respectively. The filtrates of biological resistance fungi showed inhibition of the pathogenic fungus *A.alternata* when used at concentrations of (10, 20, and 30) % with a PDA culture medium. When analyzing the infiltrates of *T.viride* and *T.koningii* using the GC-MS technique, several chemical compounds that have a role in inhibiting pathogens were obtained, including n-hexadecanoic acid and octadecanoic acid. As for the total phenol content in the leaves of the tomato plant, *the T.konhngii treatment gave the highest phenol content, at* 0.56 mg. Also, chlorophyll was increased in tomato leaves, so the T.v + T.k treatment gave the highest percentage of chlorophyll, which amounted to 47.55 mg, compared to the fungus *A.alternata* treatment, which amounted to 36.13 mg .The biological resistance fungi also reduced the severity of infection with the pathogenic fungus *A.alternata*, which amounted to 19.66% in the treatment of *T.konhngii*, compared to the treatment of the pathogenic fungus, which amounted to 50.36%. **[Hadeel Chasib Abbas[1] and Abd al-Nabi Abd al-Amir Matroud*[1],(Iraq)**, [1]Plant Protection Department, College of Agriculture, Basrah University, Iraq. Syrian Journal of Agricultural Research- SJAR 10(4): 448-459 August 2, 2023]**.** abdulnabi.matrwod@uobasrah.edu.iq

Iraq

Exploring biocidal effects of methyl salicylate and limonene toward *Trogoderma granarium* everts. The khapra beetle, *Trogoderma granarium*, poses a significant threat as a post-harvest pest in stored products and stands out as a crucial quarantine concern globally. Unlike many other stored product pests, this species proved challenging to manage using conventional insecticides and alternative non-chemical methods. The exploration of plant-based natural products, particularly essential oils, as alternatives arises in response to challenges associated with the prolonged use of synthetic insecticides. While essential oils show promising activity, their use encounters challenges associated with standardization. This study investigates the feasibility of employing single chemical compounds widespread in several essential oils with insecticidal activity as candidate insecticides, specifically limonene and methyl salicylate, in contact/fumigation bioassays toward *T. granarium* adults. The results showed that methyl salicylate caused a lethal time of 50% (LT50) at the dose of 1 mg after 7.40 hours of exposure. The LT50 calculated for limonene was 86.83 hours, while positive control using deltamethrin, used at the manufacturer's recommended dose, was 5.20 hours after exposure. These data suggest that methyl salicylate can be exploited as a candidate for further tests in field conditions toward *T. granarium* also in consideration of its relative low toxicity for humans. **[Mokhtar Abdulsattar Arif (Iraq), [1]Salvatore Guarino[2],** [1]Plant Protection Directorate, Ministry of Agriculture, Abu-Ghraib, Baghdad, Iraq; [2]Institute of Biosciences and BioResources (IBBR), National Research Council of Italy, Palermo, Italy, 2024]. https://www.pagepressjournals.org/index.php/jear/article/view/12271

Morocco

Worldwide potential insect vectors of *Xylella fastidiosa* and assessment of their importance with a focus on Morocco.

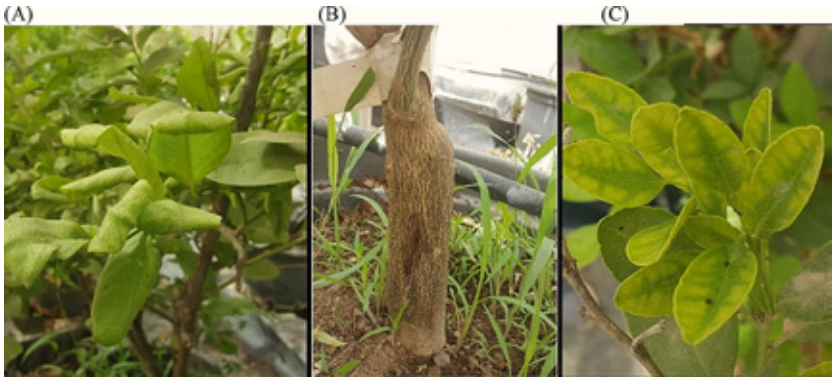
In Morocco, the climate conditions are favorable for the establishment and the spread of *Xylella fastidiosa* (*X.f*). However, the successful establishment of the bacterium depends on many factors, mainly bacterial subspecies and sequence type, host plant susceptibility, feeding behavior, and transmission efficiency of the insect vectors. Knowledge of the relationship between the bacterium–affected crop agroecosystem and potential insect vectors is of crucial importance. In this work, we list the tritrophic interaction *X.f*-host plants-insect vectors that occur worldwide to apply it to the current situation in Morocco and for risk analysis on the bacterium in the country. The two most relevant *X.f* subspecies of the bacterium (in terms of impact on crops) were considered, namely, subspecies fastidiosa and subsp. pauca. Based on the international literature and public databases, the majority of the *X.f*-insect vectors are comprised in two families: Cicadellidae and Aphrophoridae. Among all cicadellid species recorded, a high number had the capacity to transmit *X.f* to hosts in America while this ability is null for other regions (except Graphocephala versuta Say (Hemiptera: Cicadellidae) recorded in Algeria). In Morocco, none of the cicadellid genera reported worldwide as vectors of *X.f*, have been so far reported, whereas many species of spittlebugs and leafhoppers are present. Philaenus tesselatus Melichar (Hemiptera: Aphrophoridae) is highly abundant in Morocco and could play a role as potential vector in case the bacterium is introduced in the country. With regard to the *X.f* hosts, citrus, olive, almond and grapevine, forest agroecosystems and oleander are considered the main susceptible species present in Morocco. **[Najat Haddad, Moulay Chrif Smaili, Mohamed Afechtal, Vincenzo Cavalieri, Rachid Benkirane, Kaoutar El Handi and Raied. Abou Kubaa (Algeria),** National Institute of Agricultural Research, Regional Center of Agricultural Research of Kenitra, Morocco. Faculty of Sciences, University Ibn Toufail, Kenitra Morocco. Institute for Sustainable Plant Protection, CNR, Bari, Italy. Faculty of Sciences, Moulay Ismail University, Meknes, Morocco, Hellenic Plant Protection Journal 17: 1-30, 2024]. DOI 10.2478/hppj-2024-0001

Palestine

Molecular detection of citrus exocortis viroid (CEVd), citrus viroid-III (CVd-III), and citrus viroid-IV (CVd-IV) in Palestine. Citrus hosts various phytopathogens that have impacted productivity, including viroids. Missing data on the status of viroids in citrus in Palestine were not reported. This study was aimed to detect any of *Citrus exocortis viroid* (CEVd), *Citrus viroid-III* (CVd-III), and *Citrus viroid-IV* (CVd-IV) in the Palestinian National Agricultural Research Center (NARC) germplasm collection Field inspections found symptoms such as leaf epinasty; vein discoloration, and bark cracking on various citrus varieties. RT-PCR revealed a significant prevalence of CVd-IV; CEVd and CVd-III (47%, 31%, and 22%; respectively).

CVd-III variants with 91.3% nucleic acid sequence homology have been reported. The sequence of each viroid was deposited in GenBank as (OP925746 for CEVd, OP902248 and OP902249 for CVd-III-PS-1 and -PS-2 isolates, and OP902247 for CVd-IV). This was the first to report three of citrus viroids in Palestine, appealing to apply

of phytosanitary measures to disseminate healthy propagating materials free from viroids. **[Aswar Abualrob, Osama Alabdallah, Raied Abou Kubaa, Sabri M. Naser and Raed Alkowni (Palestine),** Biology and Biotechnology Department, An-Najah National University, Nablus, Palestine. National Agricultural Research Center (NARC), Jenin, Palestine. Department of Plant Pathology, University of California, Davis, CA, 95616, USA. Scientific Reports volume 14, Article number: 423, 2024]. https://doi.org/10.1038/s41598-023-50271-5



Inspected citrus trees were exhibited symptoms as leaf epinasty on Pomelo (**A**); cankers of bark on Clementine (**B**); and leaf discoloration on Lemon (**C**), of putatively viroid's pathogeneses.

Syria

The effect of chemical and biological control on early blight *Alternaria solani* on potato and its reflection on growth and production.

The research was carried out at Alsonawbar station of the Agricultural Scientific Research Center in Lattakia in the spring of 2021, and the research included six treatments (control, spraying with fungicides: Ranman, Moximate, and biological control agents: *Bacillus subtilis, Beauveria bassiana, Trichoderma harizianum*) to compare the effect of using chemical pesticides with the effectiveness of some beneficial microorganisms in enhancing the systemic acquired resistance of potato against early blight *Alternaria solani* and its reflection on growth and production of potato. Results showed that treating pesticide plants by spraying fungicide moximate led to a reduction in the severity and percentage of infection; they reached 14.05% and 32 respectively, after two weeks of treatment, which was less than the control treatment by 20.92 and 17% respectively.

By following up the effect of early blight on the foliage, results showed that *Beauveria bassiana* treatment was the best, that after 100 days of planting, it recorded 8430.75 cm2/plant for the foliage area, and the lea index was 3.45 m2/m2;while *Bacillus subtilis* treatment exceeded other treatments in terms of the numbers of tubers, productivity per unit area, and marketing production, which reached: 11.6 tuber/plant, 990.6 g/plant, 3877 kg/donum, respectively. **[Alisar shaabow[1],Nisreen Dib[1], Majida Mofleh[1], Riad Zidan[2], Amal Haj Hasan[1], Ammar Askaria[1], Lina Adra[1] and Nirmin Sakoor[1] (Syria),** [1]General Commission for scientific Agriculture Research, Lattakia, Syria. [2]Department of Horticulture, Faculty of Agriculture Tishreen University, Lattakia, Syria. Syrian Journal of Agricultural Research – SJAR 10(4): 433-447, 2023]. alisar.nadeem@yahoo.com

Syria

Isolation of local strains of the *Beauveria bassiana* and *Bacillus thuringiensis* bacteria from the red palm weevil *Rhynchophorus ferrugineus* in Damascus.

Local strains of the *Beauveria bassiana* fungus and *Bacillus thuringiensis bacteria* were isolated from adult insects, and the larvae and pupae of the red palm weevil, *Rhynchophorus ferrugineus*, which were collected from date palm trees infested with the weevil, located in the gardens of Damascus in February 2024. This pest poses a significant threat to date palm trees in Syria. The red palm weevil had entered Syria since approximately 2000, but it was observed for the first time in Latakia and Tartous in 2005. Despite agricultural measures such as uprooting and burning infected trees and agricultural quarantine measures to prevent the spread of this pest to other governorates, unfortunately, the infestation spread to the governorate Damascus, its countryside, Daraa and Suwayda since 2022, and perhaps before that. Currently, in the laboratories of the Faculty of Science - University of Damascus, we are testing the pathogenicity of local strains of the *Bacillus thuringiensis* and *Beauveria bassiana*, isolated from the different stages of the red palm weevil, in preparation for their use as biopesticides to control the red palm weevil and limit its spread, which has become a big Dangerous to date palm trees in Syria**. [Randa Abou Tara (Syria), Faculty of Science - University of Damascus, Syria, 2024].**

Saudia Arabia

Red palm weevil, *Rhynchophorus ferrugineus*, a significant threat to date palm tree, global invasions, consequences, and management techniques. As a significant pest in diverse agroecosystems globally, the red palm weevil (RPW), *Rhynchophorus ferrugineus* (Coleoptera: Dryophthoridae), is frequently identified as the Asian palm weevil. Several pests affect date palms *Phoenix dactylifera* L, but *R. ferrugineus* (Olivier) is a significant problem. It is spreading across date palm plantation countries and among them. Despite that, RPW is a pest of the coconut in the South and Southeast Asian regions, where it has been a significant pest for many years. RPW is being reported from Sochi in Russia and East Africa in Djibouti, where it is gaining a foothold in the Caucasian region. As of now, RPW-IPM programs, based on pheromone and bait trapping techniques, have had limited success in focusing on RPW pest problems. As a result, this study focused on reviewing the existing knowledge of RPW's different aspects to reveal the actual research situation. The present review highlights different management strategies of palm weevil to protect date palms. It was impressive to see the results achieved by using chemical pesticides on plantations to mitigate RPW infestations. Nevertheless, they pose a significant threat due to their adverse effects on the environment and physiological resistance. It is imperative to collaborate and organize to develop new protocols and surveillance programs to mitigate RPW through a joint collaboration at the national and international levels in the form of funding, and research plans implementation. **[Al Thabiani Aziz (Saudi Arabia),** Department of Biology, Faculty of Science, University of Tabuk, Tabuk, 71491, Saudi Arabia, Volume 131, pages 9–26, 2024].

https://link.springer.com/article/10.1007/s41348-023-00805-w

Sultanate of Oman

Plant-herbivore–natural enemy trophic webs in date palm agroecosystems.

Cite this article Understanding the composition and dynamics of ecological communities is challenging because of the large number of organisms present and their numerous interactions. Among agricultural systems, intercropping considerably increases the complexity of communities compared to monocultures, and alternative host plants can influence insect pest damage. Using literature records, we construct and analyse connectance trophic webs of date palm (*Phoenix dactylifera*) agro-ecosystems, including and excluding intercrops. Estimates of connectance (community complexity) are relatively low and little affected by consideration of intercrops. Plant–herbivore overlap is relatively high, suggesting that herbivores are typically not specialists. Herbivore–natural enemy overlap is greater when intercrops are considered, suggesting that diffuse apparent competition regulates pest populations. We pay particular attention to how trophic web structure might affect *Batrachedra amydraula* (Lesser date moth), an important economic pest. Records indicate it having 15 species of natural enemies and sharing 9 of these with other herbivores; these may maintain populations of natural enemies when the moth is seasonally rare, contributing to pest suppression. The estimated potential for apparent competition between the lesser date moth and other herbivores is higher when intercrops are considered. The consequent expectation of less severe infestations in plantations that are intercropped compared to monocultures matches empirically derived reports. Further, comparing results obtained from the literature on one country (Oman) and from 15 Middle Eastern countries, we find that community metric estimates are relatively little affected by the geographical scale considered. Overall, our results suggest that literature-based trophic web construction can provide an efficient and robust alternative, or in addition, to direct empirical methodologies and that the presence of intercrops will contribute to major pest suppression via indirect apparent competition. **[K.S. Shameer, Tarik Almandhari (Muscat, Oman) and Ian C. W. Hardy,** Springer, Published: 05 February 2024]. https://doi.org/10.1007/s10340-023-01730-5

Tunisia

Biochemical and molecular identification of a native *Bacillus thuringiensis* gv. *cytolyticus* isolate with insecticidal effect against the pod borer larvae (*Helicoverpa armigera*).

This study aims to isolate and identify autochthonous bacterial strains with insecticidal effect against the larvae of the tomato moth *Helicoverpa armigera*. Dead and diseased larvae were collected from chili plots in the region of Gotraniya from the governorate of Kairouan, Tunisia. These larvae were used to isolate eight bacterial strains named Hr1 to Hr8. The bacterial isolates were characterized by macroscopic and microscopic observations and 16S rRNA sequencing. Hr1, Hr2, Hr4, Hr5, Hr6, and Hr8 were identified as *Bacillus* spp., Hr3 as *Staphylococcus* sp., and Hr7 as *Enterobacter* sp. Their insecticidal activity was evaluated against third-instar larvae of *H. armigera*. A Hr1 bacterial isolate showed an insecticidal effect against *H. armigera* larvae, causing 60% larval mortality four days post-treatment at a dose of 1.8×10^9 CFU/ml. Based on further characterization studies, Hr1 was identified as *Bacillus thuringiensis* gv. *cytolyticus* following Biolog biochemical tests and multi-locus sequence analyses studies based on sequencing of seven housekeeping genes. **[Bouslama, T., Laarif, A., Chattaoui, M., Vial, L., Lavire, C., and Doré, J., and Rhouma, A. (Tunisia/France),** Tunisian Journal of Plant Protection 18 (2): 71-91, 2023]. https://doi.org/10.4314/tjpp.v18i2.3

Plant Protection News in the Arab and Near East Countries

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

Survey and classification of entomopathogenic fungi and evaluation of their efficacy on maize stem borer in south Syria.

The study was conducted in several cities in Southern Syria and in the laboratories of the Biological Control Studies and Research Center at the Faculty of Agriculture, Damascus University, during the period from 2020 to 2023. The study aimed to identify the major Stem borers infesting corn crops, which included the European corn borer (*Ostrinia nubilalis*) and the pink corn borer (*Sesamia cretica*).

The morphological characteristics of the eggs, various larval instars, Pupae, and both male and female insect adults were described. A total of 18 species of entomopathogenic fungi belonging to 12 genera were recorded. These genera were *Acremonium*, *Aspergillus*, *Beauveria*, *Paecilomyces*, *Lecanicillium*, *Penicillium*, *Verticillium*, *Cladosporium*, *Fusarium*, *Metarhizium*, *Mucor*, and *Rhizopus*. These fungal species were distributed across seven different soil types in several fields located in Abu Qawq, Saasaa, Beit Saber, and Hiana in the countryside of Damascus.

The presence of entomopathogenic fungi varied depending on the location and soil type. The Sa'saa site was more diverse than other sites, and the abundance of isolates was directly affected by geographical location, soil characteristics, crop type, and vegetation cover, and the highest abundance of the fungus B.bassiana was recorded in the study sites. The pathogenicity fungal isolates of *B.bassiana*, *M.anisoplia*, *L.muscarium*, and *P.fumosoroseus* affected the first larval instars of the European corn borer significantly compared to the last instars and pupal stage, and the death rate increased with the increase in the concentration of spores in the spore suspension of the fungus.

The soil texture differed between the studied sites, as it was found that the studied soils were of medium texture, with the texture ranging between silty loamy clay and silty loamy clay. Alkaline soils predominate in most of the soil samples studied in various locations. **[Basil Mohammad Al-Shadidi, Goudat Faddoul, Abdulnabi Mohammad Basheer,(Syria),** Plant Protection Department, Faculty of Agricultural Engineering, Damascus University (Doctorate, 2024].

The interactions between the parasitoid *Cotesia glomerata* L. (Hymenoptera: Braconidae), and its host *Pieris brassicae* L. (1758), and its laboratory-rearing

The aim of this research was to study the influencing factors on parasitoid *Cotesia glomerata* L. (Hymenoptera: Braconidae) distribution, and the biotic and abiotic interactions with its host *Pieris brassicae* L. (1758) in the laboratory conditions (25˚C, RH 60%, D8:L16), and its laboratory rearing on the larvae of the host and the host plant White cabbage in insects Laboratory of the Department of biological control in Lattakia Directorate Agriculture in 2021-2022. The biological parameters of the parasitoid *C. glomerata* were affected by rearing the parasitoid for three subsequent generations. Results showed a decrease in the rate of females and an increase in the rate of males through successive generations. The duration of the parasitoid life cycle reached 25.8 days in the third generation compared to 21.8 days in the first generation.

The decrease in parasitism rate was very high in the second and third generations,

recording 50% and 34.33%, respectively, compared to the first one, 83.33%. The results of this study suggest that the first instar of *P. brassica* would be the best host instar for the mass production of C. glomerata in laboratory conditions. According to the results of this study, white cabbage is the most suitable host plant for rearing the *C. glomerata* on larvae of *P. brassicae* under laboratory conditions, with the highest rate of parasitism, 90% compared to Broccoli and Cauliflower.

The results showed that the parasitoid *C. glomerata* has a direct and significant effect on duration, growth rate, and Food consumption of the larval stage of *P. brassicae* compared to the unparasitised one under laboratory conditions. **[Zeina Sadeq Baddour (Syria),** Plant Protection Department, Faculty of Agriculture Engineering, Supervised by: Dr. Ali Mohammad Ramadan, Professor, Department of plant protection, Faculty of Agriculture Engineering. Dr. Eyad Mohammad Mohammad, Researcher, Ministry of Agriculture and Agrarian Reform, Damascus. Syria (Doctorate, 2024)].

The effect of moringa extract, *Spirulina platensis*, and neem oil on the resistance of cucumber plants against infection with *cucumber vein yellowing virus* (CVYV) and molecular detection of resistance genes using NGS technology

The study aimed to genetically detect the cucumber vein yellowing virus and its biological resistance. There were visible symptoms of infection with the Cucumber vein yellowing virus (CVYV). Next Generation Sequence (NGS) technology was adopted to diagnose this virus for the first time in Iraq on the cucumber plant, in addition to diagnosing Resistance genes in ten varieties of cucumber plants.

The results of using induction agents represented by treatment with moringa extract, treatment with laboratory-grown *Spirulina platensis* algae, commercial algae of the same species, and neem oil showed a clear effect in improving the vegetative growth parameters of ten varieties of cucumber plants infected with the CVYV virus.

The *Moringa oleifera* treatment of the Faiz variety achieved the highest increase in plant height, reaching 95 cm, compared to the control treatment for the same treatment, variety, and addition date, which amounted to 40 cm. The best results were recorded for the amount of chlorophyll in the Moringa *M. oleifera* treatment for the two varieties, Fareed and Faiz, at the time of treatment before the infection, as it reached 61.3 and 55.3 spades, respectively, compared to the control treatment, which reached 37 spades, while the highest average leaf area was recorded in the Moringa *M. oleifera* treatment of the variety. Unique and the time of addition before the infection amounted to 78.7 cm2, with a non-significant difference with the treatments of moringa *M. oleifera* and the growing *moss S. platensis* for the Faez cultivar, which amounted to 76.7 cm2 and 75.7 cm2, respectively, compared to the control treatment Infected with the virus for the Gad variety, which was 33 cm2. The same effect was reflected in improving productivity standards.

The highest dry weight and yield values were recorded in the treatment of moringa *M. oleifera* for the variety Fayez and Farid, with a non-significant superiority with the treatment of the locally grown moss *S. platensis*. It appeared that the timing of the treatment before Infection with the virus was more effective in increasing the standards than the treatments after Incidence in all studied characteristics.**[Basma Dhabab Ayed and Maadh Abdel Wahab Al-Fahad (Iraq),** Plant Protection, College of Agriculture, Tikrit University, Journal of Modern and Heritage Science, 12 (1): 101-115, (Doctorate,2024)]. https://j-msh.com/index.php/jmsh/article/view/131

Efficacy of entomopathogenic nematodes (EPNs) against Mediterranean fruit fly *Ceratitis capitata* (Wied.) in citrus orchards in Lattakia governorate

Entomopathogenic nematodes (EPNs) constitute crucial biological control agents, a sustainable opportunity in improving integrated pest management (IPM) programs, and a promising alternative to synthetic insecticides. A total of 66 composite soil samples were collected from Citrus orchards in Lattakia governorate, Syria during (2016-2017). Entomopathogenic nematodes (EPNs) were recovered from soil samples by the insect baiting technique, using seventh instar larvae of the Greater wax moth *Galleria mellonella* (Lepidoptera: Pyralidae). Infective juveniles (IJs) were collected from *G. mellonella* cadavers. The positive soil samples ratio was 12.12% of total samples, where EPNs isolates were extracted from regions (Al-Bassa, Al-Magreet, Al-Shamia, Gio, Al-Kharnoba, Al-Sorsokia, Fideo, Burj Al-Qasab).

The soil textures of the EPNs positive samples were (sandy loam, silt loam, loamy sand, loamy clay sand, and clay) with (pH 6.34- 8.03) and (1.99- 4.6) g\100g organic content. The electrical conductivity of the nematode-positive soils varied from 0.33 to 0.82 ds/m. EPN isolates were identified based on morphometric and morphological characters. Eight isolates were identified as *Heterorhabditis bacteriophora* Poinar 1976 (Ord. Rhabditida: Fam. Heterorhabditidae). Internal transcribed spacer 1 (ITS1) of five isolates was amplified using the PCR. Sequences of collected material have compared with available genetic data in the GeneBank. The identity of the collected material with the available sequences reached up to 99%. The phylogeny tree of the isolates was inferred based on the ITS1 sequences of five Syrian isolates and some international sequences of the same and other related species using *Steinernema feltiae* as an outgroup.

Syrian isolates of *H. bacteriophora* grouped in the same clad with other related isolates of neighboring countries. Virulence assays performed using several native isolates of EPNs against 3rd instar larvae (L3) of The Mediterranean fruit fly (Medfly), *Ceratitis capitata* Wiedemann, showed no significant differences between the isolate of Al-Sorsokia, *H. bacteriophora* SR1 MK474617.1 and the isolate of Al-Magreet, *H. bacteriophora* MG2 MK474643.1. The highest mean mortality value reached by the isolate of Gio, *H. bacteriophora* GA1 MK474645.1 was 69.19%. An experiment carried out under field conditions to evaluate the effect of *H. bacteriophora* GA1(MK474645.1) isolate on the 3rd instar larvae of medfly showed that inoculation with different concentrations of infective juvenile (IJ) (600, 300, 150 IJ/cm^2) caused the highest larval mortality rate (66.89%) at 600 IJ/cm^2, with a LC_{50} value of 88 IJ/cm^2 in soil. Statistical analysis of the effect of *H. bacteriophora* on mortality exhibited significant differences ($p \leq 0.05$) when applied at concentrations of 600 IJs and 150 IJs. Mortality differences were observed when different concentrations were tested against Medfly's larvae and pupae, by using the local isolate, *H. bacteriophora* GA1(MK474645.1), where the results showed that the third-instar *C. capitata* larvae were susceptible to the tested local isolate and the overall mortality ranged from 16.66 to 69.77%. Mortality of the third-instar larvae of *C. capitata* proportionally increased with increased nematode concentration. The highest larvae mortality rates (69.77) and (65.33) %. Were obtained at concentrations D_{10} and D_9 respectively,

The highest mortality rates of pupae were (51.61) and (39.72)% at dosage of 2000 (IJs)/ mL. Young pupae (1-3 day old) were more susceptible to the nematode than older pupae (4-8 day old). Significant differences in nematode penetration were recorded between the third-instar larvae of *C. capitata* and two local nematode isolates. *H. bacteriophora* SR1

MK474617.1 isolate had the highest penetration rate in the host according to a penetration rate assay. Evaluation of Different *In vitro* solid media for Mass Production of Native entomopathogenic nematodes, *H. bacteriophora* GA1(MK474645.1) showed various results. The multiplication of the isolate ranged from 3286.4–875693 IJs/250 ml flasks. Significantly, the data revealed that the nematode isolates multiplied maximum on the Nutrient agar medium. Moreover, a multiplication potential assay of three local nematode isolates showed that *H. bacteriophora* GA1 MK474645.1 showed the greatest reproduction of infective juveniles)155568(in *G. mellonella*, followed by the isolates *H. bacteriophora* MG2 MK474643.1, MK474617.1, *H. bacteriophora* SR1 (113788 and 72181) IJs respectively. **[Ghadah Hasan Zeini (SYRIA),** Supervisors: Prof. Dr. Nabil Abo Kaf, Department of Plant Protection, College of Agricultural Engineering /Tishreen University, and Dr. Mazen Al-Body (Associate Supervisor) and Dr.Majda Mofleh (Cooperation) Researcher–General Commission for Scientific Agricultural Research - Syrian Arab Republic (Doctorate, 2024)].

Molecular diagnosis of fall armyworm *Spodoptera frugiperda* (Lepidoptera: Noctuidae) and evaluating the impact of some chemicals and biopesticides to control FAW

A laboratory and field study was conducted in the entomology laboratory at the College of Agriculture - Tikrit University and in the maize fields in Hawija , Kirkuk, for the period from 1/7/2022 - 30/10/2022, to diagnose the fall armyworm type, Spodoptera sp. by phenotypic and molecular methods, and evaluating the effectiveness of three chemical pesticides, which included Coragen20SC (chlorantraniliprole), Evisect 50 WP (Thiocyclam hydrogen oxalate), Match 50EC (Lufenuron), and the bioformulation Antario KAB (B.thuringiensis var kurstaki +Abamectin 0.1%) and their their combinations combinations to control it on Yellow corn crop (KSC 703), in addition to surveying and diagnose some of the parasitoids and predators accompanying it.

The results of the study reached the following: The fall armyworm was diagnosed and found to be *Spodoptera frugiperda* according to phenotypic and molecular methods based on the nucleotide sequence of the gene cytochrome c oxidase subunit I (COX1), and its identity was 99.84% with the strain isolated from South Korea, registered with the international number OP132904.1, and registered in the genetic bank. The global isolation code is strain AHM-1 Spodoptera frugiperda isolate K2 under the international number OP557603.1.

The results showed that the Coragen pesticide at the semi-field concentration (0.01 ml/l) and the field concentration (0.02 ml/l) was compatible with the bacteria *B.thuringiensis* var *Kurstaki*, as the percentage of reduction in the number of bacterial colonies reached 7.64 and 26.39%, respectively, as for the two pesticides, Match and Evisect at both field and semi-field concentrations showed incompatibility with bacteria, as the reduction rates reached (88.89 and 84.03%) and (100 and 95.14%), respectively. The results showed that all chemical and biological pesticides and their combinations were able to reduce the percentages of fall armyworm infestation on corn plants in the first and second sprays, as the(Coragen+Match) treatment had the highest reduction percentage in the percentage of fall armyworm infestation in the first and second sprays, reaching 90.8 and 93.4. %, respectively, followed by the treatment (Coragen) with field concentration, where the reduction percentage reached 90.7% in the first and second sprays, respectively, followed by the two combination treatments (Coragen+Antario) and (Antario + Match) for the first and second sprays, with reduction percentages reaching (86.4 and 88%).) and (81 and 82.2%), respectively.

It was found that all chemical and biological pesticides and their combinations were able to reduce the severity (intensity) of fall armyworm infestation on corn plants by varying percentages after the first and second sprayings. The combination (Coragen + Match) at the half-field concentration excelled in having the lowest percentage of fall armyworm infestation severity, reaching 11.47%, followed by the two treatments (Coragen) at field concentration(FC.) and the combination (Coragen + Antario) amounted to 13.47 and 15.07%, respectively, compared to the control treatment (38.83%).The combination treatment (Coragen + Match) at the half-field concentration(FC -50%), and after the second spray was superior in achieving the lowest percentage of dead seedlings, reaching 9.75%. It was followed by a non-significant difference from the two treatments, Coragen (FC) and Coragen (FC -50%), in which the percentages of dead seedlings reached 12.41 and 12.81%, respectively, followed by the Match (FC.) and the combination (Coragen + Antario) treatments, in which the percentages of dead seedlings reached 20.78% for each, while the highest percentage of dead seedlings in the Evisect treatment (FC - 50%) was 12.41% and 12.81%, respectively. 51.90%, while the rest of the treatments recorded a decrease in the percentage of dead seedlings, ranging between 20.78-45.82% compared to the control treatment (57.85%). The combination treatment (Coragen + Match) at the half-field concentration was superior in achieving the lowest percentage of dry matter loss in plants infected with fall armyworm, amounting to 21.72%, followed by the treatment (Coragen + Antario) without a difference.

It was significant at 23.78%, followed by (Coragen) when concentrated in the field, with a percentage of 28.31 compared to the comparison treatment in which the loss percentage reached 68.91%. The results showed that all chemical and biological pesticides and their combinations could reduce the percentage of yield loss in varying percentages. It was found that the treatment of the combination (Coragen+Match) at the half-field concentration showed the lowest percentage of yield loss, amounting to 10.67%, followed by a non-significant difference with the combination (Coragen+ Antario) as the percentage of loss in the yield reached 17.26%, while the highest percentage of loss in the yield was in the (Antario) treatment amounting to 46.10%, compared to the control treatment (76.46%). Through a random field survey in corn fields infested with fall armyworm in the study field and in farmers' fields in Hawija for the year 2022, four species of parasitoids were recorded, two of the order Hymenoptera, *Cotesia ruficrus* and *Trichomma* sp., and two parasitoids of the Dipteran order, and Tachina flies, *Exorista* sp and *Drino* sp as well as two predators, the rove beetle *Paederus* sp and *Chrysoperla carnea*. **[Ahmed Hasan Ahmed Al-Jubouri (Iraq),** College of Agriculture, University of Tikrit, Supervised by Dr. Safaa Zakaria Baker (Master in Science in Agriculture (Plant Protection), 2024].

Study of olive scab caused by *Venturia oleaginea* (Castagne) Rossman and Crous: Occurrence and phenotypic and genotypic characterizations

An investigation was initiated into the disease of fungal origin (*Venturia oleaginea*) which affects the olive tree, considered the most destructive in all olive-growing regions, causing yield losses. This study aimed to identify the phenotypic variability and the search for genetic variations between isolates of *V. oleaginea* from different olive-growing regions of Algeria. Surveys were carried out in several olive groves during the 2013, 2014, and 2015 agricultural campaigns, allowing the census of 1163 affected orchards out of 1696 surveyed, with an infection percentage of varying incidence and severity depending on the different regions, the genotype of the olive tree and environmental conditions. Statistical analyses based on the Tukey HSD test at $P<0.05$ show highly significant differences between the

affected wilayas. Phenotypic characterization was not evaluated due to the mycelium being very compact and not producing conidia under *in vitro* conditions. In this context, molecular techniques based on PCR were used to identify the genetic diversity of populations of 40 isolates coming from different olive-growing regions of the East, West, and Center. The study of the different electrophoretic profiles was carried out by the BOX-PCR technique, using the Box repair primer (5'-CTACGGCAAGGCGACGCTGACG-3') specific to the species and revelation on agarose gel. The analyzes obtained revealed a low level of variation in the Algerian population of *V. oleaginea* in the Eastern regions, higher in the Center and the West. The various isolates forming five groups were not similar with respect to the diverse host range, the molecular size of the fragments, and the different olive growing regions surveyed. This work, a first in Algeria, contributes to improving the understanding of the genetic diversity of this pathogen. [**Nadia Kheddam (Algeria),** Department of Botany of the National Higher School of Agronomy -El Harrach - Algiers. supervised by Professor Dr. Zouaoui Bouznad from the National Higher School of Agronomy in El Harrach; Algiers, Algeria.(Doctorate, 2024)].

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

Strengthening the National Capacities for Preventing, Containing, and Managing Fusarium TR4 on Banana

The TCP/LEB/3803 project was terminated in 2024 in Lebanon. A national strategy and an action plan for the containment and management of Foc TR4 were developed in coordination with the Ministry of Agriculture (MoA). A nationwide survey was conducted to assess the extent of Foc TR4 spread, and a methodology was established for early detection of the disease. Click here.

FAO Participated in the Conference of Agricultural Ministers of the Date Producing and Processing Countries ,Abu Dhabi, UAE

26-27 February 2024

The FAO delegation headed by Mr. Abdulhakim Elwaer, FAO Assistant Director-General, and Regional Representative for the Near East and North Africa, participated in the honoring ceremony of the 16th Khalifa International Award for Date Palm and Agricultural Innovation 2024 winners. The two-day ministerial conference aims to strengthen and coordinate regional and international efforts regarding the sustainability and future of date palm cultivation. https://www.youtube.com/watch?v=jokol4MbQp0

FAO Co-organized the Technical Meeting on the IPM of RPW , Abu Dhabi, UAE.

27 February 2024

The FAO regional plant protection officer presented the FAO Regional Strategy for RPW Eradication results and achievements in the NENA region.

https://www.youtube.com/watch?v=VSYXYOJIytE

The Annual Steering Committee (SC) Meeting of the RPW Program, Abou Dhabi, UAE:

27 February 2024

Members of the steering committee from UAE, Oman, KSA, and FAO attended the SC meeting. The meeting was held to assess the progress made in the regional program, coordinate the remaining activities, enlighten the steering committee on strategic issues related to the project, and discuss directives for the next phase of the program.

The FFS: A New Approach to Strengthen Small-Scale Farmers' Role in Good Agricultural Practices and RPW Management, in the Tunisian Oases

Under the framework of the FAO Regional Eradication Program, three FFSs were established last November 2023 in Métlaoui region (Gafsa Governorate), the Jahim area, and the Nefta area (Tozeur Governorate). Three well-trained FFS facilitators currently run the FFSs, and another two FFSs will be operated shortly. Video

Eleven FFSs on Date Palm Established in Four Egyptian Governorates

Eleven FFSs on date palm were established in four Egyptian governorates (Giza, the New Valley, Aswan, and Matrouh) under the framework of the FAO Regional RPW Eradication.

In total twenty FFSs are dedicated to date palm farmers in different Egyptian countrysides.

The curriculum of the FFS stressed good agricultural practices for date palms, control of RPW using integrated pest management tactics, and agroecosystem analysis.

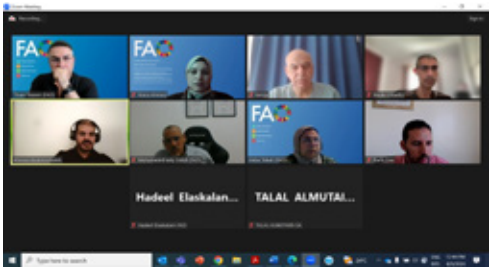
Special Issue of the Blessed Tree Journal

Khalifa Award Secretariat released a special issue of Blessed Tree Journal vol.16, No.02,2024 .This issue includes 22 scientific publications from the outputs of the FAO regional project for RPW eradication (GCP/RNE/012/MUL) and a wide range of the latest findings of research and field experiments to combat RPW in both Arabic and English. The journal was distributed to all the participants of the Conference of Agricultural Ministers of the Date Producing and Processing Countries organized on 26-27 February 2024 in Abu Dhabi, UAE.

The 2nd Revised Edition of the Dictionary of Biotechnological Terms in Food and Agriculture

The 2nd revised edition of the Dictionary of Biotechnological Terms in Food and Agriculture (Arabic Version) was released in March 2024 by the FAORNE and Khalifa International Award for Date Palm and Agricultural Innovation KIADPAI. The dictionary is organized alphabetically into two sections, AR-Eng and Eng-AR, with a total of 6596 terms to facilitate users' access. The updated version of the dictionary was created in collaboration with the Arab Society for Plant Protection.

ACTIONS



- Regular monthly meetings for the NENA regional workshop committee (FAORNE, FAOSNE, NEPPO, ONSSA, IPPC secretariate, SC, and IC members) to prepare for the 2024 IPPC regional workshop, which will be held in Rabat, Morocco, from 3 to 4 August 2024.

- Signing an LOA with the International Center for Biosaline Agriculture (ICBA) under the FAO project on RPW Eradication in the NENA Region (GCP/RNE/012/MUL). The agreement aims to validate early detection systems and field-evaluate Remote Sensing technology for the RPW.

- Signing a LoA with the Near East Plant Protection Organization (NEPPO) under the FAO project on RPW Eradication in the NENA Region (GCP/RNE/012/MUL). The agreement aims to publish and circulate the guidelines and protocols related to RPW control and organize the NEPPO-FAO Regional Meeting on "Strategies for Prevention, Early Detection and Control of RPW.

- Completing the book on Sustainable practices to improve the date palm value chain in Sudan (Arabic). The book is an outcome of the TCP/SUD/3703 project for developing date palm products and by-product value chains in Sudan. The book is prepared in Arabic, targeting the farmers, technicians, manufacturers, and all the stakeholders of the date palm sector.

- Finalizing the technical report on climate-resilient seeds and adaptation practices in the NENA region. The report discusses the impacts of climate change on the NENA agricultural sector and outlines the challenges and opportunities for adaptation strategies (in Arabic).

- Completion of the Protocols for producing natural enemies and biocides to combat fall armyworm book as an output of the regional TCPs in the NENA, which considers the first dealing with mass rearing and releasing of natural enemies (Parasitoids, Predators, and Entomopathogenic agents). The book was composed by many distinguished scientists from the region.

37th Session of the FAO Regional Conference for the Near East-Amman (Jordan), Hybrid Event, 04/03/2024 - 05/03/2024

The importance of transforming agrifood systems to embed more efficient, inclusive, resilient, and sustainable systems that promote better production, better nutrition, a better environment, and a better life, leaving no one behind, has been acknowledged as being pivotal for the attainment of the Sustainable Development Goals.

As countries from the region recover from the adverse implications of the global challenges that have prevailed in recent years, the need to embrace a policy framework and action plan that would secure the acceleration of transforming the regional agrifood systems so as to attain sustainable agriculture and food security amidst the poly-crises facing the region is becoming increasingly crucial. Building on the outcomes of the 35th and 36th Sessions of the FAO Regional Conference for the Near East (NERC), the deliberations at #NERC37 would seek to forge a regional understanding and define an action plan, with shared ownership and support towards the implementation of actions to accelerate such transformation. The discussion would focus in this context on FAO's global and regional framework, programme and priorities to this end. #NERC37 is hosted

by Jordan and is held in two segments. The Senior Officers Meeting took place virtually from 5 to 8 February 2024, where ministers of agriculture, partner organizations, sister agencies, and senior officials of member countries elaborated on regional challenges and priorities in the NENA region. This ensured the effectiveness of FAO's impact in the region and helped define its work priorities for the next biennium. The second and final segment of NERC37 is the Ministerial Session, which was taking place through a hybrid modality on 4 and 5 March 2024. The purpose of the high-level discussions is to frame the deliberations and gather different perspectives from the member countries on priorities for action. The Ministerial Session will result in a regional agreement on the way forward and joint action to achieve a sustainable agrifood system. https://www.fao.org/events/detail/fao-regional-conference-for-the-near-east/e

A Training Workshop on Applying Good Agricultural Practices for Improving Palm Productivity and Pest Management, Najaf, Iraq

The Food and Agriculture Organization of the United Nations (FAO) in Iraq, in collaboration with the Ministry of Agriculture, conducted a training workshop on applying Good Agricultural Practices (GAP) to enhance date palm productivity and pest management.

Participants in the workshop included trainees from departments of Agricultural Extension, Horticulture, and Agricultural Directorates in the governorates of Najaf, Karbala, Diwaniyah, Muthanna, Babel, and Wasit during the period from 16 - 18 April 2024 at the Extension Center in Najaf governorate.

The workshop covered the following topics.

- Application of Good Agricultural Practices, including establishing date palm farms, irrigation techniques, fertilization methods, pollination techniques, pruning and thinning methods, and pest control.
- Identification of major diseases and pests affecting date palms, with a focus on Red Palm Weevil.
- Introduction to Red Palm Weevil, prevention and control methods, the role of agricultural practices in limiting this pest, and practical experiences in Red Palm Weevil management.
- Field day included visits to two farms, one of which using traditional methods and the

other using modern systems, with practical exercises on pollination, pruning, thorn removal, and irrigation.

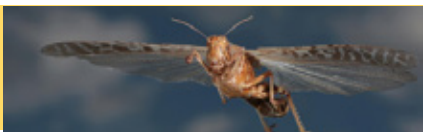
Experts from FAO (Prof Dr. Ibraheem Al-Juboori and Prof Dr. Abdulbasit Ibrahim) and lecturers from agriculture departments in Basra(Dr. Mohamed Mahdi Alderawi), and Najaf governorates (Eng Kadhum Abid Hussein) conducted the workshop lectures and practical training. Dr. Hussein Jaber Al-Wasiti, Advisor to the Prime Minister for Agricultural Affairs; Dr. Salah Al-Hajj Hassan, FAO Representative in Iraq; Dr. Munir Ali Khreidi, Director-General of Agricultural Extensions MoA, and Dr. Jawad Hassan Hamidi, Director of the Agricultural Extension Center attended and concluded the workshop.

Thirty-five trainees participated in the workshop, including 20% women, with different specialties in agriculture.

The workshop concluded with the following recommendations:

1. Conducting similar workshops targeting provinces affected by Red Palm Weevil.
2. Collaborating with Iraqi universities and agricultural research institutions to study the resistance of Iraqi varieties to infestation through analyses of stem, heart, and fiber components.
3. Developing a practical guide for separating and planting offshoots.
4. Introducing modern technologies for early detection and injection-based pest control.
5. Conducting practical training for technicians in affected farms.
6. FAO's ongoing follow-up, in collaboration with the Ministry of Agriculture and relevant departments, to facilitate/control green offshoot sales from horticulture department stations at competitive prices.
7. Collaborating between FAO and the Ministry of Agriculture on the importance of regulating the sale and transfer of offshoots between regions and governorates.

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

WARNING LEVEL: CAUTION. CENTRAL REGION OUTBREAKS

General situation during March 2024 and Forecast until mid-May 2024
Provided by the FAO Desert Locust Information Service (DLIS).
General Situation

CALM SITUATION **CENTRAL REGION OUTBREAKS**

In March, the Desert Locust outbreaks decreased along the Red Sea and Gulf of Aden coast in the Central Region. Egypt, Eritrea, Saudi Arabia, and Sudan had second-generation hoppers, groups, bands, and immature adult groups, but annual vegetation was drying up and control operations decreased by 50% since January. Biopesticides controlled a few small bands on the southeast coast of Yemen. During the forecast, locust populations are expected to decrease along the coasts of the Red Sea and Gulf of Aden. Adult groups in Saudi Arabia will move east towards the interior, while any from Egypt and Sudan will move west to the irrigated areas of the Nile River. Good rain fell in Saudi Arabia during March and is likely to continue there as well as in Yemen during parts of April and May. As a result, one generation of spring breeding will occur with laying, hatching, and hoppers starting in April. Limited breeding is expected due to above-normal rainfall in late April and early May in southeast Iran and southwest Pakistan. Heightened cyclone activity is anticipated in May and June for the Gulf of Aden and the Arabian Sea. No significant developments are likely in the Western Region

Western Region: Calm

SITUATION. Isolated adults in central **Algeria**; no locusts were seen in **Morocco**.

FORECAST. No significant developments are likely.

CENTRAL REGION: CAUTION

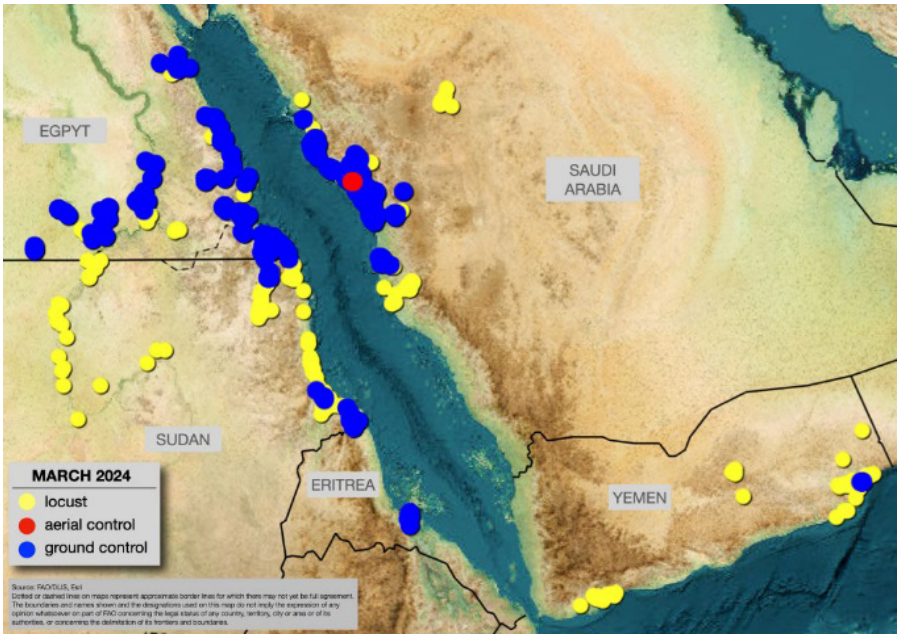
SITUATION. The second-generation hatching, hopper groups, and bands declined along the Red Sea coast of **Sudan** (1 695 ha treated) and **Eritrea** (1 445 ha) as well as **Saudi Arabia** (17 693 ha), although groups of immature adults increased slightly. Locust increased in **Egypt** (19 703 ha), where there are still some first-generation mature swarms. In **Yemen** (153 ha), a few hopper groups and bands were on the southeast coast. No locusts were seen in **Somalia** and **Oman**, and no surveys in **Ethiopia**.

FORECAST. Locusts will decline along the Red Sea and Gulf of Aden coasts as adults and small groups will move to the interior of **Saudi Arabia** and **Yemen,** while others may arrive in the irrigated areas of the Nile River in southern **Egypt** and northern **Sudan**. One generation of limited spring breeding will occur due to rain with laying, hatching, and hoppers during April and May. Rains may also occur in the plateau of northwest **Somalia** and eastern **Ethiopia** with perhaps a few limited breeding in the spring. May and June might see a rise in cyclone activity along the Gulf of Aden.

Easter Region: Calm

SITUATION. Isolated mature adults in the northern areas of southwest Pakistan.

FORECAST. Above-normal rainfall is likely to occur in late April and early May in southeast Iran and southwest Pakistan followed by one generation of small-scale breeding. May and June might see a rise in cyclone activity along the Arabian Sea.



Map No;1 locust situation March 2024

For more up to date information about the Desert Locust situation and forecasts, visit the FAO's Desert Locust website: http://www.fao.org/ag/locusts/en/info/info/index.html and FAO Commission for Controlling the Desert Locust in the Central Region http://desertlocust-crc.org. Source: The FAO Desert Locust Bulletin issued monthly in English and French by the Desert Locust Information Service, AGP Division (Rome, Italy; and Arabic version by the Commission for Controlling the Desert Locust in the Central Region (FAO Regional .(Office for Near East, Cairo, Egypt http://desertlocust-crc.org

Other activities of the Commission for Controlling the Desert Locust in the Central Region

Somalia joins FAO Commission for Controlling the Desert Locust in the Central Region

The Food and Agriculture Organization of the United Nations (FAO) welcomes the Federal Government of Somalia as its 17th member of the Commission for Controlling the Desert Locust in the Central Region (CRC).

Somalia's geographical location, historical significance in locust control, and contributions to the Locust Central Region Commission make it a crucial player in combating locusts in the Horn of Africa. Its membership in the CRC is a strategic step that will help improve the region's locust control efforts. Including Somalia in the Commission is considered a significant step in the fight against desert

locusts in Commission member countries. The country has been affected by the locust upsurge that has devastated crops and pastures in East Africa, causing food insecurity and economic losses. By joining the CRC, Somalia will be able to collaborate with other countries in the region to control and manage locusts, which will help mitigate the impact of this pest on farmers' livelihoods and the population's food security.

CRC-CLCPRO Interregional Research activity

First Applied field experiment of barrier treatment using *Metarhizium acridum*, EGYPT (February- March 2024)

With the efforts toward introducing modern and innovative approaches that ensure preventive control strategies, promoting the implementation of alternative control methods respect the environment, and reducing the cost of locust control operations, CRC and CLC PRO have conducted a field trial to investigate the efficacy of barrier treatment of the biopesticide *Metarhizium acridum* on the hoppers of desert locust (*Schistocerca gergaria*), and to develop a guideline for an optional scale using this eco-friendly and economic efficiency technique. The activity took place in Abu-Ramad, southeast Egypt, in collaboration with the General Department for Locust and Agro-Aviation Affairs, Egyptian Ministry of Agriculture. The experiment, performed on an area of about 50 hectares, contains several hopper bands of 3rd to 5th instars. Preliminary results are promising, and we are anxious to publish them after researchers analyze the obtained data.

Group photo of the participants in the field trial

Regional workshop on using the third version of the SVDN (system for monitoring national locust control arrangements) and the L-PMS (locust pesticides management system)

The commission participated in a workshop organized by the Desert Locust Control Commission in the Western Region (CLCPRO).

The objectives were to transmit practical knowledge on this theme, allow the focal points to practice the new version of SVDN3, introduce L-PMS to CLCPRO's country members so they can start using the application, and allow the focal points to practice this new version of the pesticide inventory management system. L-PMS is an innovative tool designed to facilitate the management of pesticide stocks. The L-PMS comes equipped with a range of features that enable users to monitor and track pesticide usage across different locations, as well as manage inventory levels and generate reports on pesticide usage and stock levels.

ARAB SOCIETY FOR PLANT PROTECTION NEWS

Dr Ibrahim Al-Jboory, ASPP executive committee member and Editor-in-Chief, ANEPPB

One of the Winners of Khalifa International Award for date palm and agricultural innovation, in its sixteenth session, 2024 as (Influential Figure in the Field of Date Palm and Agricultural Innovation Category

Participated in the 37th Session of the FAO Regional Conference for the Near East tookplace in Amman March 4-5,2024 representing the ASPP in the sector of Civil organizations.

Within the framework of communication and cooperation with academic experts in the agricultural sector,

the College of Agriculture, Jordan University hosted Ibrahim Al-Jubouri, on Sunday, 3/21/2024 the former professor of entomology at the University of Baghdad, and past president of the Arab Society for Plant Protection, IPM consultant at FAORNE. He was received by the Dean of the College, Professor Dr. Ayed Al-Abdallat, the Deputy Dean, Professor Dr. Nihad Samirat, and the Assistant Dean for Graduate Affairs, Professor Dr. Lama Al-Banna. This lecture aims to guide the students and provide them with functional skills to be in line with the requirements of the labor market and to keep pace with the rapid technological developments in the specializations offered by the College of Agriculture.

Delivered a lecture on April 18th, 2024, in collaboration with FAO-Iraq, on the Integrated Pest Management of Red Palm Weevil and the Common mistakes that increase palm infestation. Around 30 participants from central and the south of Iraq attended to Najaf province to acquire knowledge on the topic discussed.

NEWS OF ASPP MEMBERS ABROAD

Active packaging systems to extend the shelf life of 'Italia' table grapes

Sulfur dioxide (SO2)-generating pads associated with perforated plastic liners are often used to control gray mold in table grapes during cold storage; however, SO2 may cause bleaching, shattered berries, and an unwanted taste. To overcome this difficulty, a field ultrafast SO2-generating pad was designed to be used for a few hours before packaging grape bunches as an alternative for eradicating spores of fungi from berry skin. This study aimed to assess the postharvest conservation and shelf life of 'Italia' table grapes packaged in plastic clamshells and perforated plastic liners using the field ultra-fast SO2-generating

pads before packaging, associated with or without slow- or dual-phase SO2-generating pads during cold storage. The packaged grapes were cold stored (1.0 ± 1.0 ˚C; 95% relative humidity), and after 45 d, grapes were placed at room temperature (22.0 ± 1.0 ˚C) without plastic liners and SO2-generating pads for 3 d. Before and after the grapes had been subjected to the field ultra-fast SO2-generating pads, the quantification of filamentous fungi on the surface of the berries was assessed.

The use of field ultra-fast SO2-generating pads before packaging, associated with slow- or dual-phase SO2-generating pads during cold storage, resulted in a lower incidence of gray mold after 45 d of storage, with low weight loss and shattered berries, good preservation of stem freshness, and no impairment in the color and firmness of the berries. Additionally, a significant decrease in disease incidence was observed when using only the dual-phase SO2-generating pads in cold storage, with good maintenance of bunch quality. **[Higuchi, M.T.; Aguiar, A.C.d.; Leles, N.R.; Ribeiro, L.T.M.; Bosso, B.E.C.; Yamashita, F.; Youssef, K.; Roberto, S.R.** Active Packaging Systems to Extend the Shelf Life of 'Italia' Table Grapes. Agricultural Research Center, State University of Londrina, Brazil, Plant Pathology Research Institute, Egypt. Horticulturae, 10, 214, 2024]. https://doi.org/10.3390/horticulturae10030214

Transcriptomic insights into *Abies koreana* drought tolerance conferred by *Aureobasidium pullulans* AK10

The conservation of the endangered Korean fir, *Abies koreana*, is of critical ecological importance. In our previous study, a yeast-like fungus identified as *Aureobasidium pullulans* AK10 was isolated and shown to enhance drought tolerance in *A. koreana* seedlings. In this study, the effectiveness of *Au. pullulans* AK10 treatment in enhancing drought tolerance in *A. koreana* was confirmed.

Furthermore, using transcriptome analysis, we compared *A. koreana* seedlings treated with Au. pullulans AK10 to untreated controls under drought conditions to elucidate the molecular responses involved in increased drought tolerance. Our findings revealed a predominance of downregulated genes in the treated seedlings, suggesting a strategic reallocation of resources to enhance stress defense. Further exploration of enriched Kyoto Encyclopedia of Genes and Genomes pathways and protein-protein interaction networks revealed significant alterations in functional systems known to fortify drought tolerance, including the terpenoid backbone biosynthesis, calcium signaling pathway, pyruvate metabolism, brassinosteroid biosynthesis, and, crucially, flavonoid biosynthesis, renowned for enhancing plant drought resistance. These findings deepen our comprehension of how AK10 biostimulation enhances the resilience of *A. koreana* to drought stress, marking a substantial advancement in the effort to conserve this endangered tree species through environmentally sustainable treatment. [**Jungwook Park, Mohamed Mannaa(Egypt-Koria), Gil Han, Hyejung Jung, Hyo Seong Jeon, Jin-Cheol Kim, Ae Ran Park, Young-Su Seo**, The Plant Pathology Journal, 40(1):30-39, 2024]. https://doi.org/10.5423/PPJ.FT.11.2023.0161

Insect-based agri-food waste valorization: Agricultural applications and roles of insect gut microbiota

Meeting the demands of the growing population requires increased food and feed production, leading to higher levels of agri-food waste. As this type of waste seriously threatens public health and the environment, novel approaches to waste management should be developed. Insects have been proposed as efficient agents for biorefining waste,

producing biomass that can be used for commercial products. However, challenges in achieving optimal outcomes and maximizing beneficial results remain. Microbial symbionts associated with insects are known to have a critical role in the development, fitness, and versatility of insects, and as such, they can be utilized as targets for the optimization of agri-food waste insect-based biorefinery systems. This review discusses insect-based biorefineries, focusing on the agricultural applications of edible insects, mainly as animal feed and organic fertilizers. We also describe the interplay between agri-food waste-utilizing insects and associated microbiota and the microbial contribution in enhancing insect growth, development, and involvement in organic waste bioconversion processes. The potential contribution of insect gut microbiota in eliminating pathogens, toxins, and pollutants and microbe-mediated approaches for enhancing insect growth and the bioconversion of organic waste are also discussed. The present review outlines the benefits of using insects in agri-food and organic waste biorefinery systems, describes the roles of insect-associated microbial symbionts in waste bioconversion processes, and highlights the potential of such biorefinery systems in addressing the current agri-food waste-related challenges. [**Mohamed Mannaa (Egypt-Koria), Abdelaziz Mansour, Inmyoung Park, Dae-Weon Lee, Young-Su Seo,** Environmental Science and Ecotechnology, Volume and Issue: 17, 100287, 2024].

Taxonomy-guided selection of *Paraburkholderia busanensis* sp. nov.: a versatile biocontrol agent with mycophagy against *Colletotrichum scovillei* causing pepper anthracnose

This study introduces a novel approach based on the taxonomy-guided selection of bacterial biocontrol agents from a known beneficial taxonomic group. Following 16S rRNA screening, we focused on the genus *Paraburkholderia*, which harbors strains with large genomes and versatile benefits to plants. A strain designated P39 was selected, identified, and characterized for its biocontrol activity against *Colletotrichum scovillei*. Strain P39 exhibited antagonism against *C. scovillei* by producing compounds, including volatiles, with antifungal activity, both in vitro and on pepper fruits. Genomic, physiological, and biochemical analyses revealed that the selected strain represents a novel species, named *Paraburkholderia busanensis*. Genomic analyses provided insights into the fitness and biocontrol activities of the selected strains. Moreover, P39 displays mycophagy, consuming fungal mycelia and transforming them into bacterial biomass, particularly in nutrient-poor media supplemented with fungal mycelia. The genome harbored chitin and N-acetylglucosamine utilization genes, suggesting a proposed pathway for the utilization of fungal cells as a nutrient source.

Microscopic observations further supported the ability of this strain to rupture and damage fungal hyphae, depriving them of their cellular constituents. This study successfully demonstrated the implementation of a taxonomy-guided approach for the selection of bacterial strains for biocontrol. These findings contribute to our understanding of biocontrol strategies, bacteria-fungi interactions, and the identification of *Paraburkholderia busanensis* sp. nov. as a potential candidate for the biocontrol of pepper anthracnose. Additionally, this strain serves as a valuable resource for antifungal compounds and volatiles, and for the study of bacteria-fungal interactions and mycophagy. [**Mohamed Mannaa(Egypt-Koria), Gil Han, Taeho Jeong, Minhee Kang, Duyoung Lee, Hyejung Jung, Young-Su Seo**, Microbiology Spectrum, 2023]. https://doi.org/10.1128/spectrum.02426-23

Recruitment of the rhizo-microbiome army: assembly determinants and engineering of the rhizosphere microbiome as a key to unlocking plant potential

The viable community of microorganisms in the rhizosphere significantly impacts the physiological development and vitality of plants. The assembly and functional capacity of the rhizosphere microbiome are greatly influenced by various factors within the rhizosphere. The primary factors are the host plant genotype, developmental stage and status, soil properties, and resident microbiota. These factors drive the composition, dynamics, and activity of the rhizosphere microbiome.

This review addresses the intricate interplay between these factors and how they facilitate the recruitment of specific microbes by the host plant to support plant growth and resilience under stress. This review also explores current methods for engineering and manipulating the rhizosphere microbiome, including host plant-mediated manipulation, soil-related methods, and microbe-mediated methods.

Advanced techniques to harness the plant's ability to recruit useful microbes and the promising use of rhizo-microbiome transplantation are highlighted. The goal of this review is to provide valuable insights into the current knowledge, which will facilitate the development of cutting-edge strategies for manipulating the rhizosphere microbiome for enhanced plant growth and stress tolerance. The article also indicates promising avenues for future research in this field. [**Inmyoung Park, Young-Su Seo, and Mohamed Mannaa (Egypt-Koria**), Frontiers in Microbiology, Volume 14, May 2023]. https://doi.org/10.3389/fmicb.2023.1163832

Aureobasidium pullulans treatment mitigates drought stress in *Abies koreana* via rhizosphere microbiome modulation

The Korean fir tree *Abies koreana*, an endangered species in Korea, faces threats primarily from climate change-induced stress and drought. This study proposed a sustainable method to enhance *A. koreana* drought tolerance using a black yeast-like fungus identified as *Aureobasidium pullulans* (AK10). The 16S/ITS metabarcoding analysis assessed the impact of drought and AK10 treatment on the seedlings' rhizosphere microbiome. Results revealed a profound drought influence on the microbiome, particularly affecting fungal mycobiota. Drought-stressed seedlings exhibited elevated Agaricaceae levels, opportunistic fungi generally associated with decomposition.

AK10 treatment significantly mitigated this proliferation and increased the relative abundance of beneficial fungi like *Cystofilobasidium* and *Mortierella*, known biocontrol agents and phosphate solubilizers. A notable reduction in the phytopathogenic Fusarium levels was observed with AK10, alongside an increase in beneficial bacteria, including *Azospirillum* and *Nitrospirillum*. Furthermore, the conducted correlation analysis shed light on microbial interrelationships within the rhizosphere, elucidating potential co-associations and antagonisms.

Taken together, the isolated A. pullulans AK10 identified in this study serves as a potential biostimulant, enhancing the drought tolerance in *A. koreana* through beneficial alterations in the rhizosphere microbiome. This approach presents a promising strategy for the conservation of this endangered species. [**Mohamed Mannaa(Egypt-Koria), Gil Han, Hyejung Jung, Jungwook Park, Jin-Cheol Kim, Ae Ran Park, Young-Su Seo,** Plants, 12(20), 3653, 23 October 2023]. https://doi.org/10.3390/plants12203653

Improved and simplified method for aseptic Isolation of nematodes and nematode-endosymbiotic bacteria from pine seedlings

Pine wilt disease (PWD), caused by the pinewood nematode (PWN), *Bursaphelenchus xylophilus*, significantly impacts pine species and poses a broader ecological concern. An understanding of these nematode-associated microbes is essential for formulating sustainable PWD management strategies. We introduce a streamlined method for the aseptic extraction of *B.xylophilus* from pine seedlings, evolving beyond traditional Baermann funnel approaches. The method ensures optimal nematode extraction under sterile parameters, with seedling cutting discs processed using a unique sterile syringe assembly setup. The efficiency and simplicity of this method promise to significantly reduce the time and resources required. It also incorporates endosymbiotic bacterial isolation from isolated nematodes. The robustness of this method is affirmed by the successful isolation and identification of nematodes and bacterial strains as endosymbionts. Collectively, this protocol paves the way for more effective studies of nematodes and associated microbes, promoting the understanding of PWD and offering practical implications for better PWD management.

- A simplified, aseptic method for extracting *B. xylophilus* from pine seedlings, offering a modern alternative to the traditional Baermann funnel method.
- Utilization of a specialized sterile syringe assembly setup, ensuring controlled and optimal nematode isolation.
- Method validation achieved through the successful isolation and identification of bacterial strains as nematode endosymbionts.

[Mohamed Mannaa (Egypt-Koria), Young-Su Seo, Methods X, VOLUME 11, 102421, December 2023]. https://doi.org/10.1016/j.mex.2023.102421

General News

Winners of Khalifa International Award for Date Palm and Agricultural Innovation, in its Sixteenth Session, 2024

Distinguished Innovative Studies and Modern Technology Category (Equally won by):
Dr. Khaled Masmoudi – College of Agriculture and Veterinary Medicine – UAEU / UAE.
Dr. Ezzeldin Gadallah Hussein Ahmed – Agricultural Research Centre, Ministry of Agriculture and Land Reclamation / Egypt.

Pioneering Development and Productive Projects Category (Equally won by):
Dr. Lim Swee Hua Erin – HCT – Abu Dhabi / UAE.
AFRICA ORGANICS / Morocco.

Pioneering and Sophisticated Innovations Serving the Agricultural Sector Category (Equally won by):
Dr. Yarub Kahtan Abdul Rahman Al Doruri – University of Sharjah / UAE.
VALORIZEN LLC, Research and Innovation Center / Egypt.

Influential Figure in the Field of Date Palm and Agricultural Innovation Category (Equally won by):

Prof. Ibraheem Jaddoa Olelwi Al Juboori, PhD / Iraq.
Dr. Ramzy Abdelrahim Dessoky Aboaiana / KSA.

Visit of Experts from the Foundation Plant Services (FPS) at the University of California, Davis to the Sultanate of Oman-Muscat (February 22 - March 2)

Under the slogan "*Promoting Sustainable Agriculture and Protecting Plant Genetic Resources from Pests and Diseases*," **Dr. Maher Al Rwahnih**, Director of the FPS, at the University of California, Davis, and Dr. Raied Abou Kubaa, an expert in genetic resources assessment at the same institution, visited the Sultanate of Oman during the last week of February. During the visit, the experts conducted informative tours at agricultural research stations in Suhar and Ghadfan, where the infrastructure and ongoing research projects were reviewed, and the staff at the research stations were trained on standard protocols

used at FPS to detect specific quarantine diseases. A workshop titled “Preservation and Production of Pest and Disease-Free Plant Genetic Resources” was held at the General Directorate of Agricultural and Animal Research in Al-Rumays. A significant audience of individuals concerned with plant protection and phytosanitary measures were present for the workshop. Three different lectures were presented during the session: (1) The role of the Foundation Plant Services at the University of California in protecting and producing disease-free plants and how to benefit from this model in the Sultanate of Oman, Dr. Maher Al Rwahnih,, (2) Strategies for preventing plant quarantine diseases and the best detection methods, Dr. Raied Abou Kubaa (3) Results of plant quarantine sample testing during 2023 by Eng. Mohammed Al-Sadrani. The visit also included a meeting with His Excellency Dr. Ahmed bin Nasser Al-Bakri, Undersecretary of the Ministry of Agriculture, Fisheries Wealth, and Water Resources for Agriculture, and relevant directors in the ministry, during which Dr. Al Rwahnih, presented the University of California’s experience in producing disease-free plant genetic resources, and highlighted how this strategy can be applied in the Sultanate of Oman to enhance the agricultural sector. The visit concluded with tours of plant health laboratories in Al-Rumays and a meeting with the director of the Agricultural and Fisheries Development Fund, in addition to a visit to the College of Agricultural and Marine Sciences at Sultan Qaboos University.

Near East Plant Protection Organization Bulletin

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 5th issue of the bulletin regroups the most important activities during the three months (January/February and March) of the year 2024. [Editor: **Ben Jamaa Mohamed Habib**, Executive Director, Bulletin no: 5,2024, NEPPO].


Near East Plant Protection Organization Bulletin

NEPPO

نشرة منظمة وقاية النباتات للشرق الأدنى

Editorial

Updating members of NEPPO in IPPP Commissions

Plant Protection and Phytosanitary Directorate Activities, Jordan

Evaluation of the phytosanitary control system through the The TAIEX (Technical Assistance and Information Exchange) instrument of the EU

During the period 14-18 January 2024, the European advisory mission, consisting of three European experts from Italy and Poland, implemented its program to evaluate the phytosanitary control system and the examination, inspection and monitoring procedures for plant consignments in a way that ensures enhancing the competitiveness of Jordanian products in global markets and preventing the entry of quarantine pests into Jordan. The program includes lectures, discussion sessions, and conducting exploratory tours for all governmental and private institutions concerned with implementing the control system in the phytosanitary sector. This evaluation contributes to defining the road map for developing the phytosanitary control system and the technical and financial requirements necessary to improve the phytosanitary sector in Jordan.

Adopting the electronic signature on phytosanitary certificates issued in the electronic system (GeNS) in Jordan

The electronic signature has been approved on phytosanitary certificates issued for plant consignments, considering the requirements of countries that are still working on the paper issuance of phytosanitary certificates for the signature and stamp of the certificates by the concerned employee at the border center.

Approval of facilities for vapour heat treatment of fruits in Saudi Arabia and Kenya

The competent technical committees in the Jordanian Ministry of Agriculture carried out field visits to facilities for treating mango fruits with vapour heat in Saudi Arabia and Kenya at a temperature of 46.2˚C for 30 minutes to eliminate incomplete stages of quarantine fruit flies. It was found that the facilities meet the infrastructure requirements and are able to gradually raise the core temperature of the fruits to the required temperature and maintain it for 30 minutes. Therefore, the Plant Health Committee recommended approving these facilities to treat mango fruits that are exported to Jordan.

Updated insect quarantine pest lists

The technical committee of specialists has begun its work to update the lists of insect quarantine pests in line with the emergence and registration of new insect pests in

different regions of the world, in order to facilitate the tasks of plant health officers to conduct risk analysis and make appropriate decisions based on the results of laboratory tests of imported consignments of plants and plant products in a manner appropriate with the change in the pest status according to their spread.

Amending instructions for registering and importing biocides and biological enemies

A technical committee of specialists was formed to review the instructions for registering, importing, and trading in bio-pesticides and natural enemies, and to develop the necessary amendments to keep pace with the latest developments, and to develop local legislation for regulating this vital sector with regard to the processes of producing and manufacturing bio-pesticides locally and the reproduction of natural enemies**.**

Holding a workshop on Human Health Hazard and Risk Assessment in Amman, Jordan

The Ministry of Agriculture in Jordan held a workshop entitled "Human health hazard and risk assessment" in collaboration with the Netherlands Food and Consumer Product Safety Authority (NVWA), and Wageningen University within the project "Strengthening bio-pesticides registration in Jordan". The workshop was held at the training center of Jordan Food and Drugs Administration (JFDA) in Amman during the period of 11-15/2/2024. The topics of the workshop included human health hazard assessment and classification methods, occupational risks, risk assessment, bridging, risks for residents, dietary risks, food safety, MRLs, chronic risk assessment.

Microinjection technology to control the Red Palm Weevil

The Plant Protection and Phytosanitary Directorate in collaboration with The Jordan Valley Agriculture Directorate has implemented, for the first time, the use of tree microinjection technique using Aretor insecticide which contains the active ingredient Emamectin Benzoate 9.5%. The technique is used to control the Red Palm Weevil (*Rhynchophorus ferrugineus*) with low residual effect of Aretor on fruits and high persistence rate (one year) for pest control.

Simulation training on how to deal with the entrance of the desert locusts swarms into Jordan

Within the readiness of the Ministry of Agriculture and through those concerned in the Plant Protection and Phytosanitary Directorate and the Directorates of Agriculture in the southern governorates, which are considered the first line of defense to confront the desert locust swarms entrance into Jordan. The Plant Protection and Phytosanitary Directorate has conducted simulation training on how to confront desert locusts swarms through the spraying application of insecticides produced in Ultra Low Volume formulation. The training was performed in coordination with the relevant agricultural directorates, including the technical teamwork of desert locust survey and detection, technicians in the Directorate of Mechanization and Machinery, and members of the local community at the

training areas. The readiness of teamwork for confronting the desert locusts swarms once they enter the country, was confirmed.



Participation in the Annual Meeting of Commission on Phytosanitary Measures (CPM-18)

The Plant Protection and Phytosanitary Directorate has participated in the annual meeting of the commission on phytosanitary measures (CPM) which was held at FAO headquarters in Rome, Italy during 15-19/4/2024 to promote global cooperation of contracting parties and relevant stakeholders to help implement the objectives of the IPPC and develop plant health standards for a greener, healthier world. The CPM is a key forum for protecting global plant health, and Jordan plays a vital role. During the meeting, important topics like ephyto update, trade security measures, sea container biosecurity, the assessment and management of climate change impacts on plant health, and other emerging topics were discussed. Our Jordanian delegation is further strengthened by the presence of Mr. Emad Alawad (IPPC focal point in Jordan), and confirmation of the membership of Dr. Amani Alawamleh (Head of Phytosanitary Division) for the first term for CPM Standard Committee (2024-2027).


Selected Research Papers

- **New host plant species of Grapevine Virus a identified with Vector-Mediated infections.** Darko Vončina, Martin Jagunić, Angelo De Stradis, Alfredo Diaz-Lara, Maher Al Rwahnih, Maja Šćepanović, and Rodrigo Almeida, Published Online: 8 Jan 2024. https://doi.org/10.1094/PDIS-03-23-0607-RE
- **A C-Type Lectin, RfCTL27, activates the Immune defense in the red palm weevil *Rhynchophorus ferrugineus* (A.G. Olivier, 1791) (Coleoptera: Curculionidae: Dryophthorinae) by the recognition of Gram-negative bacteria.** Yanru Gong,Yongjian Xia, Zhiping Su, Xinghong Wang, Yishuo Kou, Bing Ma, Youming Hou, and Zhanghong Shi, Insects, 15(3), 212, 2024. https://doi.org/10.3390/insects15030212
- **Association of a global Invasive pest *Spodoptera frugiperda* (Lepidoptera:Noctuidae) with local parasitoids: prospects for a new approach in selecting biological control agents.** Ihsan Nurkomar, Ichsan Luqmana Indra Putra, Damayanti Buchori and Fajar Setiawan, Insects,15(3), 205, 2024. https://doi.org/10.3390/insects15030205
- **New species of genus *Dinogamasus* Kramer (Mesostigmata: Laelapidae) associated with large carpenter bees (Hymenoptera: Apidae) in Egypt, with new concepts of the genus.** Abo-Shnaf, Reham ,Kamel, Marwa S. Shebl, Mohamed A. Badawy, Rawda M. and Okely, Mohammed, Volume: 64 Issue: 1 pages: 43-55, 2024. https://doi.org/10.24349/9y0q-gpv4
- **Optimizing the release pattern of *Telenomus podisi* for effective biological control of *Euschistus heros* in Soybean.** William Wyatt Hoback, Gabryele Ramos, Rafael Hayashida, Daniel Mariano Santos, Daniel de Lima Alvarez and Regiane Cristina de Oliveira, Insects, 15, 192, 2024. https://doi.org/10.3390/insects15030192
- **Incidence and severity of Okra mosaic virus on field-grown three cultivars of Okra (Abelmoschus Esculentus L.).** Osundare O.T, Oyebamiji K.J, Okonji C.J., Fayemiro O. S. and Fajinmi A. A. Jordan Journal of Agricultural Sciences, Volume 20, No.1 2024. DOI: https://doi.org/10.35516/jjas.v20i1.201
- **Key role of environmental competence in successful use of entomopathogenic fungi in microbial pest control.** Enrique Quesada-Moraga, Natalia González-Mas, Meelad Yousef-Yousef, Inmaculada Garrido-Jurado and María Fernández-Bravo, Journal of Pest Science, 97:1–15, 2024. https://doi.org/10.1007/s10340-023-01622-8
- **Intruding into a conversation: how behavioral manipulation could support management of *Xylella fastidiosa* and its insect vectors.** Sabina Avosani, Rachele Nieri, Valerio Mazzoni, Gianfranco Anfora, Zeinab Hamouche, Caterina Zippari, Maria Luisa Vitale, Vincenzo Verrastro, Eustachio Tarasco, Ilaria D'Isita, Salvatore Germinara, Thomas F. Döring, Gregor Belusic, Alberto Fereres, Vinton Thompson & Daniele Cornara, Journal of Pest Science , 97:17–33, 2024. https://link.springer.com/article/10.1007/s10340-023-01631-7
- **Reconstructing the biological invasion of *Tuta absoluta*: evidence of niche shift and its consequences for invasion risk assessment.** Cesar Augusto Marchioro and Flavia Silva Krechemer, Journal of Pest Scienc Volume 97, pages 127–141, 2024.
- **The evaluation of resistance risk to Cry2Ab and cross-resistance to other insecticides**

in *Helicoverpa armigera*. Jinrong Tang, Jie Lu, Caihong Zhang, Siqi Yu, Zhongwei Ding, Ei Thinzar Soe & Gemei Liang, Volume 97, pages 173–184, 2024.

- **Odor learning improves efficacy of egg parasitoids as biocontrol agents against *Tuta absoluta*.** Jérémy Gonthier, Yi-Bo Zhang, Gui-Fen Zhang, Jörg Romeis & Jana Collatz. Volume 97, pages 481–482,2024.
- **Population divergence in pheromone communication for mate choice of *Tribolium castaneum* and its association with gut bacteria**. Zhengyan Wang, Yaru Zhao, Yang Wang & Yujie Lu, Volume 97, pages 385–395, 2024. https://link.springer.com/article/10.1007/s10340-023-01632-6

Papers published in the Arab Journal of Plant Protection(AJPP), Volume 42, Issue 1, March 2024

ETIOLOGY

Characterization of Two Local Isolates of the Fungus *Verticillium dahliae* that Causes Vascular Olive Wilt, and the Reaction of Olive Cultivar Khudairi to Infection with this Pathogen
K.A. Muhrez and B. Barhoum (SYRIA)
Pages 1-8
https://doi.org/10.22268/AJPP-001219

First Record of Passalora Blight Caused by *Passalora malkoffii* on Anise Crop in Syria
R.N. Youssef, R.N., H.A. Khalil, N.A. Bdour, O.M. Salloum and R.M. Salloum (SYRIA)
Pages 9-12
https://doi.org/10.22268/AJPP-001207

Molecular Identification and Morphological Characterization of *Alternaria solani* Causing Potato Early Blight in the Southern Region of Kurdistan – Iraq
A.M. Hassan and Q.A. Marzani (IRAQ)
Pages 13-18
https://doi.org/10.22268/AJPP-001206

EPIDEMIOLOGY

Population Densities of Three Mite Species on Wheat in Sharkeia Governorate, Egypt
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SELECTED GLOBAL PESTS

First report of the tobamovirus *Tomato brown rugose fruit virus* (ToBRFV) in India and first detection in Argentina

In 2023, cultivated *Solanum lycopersicum* (tomato) plants in India exhibited blemished fruit and leaf mosaic, mottling, and deformity. Molecular analyses confirmed that the causal agent was the tobamovirus *Tomato brown rugose fruit virus* (ToBRFV). Additionally, in 2022, *S. lycopersicum* plants in Argentina exhibited similar symptoms. Molecular analyses and pathogenicity tests confirmed that the causal agent was ToBRFV. Phytosanitary measures have been implemented in Argentina. This is the first report of ToBRFV in India and the first detection of ToBRFV in Argentina. ToBRFV infects many plants, including *Solanum* spp., *Capsicum* spp. (pepper), *Taraxacum officinale* (dandelion), *Amaranthus retroflexus* (amaranth), and *Malva parviflora* (mallow). ToBRFV has also been reported from Albania, Turkey, parts of the Middle East, China, and Mexico and has been detected in parts of Europe and the Middle East, Egypt, New Zealand, and the United States. Tobamoviruses 49can be transmitted mechanically and by seed, and ToBRFV can be transmitted by the bee *Bombus terrestris*, which is not known to occur in the United States. **Source:** Australasian Plant Disease Notes, New Disease Reports, **Event:** New Location, Detection.

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EVENTS OF INTEREST

22-25/4/2024	1st international conference ESIPM 2024 Building Roads and Bridges to Adopt Integrated Pest Management (IPM) Cairo, Egypt. esipmc@gmail.com
27-28/6/2024	International Conference on Agricultural Entomology and Pest Management ICAEPM in Istanbul, Turkey. https://rb.gy/hi5l0e
1-5 /7/2024	20th International Plant Protection Congress in Greece. https://www.ippcathens2024.gr/concurrent-sessions/concurrent-session-proposals
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

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

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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.

www.asplantprotection.org | aspp@asplantprotection.org

www. arabjournalpp.org | ajpp@arabjournalpp.org

www.acpp-aspp.com | info@acpp-aspp.com

ASPP Office, P.O. Box 113-6057, Beirut, Lebanon; Tel/Fax: (+961-1) 809173
E-mail: aspp@arabjournalpp.org

www.asplantprotection.org