Food and Agriculture Organization of the United Nations

ARAB AND NEAR EAST PLANT PROTECTION BULLETIN

ANEPPB

ISSUE 97 (1) April 2026

الجمعية العربية لوقاية النبات
ARAB SOCIETY FOR PLANT PROTECTION

Contents

EDITORIAL

Desert Locust (Schistocerca gregaria):Destructive Impacts and the Role of the Commission for Controlling Desert Locust (CRC) in Preventive Control Across the Arab Peninsula and Central Region

Introduction

Desert locust, *Schistocerca gregaria* (Forskål, 1775), is the world's most destructive migratory pest, driven by climate change, land degradation, and regional conflicts. A single swarm can travel hundreds of kilometres in a day, crossing the Red Sea from Africa to Saudi Arabia, has 80 million locusts, and eats the same amount of food per day as 35,000 people. As a migratory pest, Desert Locust invades and threatens the agricultural system across more than 60 countries in Africa, the Near East, the Arab Peninsula, and Southwest Asia. Throughout recorded history, locust plagues have been associated with famine, social disruption, and economic decline. Unlike most agricultural pests, which are geographically confined and ecologically specialized, the desert locust is characterized by extraordinary mobility, ecological adaptability, and the ability to undergo rapid population expansion. Its transboundary nature makes it not merely a national concern but a regional and global challenge. For countries in the Arab region and the Horn of Africa, where rainfed agriculture and pastoral systems underpin food security and rural livelihoods, the desert locust represents a serious threat capable of destabilizing the production that are already fragile.

The upsurge of 2019–2022 clearly demonstrated that desert locust outbreaks are not isolated biological events, but complex phenomena influenced by climate variability, environmental conditions, preparedness levels, and regional cooperation mechanisms. As the crisis developed rapidly, the Food and Agriculture Organization of the United Nations (FAO) launched an appeal in January 2020 to support surveillance and control operations across the affected regions. This experience highlighted the importance of strengthening preventive management systems and exploring innovative approaches to better anticipate and mitigate future locust threats and mitigate their impact.

With decades of operational experience, the Commission for Controlling the Desert Locust in the Central Region (CRC) plays a key role in coordinating regional efforts to strengthen preventive desert locust management. Operating within the framework of the Food and Agriculture Organization of the United Nations (FAO), the Commission promotes cooperation, research, and capacity development at national, regional, and international levels to support member countries in preventing and responding to desert locust outbreaks.

Desert Locust biology and life cycle:

Understanding the biology of *S. gregaria* is essential to conducting an effective management strategy. Locusts are members of the grasshopper family *Acrididae*, which includes most of the short-horned grasshoppers. However, Locusts differ from grasshoppers, in particular, they have the ability to change their behavior and physiology, in particular their colour and shape (morphology) in response to changes in density. The life cycle desert

locust undergoes incomplete metamorphosis, progressing through egg, hopper (nymphal), and adult stages. Females lay egg pods in moist sandy or sandy-loam soils, typically at depths of 10-15 cm. Each pod may contain 60-100 eggs, and under optimal temperature and moisture conditions, hatching occurs within two to three weeks.

The hopper stage lasts four to six weeks, depending on environmental conditions, contains five to six instars, and feeds voraciously on green vegetation. Hoppers shed their skins (moulting) five or six times (after each instar stage) and grow in size. During this period, hoppers are wingless and dependent on local vegetation. When low-density, they behave solitarily. However, when the population increases, and vegetation becomes concentrated, behavioral changes occur among individuals, inducing physiological changes that initiate a transition to the gregarious phase. Once fledged, after the final moult (fifth or sixth instar), locusts develop functional wings (fledging). The new adult (fledgling) has soft wings that must dry and harden before it can fly. When favorable winds occur, adult locusts may travel distances exceeding 100-150 km per day in case of favorable winds. Sexual maturation occurs within weeks under suitable conditions, enabling successive generations and population growth when breeding habitats are favorable (FAO. Desert Locust Guidelines)

Again, a core feature of the desert locust, that distinguishes it from most other acridid pests, is its density-dependent phase polyphenism. Where, solitary locusts are cryptic, avoid conspecifics, and remain localized. In contrast, gregarious locusts exhibit attraction to one another, synchronized development, and collective movement in hopper bands and adult swarms, which is associated with the species' destructive capacity.

Population dynamics of the Desert Locust, Favorable Habitats and Climate Drivers

The biological success of the desert locust lies in its extraordinary ecological flexibility. It inhabits arid and semi-arid zones across North Africa, the Sahel, the Red Sea basin, the Arabian Peninsula, and Southwest Asia. Rainfall is the principal ecological driver. Under recession conditions, locust populations remain scattered at low densities in remote desert areas. However, when ecological conditions become favorable, particularly following unusual or repeated rainfall especially when associated with cyclonic systems or unusual weather anomalies across geographically connected breeding areas create temporary

ecological windows and stimulate vegetation growth which create ideal breeding conditions causeing locust populations to dramatically increase. When crowding occurs, a remarkable density-dependent phenomenon known as phase polyphenism is triggered. Solitary, cryptic individuals transform into gregarious forms characterized by increased mobility, attraction to conspecifics, synchronized maturation, and the formation of cohesive hopper bands and ultimately massive flying swarms. Adult swarms, carried by prevailing winds, may travel up to 150 kilometers per day, crossing national borders with ease. A single swarm covering one square kilometer can contain tens of millions of insects, each consuming its own weight in fresh vegetation daily. Collectively, such a swarm can destroy in hours what smallholder farmers have cultivated over months. Unlike specialized pests, desert locusts feed on a wide range of crops including cereals, pulses, vegetables, fruit trees, and pasture grasses. Their polyphagous nature magnifies the scope of damage across entire agricultural landscapes.

Thus, the population dynamics of the Desert Locust characterized by dramatic fluctuations between low-density (recessions) and high-density (plagues), driven by the interaction of climatic conditions and the locust's unique ability to change phase. During recessions, small, scattered populations behave as solitary individuals, causing a limited damage. However, when widespread and substantial rains occur in arid breeding regions, it causes a sequence of events leads to a behavioral shift from repulsion to attraction. This can lead to a localized outbreak, forming hopper bands and swarms. If favorable breeding conditions continues across successive generations and remains unchecked by control measures, these outbreaks can coalesce into a regional upsurge, where an increasing proportion of the population exists as cohesive bands and swarms. Then, if upsurges in multiple regions coincide, a full-scale plague can develop. A plague typically declines due to a combination of natural factors, such as the failure of seasonal rains or migration to inhospitable areas, and effective human intervention through control operations, eventually returning the population to a recession state.

Climate projections suggest that the frequency of extreme rainfall events may increase in the region, potentially expanding suitable habitats and altering traditional migration corridors. This raises the possibility that areas previously considered marginal may become more vulnerable to invasion, thereby complicating risk assessment and surveillance planning.

The 2019–2022 Desert Locust Upsurge: A Case of Climate-Driven Damage by Locusts

Based on the above information, it is clear that climate variability plays a central role in determining the scale and timing of outbreaks. In recent years, climate change brings concerns regarding desert locust dynamics. Increasing sea surface temperatures in the Indian Ocean have been associated with more frequent and intense cyclonic activity affecting the Arabian Peninsula and East Africa. These cyclones deposit substantial rainfall in desert interiors, generating exceptional breeding conditions in areas that are normally too dry to sustain prolonged locust reproduction. Such conditions were observed prior to and during the 2019–2022 upsurge, when multiple tropical cyclones created interconnected breeding zones across the Arabian Peninsula and the Horn of Africa, leading to locust outbreaks that affected a wide region and caused huge damage to the community.

The 2019–2022 desert locust upsurge provided a stark illustration of the pest's capacity to generate widespread agricultural and socio-economic disruption. Successive breeding cycles fueled by unusual rainfall allowed locust populations to multiply rapidly and spread across Eastern Africa, the Arabian Peninsula, and parts of Southwest Asia. Countries such as Ethiopia, Kenya, Somalia, Sudan, Yemen, and others experienced repeated waves of swarms that damaged staple crops and decimated pasturelands. The timing of these invasions often coincided with critical planting or harvesting periods, exacerbating crop losses and reducing household food availability. For pastoral communities dependent on rangelands, the loss of forage translated directly into reduced livestock productivity, diminished income, and heightened vulnerability.

Beyond direct agricultural damage, the socio-economic repercussions were profound. Reduced crop yields contributed to food price inflation, strained national grain reserves, and increased dependence on imports and humanitarian assistance. In regions already affected by conflict, drought, or economic instability, locust invasions compounded existing fragilities. The overlap of the upsurge with the COVID-19 pandemic further disrupted

supply chains and response operations, demonstrating how compound crises can amplify impacts on food systems. These events underscored that desert locust management is not merely an agricultural concern but a matter of food security, social stability, and sustainable development.

The 2019–2022 Upsurge: Lessons Learned

The experience of recent desert locust upsurges has reinforced the critical importance of preventive control as the cornerstone of effective locust management. Reactive responses during plague situations often require extensive aerial spraying operations, substantial financial resources, and may pose increased environmental risks. In contrast, preventive control focuses on detecting and suppressing locust populations at an early stage, particularly during the recession phase, before gregarization and swarm formation occur.

This approach relies on continuous surveillance in remote breeding areas, timely field reporting, the use of predictive analysis, and rapid localized interventions. Together, these elements form the foundation of an effective preventive strategy. Preventive control is both economically sound and environmentally responsible, as early interventions generally require smaller quantities of pesticides and more limited operational efforts.

Recent upsurges have also demonstrated that delayed detection or insufficient operational capacity during the early stages can allow locust populations to increase rapidly and spread beyond manageable levels. Conversely, countries with well-established surveillance systems and rapid response mechanisms were better able to contain outbreaks before large-scale swarm formation occurred. These experiences further highlight the strategic and economic value of investing in strong preventive control systems.

Commission for Controlling the Desert Locust in the Central Region: Its Role in Mitigating Desert Locust Damage

CRC, the Commission for Controlling the Desert Locust in the Central Region, was established in 1967 under the framework of the Food and Agriculture Organisation of the United Nations (FAO). It is the largest of the three FAO regional desert locust commissions, alongside the Commission for Controlling the Desert Locust in the Western Region (CLCPRO) and the Commission for Controlling the Desert Locust in South-West Asia (SWAC).CRC currently comprises 17 member states: Bahrain, Djibouti, Egypt, Eritrea, Ethiopia, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syria, the United Arab Emirates, and

Yemen. Many of these countries are located along the Red Sea and the Horn of Africa, which are among the most ecologically sensitive areas for desert locust breeding and development.

For decades, the commission has promoted synergies and cooperation between its member countries and engages national and regional organizations that contribute to crop protection and agricultural research that reduce and manage locust risk. This is embodied in CRC desert locust preventive control strategy, the strategy that provides means of preparation, monitoring, warnings, alerts and early intervention against desert locust infestations, which would enable countries to deal efficiently and effectively against this pest, to save agricultural production and secure food security and human well-being. This is in addition to the technical and financial support provided by the Commission to member states, such as building national human capacities through permanent and renewable training programs and introducing modern approaches in survey and control operations. The commission is also making continuous and vigorous efforts to ensure the autonomy of the desert locust control units in the member states in dealing with desert locust crises in a more flexible and efficient system.

The 2019-2021 Desert Locust upsurge is a perfect example of how important the role of CRC is regarding desert locust management.

In July 2019, once all analysis confirm that a major outbreak will occur in the region, the Commission's secretariat called for an emergency meeting to present the desert locust situation and the critical needs of an urgent actions to curb this upsurge. The commission has provided technical and material support, the support which helped a lot in limiting the damage caused by the infestation. Later, and due to remarkable efforts, and recognized contribution, the FAO obtained financial resources from regional and international donors amounting of about 243 million USD to help in combating the upsurge and supporting preparedness of the countries (Desert locust upsurge report). With this fund, CRC not only supports the state members but also extends its technical support to non-CRC countries like Uganda and Rwanda.

In addition, CRC, and in collaborations with FAO and others, Desert locust controlling commissions (especially the CLCPRO commission), have a history of experiences in promoting actions and research at national and international levels, to ensure a preventive control strategy and to cope with Desert Locust invasions. In this context, several research have been undertaken to introduce new eco-friendly biomolecules in desert locust control (ANRPPB, April 2025, https://doi.org/10.21608/mjard.2024.379034). In addition, the two commissions carried out several drone tests for use in survey operations, which led to the validation of a prototype dedicated exclusively to locust surveillance. Most recently the two commission are introduce drones in locust control operations. In addition, several research projects are being carried out which deals with climate change issue with the aim of developing predictive models to rationalize the preventive control and to define and apply criteria for rapid intervention.

Conclusion

The desert locust remains a dynamic and formidable threat to agriculture, food security, and rural livelihoods across the Arab region and beyond. Its biology, ecological responsiveness, and transboundary mobility require a sustained and scientifically grounded response. Climate change is likely to intensify environmental drivers of outbreaks, increasing the urgency of robust surveillance and preventive systems.

Through the coordinated efforts of FAO and the Desert Locust Commissions, significant progress has been made in strengthening early warning systems, building national capacities, promoting innovation, and enhancing environmental management. Continued investment in preventive control strategy, technological advancement, and regional cooperation will be essential to safeguard crops, protect livelihoods, and enhance resilience against future locust upsurges.

Mamoon Alsarai AlAlawi, PhD
Executive Secretary
Desert Locust Commission (CRC)
https://www.fao.org/crc
Food and Agriculture Organization of the United Nations (FAO)
Regional Office for the Near East and North Africa

Cairo – Egypt

Mamoon.AlSaraiAlalawi@fao.org

CROP PROTECTION NEWS FROM ARAB AND NEAR EAST COUNTRIES

INVASIVE, NEW PESTS AND NATURAL ENEMIES

Saudi Arabia

Detection of New Viruses in Onion and Garlic Crops Growing in Saudi Arabia

During the field survey (2021–2022), a total of 113 onion and 44 garlic symptomatic and asymptomatic plants showing different virus-like symptoms were collected from different regions of production in Saudi Arabia. The collected samples were tested through DAS/TAS ELISA against 10 different viruses infecting onion and garlic plants. The results showed that 88/113 (77.8%) onion samples were positive for at least one of the tested viruses. A single virus infection was detected in 49 (55.6%) samples as follows, iris yellow spot virus (IYSV; 13.6%), shallot yellow spot virus (SYSV; 10.2%), shallot latent virus (SLV; 7.9%), shallot virus X (ShVX; 6.8%), onion yellow dwarf virus (OYDV; 6.8%), 3.4% of each of garlic virus A (GarV-A) and garlic virus C (GarV-C), and 1.1% of each of garlic virus B (GarV-B), leek yellow stripe virus (LYSV), garlic common latent virus (GarCLV) (1.1%). Whereas mixed infections with at least two viruses were detected in 39 (44.3%) samples. Moreover, 40/44 (91%) garlic samples were found to be positive with at least one of the tested viruses. However, 15 garlic samples (37.5%) from different regions had a single virus infection as GarV-C (17.5%), GarV-A (7.5%), SLV (7.5%), and SYSV (2.5%). Whereas 25 samples (62.5%) showed mixed infections with at least two viruses. ELISA test of the 157 plant samples showing different virus symptoms indicated the occurrence of new ten viruses for the first time in onion and garlic crops in Saudi Arabia. The importance of viral diversity and mixed infection in the epidemiology and pathogenesis of viruses has been discussed. [**Muhammad Amir, Mahmoud A. Amer, Zaheer Khalid, Muhammad Zaman, Khadim Hussain, Ibrahim M. Al-Shahwan and Mohammed A. Al-Saleh.** Plant Protection Department, College of Food and Agriculture Sciences, King Saud University, P. O. Box 2460, Riyadh, 11451, Saudi Arabia. Journal of the Saudi Society of Agricultural Sciences, Published: 09 December 2025]. https://doi.org/10.1007/s44447-025-00053-4

Syria

Obseration on Madeira mealybug Phenacoccus madeirensis Green in Syria.

The Madeira mealybug *Phenacoccus madeirensis* Green (Hemiptera: Pseudococcidae) is a species of polyphagous insect that is invading new areas worldwide. It is a pest of many fruit trees, fibre plants, food crops, vegetables, cacao and ornamentals (Wang *et al*., 2019; Gracía Morales *et al*., 2016). *Phenacoccus madeirensis* is a serious pest on greenhouse ornamentals in the USA (Chong and Oetting, 2006). It has a Neotropical origin, Although it was first described on island of Madeira in 1923 (Green, 1923). The mealybug infestation were noticed in April of 2024 in the

Madeira mealybug *Phenacoccus madeirensis* on *Cestrum nocturnum*

home garden in Darya city, Countryside of Damascus on Night-blooming Jasmine *Cestrum nocturnum* (Solanaceae) which is an ornamental shrub. The insect was identified by using the keys of classification (Kaydan *et al*., 2012; Williams, 2004). [**Faiha'a Al-Abbar (Syria),** Department of Plant Protection, Faculty of Agriculture, Damascus University, 2026].

First Record of Termites as a Secondary Pest in Wooden Beehives of Honeybee Colonies in Syria.

The destruction of wooden beehives by termites is a significant issue in many parts of the world, especially in Africa, where it causes economic losses from damage to wooden structures. This requires replacing or repairing hives, which raises the costs of beekeeping. Infestation by termites (Family: Termitidae) in active honey bee colonies was recorded for the first time in Syria, specifically in an apiary in the Damascus countryside. Colonies were monitored over two years, and observations were made about the development of termite colonies inside the beehives. The identified termites belonged to the genus Amitermes, as determined using standard taxonomic keys.

Termite workers are characterized by a narrow thorax and a swollen, translucent abdomen, allowing the contents of the gut to be visible. Their body length ranges from 3.5 to 4.5 mm. Extensive tunnel construction was observed on the inner surface of the outer hive cover, on the sidebars of the feeders, and along the edges of the inner hive walls. Nests were located between layers of wood, away from light.

A noticeable decline in colonies infested with termites was observed compared to healthy colonies within the same apiary. This may be attributed to stress imposed on the bees, or possibly due to the termites acting as vectors of viral pathogens affecting bees—this hypothesis requires further investigation. Some references suggest that certain ant-eating insects may transmit chronic paralysis virus. Therefore, further studies will be conducted to precisely identify the termite species and determine the relationship between termite infestation and colony deterioration. **[Nouraldin Youssef Daher Hjaij[1] and Walid Khaled Al-Housa[1] (Syria),** 1Plant Protection Research Administration, General Commission for Scientific Agricultural Research (GCSAR), Damascus, Syria, 2026].



Lebanon

First Report of Jasmine virus C (JaVC) on Jasminum officinale in Lebanon

Ornamental plants constitute a growing global industry, but viruses and viroids can greatly reduce their decorative and propagation quality (Mitrofanova *et al*. 2018). Virus-like symptoms have been reported on Jasminum species, and the vegetative propagation of jasmine facilitates the dissemination of infected planting material (Dey et al. 2024). Jasmine virus C (JaVC; *Carlavirus jasmini*), a member of genus *Carlavirus* (family Betaflexiviridae), was initially reported from *Jasminum sambac* in Taiwan and later associated with yellow mosaic symptoms on *J. officinale* in Italy (Amoia *et al*. 2022).

To investigate the possible presence of JaVC in Lebanon, a small-scale survey was conducted in the Bekaa Valley in May 2022, where leaves from 33 *J. officinale* samples were collected from 6 nurseries and 4 private gardens. Some plants displayed non-specific viral symptoms such as chlorosis and leaf mosaic, while others were a symptomatic. All samples were tested by RT-PCR using diagnostic primers previously reported for JaVC detection in the RdRP gene (Amoia *et al*. 2022).

To enhance diagnostic sensitivity, a new primer pair targeting a 490 bp region of the coat protein gene was designed: CP490F5′-) CCTCTCAAGAT ATGGCCGCA-3′) and CP490R (5′-ACCTCTGCTTCGAG GTTTGC-3′), with an annealing temperature of 56 ˚C for 45s. Three symptomatic plants originating from the same nursery tested positive with both primer sets, representing a %100 infection rate among the samples obtained from that nursery, while all 30 remaining samples tested negative for JaVC using both primer sets. Sequencing of the amplified fragments revealed a high similarity (>99.8%) among the Lebanese isolates. The representative sequence (isolate JAS-08) was submitted to GenBank under accession number OR544076, which shared>98% nucleotide identity with the Italian JaVC isolate (OL828237), confirming their close genetic relatedness.

This study represents the first report of JaVC infecting *J. officinale* in Lebanon, highlighting the need for investigating potential insect vectors and virus sur-veillance programs in ornamental plant nurseries to prevent the dissemination of infected materials. [**Raied Abou Kubaa, Serafina Serena Amoia, Luisa Rubino, Fouad Jreijiri, Elia Choueiri ,** Journal of Plant Pathology, 2026]. https://doi.org/10.1007/s42161-026-02145-8

RESEARCH HIGHLIGHTS

Algeria

Pomegranate Heart Rot Caused by Alternaria alternata, an Emerging Disease in Algeria.

Pomegranate heart rot (black heart) was observed in several pomegranate-growing areas of Algeria. From 2022 to 2025, surveys were conducted across 15 provinces (20 localities), and a total of 85 fruits (symptomatic and asymptomatic) were collected. Fruits were cut transversely to assess internal symptoms, ranging from early aril browning to dry black rot. Thirty *Alternaria* isolates were obtained and grouped into four morphotypes based on colony and conidial morphological traits. A subset of 18 isolates was analyzed by multilocus phylogeny (ITS, EF-1□, GAPDH, and OPA10-2); all analyzed isolates clustered within the *Alternaria alternata* species complex, in the clade including the ex-type strain CBS 916.96. Fruit pathogenicity tests with Algerian isolate GA reproduced typical internal heart rot symptoms, and the pathogen was consistently re-isolated from symptomatic tissues. In fruit inoculations with isolate GA, cultivars differed in susceptibility, with mean disease severities of 94%, 62%, and 9.5% in 'Taferrante', 'Ikhessène', and 'Kares', respectively, expressed as the percentage of the fruit section presenting rot symptoms.

Detached leaf assays indicated isolate-dependent differences in aggressiveness, and 'Kares' showed the lowest susceptibility. Overall, the results confirm that *A. alternata* is the causal agent of pomegranate heart rot in Algeria and provide baseline information for disease diagnosis and management.[**Nesma Abdessemed [1,2], Ali Kerroum [2], Sabri Ala Eddine Zaidat [3,4], Brahim Beladis [5], Ihssan Cherief [1], Rossana Parlascino [6], Mario Riolo [6], Antonella Pane [6] and Santa Olga Cacciola [6].Journal of Fungi 2026**. 1 - Département des Sciences Agronomiques, Faculté des Sciences de la Nature et de la Vie, Université Morsli Abdellah, Tipaza , Algeria; 2 -Laboratoire de Phytopathologie et Biologie Moléculaire, Ecole Nationale Supérieure d'Agronomie (ENSA), Algeria.3 -Department of Agricultural and Veterinary Sciences, Faculty of Natural and Life Sciences, Ziane Achour University, Djelfa, Algeria 4 -Department of Soil, Plant and Food Sciences, University of Bari Aldo Moro, 70126 Bari, Italy 5 -Laboratoire Bioressources Sahariennes: Préservation et Valorization, Département des Sciences Agronomiques, Université Kasdi Merbah, Ouargla, Algeria.6 -Department of Agriculture, Food and Environment (Di3A), University of Catania, Via Santa Sofia 100, 95123 Catania, Italy.] https://doi.org/10.3390/jof12030209.

Occurrence and genetic diversity of grapevine leafroll-associated virus 4 in Algeria.

Grapevine leafroll-associated virus 4 (GLRaV-4, *Ampelovirus tetravitis*) has considerable genetic diversity. A survey was conducted in central, western, and southern Algeria to investigate the distribution and the genetic diversity of GLRaV-4 in commercial and autochthonous grape cultivars. DAS-ELISA detected an overall grapevine infection rate of 18.2%, and infections in a subset of samples were confirmed by RT-PCR. Analysis of the P23 protein gene sequence revealed six known phylogenetic groups, with Algerian isolates clustering in strains -4, -5, -6, -9, and -Pr of GLRaV-4. In addition to this virus, three viruses and two viroids were identified using high-throughput sequencing: grapevine

Pinot gris virus (GPGV, *Trichovirus pinovitis*), grapevine leafroll-associated virus 2 (GLRaV-2, *Closterovirus vitis*), grapevine fanleaf virus (GFLV, *Nepovirus foliumflabelli*), hop stunt viroid (HSVd, *Hostuviroid impedihumuli*), and grapevine yellow speckle viroid 1 (GYSVd-1, *Apscaviroid alphaflavivitis*).

This study was the first research on the genetic diversity of GLRaV-4 in Algeria. **[Anfel DJENAOUI[1],, Osamah ALISAWI[2] , Manel EL AIR[3] , Nour Elhouda LAIDOUDI[4], Imene MAHDID[1], Rima Hind BOUDCHICHA[5,] Naima MAHFOUDHI[3] , Arezki LEHAD[1.]** Phytopathologia Mediterranea 65(1): 55-65, 2026.1- Laboratoire de Phytopathologie et Biologie Moléculaire, Département de Botanique, Ecole Nationale Supérieure Agronomique (ENSA-ES 1603), Avenue Hassan Badi, ElHarrach, Algiers, 16200, Algeria 2- Department of Plant Protection, Faculty of Agriculture, University of Kufa, Najaf, Iraq 3- Laboratoire de Protection des Végétaux, Institut National de la Recherche Agronomique de Tunisie, Rue Hedi Karray, 1004 El Menzah, Tunis, Tunisia 4- Laboratoire de Microbiologie Appliquée, Faculté des Sciences de la Nature et de la Vie, Université Ferhat Abbas Sétif 1, Setif, Algeria 5- Biotechnology Research Center, Constantine (CRBT), Constantine, Algeria**]** DOI: 10.36253/phyto-16539

Screening and characterization of aggressiveness of an indigenous *Fusarium culmorum* isolates collection associated to Fusarium head blight (FHB) of wheat in Algeria.

In Algeria, Fusarium head blight (FHB) is an emerging disease principally caused by *Fusarium culmorum* (Wm.G. Sm.) Sacc. In this study, we screen and characterize the aggressiveness of a collection of 14 *Fusarium culmorum* national isolates (I) on the most cultivated wheat variety in Algeria HD1220. The characterization was based on the latent period (LP) in days, the disease severity (DS) converted to the Area Under the Disease Progress Curve (AUDPC), and the thousand kernel weight loss (TKWL). During two-year study, all isolates reproduced the typical disease symptoms with highly significant isolate effect ($p < 0.001$) for all the studied parameters. The isolate x year interaction was not significant for LP ($p > 0.05$), whereas for AUDPC and TKWL it was highly significant ($p < 0.001$).

The I9 was the least aggressive isolate with a LP of 11 days, an AUDPC of 36.76 and a TKWL of 9.08%; the most aggressive isolates were I3 with a LP of 6 days, an AUDPC of 594.60 and a TKWL of 41.54%, and I5 with 6.25 days, 667.76, and 40.33% for the same parameters; these isolates were selected for FHB resistance tests. All isolates produced lower LPs, higher AUDPCs, and greater TKWL in wet conditions than in dry conditions, although the ranking of aggressiveness parameters remained generally stable irrespective of the year's climate. To our knowledge, this is the first report from Algeria to demonstrate the stability of aggressiveness among isolates and to highlight the influence of climatic conditions on disease severity.**[Assia Khalfi-Douici[1,4], Sihema Touati-Hattab[2,]Abdenour Zibani[3], Houda Boureghda[4] 2026. J Plant Pathol (2026).**1-National Institute of Agronomic Research of Algeria, Algiers, Algeria, 4-Laboratory of Phytopathology and Molecular Biology, Department of Botany, National Higher School of Agronomy, Algiers, Algeria,2-Laboratory of Biological and Agronomy Sciences, Amar Telidji University, Laghouat, Algeria,3-Technical Institute of Field Crops (ITGC), Algiers, Algeria, 4-Laboratory of Phytopathology and Molecular Biology, Department of Botany, National Higher School of Agronomy, Algiers, Algeria**]** https://doi.org/10.1007/s42161-026-02172-5

Antagonistic activity of Indigenous Algerian *Trichoderma* spp. and their secondary metabolites against major wheat crown rot pathogens

Fusarium crown rot (FCR), caused mainly by a complex of *Fusarium* species, is a destructive wheat disease worldwide that reduces yield and contaminates grain with mycotoxins. In Algeria, previous studies have shown that *Fusarium culmorum* is the pathogen most commonly associated with FCR, alongside *Fusarium pseudograminearum*, *Microdochium nivale*, and *M. majus* also identified as important causal agents.

To support sustainable disease management, this study investigates the biocontrol potential of indigenous *Trichoderma* strains against FCR pathogens through *in vitro* and *in vivo* assays using *in vitro* confrontation tests and *in vivo* seed treatment bioassays. The antagonistic activity was evaluated with emphasis on antibiosis mediated by bioactive secondary metabolites, some of which were isolated and tested individually against *F. culmorum* (Fc111).

The tests conducted *in vitro* (direct and indirect confrontation) and *in vivo* revealed the antagonistic potential of these strains. Direct confrontation resulted in 44.25–90.63% of mycelial growth inhibition across pathogens, with *Trichoderma* frequently overgrowing colonies. Indirect assays (VOCs) yielded 0.97–33.59% inhibition. Seed treatments with four *Trichoderma* strains reduced FCR severity by 17.43–77.75% compared to controls. The three strains *Trichoderma atroviride* (Ta.09), *Trichoderma orientale* (To.15) and *Trichoderma afroharzianum* (Taf.17), were found to produce distinct secondary metabolites, which change depending on the culture conditions. Notably, the strain To.15 proved to be a rich source of secondary metabolites, including 4-phenyl-1,3-butanediol, identified here for the first time as a natural product of microbial origin, several compounds newly identified in *Trichoderma*, and additional metabolites such as bisvertinolone, previously known in the genus but observed here for the first time in strain To.15.

The antifungal activity of the crude extracts and the main metabolites from each strain were evaluated against the Fc111 strain at different concentrations. Among these, the major compound from Ta.09, 6PP, exhibited a significant inhibition rate, at the lowest concentration (100 µg plug-1), against Fc111 compared to the secondary metabolites identified from the other two strains. Three strains showed strong potential to control FCR disease, with antibiosis likely contributing in some cases.

These results support the potential use of these strains and specific metabolites, particularly 6-PP, as candidates for integrated FCR management and future biopesticide development.**[Hadjer Lasmer[1], Houda Boureghda[1], Alessia Staropoli [2], Laura Grauso [3], Saliha Chihat 4, Abdenour Zibani[1] , Matteo Lorito [5] & Francesco Vinale [2].Chemical and Biological Technology in Agriculture. 2026.**

[1]Département de Botanique, École Nationale Supérieure Agronomique, Algiers, Algeria,[2]Department of Veterinary Medicine and Animal Production, University of Naples Federico II, Naples, Italy [3]Department of Agricultural Sciences, University of Naples Federico II, Portici, Italy [4]Agropastoralisme Research Centre - CRAPast, Djelfa, Algeria [5]Department of Agricultural Sciences, University of Naples Federico II, Portici, Italy]

https://doi.org/10.1186/s40538-026-00927-x

Combination effect of wheat cultivars and antagonistic activity of *Trichoderma* spp. in *Fusarium* head blight biocontrol

Fusarium culmorum is the main pathogen causing head blight (FHB) in Algeria and several parts of the world. The aim of this study is to evaluate the effect of *Trichoderma* combined with wheat cultivars on disease index, grain weight and yield. Two assays were conducted in field trials for two seasons, with two antagonistic strains, *T. atroviride* (Ta13) and *T. longibrachiatum* (TL9), against two mycotoxigenic *F. culmorum* strains (BD11) and (FC7). Methods of seed treatment before sowing and head treatment during anthesis were investigated on three durum wheat genotypes (cv. Vitron) and two lines (G03 and G01). *Trichoderma* treated seed before sowing induced 28.16% and 26.88% of disease reduction caused by BD11 combining Ta13– G01 and Ta13–Vitron respectively, and 24.61% of disease reduction caused by FC7 combining TL9–Vitron. Ear treatment leaded to 19.56% and 35.94% of DI reduction caused by BD11 combining Ta13–G01 and TL9–Vitron, respectively.

TGW was increased with the combination of Ta13–G01 and Ta13–Vitron by about 17% with ear treatment against BD11. Ear treatment against BD11 increased yield by about 150%, 97% and 22%, 30% using Ta13–Vitron, Ta13–G03, Ta13–G01 and TL9–Vitron, respectively, and with 29% by TL9–G03 once against FC7. Yield obtained with treated seed showed an increase by 114% and 58% with Ta13–Vitron and Ta13–G03, respectively. However, a decrease by 25% with combination TL9–G01–FC7 and by 35% with TL9–G03–BD11 were noted. Our results show that the bioefficacy of the antagonist is genotype dependant, and that the relationship antagonist–cultivar–pathogen is complex, variable over time and depends on many biotic and abiotic factors.[**Houria Boulahouat [1], SihemTouati-hattab [2], Leila Mekliche [3], [1]Houda Boureghda. 2025.** Biocontrol Science and Technology, [1]Laboratoire de Phytopathologie et de Biologie Moléculaire,Département de Botanique, Ecole Nationale Supérieure Agronomique , El Harrach , Algiers, Algeria.[2]Amar Telidji University, Laghouat, Algeria,[3]Ecole Nationale Supérieure Agronomique El Harrach , Algiers, Algeria.] DOI: 10.1080/09583157.2025.2605568

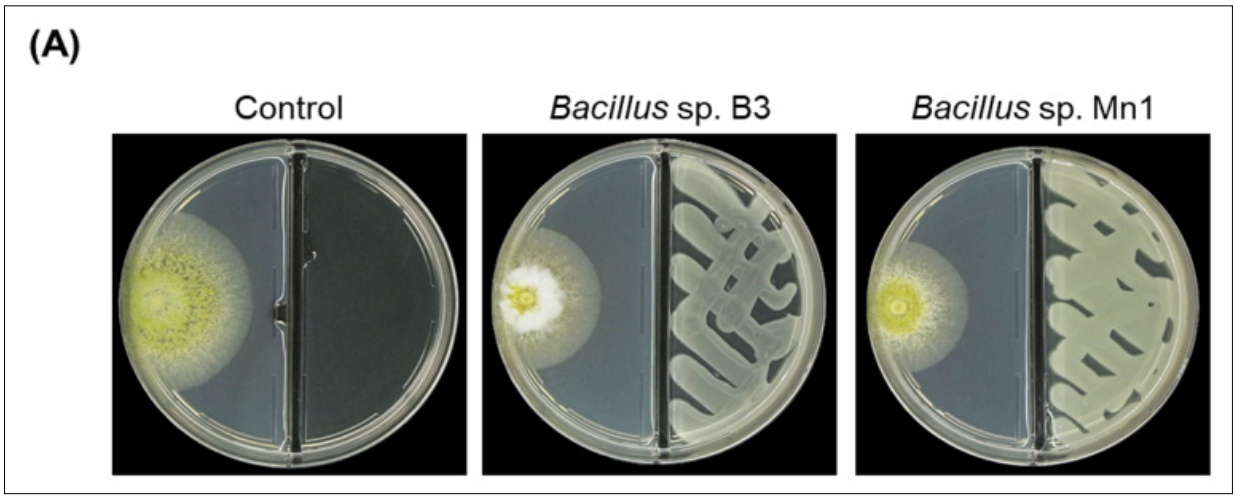
The Effect of Essential Oil from White Wormwood, *Artemisia herba alba* on Black Bean Aphid, *Aphis fabae* and Green Peach Aphid, *Myzus persicae*. This study was conducted on the white wormwood plant *Artemisia herba alba* Asso growing in Algeria. Hydrodistillation yielded an extract of 1.5%. Chemical analysis of the essential oils, using gas chromatography-mass spectrometry (GC-MS), revealed a chemical profile rich in diverse compounds. The primary constituents obtained were: Camphor (26.51%), Chrysanthenone (25.49%), 1,8-Cineole (8.08%), Thujone (6.77%), and Δ-3-Carene (5.03%). The essential oil of white wormwood demonstrated high efficacy in controlling aphids, with lethal concentration values of LC_{50} = 0.68 µL/ml against *Myzus persicae* and LC_{50} = 0.77 µL/ml against *Aphis fabae*. Statistical analysis of the data obtained indicated significant differences between the concentrations used during the first 24 hours of exposure. The results obtained from this study provide an effective and natural solution for aphid control. This contribution significantly promotes sustainable agriculture and mitigates the adverse effects of chemical pesticides on both the environment and human health. [**Nouichi, A., S. Chibani, S. Nouichi, M. Boukabache, A. Othmani and N. Marhoun (Algeria),** Arab Journal of Plant Protection, 43(4):547-551, 2025]. https://doi.org/10.22268/AJPP-001348

Egypt

Biocontrol of *Aspergillus flavus* in stored wheat using *Bacillus* sp. B3 and *Bacillus* sp. Mn1 with antagonistic capacity through volatile compounds production

Background Contamination of stored wheat grains by *Aspergillus flavus* poses serious food safety risks due to aflatoxin production. This study aimed to identify and evaluate wheat-associated bacterial isolates for their potential to biologically control *A. flavus*. Two promising strains, *Bacillus* sp. B3 and *Bacillus* sp. Mn1, were selected based on a strong antifungal activity against *A. flavus*, on dual culture assays.

Results Dual-culture and co-cultivation assays confirmed that both strains significantly inhibited *A. flavus* mycelial growth and sporulation. Additionally, both strains exhibited facultative mycophagy, utilizing fungal biomass under nutrient-limited conditions. Volatile organic compounds (VOCs) produced by these bacteria suppressed fungal growth in vitro and on wheat grains without direct contact. Gas chromatography–mass spectrometry (GC–MS) profiling revealed that *Bacillus* sp. B3 primarily emitted nitrogenous and oxime-related compounds, while *Bacillus* sp. Mn1 produced diverse volatiles including fatty acids, hydrazine derivatives, and trigonelline. Both strains significantly reduced fungal colonization on treated grains. The strains were characterized through 16 S rRNA gene sequencing, alongside biochemical and enzymatic profiling, to aid taxonomic placement and provide insight into their functional potential Conclusion *Bacillus* sp. B3 and Mn1 demonstrated robust antifungal potential through multiple antagonistic mechanisms including diffusible metabolites, mycophagy, and VOC-mediated inhibition. These findings support their use as sustainable, residue-free biocontrol agents to mitigate *A. flavus* contamination and enhance the safety of stored wheat. **[Hussien M. AboDalam, Mona Mahmoud Maher Ragab, Marwa Abd-Elateef Zayton, Mohamed Mannaa,** Egypt J Biol Pest Control 36, 7,2026]. https://doi.org/10.1186/s41938-025-00880-1]



The Impact of Pressurized CO_2 and N_2 Gases on the Various Developmental Stages of *Ephestia cautella* and *Oryzaephilus surinamensis* Store Insects.

The purpose of this study was to assess the impact of pressurized CO_2 and N_2 on the various stages of two well-known insect species found in storage, namely, *Ephestia cautella* (Walker) and *Oryzaephilus surinamensis* (L.).The insects were subjected to three different levels of pressurized gas (2, 4, and 6 Kg/cm2) in a metal gas cylinder

over a period of two days at a room temperature of around 30˚C. The results suggested that CO2 was significantly more effective than N2. The egg stage of both insect species exhibited the greatest tolerance, whereas the adult stage displayed the highest sensitivity to both gases, regardless of pressure level.

It was observed that insect mortality increased as the pressure level of gas increased, with the highest mortality rates recorded at the highest gas pressure (6 kg/cm^2). Additionally, certain biochemical parameters were analyzed in adults of *O. surinamensis* that were exposed to 6 kg/cm^2 of CO_2 pressure for 2 days. [**Amin, M.Y., E.L. Ayad and M.M.I. Aamir**. Arab Journal of Plant Protection, 43(4):480-487,2025]. https://doi.org/10.22268/AJPP-001351

Efficiency of Mixing Methyl Eugenol and Trimedlure to Attract Peach Fruit Fly, Bactrocera zonata, and the Mediterranean Fruit Fly, Ceratitis capitata Males under Field Conditions in Egypt.

Detection and control of the peach fruit fly, *Bactrocera zonata* (Saunders), and the Mediterranean fruit fly, Ceratitis capitata (Wiedmann), depend mainly on two male lures, methyl eugenol and trimedlure, which are used individually in separate traps. This study was carried out under field conditions in three governorates in Egypt: Kafer –El Sheikh, Sharqia and Ismailia to investigate the effect of mixing methyl eugenol and trimedlure in a single trap on the mean number of attracted male flies of *B. zonata* and *C. capitata* as compared to the same lures individually in separate traps. The study investigated also the effect of different concentrations (1, 2 and 3%) of ammonium acetate traps as well as the effect of different times of inspection and different locations of these two types of traps inside the orchards on the mean number of attracted flies. The results obtained showed that in the three governorates there was no significant difference in mean number of *B. zonata* male flies attracted to single methyl eugenol (9.86 male flies/trap/week) and those attracted to that mixed with trimedlure (10.16 male flies/trap/week). In case of *C. capitata*, in Kafer –El sheikh and Ismailia governorates, there was no significant differences in mean number of attracted male flies between the single trimedlure trap (9.09 and 6.11 male flies/trap/week) and the mixture of it with methyl eugenol (8.11 and 5.63 male flies/trap/week) for the two governorates, respectively.

There were no significant differences found between the three concentrations 1, 2 and 3% of ammonium acetate traps in the mean number of attracted flies of the two insects among the three tested governorates. Time of inspection for each tested orchard had a high significant effect on the mean number of attracted *B. zonata* and *C. capitata* male flies with both single and mixed lures and also on the mean number of the two insect flies captured by Ammonium acetate traps. The study also showed that there were no significant differences between the three locations of the tested traps inside all orchards in the mean number of male flies of the two insects attracted by the single lures or the mixture of them or by Ammonium acetate traps. Based on the results obtained, it can be concluded that using the mixture of methyl eugenol and trimedlure as a single lure in a single trap as a practical alternative to each of them alone in two separate traps should be considered, and this will have positive economic impact on the control of these insects. [**Morsi, Gh.M.A. and S.R.M. Farag (Egypt),** Arab Journal of Plant Protection, 43(4):488-493, 2025]. https://doi.org/10.22268/AJPP-001349

Cost Benefit Analysis of Red Palm Weevil, *Rhynchophorus ferrugineus* Control in Date Palm Trees Farms at Sharkia Governorate, Egypt.

The red palm weevil, RPW, *Rhynchophorus ferrugineus* (Olivier) is considered a dangerous palm pest in Egypt. Field trials were conducted at new Selhia district, Sharkia Governorate, Egypt during two seasons, 2022/2023 and 2023/2024. Results obtained showed that the palm trees infestation rate reached 17.95 and 19.44% in farm 1, 26.28 and 23.33% in farm 2; 28.84 and 26.11% in farm 3, in the two seasons, respectively. Whereas, the infestation rate reached 26.92 and 31.11% in the control farm without mass trapping of adult weevils, in the two seasons, respectively. The infestation rate with RPW increased from 46.42% in the 2022/2023 season to 53.57 % in the 2023/2024 season. Statistical analysis showed a highly positive significant difference between RPW infestation rate in date palm trees in farms with pheromone traps and the infestation rate in the control farm (without pheromone traps). Statistical analysis of date palm yield showed no significant difference between low and moderate weevil infestation in the two growing seasons. Generally used mass pheromone traps in IPM to control RPW, considered as a dangerous date palm pest in Egypt. [**Arafa, O.E. and M. M. AbdulHafiz (Egypt),** Arab Journal of Plant Protection, 43(4):494-500,2025]. https://doi.org/10.22268/AJPP-001354

Field Evaluation of Attraction Efficiency of Some Food-Olfactory Attractant Mixtures and Mass Trapping Technique Compared to Partial Spray for Controlling *Ceratitis capitata* in Orange Orchards.

The Mediterranean fruit fly, *Ceratitis capitata* (Wiedemann), is one of the most destructive fruit pests in the world, especially on economical crops such as oranges. This study was carried out to evaluate the attraction efficiency of food-olfactory combined with food attractants as well as the mass trapping technique on the reduction rate of *C. capitata* adults population. The food attractant Buminal (Bu) and two olfactory compounds, diammonium phosphate (DAP) and ammonium acetate (AA) were used and compared to a partial spray in a citrus orchard located in El-Gharbia governorate, Egypt. The results obtained showed that all tested mixtures had more attraction efficiency than the other tested compounds alone. The mixture solution of Bu + DAP + AA at a ratio of 1:1:1 significantly attracted the highest average numbers of *C. capitata* adults throughout the four weeks of investigation compared to other tested compounds. The tested mixture and DAP, Bu, and AA alone trapped 8.64, 1.83, 1.78, and 0.61 flies per trap per day, respectively. Thus, this mixture was evaluated as a mass trapping technique comparable to a partial spray. The partial spray treatment was significantly different compared to mass trapping, showing a reduction of 56.71 and 24.60%, respectively. [**El-Shabrawy, H.A., F.A.A. Badr, T.M. Amara and M.H. Naro. (Egypt),** Arab Journal of Plant Protection, 43(4):541-546, 2025]. https://doi.org/10.22268/AJPP-001353

Integrative Multi-transcriptomic Analysis uncovers Core Genes and Potential Defense Mechanisms in Rice-*Magnoporthe Oryzae* Interaction.

Multiple transcriptomic comprehensive analyses highlight key genes and cast new light on multifaceted pathways that may be important arenas in rice innate immunity against Magnoporthe oryzae blast disease. Magnaporthe oryzae (MOR) poses a significant

threat to rice production worldwide. However, defense mechanisms in rice against MOR remain inadequately defined. In this study, a multi-transcriptomic integrative analysis on 441 samples from diverse microarrays and RNA-seq sets was conducted to reveal critical factors in rice defense against MOR infection. A robust pattern of 3534 upregulated genes and 2920 repressed genes was commonly identified across all MOR-infected arrays and RNA-seq profiles. Interestingly, enrichment analysis revealed a consistent triggering of endoplasmic reticulum (ER)-related mechanisms and citric acid cycle (TCA) influx in rice response to MOR infection across all the transcriptome profiles, suggesting their critical role in modulating rice immunity against the pathogen. By contrast, chloroplast and photosynthesis pathways were frequently repressed across all the profiles. Among ER-related mechanisms, the phagosome pathway involved in the activation of NADPH oxidase was highly triggered in early response to MOR infection. Moreover, WGCNA analysis highlighted four key co-expressed gene modules and 80 significant hub genes associated with MOR infection. Among the core genes, Sec61 gene involved in the ER-translocation process was identified along with OsMFP (peroxisomal oxidation gene) and OSAHH gene (involved in cyclic-trans-methylation). Furthermore, MPK6, WRKY24, NUP35, and NPR1 genes were observed as core co-expressed genes, suggesting their significance in regulating rice immunity against MOR. Our findings elucidate key genes and multifaceted mechanisms in rice-MOR interaction, proposing new informative clues that can be exploited to improve rice resistance against blast disease. **[Fatma Salem (Egypt), Ahmed ElGamal, Zujian Zhang, Weiwen Kong.Plants Cell Reports** PMID: 40332586, May 7;44(6):114.2025. DOI: 10.1007/s00299-025-03490-1

Transcriptional Dynamics of Receptor-Based Genes Reveal Immunity Hubs in Rice Response to *Magnaporthe oryzae* Infection

Rice blast caused by *Magnaporthe oryzae* (MOR) reigns as the top-most devastating disease affecting global rice production. Pattern-triggered immunity (PTI) is crucial for mitigating plant responses to pathogens. However, the transcriptional dynamics of PTI-related genes in rice response to MOR infection remain largely unexplored. In this study, we performed a meta-analysis of 201 RNA sequencing and 217 microarray datasets to investigate the transcriptional dynamics of rice under MOR infection at various infection stages. The transcriptional dynamics of extracellular/cytoplasmic receptor kinase genes (*RLKs*,*RLCKs*, *WAKs*) and downstream signaling intermediates, including mitogen-activated protein kinases (MAPKs) and Ca2+-related signaling genes, were identified as immunity hubs for PTI. Extracellular/cytoplasmic receptors were predominantly induced, in contrast to a marked decrease in the repression of these genes. Notably, a maximum of 141 and 154 receptor-based genes were frequently induced from the microarray and RNA-seq datasets, respectively. Moreover, 31 genes were consistently induced across all the transcriptomic profiles, highlighting their pivotal role in PTI-activating immunity regulation in rice under MOR stress. Furthermore, protein–protein interaction (PPI) analysis revealed that cytoplasmic receptor-based genes (RLCKs) and MAPK(K)s were highly interconnected. Among them, four core *MAPKK* genes, including *SMG1*, *MKK1*, *MKK6*, and *MPKK10.2*, were identified as the most frequently interconnected with receptor-based genes or other MAPKs under MOR infection, suggesting their critical role as intermediates during downstream signaling networks in response to MOR infection. Together, our comprehensive analysis provides insights

into the transcriptional dynamics of receptor-based genes and downstream signaling intermediates as core PTI-related genes that can play crucial roles in modulating rice immune responses to MOR infection. **[Fatma Salem(Egypt), Ahmed ElGamal, Xiaoya Tang, Jianyuan Yang and Weiwen Kong,** International Journal of Molecular Sciences, 26(10), 4618, 2025]. https://doi.org/10.3390/ijms26104618

Relative Abundance and Nest System of Subterranean Termite, *Psammotermes assuanesis* (Sjostedt) (Rhinotermitidae: Isoptera) in Al-Kobanea Region, Aswan Governorate, Egypt.

The population activity of *Psammotermes assuanesis* (Sjostedt) steadily increased from January, reaching its maximum of 4.994 individuals representing 21.60% in March. Subsequently, it saw a significant decline throughout the ramming months. The population activity increased again in September and November and decreased again in December. The mean percentages of various caste compositions were73.76 % workers, 18.84% nymphs,5.18% soldiers, and 2.20% winged adults. The nest extends up to 300 cm. The rooms connected them below the surface of the soil and consist of four layers. The first layer, which is about 70-90 cm, contains a large number of rooms with flat ceilings, and these rooms are used to store food, which consists of a mixture of dry herbs. The second layer, which is about 90-150 cm from the surface of the ground, is occupied by nymphs and winged individuals and a few soldiers. The third layer is 150-230cm. below the roof, it contains a few flat rooms, and these are occupied by nymphs whose ages range from the first to the third. The fourth fact is from 230-300cm. Ask the roof, and it has a number of chambers. This layer is spherical, and its inner diameter ranges from 10 to 15 cm. difficult nymphs occupy it in their first slit as well asworkers. The total population of a nest was 5312 individuals, and the total number of workers was 4332, representing 81.55 % of the total population of a nest. [**Hassan M.A. Ali* and Olfat E. Arafa (Egypt),** Plant Prot. Res. Inst., Agric. Res. Center, Dokki, Giza, Egypt, Zagazig J. Agric. Res., Vol. 53 No. (1) 25-34, 2026]. DOI: 10.21608/zjar.2026.489538

Iraq

Fungi Associated with the Infestation of the Jujube Tree by the Insect Borer, *Lampetis mimosa*.

Jujube trees are becoming economically important in Iraq, and their commercial cultivation is expanding fast in the southern regions of the country. This tree is affected by various biotic and abiotic factors, including insect pests and pathogens.

The aim of this study was to isolate and identify the fungi associated with the flathead borer *Lampetis mimosae*. The results of the study concluded that 12 species of fungi belonging to seven genera were recorded, namely *Aspergillus niger, Aspergillus terreus, and Aspergillus* sp. *Aspergillus soja, Acremonium fusidioides, Acremonium kiliense, Alternaria alternata, Humicola grisea, Fusarium equiseti, Fusarium semitectum, Scolpulariopsis acremonium, Verticillium lecanii*. The highest occurrence and frequency were that of *Aspergillus niger* and *Alternaria alternata*, and the lowest of *Scolpulariopsis acremonium* and *Verticillium lecanii*. This study contributes to understanding the interaction between the flathead borer and its associated fungi in causing damage to the huhuba trees, with more in-depth studies needed in the

future to better understand this association. [**Hussein, E.M., Sh.F. Abd El-Sayed and M.A.A.W. El-Atby (Iraq),** Arab Journal of Plant Protection, 43(4): 439-445, 2025]. https://doi.org/10.22268/AJPP-001346

Isolation and Identification of Fungi Associated with Leaf Spot Disease of Some Ornamental Plants in Misan, Iraq.

The infection rate (%) of leaf spot disease on some ornamental plants grown in five nurseries from different locations in Misan province, Iraq named *Bougainvillea spectabilis, Catharanthus roseus, Kalanchoe blossfeldiana, Lantana camara* and *Rosa damascene* was evaluated. *Kalanchoe blossfeldiana* had the highest infection rate (79.4%), whereas *Lantana camara* had the lowest infection rate (57.28%). 30 fungal species belonging to 13 genera were isolated and identified. *Alternaria alternata* was isolated from *Bougainvillea spectabilis*, *Kalanchoe blossfeldiana* and *Rosa damascene* with relatively high frequency and occurrence rates of 6.1 and 12.5%, respectively, whereas *Scopulariopsis brevicaulis* isolated from *Kalanchoe blossfeldiana* and *Rosa damascene* had the lowest frequency and occurrence rate of 1.0 and 0.7%, respectively. Ten fungal species belonging to six genera were isolated and identified from the nursery soils in which these plants were grown, and the fungus *Alternaria alternata* recorded the highest frequency and occurrence rates of 12.8 and 20%, respectively, followed by *Rhizoctonia solani* with frequency and occurrence rates of 11.4 and 17.7%, respectively. However, *Rhizopus stolonifer* had the lowest frequency and occurrence rates of 2.8 and 4.4%, respectively. In addition, seven species of fungi belonging to five genera were isolated and identified from the air of the same nurseries. *Aspergillus niger* recorded the highest frequency and occurrence rates of 16.6 and 32%, respectively, followed by *Alternaria alternata* with frequency and occurrence percentages of 12.5 and 24%, respectively, whereas *Mucor racemosus* recorded the lowest frequency and occurrence rates of 4.1 and 8%, respectively. [**Madhi, Q.H., Y.A. Saleh and A.M. Jasem(Iraq**), Arab Journal of Plant Protection, 43(4): 446-452, 2025]. https://doi.org/10.22268/AJPP-001345

Effect of Biological Characteristics of Two Species of *Trichogramma* on the Eggs of Lesser Date Moth, *Batrachedra amydraula* Treated with *Lawsonia inermis* Plant Extract.

This study aimed to evaluate the effects of treated and untreated *Batrachedra amydraula* Meyrick eggs with *Lawsonia inermis* (henna) on the parasitism rate, adult emergence rate, number of females, and adult longevity of two parasitoids, *Trichogramma brassicae* Bezdenko and *Trichogramma. evanescens* Westwood (Hymenoptera: Trichogrammatidae). The results obtained revealed that there were noticeable differences regarding the parasitism rate of the *Trichogramma* species. *T. brassicae* had the greatest parasitism rate (63%) on untreated *B. amydraula* eggs. However, when the eggs were treated with plant extract and water separately, the highest mortality rates caused by *T. evanescens* were 37.01 and 39.83%, by the two treatments, respectively. In addition, *T. brassicae* greatly outperformed the second species in terms of adult emergence rates when plant extract was not used to raise the larvae of *B. amydraula* 69.88%, followed by *T. evanescens* 65.02%. Compared to the other species, *T. brassicae* had a higher proportion of females. Additionally, *T.*

brassicae lived longer compared to *T. evanescens* reaching 6.05 days. As far as we know, this is the first report investigating the ability of *T. brasicae* to biologically manage *B. amydraula* and reduce its population without the use of harmful pesticides. The results of the present study indicated that the use of *Trichogramma brassicae* and *T. evanescens* with *Lawsonia inermis* (henna) does not have a significant effect on the biological properties of *Trichogramma* when treated on *B. amydraula*. **[Al-Saedi, G.F. and R.M.A. Alasadi (Iraq),** Arab Journal of Plant Protection, 43(4):517-521, 2025]. https://doi.org/10.22268/AJPP-001356

Evaluation of the Efficiency of the Bio-Pesticides Oxymatrine, Palizin, Tondexir and the Cold and Hot Water Extract of *Moringa oleifera* leaves Against the Adults and Second Larval Stage of the Red Rusty Flour Beetle, *Tribolium castaneum* Under Laboratory Conditions

A laboratory study was conducted to evaluate the efficiency of some bio-pesticides Oxymatrine, Tondexir, Palizin and cold and hot aqueous extracts of *Moringa oleifera* leaves against the second larval stage and adult stage of the red rusty flour beetle (Herbst) *Tribolium castaneum* under laboratory conditions. The results obtained indicated that Oxymatrine at a concentration of 2.5 ml/L produced the highest mortality rate of the adult stage and the second larval stage at 76.70 and 85.30%, respectively, compared to Tondexir and Palizin at a concentration of 4 ml/L, which achieved average mortality rates of 31.3 and 80.7%; 25.33 and 77.33%, respectively, 9 days after treatment. Results obtained showed that the hot water extract of *M. oleifera* leaves was more effective at a concentration of 5000 ppm, and achieved the highest mortality rate of the adult stage of 53.33%, 9 days after treatment, compared to the cold water extract, which produced a mortality rate of 43.33% at the same concentration and after the same period of time. Likewise, the hot water extract outperformed the cold water extract in causing the highest mortality rate in the second larval stage at the same previous concentration, reaching 100% and 86.7%, respectively, 9 days after treatment.[**Eesa, A.T. and M.T.M. Ali.(Iraq),** Arab Journal of Plant Protection, 43(4):534-540, 2025]. . https://doi.org/10.22268/AJPP-001358

The Use of the Filtrate of the Fungus *Beauvaria bassiana* and the Growth Regulator Match to Control of the Beetle *Oryzaephillus surinamensis*.

The insect saw-toothed grain beetle is one of the most important pests of insect stores in most parts of the world. This study aimed to evaluate the effectiveness of the growth regulator match and the fungus B. *bassiana* leachate in controlling different insect species in the laboratory. Using three concentrations of the growth regulator (0.25, 0.50 and 0.75 ml/100 ml), and the fungal filtrate (50, 75 and 100 ml), against the second, fourth, and adult larval stages of the insect. The results obtained showed that the growth regulator caused the highest mortality rate of the second larval stage of the insect (93.3%), 7 days after treatment with a concentration of 0.75 ml/100 ml. The results also showed that the fungal leachate gave the highest mortality rate of the second larval stage (70%), 7 days after treatment with a concentration of 100%. These encouraging laboratory results will be followed by in-store tests in the near future. [**Rashed, Y.D., M.A. Hasoon and L.A. Atshan (Iraq**), Arab Journal of Plant Protection, 43(4):522-526, 2025]. https://doi.org/10.22268/AJPP-001352

Cheatomum globousum Promotes Tomato Growth and Induces Systemic Resistance Against Tobacco Mosaic Virus.

Endophytic fungi are being explored as a promising approach for sustainable disease management. This study investigated the potential of *Cheatomum globosum*, an endophytic fungus, to enhance systemic disease resistance against tobacco mosaic virus (TMV) in tomato plants. Seedling root immersion with *C. globosum* culture filtrate under controlled greenhouse conditions resulted in several positive effects on plant growth. These included increased plant height (55.03 cm) and primary root length (14.56 cm), along with increased fresh (7.54 and 4.75 g) and dry (3.21 and 2.05 g) weight of both the aerial and root systems, respectively. Additionally, treated plants exhibited significantly higher total chlorophyll content (3.98 mg/1 g fresh weight), indicating improved photosynthetic potential. Furthermore, the activity of catalase (91.13 units g^{-1} ml^{-1} min^{-1}) and peroxidase (4.09 units g^{-1} ml^{-1} min^{-1}) enzymes, crucial for scavenging harmful reactive oxygen species, was significantly elevated compared to the untreated control group. Most importantly, *C. globosum* treatment led to a significant reduction in TMV accumulation within systemically infected leaves (disease severity index = 0.81%). These findings collectively suggest that *C. globosum* holds promise as a dual-purpose agent, promoting plant growth and at the same time acting as a potential biocontrol tool for combating plant viral diseases. [**Matrood, A.A., A. Rhouma, M.A. Al Waeli, W. Anwar and L. Hajji-Hedfi (Iraq**), Arab Journal of Plant Protection, 43(4):570-576. 2025]. https://doi.org/10.22268/AJPP-001360

Effect of Some Essential Oils on the Repellence Behavior of the Peach Fruit Fly, *Bactrocera zonata* (Saunders).

The peach fruit fly, *Bactrocera zonata* (Saunders), is a major pest of the Tephritidae family, causing significant economic damage globally. Native to India, where it was first recorded in Kashmir, B. zonata has since spread to various regions, particularly Asia and the Mediterranean, affecting many crops, including peach, custard apple, guava, mango, and citrus. Infestations result in fruit damage, premature fruit drop, and the imposition of quarantine restrictions that disrupt export markets. As resistance to chemical pesticides continues to rise, the need for alternative pest control methods becomes increasingly urgent. Plant-derived insecticides are emerging as an eco-friendly and sustainable solution for pest management, as they effectively control pest populations while posing minimal risks to non-target organisms. In this study, a behavioral bioassay was performed using Petri dishes to evaluate the behavioral response to three essential oils, namely limonene, thymol, and methyl salicylate, of B. zonata adult females over four intervals of 15, 30, 45, and 60 minutes. The results revealed that methyl salicylate exhibited consistent repellent effects across all time intervals. In contrast, thymol showed repellent effects only after 60 minutes, while no significant differences were observed with limonene. In the field, essential oil formulations reduced the population density of B. zonata on citrus fruits. These findings highlight the ecological potential of methyl salicylate as a promising, eco-friendly pest control agent.[**Mohammed, T. A., Ahmed, Q., and Arif, M.A. (Iraq),** Department of Plant Protection, College of Agricultural Engineering Sciences, University of Baghdad, Plant Protection Directorate, Ministry of Agriculture, Abu-Ghraib. **Anbar Journal of Agricultural Sciences, 24(1): 242–255,2026]** https://doi.org/10.32649/ajas.2026.191239

Lebanon

Empowering Farmers and Youth with Knowledge to Strengthen Legume Viruses and Fall Armyworm Management in Lebanon.

Two field days were held at the Qob Elias site of the Plant Health Innovation Platform (PHI-IP) in Lebanon. The events were attended by around 50 farmers and youth who were trained to improve their knowledge and skills in managing legume viruses, legume aphids, and the fall armyworm (*Spodoptera frugiperda*) on summer-planted maize. Farmer participants were selected by village-level extension staff based on key criteria, including educational background, commitment, initiatives, age, and gender diversity. Regarding integrated management of legume viruses, the trainees observed that infection rates were lower in plots treated seeds compared to untreated seeds. Besides, the fall armyworm, which is an invasive pest, poses a significant threat to irrigated summer maize production in Lebanon and other countries in West Asia and North Africa, endangering food security and farmers' incomes. During the field day, the results of applied research on the effectiveness of pheromone trap-based insecticides in controlling FAW infesting summer maize were presented and discussed. The IPM approach significantly reduced FAW damage, achieving unobservable infestation levels compared to neighboring farmers employing traditional methods. **[Safaa G. Kumari[1], Elia Choueiri[2], and Abdelrahman Moukahel[1].** [1]Seed Health Lab. International Center for Agricultural Research in the Dry Areas (ICARDA), Terbol Station, Zahle, Lebanon; [2]Department of Plant Protection, Lebanese Agricultural Research Institute, Tal Amara, Lebanon]

Jordan

Green-Synthesized Silver Nanoparticles as Antifungal Agents against Tomato Vascular Wilt.

Tomato (*Solanum lycopersicum*) is a globally important crop that faces significant yield losses due to vascular wilt caused by *Fusarium oxysporum* f.sp. *lycopersici* (FOL), a persistent soil-borne pathogen.Conventional chemical fungicides used to combat this disease often pose environmental hazards and contribute to pathogen resistance, highlighting the urgent need for sustainable alternatives. This study aimed to explore the antifungal potential of silver nanoparticles (AgNPs) synthesized through a green approach using aqueous leaf extracts from *Eriobotrya japonica*, *Ficus carica* and *Olea europaea*. The synthesized AgNPs were characterized by X-ray Diffraction (XRD), UV-Visible Spectroscopy (UV-Vis), Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS). AgNPs that are synthesized from *E. japonica* were tested through both laboratory assays and greenhouse trials to assess their inhibitory effects on FOL growth and disease progression. Results demonstrated that AgNPs significantly suppressed fungal development. Treated tomato plants exhibited reduced wilt symptoms compared to untreated controls. The application of green-synthesized AgNPs showed variable effects on the growth and development of tomato plants (cv.Dafnes) under greenhouse conditions. These findings highlight the potential of green-synthesized AgNPs as an eco-friendly and effective strategy for managing Fusarium wilt in tomato crops. By integrating green nanotechnology with plant disease management, this approach offers a promising alternative to chemical fungicides, contributing to sustainable agriculture and improved crop protection. [**Rebhi Darwazah, Nidá Salem, and Akl Awwad (Jordan),** International Journal of Agriculture and Biosciences, 15(2): 772-781, 2026]. https://doi.org/10.47278/journal.ijab/2025.226

Libya

Survey and Identity of the Common Weeds Distributed in Agricultural Fields in Benghazi Plain, Libya.

This study aimed to survey and identify the common weeds distributed in agricultural fields in the Benghazi Plain region and to assess the weed density in order to develop a database about the distributed species and help specialists develop an appropriate weed control program for the region. In this study, 116 weed species were collected, belonging to 97 genera represented in 40 plant families. All of these species belong to the angiosperms, including 99 species of dicotyledons distributed into 34 families. There were 17 species of monocotyledons distributed into six families. According to the number of species for each genus, the genus Euphorbia contained six plant species. The most represented plant family was the Asteraceae, which contained 18 plant species, followed by the Poaceae family, with 10 plant species.The results obtained also showed a diversity in the forms of plant species in the study area were included 11 species (9.48%) of Phanerophytes, 23 species (19.82%) of Chamaephytes, 13 species (11.21%) of Cryptophytes, and 8 species (6.90%) of Hemicryptophytes, whereas the annual plants (Therophytes) were the most common with 61 species (52.59%). As for weed density, results showed that the species *Avena fatua* had the highest density in the study area. [**Al-Maksaby, F.M., S.S.S. Abd El-Galil and A.H.Kh. Alzerbi (Libya),** Arab Journal of Plant Protection, 43(4):464-471. 2025] .https://doi.org/10.22268/AJPP-001343

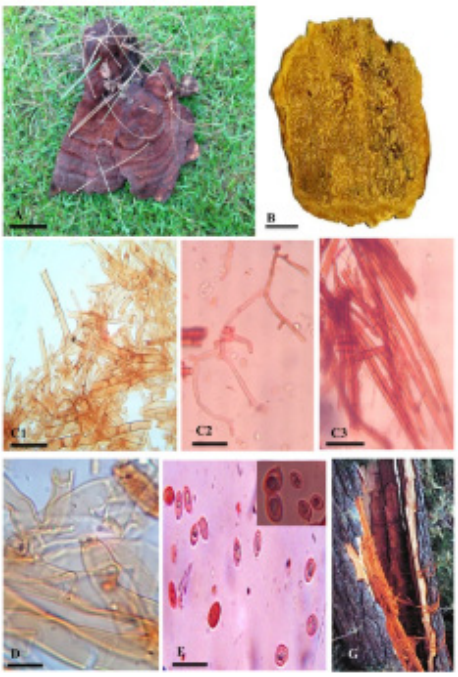
Morocco

Management of Thrips Species in Citrus Groves in the Marrakech Region: Exploring Control Methods as Alternatives to Chemical Methods.

Thrips, which historically caused minimal damage to Moroccan citrus orchards, have become a significant concern since 2018. A study was conducted from March to July 2021 in a citrus orchard in the Marrakech region and aimed to identify thrips species and natural enemies, monitor population dynamics, and evaluate alternative control methods. Two trials were conducted on the effect of several products on thrips species in the citrus orchards; the first one (chemical trial) where Flonicamib, Spirotetramat, Formetanate, Acetamiprid, Cyantraniliprole, and Abamectine were assessed, the second trial (biological control), Pyrethrum, Neem oil, *Beauveria bassiana*, a mixture of Azadirachtin and paraffinic mineral oil, a mixture of Pyrethrum and neem oil, and a mixture Pyrethrum and azadirachtin were evaluated. Six thrips species were recorded: *Frankliniella occidentalis*, *Thrips tabaci*, *Pezothrips kellyanus*, *Scirtothrips* sp., *Aeolothrips* sp., and *Haplothrips* sp. Population peaks varied by citrus variety, with adult thrips reaching their highest levels during petal fall for clementine Nules (4 ± 1 individuals/beating) and during summer shoot growth for mandarin Afourer (8.8 ± 1 individuals/beating), while larval populations peaked 10 days later on Nules but remained low on Afourer. Four predatory; *Coccinella septempunctata*, *Orius* sp., *Chrysoperla carnea*, and *Aeolothrips* sp. were found on citrus trees and their population peaked during petal fall. Formetanate showing the highest efficacy (88.7% after 3 days), while Spirotetramat was less effective to control thrips species. *Beauveria bassiana* and the mixture of Azadirachtin and paraffinic mineral oil were two treatments that showed the highest significant efficacy (75.9% and 78.82 %, respectively, after two weeks). These findings underscore the increasing threat of thrips species in commercial Moroccan citrus orchards and highlight the potential of integrated pest management strategies that combine chemical and biological control for sustainable thrips management. [**Khallou, A., Smaili, M.C., Mennani, M., Haddad, N., Kokiçi, H., and Boutaleb-Joutei, A. (Morocco, Albania), Tunisian Journal of Plant Protection 20 (2): 97-116, 2025]**. https://dx.doi.org/10.4314/tjpp.v20i2.6

Saudia Arabia

Phaeolus neoschweinitzii sp. nov. Causing Dieback of *Pinus wallichiana*.



The genus *Phaeolus* has a cosmopolitan distribution and includes several brown rot fungi capable of causing damaging by tree diseases. Some of them are also regarded important for the formulation of pharmaceutical, biotechnological and food products. This paper describes a new species of *Phaeolus* named *Phaeolus neoschweinitzii* sp. nov. with striking morphological similarities to *Phaeolus schweinitzii*. Fruiting bodies of *P. neoschweinitzii* sp. nov. were attached to the base and to the lower parts of the trunks of *Pinus wallichiana*. The new species, although morphologically similar to *P. schweinitzii*. is characterized by a unique DNA sequence of the internal transcribed spacer (ITS) regions, by sessile basidiomata, ellipsoid to oval-shaped basidiospores (5–6.8 × 3.1–4.5 µm), and by a brown non-laccate pileal surface with blackish-brown margin. The new species is a close relative of the Eurasian *P. schweinitzii* and like its relative, it causes significant disease of pine trees, by infecting and causing a brown cubicle rot in root systems and butts of living trees as well as in stumps [**Aisha Umar, Abdullah Ahmed Al-Ghamdi, Fuad Ameen, Kholoud K. Alzahrani, Matteo Garbelotto and Laurent Dufossé,** Journal of Plant Pathology, 2026]. https://doi.org/10.14295/oh.v24i2.1199

Syria

Geographical Distribution and Population Density of the Citrus Nematode, *Tylenchulus semipenetrans* in Soil Samples from the Syrian Coastal Region and Its Relationship to Citrus Varieties and Some Soil Characteristics.

Citrus fruits are one of the main crops in Syria, and their cultivation is mainly concentrated on the Syrian coast region. Citrus nematode *Tylenchulus semipenetrans* is one of the main pathogens that threaten citrus cultivation. There is no recent data available on the spread of citrus nematode along the Syrian coast or assessment of the factors affecting its population density. The preset study aimed to determine the geographical spread and population density of citrus nematode communities in soil samples of different citrus growing sites in the governorates of Latakia and Tartous; and determine the role of citrus varieties and some physical and chemical soil characteristics in the spread of these nematodes and the density of their communities. 150 soil samples were collected from 35 orchards along the Syrian coast (111 samples from Latakia governorate and 39 samples from Tartous Governorate), during the period extending from October 2021 to December 2022. The results obtained showed that *T. semipenetrans* is widely distributed along the Syrian coast, as the prevalence rate reached 91.39%, with a greater prevalence in Tartous governorate (100%) compared to Latakia Governorate (89.18%), and with a higher population density. The results

obtained also showed that the highest nematodes population density was recorded on the Al-Mawardi and Al-Mayer varieties (average number of 6,022 nematodes/250 ml soil and 5,640 nematodes/250 ml soil, respectively), and the lowest value was recorded on the Al-Yafawi variety (232 nematodes/250 ml soil) and Al-Youssoufi variety (534 nematodes/250 ml soil). Multivariate statistical analysis (Co-inertia method) showed that nematodes population density was related to some physical and chemical properties of the soil, such as texture, organic matter content, pH, and Electrical conductivity. The highest densities were found in silt soils with a high content of organic matter, an alkaline pH, and low salinity. Whereas low densities were found in sandy soils.

Data generated by this investigation represent up-to-date information on the spread of citrus nematodes in citrus orchards along the coastal region of Syria. They also shed light on some of the factors that enhance or reduce the citrus nematodes density, such as citrus varieties and physical and chemical soil characteristics. This data can be used in developing improved nematodes management programs for citrus orchards, especially in some locations and on some varieties where population densities are high and exceed the threshold for economic damage caused by nematodes. [**Ismail, Y.M., N. Ali and A. Boubou(Syria),** Arab Journal of Plant Protection, 43(4): 429-438. 2025]. https://doi.org/10.22268/AJPP-001359

Evaluation of the Efficacy of some Resistance Inducers in Protecting Tobacco Plants Against Downy Mildew Caused by the fungus *Peronospora hyoscyami* f. sp. *tabacina* and Their Role in Improving Production.

This study aimed to use the resistance inducer BTH, and two PGPR strains "*Bacillus subtillis* FZB27 and *Pseudomonas chlororaphis* Ma342" for enhancing resistance of two tobacco cultivars (Virginia and Shak Al-Bint) to artificial infection with *Peronospora hyoscyami* f. sp. *tabacina*, which causes the downy mildew disease. Plants treated with both BTH and MA342 bacteria together showed a significant superiority over all other treatments in stimulating plant growth indicators of Virginia tobacco variety treated in both the nursery and the field, and only in the nursery, where leaves weight and area increased 98.1, 81.3, 52.8 and 42.0%, respectively, compared to the untreated control.

Whereas, the same growth indicators of the local cultivar (Shak Al- Bint) plants treated with FZB27 in both the nursery and the field increased by 46.5 and 47.6%, however, such increase reached 29.1 and 29.4% for the plants treated in the nursery only, compared to the control. In both cultivars, the plants treated in both the nursery and the field showed a significant increase over the plants treated only in nursery. On the other hand, no symptoms were observed in the Virginia variety plants treated with BTH, BTH with MA342, BTH with FZB27 when treatment was carried out in the nursery and in the field. Furthermore, Virginia tobacco plants treated only in the nursery did not show any infection symptoms when treated with BTH, FZB27, or BTH + FZB27. Likewise, plants of the local cultivar (Shak Al- Bint) did not show any symptoms when treated with BTH, BTH + MA342 bacteria, BTH + FZB27 bacteria when treatment was made in both the nursery and the field. It is worth mentioning that the disease was not observed on the plants treated with BTH in the nursery. [**Mansour, H.A., W. Nafaa and A.M. Mouhanna (Syria),** Arab Journal of Plant Protection, 43(4):472-479, 2025]. https://doi.org/10.22268/AJPP-001361

Effect of Plant Growth Promoting Rhizobacteria in Inhibiting the Growth of *Botrytis cinerea in vitro*.

This study aimed to evaluate the effect of three species of plant growth-promoting rhizobacteria (PGPRs): *Frateuria aurantia, Rhizobium leguminosarum* and *Bacillus megaterium* on the growth of the fungus *Botrytis cinerea in vitro*. The antagonism effect between the bacterial isolates used and the volatile substances secreted in preventing the growth of the gray mold fungus, *Botrytis cinerea* was assessed on PDA medium. The results obtained showed that all bacterial species used were able to inhibit the growth of colonies of the fungus *Botrytis cinerea* by producing compounds in the medium or secreting volatile substances. The bacteria *Bacillus megaterium* achieved superiority in inhibiting significantly the growth of the fungus over the other bacterial species using the two approaches (antagonism with bacterial secretions directly in the medium, and with volatile products), where the diameter of the colony of the pathogenic fungus reached 1.3. and 2.6 cm, respectively, compared with 8.4 cm for the control, and the inhibition rate reached 84.5 and 69.0%, respectively. The results obtained confirmed the ability of the PGPR bacteria used in inhibiting the growth of the pathogenic fungus *Botrytis cinerea* and its potential to be used as a biological control component in the management of this fungus.[**Hammad, Y.A. and R.M. Al Shami (Syria),** Arab Journal of Plant Protection, 43(4):501-505, 2025]. https://doi.org/10.22268/AJPP-001362

Influence of Endophytic Colonization of Tomato Plants with Two Local Isolates of the Entomopathogenic Fungus *Beauveria bassiana* by using Three Different Inoculation Techniques, and their Effect in Controlling Tomato Leaf Miner Larvae, *Tuta absoluta* and on plant growth.

This study was conducted to evaluate the effect of the endophytic colonization of tomato plants with two local isolates of the entomopathogenic fungus *Beauveria bassiana* (Balsamo) Vuillemin, b8 isolate obtained from the pupa of the palm weevil, and b10 isolate, obtained from the soil of a citrus orchard in Latakia Governorate, Syria, and their effect on the growth of tomato plants and in controlling the tomato leaf miner *Tuta absoluta* (Meyrick) (Lepidoptera Gelechiidae) using three different inoculation techniques: foliar spray, stem injection and root dipping. The effects were assessed 15, 30, and 45 days after inoculation.

The results obtained showed that the ability of the two isolates (b8 and b10) of the fungus *B. bassiana* to colonize internally the leaves, stems and roots of tomato plants by using the three inoculation methods. However, the colonization rate (%) of tomato tissues differed according to the method of inoculation, the period after inoculation, and the isolate type. The highest colonization rate recorded by foliar spray technique and reached 100% 15 days after inoculation with the b8 isolate, and 85.19% at 30 days after inoculation with the b10 isolate by the stem injection technique, and 92.59% at 30 days after inoculation with the same isolate by root dipping technique. Leaves were the most colonized part of the plant at all evaluation dates (15, 30 and 45 days after inoculation), and by the three techniques.

The inoculation of tomato plants with b8 and b10 isolates of the fungus *B. bassiana* led to an increase in plant height as well as an increase in wet and dry weight compared with the control plants. The results showed a significant increase in the mortality rates

of tomato leaf miner larvae as a result of their feeding on leaves inoculated with the two isolates of the fungus *B. bassiana* (b8 and b10), and by the three inoculation techniques.

The recorded mortality rate of b8 isolate infection was 96.67% and 90% of b10 isolate infection, eight days after inoculation by the foliar spray technique. However, the recorded mortality rate by stem injection and root dipping techniques were relatively lower, 70 and 70% for b8 isolate and 56.67 and 53.33% for b10 isolate, by the two techniques, respectively. [**Haj Hasan, A., M. Ahmad, O. Hammoudi and M. Moflih(Syria),** Arab Journal of Plant Protection, 43(4):506-516, 2025]. https://doi.org/10.22268/AJPP-001350

Efficiency of Some Biological Treatments in the Control of Southern Root-Knot Nematode, *Meloidogyne incognita* on Tomatoes under Greenhouse Conditions in Syria.

Tomato, *Solanum lycopersicum* is one of the important vegetables in Syria due to its nutritional, economical, industrial and export values. It is produced throughout the year due to the moderate climate conditions in the coastal regions, where greenhouse cultivation is possible without heating. Root-knot nematode is the fifth most damaging disease in the world that infects tomatoes in greenhouses. In this research, the effect of the acetone extract of Oleander leaves, the seeds and fruits of *Storax officinalis*, Storax seed powder as a soil additive, and the bio-pesticide *Trichoderma*, were compared with the nematicide nemake-30 (Imicyafos 30%), on the vegetative growth of nematode-infected tomato plants and on the southern root-knot nematode (*Meloidogyne incognita*) infection in comparison with the healthy control and untreated infected control.

The best effect on vegetative growth of tomato plants was obtained from the oleander leaf extract treatment, as it caused an increase in all studied indicators compared to the untreated infected control. The average flower clusters, number of fruits, plant length, stem diameter, fruit weight, fresh shoot, root weight, and root length indicators were 5, 25, 162 cm, 5 cm, 533.3 g, 515 g, 137.7 g, and 56 cm, respectively, whereas the average values of the same indicators in the untreated infected control were: 4, 21.3, 130 cm, 2.7 cm, 223.3 g, 281.7 g, 124.7 g, and 51 cm, respectively. The Storax fruit extract treatment had a greater effect on infection indicators than the rest of the treatments, as it caused a significant decrease in all infection indicators compared to the untreated infected control. [**Yousef, R.N., H.A. Khalil, Y.H. Mohamed and A.M. Al-Abdallah(Syria),** Arab Journal of Plant Protection, 43(4):527-533, 2025]. https://doi.org/10.22268/AJPP-001347

Effect of Aqueous Extract of Different Plant Parts of the *Phytolacca Americana* L. on the Life Span of Honeybee Workers and its Ability to Stimulate the Production of Antimicrobial Peptides.

This study aimed to determine the effect of aqueous extracts of the different plant parts of *Phytolacca americana* L. on the life span of honeybee workers and the ability to produce antimicrobial peptides.

Two methods were used in treating the bees (adding the extract to the bee food and by spraying, with three concentrations used (10, 50 and 100 ppm) of each plant

extract (leaves, twigs, roots and fruits). The results obtained showed that there were no significant differences between the two treatment methods. Therefore, the feeding method was adopted because of ease of application. By using the feeding method, all tested extracts were significantly superior compared to the control, and the highest increase in life span of worker bee (67.8 %) was reached by using the leaf extract at a concentration of 100 ppm.

In addition, it was shown that the leaf extract was able to prolong the lifespan of honey bee workers fed with the Deformed wing virus (DWV), which remained alive for 12 days after treatment, compared to the workers that were fed a sugar solution only, which remained alive for ten days, and the workers that were fed a sugar solution and a viral suspension, which remained alive only three days after treatment.

The results also showed the ability of the extracts to induce production of antimicrobial peptides. This is a preliminary study that will pave the way for further studies with the aim of developing appropriate bee treatments. [**Sharaf, M.O., N. Al-Abras and A.M. Mouhanna (Syria),** Arab Journal of Plant Protection, 43(4):552-560, 2025]. https://doi.org/10.22268/AJPP-001344

Determining the Genetic Relationship of the Purple Nutsedge, *Cyperus rotundus* L. Ecotypes in Syria.

This study was carried out in 2023 to determine the degree of genetic relationship between 17 ecotypes of purple nutsedge using ISSR (Inter simple sequence repeats) technology based on the polymerase chain reaction (PCR). For this purpose, 17 Primers were used, 15 of which proved effective in showing polymorphism between the studied ecotypes.

Their use resulted in a total of 62 bands, and the lowest number of bands was 2 bands with the primer ISSR5 and 6 bands as the highest number with the primer ISSR2, and the polymorphism rate reached 94.77%. It was also found that the highest PDV value of the PDV matrix of concordance was 0.9886 between the two ecotypes (Faculty of Agricultural Engineering, Damascus University and Safita), which indicated the presence of large genetic variation between them, whereas the lowest PDV value was 0.2348 between the two ecotypes Shahba and Al-Mazraa from Suwayda Governorate, suggesting that they have a high degree of genetic relationship. The Dendrogram tree was split into two main clusters, the first cluster included the types collected from the southern region (College of Agricultural Engineering, Damascus, Shahba Al-Mazraa, Suwayda Governorate), and they have a high degree of genetic relatedness, and the second included the types collected from Daraa and Khan Arnaba (Quneitra Governorate).

The second cluster was divided to two subclusters, the first subcluster included the genotypes from Latakia and Tartous governorates, whereas the second subcluster included the genotypes collected from the central region (Hama city and Wadi Al-Uyun, Hama governorate) and Talkalakh - Fahel from Homs governorate. The studied ecotypes of purple nutsedge were gathered in clusters based on their geographical distribution.

[**Ahmad, M.A., A.M. Basheer and G.S. Ibrahim(Syria),** Arab journal of Plant Protection, 43(4):561-569, 2025]. https://doi.org/10.22268/AJPP-001355

Tunisia

Isolation of Pathogenic and Non-Pathogenic Fungi from Cucurbits Roots Grown in Soil Amended with Organic Manure in Tunisia.

This investigation examined the effect of organic manure application (20, 40 and 60 tons/ha) on fungal communities in the rhizosphere of cucurbit plants (watermelon, grafted watermelon, melon, grafted melon, and squash) grown under field conditions. Prevalent fungal species were identified as *Cladosporium cladosporioides* (0.83×10^5 CFU/g soil) and *Alternaria alternata* (0.22×10^5 CFU/g soil). *Sclerotinia sclerotiorum*, *Cladosporium herbarum*, *Scytalidium thermophilum*, and *Arthrinium* sp. were also consistently detected.

Pathogenicity test via artificial inoculation on watermelon leaves in greenhouse revealed that the most virulent pathogens were *S. sclerotiorum* (SC2) with level of lesion severity reached 80.72%, and *A. alternata* (Aa2) 73.76%. To assess potential biocontrol agents, 24 soilborne-fungal antagonists were evaluated for their inhibitory activity against six pathogens using direct contact method. *Trichoderma harzianum* displayed the strongest mycelial growth inhibition rate (48.99-85.42% against various pathogens), followed by *Humicola grisea* (32.21-80.68%) and *Gliocladium catenulatum* (26.64-83.66%). Finally, the *in vivo* efficacy of four fungal antagonists against six pathogens was tested in a randomized complete block design following preventive and curative treatments on watermelon leaves. Both *T. harzianum* and *T. viride* significantly reduced disease incidence caused by the six phytopathogens. [**Rhouma, A., I. Ben Salem, M. M'Hamdi and N. Boughalleb-M'Hamdi(Tunisia),** Arab Journal of Plant Protection, 43(4):453-463, 2025]. https://doi.org/10.22268/AJPP-001357

Evaluation of *Trichoderma* and *Bacillus* species for the Management of Watermelon Charcoal rot and Plant Growth Promotion.

Macrophomina phaseolina responsible for watermelon charcoal rot, is a soilborne pathogen spread worldwide and in Tunisia. This study aimed to control this important disease using eco-friendly treatments. Two fungal and one bacterial antagonists were tested. Dual culture trials showed the efficacy of *Trichoderma harzianum*, *Trichoderma viride* and *Bacillus subtilis* to reduce *M. phaseolina* mycelial growth by 36.45% to 53.67% for MP4 and MP1 isolates confronted to *B. subtilis.* In the in vivo tests, the use of *T. harzianum* and *B. subtilis* and their combination showed that the preventive application is more effective than the simultaneous and the curative treatments. In fact, the preventive application of *T. harzianum* and *B. subtilis* and their combination reduced the disease severity index by 37.5%, 91.75% and 25%, respectively, compared to the inoculated control. Preventive application of *B. subtilis* significantly enhanced root volume, root length, and shoot length by 81.81%, 67.41%, and 73.07%, respectively, compared to the inoculated control.

The application of *B. subtilis, T. harzianum* and their combination simultaneously with inoculation significantly increased the length of plants by 99%, 90.85% and 34.11%, respectively, compared to the inoculated control. Our findings indicate that *T. harzianum* and *B. subtilis* can be effectively employed as preventive soil treatments to suppress charcoal rot and promote watermelon growth. [**Mannai, S., Ben Salem, I., and Boughalleb-M'Hamdi, N.(Tunisia),** Tunisian Journal of Plant Protection 20 (2): 69-83, 2025].

Turkey

Morphological, Morphometrical, Molecular Characterization, and Phylogenetic Relationship of *Paratylenchus holdemani* from kale (*Brassica oleracea* var. *acephala*) Cultivation Areas in Turkey.

Pin nematodes (*Paratylenchus* spp.) have been recorded in association with a wide range of economically significant crops worldwide, including various cereals, vegetables, and ornamental plants. In October 2021, soil samples were collected from kale (*Brassica oleracea* var. *acephala*) growing field in the Giresun province of Turkey. In this study nematodes were extracted from the soil using a modified baermann funnel method. Standard morphological characters were measured and compared to those reported in previous studies. For molecular characterization DNA was extracted from immature females and the D2-D3 expansion region of the 28S rRNA gene was amplified using primer pair D2A (5-ACA AGTACCGTGAGGGAAAGTTG-3) and D3B (5- TCGGAAGGAACCAGCTACTA-3). PCR product (750 bp) was sequenced and then compared with sequences of *Paratylenchus holdemani* available in the GenBank database. The NCBI BLAST analysis of the Turkish population sequences showed 100% similarity with *Paratylenchus holdemani* sequences registered in GenBank. The results obtained from morphological, morphometrical, molecular and phylogenetic relationship studies showed that the pin nematode population was *P. holdemani*. [**Güvercin, B, Akyazı, F, and Yiğit, U. (Turkey),** Tunisian Journal of Plant Protection 20 (2): 85-95, 2025].

GRADUATE STUDENTS THESIS (MSC AND PHD)

Mass Production, Formulation, and Efficacy Testing of Local *Trichoderma* Isolates for Use in Integrated Management Programs Against Some Plant Pathogenic Fungi

Soil-borne fungal diseases cause significant economic losses in vegetable crops. Farmers rely heavily on chemical pesticides to control these diseases, which can harm soil health and human well-being. There is an urgent need to develop sustainable, effective, and environmentally safe alternatives. This study aimed to evaluate the efficacy of local *Trichoderma* isolates against *Fusarium oxysporum* and *Rhizoctonia solani*, the causal agents of wilt and damping-off diseases in eggplant (*Solanum melongena* L.), and to determine optimal conditions for mass production of the most effective isolate, and to develop stable, effective bio-formulations suitable for field application. Local *Trichoderma*

isolates were subjected to a series of laboratory tests to assess growth rate, antagonistic capacity (dual-culture method), inhibition percentage, and conidial production. The best isolates were selected and evaluated in field trials to control eggplant diseases and improve crop productivity. The effects of temperature, pH, photoperiod, moisture content, nutrient medium type, inoculum size, and agitation frequency were also studied. The viability and efficacy of several fungal bio-formulations were also tested. A total of 76 local *Trichoderma* isolates underwent laboratory testing as a first step in selecting effective isolates for biological control, and four isolates (I25, I26, I39, I57) were selected based on their laboratory performance. Among these, isolate I25, morphologically identified as *Trichoderma harzianum*, exhibited the highest efficacy in field trials, outperforming all other treatments, and was therefore adopted for mass production and formulation experiments. Optimal conditions for mass production of the selected isolate were: temperature 25–30˚C, pH 5.5, photoperiod 16:8, and substrate moisture 55% in a wheat bran mixture medium. The talc-starch formulation and liquid formulation F5 (containing glycerol, PEG, PVP, and corn starch) demonstrated the best spore stability during storage periods. The high efficacy of local *T. harzianum* isolates is attributed to their rapid competitive ability, mechanisms of antagonism and mycoparasitism, and capacity to induce plant resistance. An economic and financial analysis of the commercial production of the *T. harzianum* bio-fungicide was conducted, and the results indicated positive financial performance. The financial analysis showed high economic feasibility, with a return on investment of 23.3%, a net profit margin of 35.3%, a break-even point at 18 tons/year, and a capital payback period of approximately 4.3 years. Marketing 30 tons of this bio-formulation at a concentration of 20×107 spores/g could replace up to 90 tons of chemical pesticides. This study provides a scientific and practical foundation for producing effective and sustainable local bio-pesticides to combat soil-borne diseases. The use of local *T. harzianum* isolates and the developed formulations can significantly reduce reliance on chemical pesticides, protect the environment, and increase agricultural productivity, thereby supporting food security and sustainable agriculture.**[Shadi Mohammad Sulaiman (Doctorate in Environmental Protection 2026).Supervised by: Prof. Moussa Al-Samara, Prof. Mohammad Ahmad, Prof. Nawal Ali.Higher Institute for Environmental Research - University of Lattakia - Syrian Arab Republic]**

Evolutionary and Functional Studies of Reproductive Mode Polymorphism in the Poplar Rust Fungus *Melampsora larici-populina*

The poplar leaf rust, caused by the plant pathogenic fungus *Melampsora larici-populina*, exhibits a heteroecious life cycle on two unrelated hosts. It alternates between a clonal multiplication phase on poplar trees and a sexual phase on larch trees. Notably, a previous study showed a phenomenon that some lineages bypass the sexual phase, offering a unique opportunity to understand the factors that influence the distribution and evolution of asexual lineages from an epidemiological perspective.

During my PhD work, we addressed this phenomenon from three complementary axes. First, we investigated the presence of distinct asexual lineages in natural populations of *M. larici-populina* across France. Our surveys revealed that asexual lineages are more prevalent in Southern France, potentially due to mild winters that create a “green bridge,” providing an opportunity for quasi-continuous clonal multiplication on green poplar leaves. To better interpret the population genetic indices used in our analyses, we conducted a theoretical study with simulations. This helped us explore how these indices change with clone turnover rate, which is essential for understanding the evolution of partially clonal

populations (mixtures of sexual and asexual lineages within the same population).

Second, we conducted comparative genomic and transcriptomic analyses to investigate the molecular basis of the differences between sexual and asexual lineages. We found that mating-type (MAT) genes (essential for sexual reproduction) are intact in both sexual and asexual lineages. This supports the hypothesis that asexuality in these lineages is not due to the loss of MAT genes. Transcriptome comparisons across developmental stages further revealed specific expression patterns associated with the reproductive mode. Additionally, we identified unique genes associated with key stages of fungal development.

Third, we tested whether and to what extent asexual lineages are able to reinvest in sexual reproduction under favorable conditions. We explored this through greenhouse experiments assessing the completeness of the heteroecious lifecycle. Some asexual lineages are still able to complete the sexual phase, while others were stopped at different developmental stages.

These findings provide new insights into the life cycle of the poplar rust fungus, which is important for understanding major crop pathogens that mainly rely on the asexual phase for disease outbreaks. Overall, this thesis enhances our knowledge of the biology of rust species and opens new avenues for exploring the evolutionary persistence of sex. [**Ammar Abdalrahem (France),** University of Lorraine, INRAE, Supervisor: Dr. Pascal Frey, Dr. Sébastien Duplessis, and Dr. Fabien Halkett, (Doctorate, 2025)].

Ecological, Biological and Physiological Studies of the Pomegranate Fruit Moth *Ectomyelois ceratoniae* (Zeller) (Lepidoptera: Pyralidae) and the Efficiency Evaluation of Selected Control Methods

The pomegranate fruit Moth *Ectomyelois ceratoniae* (Zeller) is considered one of the most widely distributed insect pests worldwide due to the severe economic losses it causes to pomegranate production. Laboratory studies were conducted at the College of Agriculture\ University of Kerbala, while field studies were carried out in one of the orchards in Al-Husseiniya district, Karbala Governorate, Cultivars (Salimi, Khudrawi, and Shakar).

The rear pomegranate fruit Moth under laboratory conditions using pomegranate fruits as a food source and to investigate the effect of temperature on its development. In addition, the study analyzed some chemical and morphological characteristics of pomegranate fruits and their relationship with infestation, examined physiological changes in overwintering larvae, assessed field infestation levels, evaluated the efficacy of certain chemical insecticides, monitored the seasonal activity of the insect using different types of traps, identified associated natural enemies, and determined its host plant range.

The insect was taxonomically confirmed at the Research Center and Natural History Museum, University of Baghdad, and the diagnostic results verified that the species was *Ectomyelois ceratoniae* (Zeller). Laboratory rearing results revealed that larval duration reached 58.00, 24.33, and 14.33 days, while pupal duration was 14.33, 7.00, and 6.33 days at temperatures of 20, 30, and 35 ˚C, respectively.

The mean developmental period from egg to adult was 87, 41, and 29 days the aforementioned temperatures. In contrast, the highest oviposition rate reached 78.00 eggs/ female, and the highest hatchability percentage was 82.01% at 30˚C. Therefore, this temperature can be considered the optimal thermal condition for oviposition. The analysis of chemical compounds in pomegranate fruits showed significant variation in

phenols, tannins, proteins, carbohydrates, and vitamin C across cultivars, ripening stages, and fruit parts (peel, arils, and juice). Regarding anthocyanin compounds, the Salimi cultivar recorded the highest concentrations during the ripe stage in fruit peels, reaching 215.87, 206.65, 198.88, and 236.57 ppm for peonidin, cyanidin, malvidin, and delphinidin, respectively, whereas the lowest concentrations were recorded in the Shakar cultivar during the unripe stage.

The estimation of some biochemical compounds in overwintering larvae of *E. ceratoniae* indicated clear seasonal changes in their concentrations. The highest activity of glutathione S-transferase was recorded in January, reaching 2.35 U/g, while glyceraldehyde-3-phosphate dehydrogenase showed its highest activity at 274.5 U/g in January. The highest protein content was recorded on January 6.51 mg/g, whereas the lowest was observed in November, 4.38 mg/g. Glycogen content reached its maximum in December 2.36 mg/g and decreased to its minimum in February 1.03 mg/g. Lipid content was highest in December 3.19% and lowest in February 1.52%.

Total sugars recorded their highest concentration in January 11.51 mg/g and the lowest in November 7.34 mg/g. Low-molecular-weight carbohydrates showed that trehalose was the most abundant, followed by sorbitol and glucose. Field studies revealed that infestation with the pomegranate fruit Moth began in the first week of April 2024, with infestation rates of 2.0, 6.3, and 6.6% in the Salimi, Khadrawi, and Shakar cultivars, respectively. Infestation gradually increased as the season progressed, reaching its peak during the last week of October 2024, with rates of 69.3%, 74.0%, and 89.3%, respectively.

The Salimi cultivar was the least susceptible, with a mean infestation rate of 35.47%, whereas the Shakar cultivar was the most susceptible, with a mean infestation rate of 50.18%. The evaluation of chemical insecticides Emamectin Benzoate, Indoxacarb, and Alpha-Cypermethrin revealed clear differences in relative efficacy. Emamectin benzoate recorded the highest efficacy during the first, second, and third spray applications, particularly on the Salimi cultivar, whereas Alpha-Cypermethrin showed the lowest efficacy.

Pheromone trap results indicated that male moths of *E. ceratoniae* were first detected in early April at low densities, followed by a gradual increase with several seasonal peaks. The highest peak was recorded on 5\10\2024, with an average of 19.33 males\ \trap\week. Light traps recorded the highest adult activity on 5\8\2024, reaching 20 adults\trap\week, after which numbers gradually declined during September and October.

During the 2024 season, two parasitoid species associated with *E. ceratoniae* were identified: *Anisopteromalus calandrae* and *Enicospilus* sp. Field surveys of infested host plants in Karbala, Diyala, and Baghdad governorates showed that the insect attacks several plant species, with the highest infestation rates recorded on apricot fruits, followed by pomegranate, apple, and pear, while late infestations were observed on quince. The overwintering study indicated that the first emergence of adults occurred on 27\3\2024. [**Manar Ahmed Abbas(Iraq),** Plant Protection, Sciences in Agriculture, University of Baghdad, Supervisor: Hind Ibrahim Al-Khazraji (Doctorate,2026)].

Food and Agriculture Organization of the United Nation, Activities of the Near East and North Africa regional office

Senior Officers' Meeting Kicks off Thirty-eighth Regional Conference for the Near East

The UAE Chairs the Upcoming Ministerial Meeting in Al Ain to Lead Regional Efforts Towards Sustainable Agrifood Systems

25/03/2026- Cairo-Al Ain

The Food and Agriculture Organization of the United Nations (FAO) yesterday convened the Senior Officers' Meeting (SOM) of the Thirty-eighth Session of the FAO Regional Conference for the Near East, bringing together senior government officials and partners from across the Near East and North Africa region at a critical moment for agrifood systems and food security.

The meeting marks the start of the 38th Session of the FAO Regional Conference for the Near East (NERC38)- FAO's highest statutory governing body in the region- and sets the technical and policy foundation for the Ministerial Segment, which will be chaired by the United Arab Emirates on 21 April t in Al Ain , United Arab Emirates.

Held under the theme "Innovating for transforming agrifood systems," the Conference provides a platform for Members to advance shared priorities and strengthen regional cooperation for the next biennium.

H.E. Mohammed Saeed Al Nuaimi, Undersecretary of the Ministry of Climate Change and Environment of the United Arab Emirates, chaired the Senior Officers' Preparatory Meeting, which was attended by representatives from several countries across the Near East and North Africa.

Opening the session, FAO Assistant Director-General and Regional Representative for the Near East and North Africa, Mr.Abdulhakim Elwaer, underscored the urgency of coordinated action to strengthen the resilience of agrifood systems in the region amid interconnected pressures including climate change, water scarcity, economic volatility and conflict.

"The Near East and North Africa region stands at a critical turning point, where converging crises are placing unprecedented strain on agrifood systems," he stated. "Escalating climate shocks, acute water scarcity, geopolitical tensions, and economic instability are not only disrupting supply chains but also undermining national food security and the livelihoods of millions. Urgent, coordinated political action is no longer optional,it is imperative," Elwaer emphasized.

H.E. Mohammed Saeed Al Nuaimi, Undersecretary of the Ministry of Climate Change and Environment of the UAE, said: "We meet today at a time of significant transition

that requires exceptional action to confront the unprecedented challenges overshadowing our region and food supply chains. These, in turn, exacerbate the climate, water scarcity, and land shortage issues facing our agricultural systems. The current circumstances impose additional pressures that demand a swift and coordinated response. In this context, we highly commend the pivotal role of the FAO in unifying regional efforts to safeguard our food security ecosystem. Guided by the vision of its wise leadership, the United Arab Emirates reaffirms its steadfast commitment to advancing the sustainability of agricultural systems. The UAE will continue to serve as an innovative and pioneering model in leveraging advanced technology and innovation to empower the agriculture sector and overcome obstacles."

Al Nuaimi added: "Through our Presidency of this Regional Conference, we aspire to lead efforts in driving innovative solutions and deepening cooperation with FAO and all countries in the region that face these challenges. We strongly believe that joint action and knowledge exchange are the only pathways to building resilient and inclusive agricultural systems that ensure food security and fulfill our peoples' aspirations for a more sustainable future. Moreover, the sustainability of these systems equips us with the necessary agility to navigate the various shifts facing the region, positioning sustainable food security as a fundamental pillar of stability and growth."

The Senior Officers' Meeting serves as a key preparatory phase for the upcoming Ministerial Meeting. It provides a platform to discuss challenges, identify regional priorities, and develop actionable recommendations, particularly strengthening supply chains, diversifying food sources, improving logistics, and leveraging innovation. Its outcomes will inform ministerial decisions, strengthen collective action and support the transition towards sustainable food systems, contributing to food security and sustainable development.

Escalating Pressures on Food Security and Natural Resources

Across the region, food insecurity remains a major concern. FAO's *2025 Regional Overview of Food Security and Nutrition* shows that in 2024 nearly 77.5 million people—15.8 percent of the region's population—experienced hunger, while four in ten faced moderate or severe food insecurity. Millions across the Near East and North Africa continue to face acute food insecurity, and many more are unable to afford a healthy diet, reflecting persistent challenges across the region.

Many countries in the region rely heavily on food imports, increasing their exposure to global market volatility and price fluctuations. At the same time, natural resource constraints further intensify the challenge. The Near East and North Africa region remains the most water-scarce region in the world, with agriculture accounting for around 85 percent of freshwater withdrawals, according to FAO's Regional Initiative on Water Scarcity. Climate variability, drought, land degradation and desertification continue to threaten productivity and rural livelihoods.

At the same time, inefficiencies within agrifood systems - particularly food loss and waste—

remain significant. Globally, up to one-third of food produced is lost or wasted, representing lost resources and missed opportunities to improve food availability and system efficiency.

Advancing Solutions through Cooperation and Innovation

Despite these challenges, countries across the region are advancing efforts to improve water management, promote climate-resilient agriculture and restore degraded ecosystems.

Innovation and digital technologies are opening new opportunities to modernize agrifood systems, enhance productivity and support more informed decision-making.

Ensuring that agrifood systems transformation is inclusive remains essential. Women and youth Women and youth are not only key actors but central drivers of agrifood systems, yet they continue to face barriers in accessing resources, finance, technology and markets.

The Senior Officers' Meeting provides a key platform for Members to review progress, exchange knowledge and shape regional priorities. Its outcomes will inform the Ministerial Segment and contribute to coordinated regional action.

FAO reaffirmed its commitment to supporting Members through its Revised Strategic Framework (2021-2030), promoting agrifood systems that are more efficient, inclusive, resilient and sustainable.

"The challenges before us are significant, but so too is our collective capacity to address them," Elwaer added. "Together, we are building agrifood systems that deliver for people, for communities and for the future."

https://www.fao.org/neareast/news/details/senior-officers--meeting-kicks-off-thirty-eighth-regional-conference-for-the-near-east/en

FAO Highlights Near East and North Africa Priorities at the Global Plant Health Meeting

13/03/2026- Rome, Italy

The Regional Office of the Food and Agriculture Organization of the United Nations (FAO) for the Near East and North Africa participated in the 20th session of the Commission on Phytosanitary Measures, held at FAO headquarters in Rome from 9 to 13 March 2026.

The session brought together representatives from 185 contracting parties to the International Plant Protection Convention, the only global treaty dedicated to safeguarding plant health. Participants discussed the adoption of international plant health standards, progress in digital trade infrastructure, commodity-specific standards, and strengthening multilateral cooperation to protect global food security and facilitate safe agricultural trade.

Regional Engagement in Global Plant Health Governance

Mr. Thaer Yaseen, Plant Protection Officer at the FAO Regional Office, actively participated in the plenary and technical discussions, representing the priorities and perspectives of countries in the region. His contributions highlighted regional concerns in global standard-setting and policymaking, including pest monitoring and surveillance needs, trade facilitation priorities, and variations in national plant health capacities.

This engagement was part of ongoing regional preparatory efforts, including the 2025 regional workshop for the International Plant Protection Convention, held in Salalah, Oman, and attended by national plant protection organizations from 18 contracting parties. The workshop aimed to develop coordinated regional positions ahead of the 20th session. Participants also reviewed the outcomes of the 37th technical consultation among regional plant protection organizations, reinforcing the connection between regional coordination and global plant health governance.

Developing Modern Plant Health Systems

Participants discussed the future development of international plant health standards under the agenda item "Rethinking International Plant Health Standards," exploring ways to update standards to address emerging plant health risks, changing global trade patterns, and contracting parties' needs.

Expanding the electronic phytosanitary certificate system was a key topic, enabling secure digital exchange of plant health certificates among countries and representing a significant step toward more efficient, transparent, and secure trade procedures.

Strengthening National Plant Health Capacities

The session reviewed progress on initiatives to strengthen national plant health systems, including capacity-building programs, early warning and pest-outbreak response systems, diagnostic laboratory networks, and the IPPC Observatory's work.

The scientific session also focused on plant health aspects related to humanitarian assistance, examining how plant health requirements can be maintained while ensuring the safe and rapid delivery of food and agricultural inputs during emergencies, which is of particular importance for several countries in the Near East and North Africa region.

Key Decisions and International Plant Health Standards

Contracting parties reaffirmed the critical role of international plant health standards in protecting plant resources while supporting safe and efficient agricultural trade amid increasingly complex global pest pathways.

The Commission adopted and reviewed several international standards for phytosanitary measures, covering pest-free areas for fruit flies, field inspection practices, and new plant health treatments, including irradiation for regulated pests. Participants also reviewed progress in implementing the IPPC Strategic Framework 2020–2030, including the expansion of electronic certification, the development of commodity-specific standards, the addressing of emerging trade pathways, the enhancement of pest outbreak response systems, and the improvement of monitoring and diagnostic capacities.

Innovation, Science, and Emerging Risks

Science and innovation received particular attention, with sessions highlighting the growing role of modern technologies in supporting plant health systems.

For the first time, the Commission hosted a Plant Health Innovations Exhibition at FAO headquarters, showcasing digital tools, artificial intelligence applications, monitoring technologies, and practical solutions for pest prevention, early detection, and rapid response. Poster sessions also facilitated knowledge exchange, international collaboration, and practical application of IPPC tools on the ground.

Regional Side Meeting to Strengthen Plant Health

On the sidelines of the 20th session, the FAO Regional Office participated in a side meeting organized by the Near East Plant Protection Organization, reviewing past regional activities and discussing priorities and planning for joint cooperative initiatives in 2026.

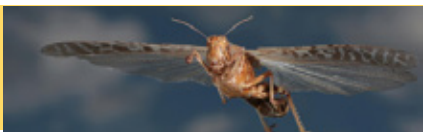
Discussions focused on strengthening coordination among regional partners, aligning technical efforts with global developments in plant health, and supporting national plant protection systems in member countries.

FAO's Ongoing Commitment

The Regional Office will continue working closely with countries in the Near East and North Africa to support the implementation of international standards, enhance national capacities, and deepen regional coordination, contributing to the protection of agriculture, ecosystems, and food security across the region.

https://www.fao.org/neareast/news/details/fao-highlights-near-east-and-north-africa-priorities-at-the-global-plant-health-meeting/en

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



Desert Locust Situation

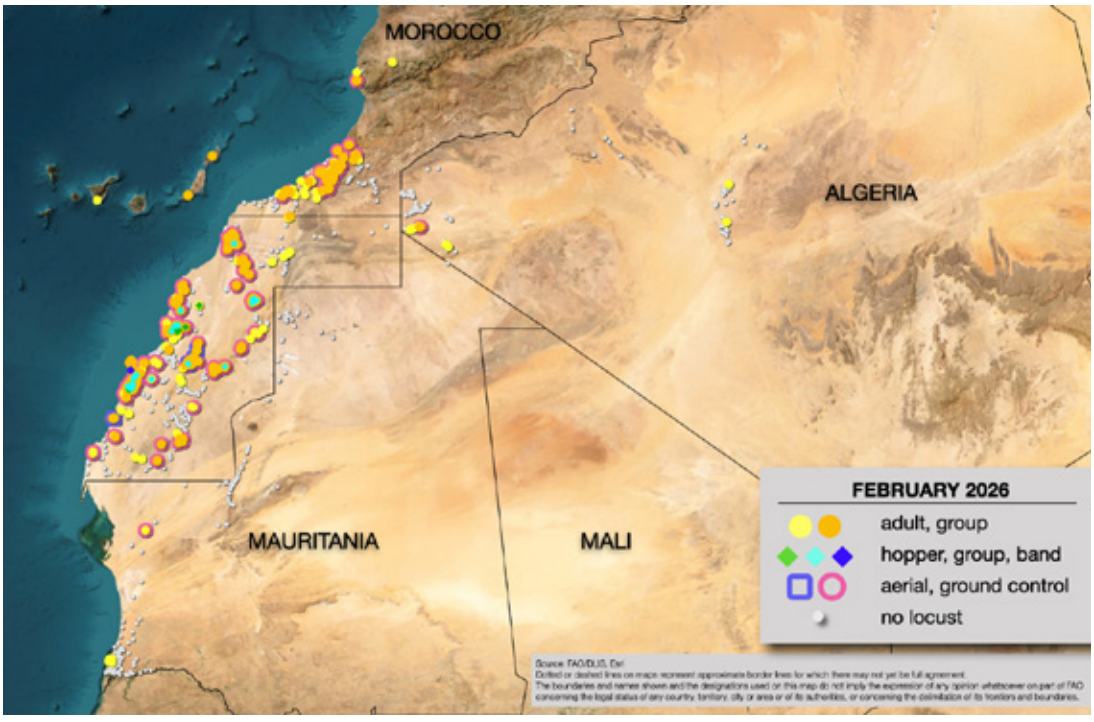
General Desert Locust Situation During February 2026 and the Forecast Until Mid-April 2026

In February, the outbreak remained serious in Western Sahara and southern Morocco. Immature adult groups increased in Western Sahara, where some matured and bred, and hopper groups were still present. Mature adult groups also increased and moved northward in Morocco, breeding in many locations, with some reaching north of Agadir. A few adult groups reached the Canary Islands and western Algeria. Scattered adults were also observed in central Algeria. Adult groups and small swarms moved out of Mauritania. In the Central Region, isolated and scattered adults were reported in Sudan, while only isolated adults were found in Egypt and Eritrea. No locusts were reported in the Eastern Region.

Forecasts

During the forecast period, further northward migration of small swarms and adult groups is expected in the Western Region, particularly into Morocco and Algeria, where breeding is likely to increase and new hopper groups and bands may form. Continued surveys and sustained control operations will be essential to prevent new infestations.

In the Central and Eastern Regions, small-scale spring breeding may begin in interior areas of Egypt, Saudi Arabia, Sudan, and Yemen if rainfall occurs as well as in the southern regions of Iran, although no significant developments are expected.



Summary of the Desert Locust Situation in February 2026

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

1. CRC is launching the official website

The Commission for Controlling the Desert Locust in the Central Region has recently launched its new official website (https://www.fao.org/crc) as part of its ongoing efforts to strengthen communication, enhance knowledge sharing, and improve access to technical information on desert locust monitoring and control. The platform provides comprehensive and up-to-date resources, including news, publications, training materials, and operational tools, serving as a central hub for member countries and partners to support coordinated action and capacity development across the region.

2. CRC Participation in the 15th International Congress of Orthopterology (ICO 2026)

San Martín de los Andes, Argentina, from 8 to 12 March 2026.

The Commission for Controlling the Desert Locust in the Central Region (CRC) actively participated in the 15th International Congress of Orthopterology (ICO 2026), held in San Martín de los Andes, Argentina, from 8 to 12 March 2026. The CRC delegation, represented by the Commission Executive Secretary and a CRC Research Consultant, participated in this major global scientific event to strengthen collaboration, share regional experiences, and explore innovative approaches to locust management.

Strategic Engagement and Knowledge Exchange

The Congress brought together scientists, practitioners, and policymakers from around the world to discuss the latest developments in locust ecology, monitoring systems, forecasting tools, and control strategies. CRC's participation aimed to represent the Central Region, highlight its operational experience, and identify best practices and emerging technologies that can be adapted to regional contexts.

Throughout the event, the CRC delegation actively participated in technical sessions covering advances in early warning systems, remote sensing, artificial intelligence, biological control, and innovative field technologies. These discussions provided valuable insights into cutting-edge approaches that can enhance preparedness and response capacities in member countries.

High-Level Scientific Contributions

CRC made significant scientific contributions through two well-received presentations:

- **Desert Locust Control in the Central Region: Lessons and Experiences",** delivered by Dr. Abdelmonim Ebrahim, CRC Research Consultant, presented a comprehensive overview of the Commission's mandate, preventive control strategy, and coordinated regional interventions. The presentation emphasized capacity-building efforts, improvements in surveillance and early warning systems, and key lessons learned from recent locust upsurges.
- **Drone-Based Ultra-Low Volume Applications for Desert Locust Control:** Field Trials and Evidence-Driven SOP Development", presented by the Executive Secretary, Dr. Mamoon Alalawi, highlighted CRC's leadership in promoting innovative technologies. The presentation showcased field trials conducted in Mauritania and Oman, demonstrating the effectiveness of drone-based ULV applications and contributing to

the development of standardized operational procedures. The session generated strong interest and engagement from participants, reflecting the growing global attention to drone technologies in locust control.

» In addition, the Executive Secretary was invited to moderate a high-level session on "Technologies for Sustainable Locust Surveillance and Control", which featured multiple international experts and cutting-edge research contributions, further reinforcing CRC's visibility and leadership in this domain.

Bridging Science and Operations

A key outcome of CRC's participation was the strengthening of linkages between scientific research and operational field implementation. The Congress emphasized the importance of translating scientific advances into practical tools for decision-makers and field teams a principle that aligns closely with CRC's preventive control strategy.

CRC's experience demonstrated how integrating innovations such as drones, data-driven forecasting, and improved surveillance systems, can enhance the efficiency, precision, and sustainability of locust control operations.

Strengthening Partnerships and Future Directions

The Congress provided valuable opportunities for networking and collaboration with international institutions, researchers, and partner organizations. These interactions are expected to support future joint initiatives, technology transfer, and research collaboration to strengthen locust management systems in the Central Region.

CRC's participation also contributed to increasing the visibility of the region's efforts and achievements, positioning the Commission as a key global actor in preventive locust control and innovation.

Group photo of conference participants

Honouring the conference board

Presentation by the CRC Research Consultant, Dr. Abdelmoneim Ebrahim

3. FAO Regional Conference for the Near East (NERC38)

The Executive Secretary of the Commission, Dr Mamoun Alalawi, participated in the Senior Officers' Meeting of the FAO Regional Conference for the Near East (NERC38), held from 24 to 26 March 2026.

During this meeting, he delivered a comprehensive presentation outlining the Commission's mandate, achievements, and strategic vision, highlighting its critical role in strengthening regional coordination to address the desert locust, one of the most serious transboundary pests threatening agricultural production, livelihoods, and food security across the region.

The presentation emphasized the Commission's long-standing experience since its establishment in 1967 under the auspices of FAO, and its continuous efforts to enhance cooperation and coordination among member countries. It highlighted the development of an advanced regional early warning system based on systematic field data collection, real-time information exchange, and continuous analysis, forming the backbone of the preventive control strategy. This approach has proven highly effective in limiting the escalation of outbreaks and reducing their economic and environmental impacts.

In addition, the Executive Secretary underscored the Commission's strong focus on innovation and modernization, including the introduction and field testing of new technologies such as drones for surveying, monitoring, and control operations. These technologies have contributed to improving the precision, efficiency, and timeliness of interventions in challenging and remote environments.

The presentation also highlighted the Commission's significant investments in capacity development, including the training of hundreds of national staff through specialized regional programmes, as well as the establishment, jointly with the Western Region Commission (CLCPRO) of a regional Master's programme in Desert Locust Management, aimed at building a new generation of experts in the field.

Furthermore, the Executive Secretary presented the Commission's efforts in strengthening emergency preparedness and response mechanisms, including the establishment of a regional Desert Locust Emergency Fund to support rapid interventions in affected countries and facilitate resource mobilization during crises. This mechanism complements

the contributions of member countries and reflects a practical model of regional solidarity and cooperation.

The intervention concluded by reaffirming the Commission's commitment, together with its member countries, to continue advancing regional collaboration, promoting innovation, and enhancing preparedness, while stressing the importance of sustained support from both member states and FAO to ensure effective and timely responses to future locust threats.

Master's Degree in Locust (CRC) and Hassan II Institute of Agronomy and Veterinary, Agadir Horticultural Complex. Agadir- Morocco

The Commission for Controlling the Desert Locust in the Central Region (CRC) was established in 2023/2024 in collaboration with the Hassan II Institute of Agronomy and Veterinary, Agadir Horticultural Complex. Agadir, Morocco, a Master's Degree in Locust Sciences.Below are the first batch of graduates:

Utilizing GIS to Predict Changes in Desert Locust Situation Developments with Changes in Ecological Conditions.

Desert locust breeding dynamics are strongly shaped by ecological conditions, yet the tools available to predict and monitor breeding activity remain limited in many affected regions. This study investigates the potential of Geographic Information Systems (GIS) to predict changes in desert locust (*Schistocerca gregaria*) situations in response to shifting ecological variables. The research addressed three main objectives: (1) analyzing the relationship between ecological conditions — specifically vegetation status, vegetation density, soil moisture, and habitat type — and different desert locust behavioral aspects; (2) calculating breeding probability based on the combined effect of vegetation and soil conditions; and (3) generating and field-validating GIS-based breeding prediction maps to guide survey operations.

Historical desert locust survey data from CRC member countries (Egypt, Saudi Arabia, Sudan, Eritrea, Yemen, Djibouti, Somalia, and Oman) collected during 2017–2022 were retrieved from the RAMSESv4.1 GIS database. Ecological variables including vegetation status and density, soil moisture, and habitat type were analyzed against locust occurrence and behavioral stages covering breeding, hopper development, and adult swarming. Data was processed and visualized using QGIS to examine spatial correlations. Breeding probabilities were then calculated based on the combined effects of vegetation and soil conditions. Breeding prediction maps were subsequently generated using Inverse Distance Weighted (IDW) interpolation, exported and displayed in the Locus Map mobile application to guide field teams. Field validation trials were conducted during the winter breeding season of February 2025 in Abu-Ramad and Halaib in southeast Egypt. The results showed that over 70% of breeding incidents occurred in areas with wet soil paired with green or greening vegetation at medium to high densities, while dry soil conditions were associated with negligible breeding activity. Notably, 27% of solitary breeding adults were recorded under dry soil conditions, suggesting potential field data entry errors that require

attention in future surveys. The generated breeding prediction maps demonstrated strong spatial accuracy, with approximately 85% of areas classified as high probability correctly confirmed to contain adult groups or hoppers during field validation. Areas predicted to have low breeding probability were found to contain only solitarious adults or no locusts at all. Habitat type analysis further revealed that specific terrain features, such as wadis and plains, were more consistently associated with locust breeding activity.

The findings confirm that integrating GIS with ecological data significantly improves the spatial accuracy of breeding forecasts and supports more efficient targeting of survey operations, reducing the time and resources needed to locate potential breeding sites. The study recommends strengthening the integration of vegetation and soil moisture monitoring through remote sensing and real-time data collection. Future research should consider incorporating additional variables such as temperature and rainfall, applying machine learning techniques, and expanding field validation to cover other regions and seasons. [**Ola Saed[1], Osama R.M. Moustafa[2], Said Aminzou[3], and Mamoon Alalawi[4]**][1] Ministry of Agriculture (Syria); [2]FAO□s Transboundary Plant Pests and Diseases team (NSPMD), Rome, Italy; [3]Hassan II Institute of Agronomy and Veterinary – Agadir Horticultural Complex. Agadir- Morocco [4]Commission of Controlling the Desert Locust in the Central Region (CRC), Dokki, Al Giza 3751311, Egypt, **Contact information**: Mamoon Alalawi Mamoon.AlSaraiAlalawi@fao.org - https://www.fao.org/crc

Utilization of the Normalized Difference Vegetation Index (NDVI) to Enhance the Desert Locust (Schistocerca gregaria) field Surveys.

The desert locust (*Schistocerca gregaria*) remains one of the most destructive migratory pests worldwide, posing severe risks to agricultural production and food security across Africa, the Middle East, and Southwest Asia. Traditional ground survey methods rely on visual observation to locate green vegetation as an indicator of locust presence; however, this approach is limited in coverage, precision, and efficiency across vast and remote desert landscapes. This study aims to improve the operational efficiency of desert locust field surveys by developing a satellite-based vegetation index classification scheme to identify and prioritize high-risk breeding areas along the Red Sea coastal zone.

Moderate Resolution Imaging Spectroradiometer (MODIS)-based NDVI imagery from 2017 to 2022 was processed and spatially linked to desert locust field survey records from the RAMSESv4 custom GIS database using zonal statistics within 500-meter survey buffers. Vegetation condition and locust behavioral data, including grouping, breeding, and infestation records, were systematically compared across defined NDVI ranges. A one-way ANOVA was applied to confirm statistically significant differences in locust breeding and grouping activity across NDVI categories. Based on these results, a new NDVI reclassification scheme was proposed, grouping values into five breeding-risk levels: Very Low, Low, Moderate, High, and Very High.

Field validation of the proposed scheme was conducted in key winter breeding zones of southeastern Egypt during February 2025, following the standard ground survey protocols outlined in the FAO Desert Locust Guidelines. The results confirmed that the NDVI-based

scheme accurately predicted on-ground vegetation and locust conditions. Approximately 78% of recorded locust infestations were concentrated within the "High" (NDVI: 0.11–0.15 and 0.21–0.30) and "Very High" (NDVI: 0.16–0.20) categories, while areas with NDVI values below 0.076 showed minimal locust activity. The proposed approach enabled survey teams to focus their efforts on the most at-risk locations, resulting in meaningful reductions in time and resource requirements. Overall, these findings support the adoption of the suggested NDVI reclassification scheme as a scalable and practical tool for early warning and targeted desert locust management, directly reinforcing the FAO's preventive control strategy across the Red Sea region. **[Saeed Alasmar Almesmari[1], Osama R.M. Moustafa[2], Said Aminzou[3], and Mamoon Alalawi[4]]**[1] Pest Control Unit, Agricultural Technical Services Division, Plant Health and Extension Services Department, Abu Dhabi Agriculture and Food Safety Authority; [2]FAO□s Transboundary Plant Pests and Diseases team (NSPMD), Rome, Italy;[3] Hassan II Institute of Agronomy and Veterinary – Agadir Horticultural Complex· Agadir- Morocco; [3]Commission of Controlling the Desert Locust in the Central Region (CRC), Dokki, Al Giza 3751311, Egypt. **Contact information:** Mamoon Alalawi: Mamoon.AlSaraiAlalawi@fao.org; https://www.fao.org/crc

Evaluation and Testing of Drones for Operations Related to the Survey of Desert Locust.

Desert locust outbreaks continue to pose a serious threat to food security and agricultural stability, particularly in some countries such as Saudi Arabia, Yemen, and Sudan where favorable environmental conditions promote frequent breeding. Conventional monitoring techniques, such as ground surveys and manned aircraft are constrained by cost, time, and limited accessibility.

This study assesses the efficiency and practicality of integrating drone technology into desert locust surveillance programs. Two types of drones were evaluated: the HAEMAV HP2 (fixed wing) and the DJI MAVIC PRO2 (rotary). Field trials were conducted in the Bader governorate in Saudi Arabia, a known winter breeding site for desert locusts. The performance of each UAV was assessed based on flight duration, image resolution, battery consumption, and detection accuracy.

The fixed-wing drone demonstrated extended flight endurance and wider area coverage, making it suitable for large-scale surveys. The rotary drone offered greater agility and captured higher-resolution images, making it ideal for localized detection. Both systems achieved over 90% accuracy in detecting locust habitats, as confirmed by ground verification teams. Compared to traditional survey methods, drones significantly reduced survey time and human effort while enhancing spatial accuracy. The findings support the integration of UAVs into national locust control and early warning systems. Moreover, the study recommends further research into enhancing drone capabilities through advanced sensors, longer battery life, and the use of artificial intelligence for automated image analysis. This work highlights the growing potential of drone technology as a sustainable and scalable solution for managing desert locust threats in endangered regions. **[Fahad H. Alshamrani[1], Essam Khalifa[2], Said Aminzu[3], Mamoon Alalawi[2]]**[1].The National Center for the Prevention and Control of Plants Pests and Animal Diseases – Kingdom of Saudi Arabia; [2]Commission for Controlling the Desert Locust in the Central Region (CRC), Food and Agriculture Organization of the United Nation (FAO),

Dokki, Al Giza 3751311, Egypt. [3]Hassan II Institute of Agronomy and Veterinary – Agadir Horticultural Complex Agadir- Morocco. Contact information: Mamoon Alalawi: Mamoon.AlSaraiAlalawi@fao.org; https://www.fao.org/crc

Enhancing Desert Locust Control Efficiency through Advanced Spraying Guidance Technologies: A Comparative field Study in Southeastern Egypt.

The desert locust *Schistocerca gregaria* remains one of the most destructive migratory pests worldwide, posing severe risks to agricultural production and food security throughout Africa, the Middle East, and Southwest Asia. Contemporary control measures relying on ultra-low-volume (ULV) spraying typically rely on ground-based guidance, in which flag bearers direct spray operators and determine the spacing between spray tracks. However, this conventional approach is constrained by limitations in precision, uniformity, and operator safety. The present study sought to enhance the operational efficiency of desert locust control by employing more accurate track-guidance technologies during ULV spraying. Three guidance methods were evaluated:

1. The conventional flag-bearer technique.
2. Navigation using the online Locus Map application; and
3. The MICRON SPRAYTRAC II GPS Track Guidance System.

A set of operational performance indicators, including (1) demarcation and area size, (2) track straightness, (3) track spacing, (4) number of spray tracks, (5) droplet deposition patterns, (6) time efficiency, (7) number of personnel engaged, and (8) volume of pesticide dispensed, was recorded for each method and subsequently compared. All field procedures followed the standard protocols outlined in the FAO Desert Locust Guidelines.

Field trials were conducted in key winter breeding zones of the desert locust in southeastern Egypt, specifically at Marsa Alam, Sheikh Shazly, and Abu Ramad. The results demonstrated a clear superiority of the two advanced guidance tools over the traditional method, with the advantages being particularly pronounced in large operational areas (e.g., Marsa Alam). Both the Locus Map application and the SPRAYTRAC II system produced consistently straighter tracks, more uniform spacing, improved droplet deposition, and reduced environmental and occupational health risks. Additionally, these technologies substantially reduced the personnel and time required to complete control operations. Overall, the findings strongly support the adoption of modern guidance technologies to enhance the precision, sustainability, and effectiveness of ULV desert locust control.

[.[**Mohamed M. Amin[1], Osama R. M. Moustafa[2], Abdelmonim Ebrahim[3], and Mamoon Alalawi[3]**][1]General Directorate of Locust Affairs and Agricultural Aviation, Ministry of Agriculture and Land Reclamation (Egypt); [2]FAO's Transboundary Plant Pests and Diseases team (NSPMD), Rome, Italy; [3]Commission of Controlling the Desert Locust in the Central Region (CRC), Food and Agriculture Organization of the United Nation (FAO), Dokki, Al Giza 3751311, Egypt. Contact information: Mamoon Alalawi: Mamoon.AlSaraiAlalawi@fao.org; https://www.fao.org/crc

The 38th Session of the FAO Regional Conference for the Near East (NERC38)

On March 24, 2026, an important online session titled "**Plant Health as a Pillar for Food Security and Resilience**" was moderated by Dr. Ibrahim Al-Jboory, the Vice President of the Arab Society for Plant Protection. This session was part of a broader discussion on **strengthening plant health systems aimed at safeguarding crop heritage and agrobiodiversity in the Near East and North Africa (NENA) region**.

The event was organized collaboratively by several esteemed organizations, including FAO-NENA, FAO-NSP, CIHEAM Bari, NEPPO, the Chinese Academy of Sciences (CAS), and ASPP. Dr. Abdelhakim El Waer, Assistant Director-General and Regional Representative for the FAO in NENA, opened the session by emphasizing the critical role of plant protection and production amidst the challenges posed by Gulf conflicts. He highlighted the significance of addressing transboundary pests and diseases in these contexts.

Following the opening remarks, Mr. Thaer Yaseen, Regional Plant Protection Officer at FAO-RNE, delivered a keynote presentation on the regional approach to plant health and food security. He outlined a strategy developed by FAO, NEPPO, and CIHEAM for managing transboundary pests and diseases, which was launched in partnership with NENA countries. The session stressed the importance of adhering to international standards set by the International Plant Protection Convention (IPPC), promoting phytosanitary harmonization, and adopting a One Health approach. These efforts contribute significantly to Sustainable Development Goals 2 (Zero Hunger) and 13 (Climate Action), supporting the establishment of resilient, inclusive, and sustainable agrifood systems in the region.

A panel of four scientists then engaged in discussions on various themes:

- Dr. Ben-Jamaa Mohamed Habib from NEPPO addressed Phytosanitary Measures Harmonization.
- Dr. Huang Wenjian from CAS in China focused on Surveillance, Monitoring, and Early Detection.
- Dr. Baogen Gu from FAO-NSP highlighted Pest Management and Regulatory Harmonization.
- Dr. Michele Digiaro from CIHEAM Bari presented lessons learned from Xylella as a Transboundary Plant Pest disease (TBPPD).

In concluding the session, Dr. Thaer Yaseen reiterated the significance of implementing

effective phytosanitary measures, the importance of monitoring and surveillance, the registration regulations for biological control agents, and the key insights gained from the experiences with Xylella. This collective effort underscores the commitment to enhancing food security and resilience across the NENA region.

One-week Staff Teaching Mobility to the Agricultural University at Athens (AUA)

Professor Ahmad Katbeh Bader from The University of Jordan (UJ) conducted one-week Staff Teaching Mobility to the Agricultural University at Athens (AUA) from February 2 to February 6, 2026. This activity took place within the framework of the European Program ERASMUS. Professor Ahmad Katbeh Bader and Professor Epaminondas Paplomatas submitted a cooperation plan on Plant Pathology issues that was included in the Institutional Application of AUA to EU. The overall objectives of the mobility were to give lectures to graduate students and faculty members of AUA about the survey of insect vectors of plant diseases in Jordan.

This mobility supported the strategic internationalization goals of both the University of Jordan and the Agricultural University at Athens (AUA) by strengthening academic cooperation in the field of Plant Protection. Through the exchange of teaching expertise and advanced knowledge in Plant Protection. The mobility contributed to the modernization of knowledge by integrating data on field surveys of potential insect vectors that cause plant diseases which threaten the food security of the countries in the Mediterranean region.

This collaboration fosters a platform for sharing research interests between the AUA and the JU, encouraging future joint research, co-supervision of postgraduate students, and the development of interdisciplinary initiatives on food security, climate change, and biodiversity protection.Additionally, the mobility reinforces intercultural awareness and strengthens academic networks within the Euro-Mediterranean and JU, improving both institutions' visibility and competitiveness in international higher education. It promotes long-term academic partnership and contributes to building a sustainable scientific community committed to practicing environmentally safe pest control management.

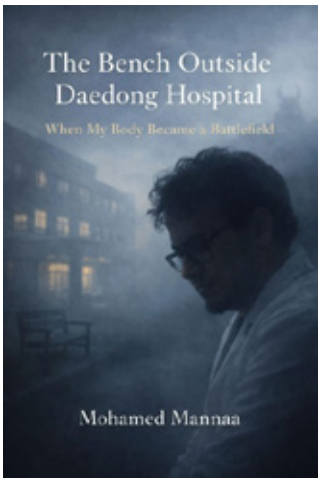
Prof. Epamenondas Paplomatas visited the Department of Plant Protection at the Faculty of Agriculture, University of Jordan, from May 2 to May 5, 2025. He delivered lectures to undergraduate and graduate students as well as faculty members, held meetings with faculty members, toured the department's laboratories and facilities, and reviewed some of the ongoing research projects in the department.

Ph.D. Defense of Dr. Eid Muhammad Khan at the Department of Plant Protection, College of Food and Agriculture Sciences, King Saud University, Riyadh, Saudi Arabia.

On 12th February 2026, Dr. Eid Muhammad Khan defended his Ph.D. research with the title, "Morphological and Molecular Characterization of Eriophyoid mites (Prostigmata: Eriophyoidea) from Saudi Arabia; with the Taxonomic Assessment of the Genus Tegonotus Nalepa (Phyllocoptinae;Eriophyidae)" at the Department of Plant Protection, College of Food and Agriculture Sciences, King Saud University, Riyadh, Saudi Arabia.

The supervisory committee consisted of Prof. Dr. Fahad Jaber Alatawi (Supervisor), Prof. Dr. Muhammad Kamran Rafique (Co-Advisor) and Prof. Amgad A. Saleh (Co-Advisor). The defense committee was lead by Prof. Dr. Fahad Jaber Alatawi (Head) and comprised of Prof. Amgad A. Saleh (Member), Dr. Yahya Z. Attal (Member, Internal Examiner) and Prof. Dr. Ahmed Katbeh (Member, External Examiner from Jordan). Dr. Eid Muhammad Khan presented his research findings related with the morphology and molecular based taxonomy of Eriophyid mites, a group of minute arthropods from the class Arachnida. These mites hold crucial importance to the agronomic and horticultural crops as pests, disease vectors and biological control agents.

Outside Daedong Hospital: A New Book by Dr. Mohamed Mannaa



The Arab Society for Plant Protection is pleased to introduce the book *"Outside Daedong Hospital: When My Body Became a Battlefield written* by Dr. Mohamed Mannaa, Plant Pathologist, a personal and reflective literary work based on the author's lived experience with serious illness.

The book is of particular interest to the Society's readership because Dr. Mannaa's main academic and research background is in microbiology and plant pathology, and he serves in the Department of Plant Pathology, Cairo University. In this sense, the book offers readers a different perspective on a scientist whose primary contributions lie in plant protection, but who here writes from the deeply human experience of confronting illness firsthand.

Dr. Mannaa is also known for his significant scientific contributions to plant protection, with more than 55 publications in indexed journals. His work has covered a wide range of topics, including the reporting of plant diseases, the discovery and evaluation of biocontrol

agents, studies involving beneficial and novel bacterial species, and research on reducing aflatoxin contamination in stored grains, a topic also reflected in his doctoral work. An important part of this scientific output was produced during periods of personal difficulty, giving this book added meaning when viewed alongside his research career.

The book follows the author's journey from the moment of a stage 4 cancer diagnosis during his time in South Korea, through fear, medical testing, treatment, concern for family, and reflection on faith, endurance, and recovery. As the author states in the opening note, the book is not intended as a medical guide but rather as a personal story honestly told.

What gives the work its special character is the combination of two viewpoints: that of a researcher trained to study disease scientifically, and that of a person suddenly living through illness at close range. The result is a clear and sincere narrative that may speak not only to general readers but also to scientists, academics, and professionals who understand the demands of research life.

By highlighting this book, the Society also recognizes the broader intellectual and human dimensions of Arab researchers in plant protection and related disciplines, as well as the value of works that connect scientific life with personal reflection and literary expression. The book is published in English and available on the Amazon site, and in Arabic in press.

A statement from the former President of the Arab Society for Plant Protection, Dr. Ibrahim Al-Jboory

I came to know Dr. Manna when he was a master's student in Bari, Italy, from 2009 to 2011. He was named the best student in his first year and the best master's thesis in his second year. He was distinguished in his knowledge and commitment. I followed his achievements when he was in Korea, where he received the Scientific Achievement Award at the university in 2018. I met him in Korea at the Korean Society of Plant Pathologists' 2015 conference, where he gave a seminar that was praised by attendees. I followed his news closely, and I was amazed by his strength and determination not to give up when he was afflicted with the disease. He came out of chemotherapy treatment in contact with me with full strength. Of course, I supported him and strengthened him with his beautiful family and his virtuous wife, who was keen to stand by him strongly to overcome the ordeal of the disease, and the smile of his son Shams, which gave him strength, endurance, and patience. As for his mother, all my love, her standing by him and prayers had a good effect on the course of the disease and recovery from it.

CIHEAM -Mediterranean Agronomic Institute of Bari MSc Thesis Abstracts 2025

Investigation of Pepper-infecting Viruses and Viroids in Greenhouse Cultivation in Albania.

Pepper (*Capsicum annuum* L.) is one of the most economically important vegetable crops in Albania, yet its production is threatened by viral diseases that can cause significant yield losses. During the 2024–2025 growing season, 300 pepper leaf samples showing virus-like symptoms were collected from 21 greenhouses across four major production regions (Berat, Fier, Elbasan, and Shkodër) to investigate the diversity and prevalence of viruses infecting pepper. A battery of RT\PCR assays targeting 19 major pepper viruses and viroids was applied, while next-generation sequencing (NGS) was performed on PCR-negative samples to identify additional pathogens. RT\PCR results demonstrated the presence of pepper mild mottle virus (PMMoV), cucumber mosaic virus (CMV), alfalfa mosaic virus (AMV),

and tomato yellow leaf curl New Delhi virus (TYLCNDV) in 38.3%, 20.3%, 5.7%, and 0.7% of samples, respectively, while all other targeted viruses and viroids were absent. NGS further revealed bell pepper endornavirus (BPEV) and a Caulimoviridae-like virus, confirmed by PCR in 24.7% and 23.6% of samples, respectively. The detection of a Caulimoviridae-like virus points to the presence of a putative new virus requiring full genome sequencing and further characterization. PMMoV emerged as the most prevalent and damaging virus across regions. This study reports for the first time the presence of PMMoV, TYLCNDV, BPEV and a putative new Caulimoviridae-like virus, highlighting the urgent need for virus monitoring and management strategies in pepper cultivation. [**HOXHALLARI Klevis (Albania) Supervisors: M. Cara and T. El Beaino, MSc,CIHEAM Bari 2024-2025**].

Investigation of the Role of Drosophila suzukii in the Transmission of Postharvest moulds on Blueberries.

Drosophila suzukii is an invasive pest of soft and stone fruits, including blueberry (*Vaccinium corymbosum* L.), where oviposition wounds facilitate the entry of opportunistic postharvest fungal pathogens. In addition, fungal spores may be externally transported on the surface of the fly's body, enabling transfer from fruit to fruit or leaf to leaf. The aim of this study was to investigate the dual role of *D. suzukii* as both a wound agent and a mechanical vector of postharvest toxigenic fungi and evaluate ozone treatment as an eco-friendly postharvest management strategy. Moreover, fungal isolation from wild-caught *D. suzukii* revealed a diverse fungal community, dominated by Alternaria spp., Aspergillus section Nigri, and Aspergillus section Flavi. In contrast, laboratory-reared insects acquired fungi only following contact with blueberries. Molecular analysis identified *A. alternata*, *A. carbonarius* and *A. flavus*. Furthermore, mycotoxin assays confirmed the toxigenic potential of several isolates, with significant variation observed among them. Finally, ozone treatment significantly reduced fungal growth and sporulation and, in some of the species tested, also mycotoxin production. It further decreased fungal incidence and *D. suzukii* egg hatchability, without adversely affecting the sensory attributes of blueberries. Taken together, these findings highlight the dual role of *D. suzukii* in postharvest spoilage and support ozone treatment as a promising, residue-free approach to enhance food safety.[**KHEMIES Sabrina (Algeria), Supervisors: A. Ricelli, N. Baser and W. Mellikeche, MSc,CIHEAM Bari 2024-2025].**

Pseudomonas syringae Complex on Grapevine: a Focus on Table Grapes in the Area of Bari (Apulia, Southern Italy).

Grapevine hosts a wide range of microorganisms, both pathogenic and beneficial, whose behaviour is affected by environmental conditions and management practices. The aim of this study was to investigate the bacterial communities in table grape vineyards around Bari. Grapevine organs were sampled across four phenological stages, and 108 bacterial isolates were characterised based on phosphate solubilization, indole-3-acetyc acid (IAA) production, and copper sensitivity. All isolates were initially screened in vitro for their biocontrol potential against Botrytis cinerea. The most promising ones were subsequently tested against *Alternaria alternata*, *Aspergillus carbonarius*, *Diaporthe neoviticola*, and *Penicillium expansum*. Bacterial abundance was significantly higher on dormant buds compared with vegetative organs sampled at subsequent stages. The solubilization index and IAA production ranged between 1.3–2.5 and 1.1–3.3 mg/L, respectively. Most isolates were able to grow under elevated concentrations of $CuSO_4 \cdot 5H_2O$. One Pseudomonas sp.

isolate and two Bacillus sp. isolates exhibited the strongest biocontrol potential against all tested fungi. A further objective of this study was to investigate pathogenic *Pseudomonas* species on symptomatic material collected from 22 vineyards. The isolates obtained were identified as *Pseudomonas syringae* pv. *syringae* (both typical and atypical) and *P. viridiflava* (all atypical). The pathogenicity of all isolates was confirmed on detached grapevine leaves. Further studies are required to elucidate the influence of environmental conditions and vineyard management practices on bacterial communities, as well as to evaluate their biocontrol potential against grapevine pathogens. [**MILAKOVIĆ Tatjana (Bosnia and Herzegovina), Supervisors: D. Gerin, F. Valentini; and S. Pollastro, MSc, CIHEAM Bari 2024-2025].**

Validation of a DDE Model Describing the biology of *Drosophila suzukii* in an Apulian Strawberry field.

Drosophila suzukii Matsumura, commonly known as the spotted wing drosophila, is an invasive pest of soft-skinned fruits. Comprehensive understanding of the seasonal dynamics, reproductive capacity, and correlations among host organisms is necessary for the design of sustainable control strategies. This multidisciplinary study involved field surveys, laboratory experiments, mathematical modelling, seasonal behavior, adaptability, invasion attributes and host organism range. Adult captures, morphotype composition and oviposition activity were recorded across multiple subplots and field sites, while fruit quality parameters (sugar content, size and form factor) were measured to assess host suitability. The findings demonstrate partial alignment of the model with the observed data (RMSE = 2.21, R^2 = 0.4), capturing early-season peaks and seasonal recovery. However, low capture rates (e.g. 38 adults in subplots) introduced noise. Laboratory findings indicate a marked preference for strawberries over blueberries. Furthermore, longevity trials have demonstrated that winter morph females can survive for over 150 days, ensuring persistence across unfavorable seasons. The DDE model was found to be superior to more elementary ODE approaches in its capacity to replicate observed dynamics. These results highlight the importance of incorporating morphotype dynamics, fruit phenology, and reproductive indicators into predictive models and pest management strategies for *D. suzukii*. [**ABDELRAZEK Amin Mustafa Gameel (Egypt)**, **Supervisors: N. Baser, L. Rossini and F. Santoro, MSc, CIHEAM Bari 2024-2025].**

Aspergillus Contamination in Algerian Dates and the use of Ozone in Post-harvest Management.

The date palm (*Phoenix dactylifera* L.) is among the oldest cultivated fruit crops, valued both for its nutritional properties and its economic importance. Algeria is one of the top producers and exporters of dates, recognised for the quality of its varieties. However, Algerian dates are often marketed with limited protection and are frequently consumed directly, without cleaning or further processing. It is therefore crucial to identify potential postharvest contaminants that may compromise fruit quality, accelerate spoilage, or result in mycotoxin production. This study reports for the first time the occurrence of postharvest fungal contaminants in Algerian dates and identifies potentially toxigenic isolates. A total of 137 fungal isolates were recovered, with *Aspergillus* spp. *prevailing* and accounting for more than 87%. Molecular characterisation of black aspergilli revealed the predominance of *A. niger* (58.3%), followed by *A. tubingensis* (25.0%) and *A. westerdijkiae* (16.7%), all

species recognised as potential producers of ochratoxin A (OTA). Although HPTLC analysis did not confirm mycotoxin production, the detection of OTA-producing species raises concern for consumer safety. The efficacy of ozone applied both directly to fungal isolates and to the fruit was also assessed. Ozone treatment significantly reduced mycelial growth and sporulation, with the greatest effect observed at 8 ppm for 24 h. However, when applied to fruits (4 and 8 ppm for 48 h), no statistically significant difference in fungal load was observed. As this is a preliminary investigation, further research is recommended to extend large-scale surveys of postharvest contaminants and to identify toxigenic fungi across the Algerian date supply chain. [**YENET Fentahun Asrat (Ethiopia)**, **Supervisors: F. Valentini and W. Mellikeche. MSc, CIHEAM Bari 2024-2025].**

Assessment of the Susceptibility of Autochthonous Citrus Accessions in the Gargano Promontory to Relevant Diseases.

Alternaria alternata and *Colletotrichum gloeosporioides* are two fungal pathogens threatening citrus cultivation in the Gargano promontory. The use of chemical fungicides for disease management in agriculture is inappropriate for environmental sustainability. Citrus Tristeza Virus is the most destructive citrus virus. Therefore, this study determined the susceptibility of various indigenous citrus accessions to three key pathogens. The aim of this work was to provide a scientific basis for developing sustainable disease managament alternatives. The methodology included fungal pathogenicity assays on leaves and fruits, followed by molecular analysis of gene expression to clarify defence mechanisms. Then, the accessions were assessed for disease severity and incidence in a controlled in vivo experiment and the associated data were analysed with Analysis of Variance (ANOVA). Additionally, artificial inoculation by grafting fol

lowed by molecular analysis were performed for viral pathogen. Statistical analysis presented significant differences (p-value<0.001) in susceptibility across varieties for both *A. alternata* and *C. gloeosporioides*. Collectively, the work identifies Femminello lemons and Arancia forte Mordesco as promising, low-susceptibility accessions to A. alternata, whereas Femminello lemons, Arancia forte Mordesco and Duretta del Gargano as low susceptible to C. gloeosporioides. In contrast, Bionda del Gargano was the most susceptible variety to both fungal pathogens. Conversely, trials for CTV susceptibility were inadequate due to heat stress and immaturity of the graft unions. Despite the limited viral outcomes, these findings are essential since they highlight the potential of using these accessions as an alternative to chemical fungicides and thus contribute to sustainable approaches to crop protection and reducing impacts on the environment. [**DIB Tatiana (Lebanon), Supervisors: A. Ippolito and K. Djelouah and O. Incerti, MSc, CIHEAM Bari 2024-2025].**

Development of a Sustainable Phage-based Biocontrol Strategy for Potato Soft rot Disease.

Dickeya solani is one of the most destructive pathogens of potato, causing severe economic losses. Despite bacteriophage therapy offering a promising sustainable alternative, the rapid emergence of bacterial resistance remains a significant hurdle. This study aimed to develop a sustainable biocontrol strategy using bacteriophages, focusing on overcoming resistance through sequential isolation of lytic bacteriophages. Three lytic bacteriophages, named LMST, PDS1, and PDS2, were isolated from wastewater. Transmission electron microscopy revealed that all three bacteriophages exhibit myovirus morphotype. Combined

genomic and phylogenetic analyses indicated that LMST and PDS1 belong to the lytic genera Limestonevirus and Salmondvirus respectively, whereas PDS2 was unclassified, and seemingly represents a novel genus. Importantly, bioinformatic predictions confirmed that none of the three bacteriophages carry genes associated with lysogeny, virulence, or antibiotic resistance, supporting their safety as biocontrol agents. In vitro assays showed that, while single-bacteriophage applications allowed bacteria regrowth within 24 hours due to resistance, the bacteriophage cocktail suppressed bacterial proliferation for up to 96 hours. Host range tests confirmed strong activity against *Dickeya* strains without adverse effects on beneficial bacteria. In potato tuber assays, bacteriophage treatments reduced disease severity by up to 68.75%. This visual reduction was corroborated by qPCR, which detected a statistically significant reduction in the bacterial DNA levels in treated tubers, compared to the control group. This study demonstrated that a cocktail of sequentially isolated bacteriophages is safe, stable, and an effective tool for sustainable management of soft rot in potato.[**MEKTOUBI Khaoula (Morocco), Supervisor: T. Elbeaino; advisor: M. Sabri, MSc, CIHEAM Bari 2024-2025].**

Assessment of the Occurrence of Robigoviruses in Apulian Cherry Trees and Characterization of a Newly Identified Robigovirus.

High-throughput sequencing (HTS) analysis of sweet cherry (*Prunus avium*) plants from an autochthonous germplasm collection in Locorotondo (Apulia, Italy) led to the identification of a novel isolate of Pomes virus Greece (PVGR), belonging to the genus Robigovirus. This isolate, designated PVGR-IT, represents the first report of PVGR in cherry and the first detection of this virus in Italy. Specific and degenerate primers for Robigovirus detection were developed and validated through Sanger sequencing. Their application to 150 samples collected across three sites in Apulia revealed a PVGR prevalence of 9.3% (14 samples). In addition, one tree was found infected with cherry green ring mottle virus (CGRMV), which constitutes the first report of this robigovirus in Apulia. Unexpectedly, the designed degenerate primer set also detected the presence of cherry virus A (CVA, genus Capillovirus) in 6% of the samples. Comparative sequence analysis of 13 PVGR isolates showed 79–83.5% nucleotide identity with the previously reported Greek isolate from pear. Biological indexing of eight local PVGR isolates confirmed their pathogenicity, inducing symptoms such as leaf crinkling and necrotic spotting on the Bing and Shirofugen indicators. Overall, this study expands the list of viruses known to infect cherry and documents for the first time the occurrence of robigoviruses in Apulian cherries, underscoring the importance of rigorous certification programs to safeguard cherry cultivation. [**AMLEH Arwa M.A. (Palestine), Supervisor: M. Digiaro; and A. Ben Slimen, MSc, CIHEAM Bari 2024-2025].**

Biocontrol of *Verticillium dahliae* and *Septoria pistaciarum* in Pistachio.

Septoria pistaciarum and *Verticillium dahliae* pose major constraints on pistachio production as regards crop yield. This study reports the first isolation of S. pistaciarum from Basilicata, Italy. In vitro, Trichoderma viride exhibited a marked inhibitory effect on both tested pathogens, with dual culture inhibition rates of 60.1% and 58.7%, respectively, for volatile organic compounds (VOCs). By contrast, Bacillus subtilis and *B. amyloliquefaciens* showed only moderate inhibitory activity, with inhibition rates ranging from 22% to 29%. The efficacy of essential oils (EOs) as biocontrol agents was pathogen-specific. Thyme and oregano were highly effective in suppressing *V. dahliae*, with oregano achieving 100%

suppression. Against *S. pistaciarum*, oregano again achieved 100% suppression, while sage, rosemary, and thyme reached ≈52%, ≈50%, and ≈40%, respectively. To calibrate the biocontrol products, two comparators were included: a chemical control and untreated control. In the *V. dahliae* screenhouse assay, the lowest disease severity was recorded with fosetyl-aluminium (endpoint PSI ~40%; AUDPC 2000), followed by the Trichoderma-based product (~45%; 2100), thyme EO (~60%; 2520), and finally the untreated control (~80%; 3150). It should be noted that only leaf symptoms are tracked by PSI and AUDPC; the extent of vascular browning could not be assessed, as this requires destructive sampling. The copper-based compound demonstrated clear efficacy in managing *S. pistaciarum*, with the highest recorded PSI of 15.4% recorded in treated plants. However, oregano oil and the Bacillus-based product exhibited approximately 44% phytotoxicity. In contrast, Trichoderma and thymol/carvacrol-rich oils showed promising potential, warranting further optimisation for incorporation into an integrated pest management (IPM) strategy. [**DHAHRI Rihab (Tunisia), Supervisor: M. Gallo, MSc, CIHEAM Bari 2024-2025**].

Investigation of Toxigenic Moulds Present in the Husks of Walnut (*Juglans* spp.) Genotypes and their Molecular.

Walnut (*Juglans* spp.) is among the most economically significant nut crops worldwide, with Turkey ranking as a leading producer. Although the kernel is widely recognised for its nutritional and economic value, the green husk is typically discarded, despite being rich in phenolic compounds and other bioactive substances. Owing to its chemical composition, the husk provides a favourable environment for fungal proliferation, which may constitute a food safety hazard through disease dissemination and production of mycotoxins. In this study, husk samples were collected from 38 walnut varieties, resulting in 179 fungal isolates. On the basis of morphological traits, these isolates were classified into 60 groups, with *Alternaria* and *Fusarium* emerging as the predominant genera. Pathogenicity assays indicated that 38 groups induced necrosis of varying intensity, while 22 were regarded as non-pathogenic. Mycotoxin analyses revealed that only a small proportion of Alternaria isolates produced alternariol (AOH) and alternariol monomethyl ether (AME). Molecular identification by ITS sequencing largely confirmed the morphological classification and additionally detected less prevalent genera, including Chaetomium, Epicoccum, and Nigrospora. The results show that walnut husks harbour a diverse fungal ecosystem, including toxigenic species, highlighting the need to monitor husk-associated fungi to ensure the safe use of this by-product in food, feed, and industrial applications. [**BOZ Çağrı Mustafa (Turkey), Supervisors: Ç. U. Serçe, N. Baser and A. Ricelli, MSc, CIHEAM Bari 2024-2025].**

Assessment of the Efficacy of Substrate-borne Vibrations for Aphid Control in Vegetable Crops.

Fear-inducing factors, such as the presence of predators or their associated cues, can profoundly modify prey behaviour, influencing movement, feeding, and habitat selection. Among these cues, substrate-borne vibrations are recognised for their role in mediating both inter- and intra-specific interactions and are increasingly explored for their potential in pest management. Building on the work of Zippari *et al.* (2024), which showed that specific substrate-borne vibrations, incidentally, produced during aphid interactions with natural enemies, may disrupt probing and feeding, our study further evaluated whether

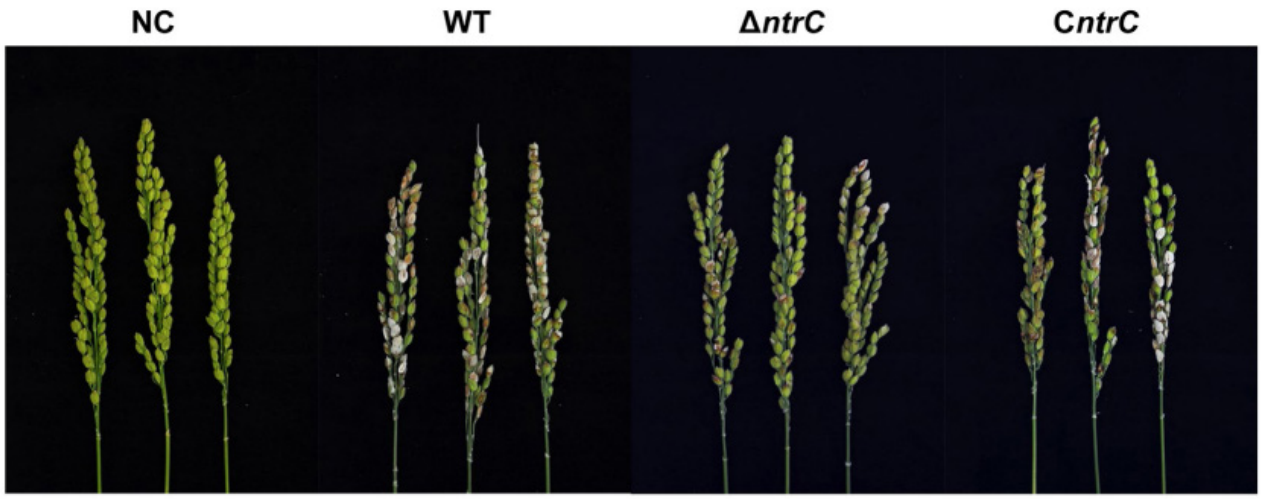
antagonist-associated substrate-borne vibrations could interfere with aphid behaviour. We investigated the effects of vibrations produced by *Adalia bipunctata* chewing and *Myzus persicae* twitching on *M. persicae* and *Macrosiphum euphorbiae*, using chilli pepper and potato as host plants. Control treatments consisted of white noise, simulating anthropogenic activity, and silent control. Aphid responses were assessed through Electrical Penetration Graph (EPG) recordings and video tracking with EthoVision XT to evaluate probing activity, host acceptance, and settling behaviour. Results indicated that vibrations had no significant effect on the behaviour of M. euphorbiae on either host plant. In contrast, twitching vibrations disrupted the feeding behaviour of *M. persicae* on pepper, resulting in a reduced probing frequency. EthoVision analysis further revealed that these vibrations prompted *M. persicae* to alter its feeding location, moving from the leaf to the stem. Such behavioural changes suggest reduced access to optimal phloem resources, potentially limiting nutrient exploitation and growth. In conclusion, this study provides initial evidence of the potential of antagonist-derived vibrations as a tool for aphid management in organic agriculture. [**MERROUKI Bassair Rahma (Algeria), Supervisors: V. Verrastro, N. Tagarelli, M. L. Vitale and D. Cornara, MSc, CIHEAM Bari 2024-2025].**

Evaluation of the Effect of Zeolite and Kaolin in Controlling *Aspergillus* spp. in Grapes and Adsorbing Ochratoxin A in Organic Grapes and Wine.

Ochratoxin A (OTA) is a carcinogenic mycotoxin predominantly produced by Aspergillus spp. It represents a major food safety concern, particularly in organic viticulture, where the prohibition of synthetic fungicides use importantly reduces the control of fungal proliferation. This thesis investigates the potential of zeolite and kaolin to mitigate fungal infection in grapes and OTA contamination in both grapes and wine. A multi-level experimental design was adopted, beginning with the isolation and characterisation of Aspergillus spp. from organic grapes. In vitro trials were then carried out on wounded and inoculated grape berries, as well as on artificially contaminated wine. These trials were designed to closely reflect vineyard and winery conditions. The findings did not indicate any direct fungicidal activity of the aluminosilicates. However, they significantly reduced disease severity indices in berries, achieving up to a 17% lower infection rate compared with untreated controls. OTA accumulation in grape berries was reduced by more than 95% in treated samples, supporting the hypothesis of a protective film and microenvironmental modulation. In wine, zeolite reached a modest OTA reduction of 4%, with greater adsorption observed at lower wine pH. This research demonstrates that zeolite and kaolin can serve as complementary tools in organic disease management, offering dual benefits in controlling Aspergillus infection and reducing OTA contamination. Their use is particularly relevant on an industrial scale, where even small reductions may secure compliance with regulatory limits. [**EZZARII Hafsa (Morocco), Supervisors: A. Trani, M. Gallo and D. Greco, MSc, CIHEAM Bari 2024-2025].**

The Nitrogen Regulatory Gene *ntrC* Modulates Virulence and Nitrogen Metabolism in *Burkholderia glumae*

Burkholderia glumae, the causal agent of bacterial panicle blight in rice, is a major threat to global rice production. Although the NtrB–NtrC two-component system is a well-established regulator of nitrogen assimilation in many bacteria, its role in *B. glumae* has remained undefined. In this study, we constructed a *ntrC* deletion mutant of *B. glumae* BGR1 to investigate the contribution of NtrC to nitrogen metabolism and virulence. Under nitrogen-limited conditions in minimal medium supplemented with a single nitrogen source, the mutant exhibited markedly impaired growth, particularly when ammonium or glutamine served as the sole nitrogen source. Loss of *ntrC* also resulted in significant reductions in swimming motility, biofilm formation, and toxoflavin production, while extracellular protease activity was unaffected. In pathogenicity assays, the mutant caused substantially milder symptoms in both rice seedlings and flowering panicles, despite showing no difference in bacterial population levels *in planta* compared with the wild-type. These findings demonstrate that NtrC is essential for efficient nitrogen utilization and for full virulence expression in rice. This study provides evidence that the NtrB–NtrC system links nitrogen metabolism with virulence expression in *B. glumae*.**[Seokhun Jang, Mohamed Mannaa, Seungchul Lee, Taeho Jeong, Duyoung Lee, Young-Su Seo.Plant Pathol J. 2026 Feb;42(1):81-92.PMID: 41656720; PMCID: PMC12884053].** doi: 10.5423/PPJ.OA.11.2025.0166



Field Evaluation of Attract and Kill Technology (Hook RPW™) to Control Red Palm Weevil, *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae) in Coconut Plantations of Goa, India.

Coconut (*Cocos nucifera)* is an important crop in peninsular India, where the red palm weevil (RPW), *Rhynchophorus ferrugineus* Olivier (Coleoptera: Curculionidae), is a key pest. Mass trapping of adult weevils using food-baited pheromone traps (FBPTs) is widely used in RPW-IPM programmes. RPW originated in South Asia where it is a major pest of coconut, *Cocus nucifera*. Frequent servicing (change of food bait and insecticide solution) of RPW- FBPTs becomes cumbersome and costly, especially at a higher trap density. We field tested trap and bait free attract and kill (A&K) technology by using Hook-RPW™ in RPW infested coconut plantations of Goa, India. Two FBPTs were located at 100 m distance

on either side in the experimental plot with 50 coconut palms to record the weekly weevil captures. Pre and post-treatment weevil captures were recorded at weekly intervals for 17 weeks each. Further, in the post-treatment phase 50% palms were directly treated with two- 3 g dollops/palm of Hook-RPW™, while for the remaining palms, two dollops were placed individually at the bottom of 4-window 5 L buckets (containers) to record proof of RPW adults being attracted and killed.

A Significant (p=0.05) T-statistic value was registered for weevil captures in FBPTs before and after treatment. Post-treatment results are significant, as a 50% mean reduction in FBPTs was observed in weevil captures. Proof-of-kills studies indicated that the A&K dollops were effective throughout the entire 17-week period after deployment of Hook-RPW™ in the field. In plantations where weevil activity is high and conventional traps have to be deployed at a density of > 1 trap/ha, the A&K technique against RPW can eliminate the adult RPW population in the field cost-effectively and efficiently. This approach is environmentally friendly because the insecticide is applied to a small, localized area, targeting the pest while minimizing risk to non-target organisms. The Hook RPW™ technology shows promise as part of a broader IPM strategy for managing RPW infestations in coconut plantations, with minimal risk of damage to healthy trees. [**Shelke, R., Mahajan, G., Parab, G., and Faleiro, J.R. Int J Trop Insect Sci, 2026**]. https://doi.org/10.1007/s42690-026-01761-2

***Bacillus altitudinis* GG-22: A Novel Plant Growth-promoting Bacterium with Beneficial Agronomic Properties.**

Bacillus altitudinis GG-22, isolated from the phyllosphere of agricultural crops, has been identified as a promising biocontrol agent and plant growth-promoting bacterium with substantial potential in sustainable agriculture. In this study, whole-genome sequencing using Illumina technology, combined with ANI analysis, confirmed the strain's classification as *B. altitudinis*.

The genome revealed a rich set of genes involved in biocontrol mechanisms, including the capacity of synthesis of siderophores (schizokinen and bacillibactin-like compounds), the lipopeptide pumilacidin, the bacteriocin pumilarin, alkylpyrones and *Bacillus* volatiles. *In vitro* antagonism assays demonstrated significant inhibitory effects against phytopathogenic fungi and oomycetes, such as *Verticillium dahliae* and *Pythium* sp., and *B. altitudinis* GG-22 also showed limited efficacy against bacterial phytopathogens, including *Xylella fastidiosa*. Transcriptomic profiling of olive trees treated with GG-22 indicated early activation of auxin transport and systemic acquired resistance (SAR) pathways, alongside substantial downregulation of cell wall remodelling genes. These findings suggest that *B. altitudinis* GG-22 primes plant defence responses and modulates hormonal pathways critical for growth and stress resilience.

Future research should prioritize optimizing application strategies and exploring synergies with other microbial agents to fully harness the biocontrol and growth-promoting potential of *B. altitudinis* GG-22. This strain holds promise for sustainable agricultural practices, particularly in controlling fungal diseases and improving plant performance under stress conditions. [**Ana Falcón-Piñeiro, Alberto Baños, Eva M. Molin, Elías González-Gragera, Annalisa Giampetruzzi, Raied Abou Kubaa, Livio Antonielli, Adrian Wallner, Günter Brader, Satish K. Verma, Antonio M. Martin-Platero, Manuel Martínez-Bueno, Stéphane Compant, Pasquale Saldarelli.Journal Biotechnology Reports, Volume 49, 2026, Article e00945]**. https://doi.org/10.1016/j.btre.2026.e00945

Presence of *Aleurocanthus spiniferus* (Quaintance, 1903) haplotypes in Croatia.

The orange spiny whitefly, *Aleurocanthus spiniferus* (Quaintance, 1903) (Hemiptera: Aleyrodidae), is a quarantine invasive pest of concern in the European Union. In Croatia, it was first detected in 2012 and afterwards reconfirmed in 2018. This study aimed to characterize the genetic variability of A. spiniferus in the southern coastal region of Croatia, specifically within the Dubrovnik–Neretva and Split–Dalmatia counties, using mitochondrial cytochrome c oxidase subunit I (COI) sequences from samples collected between 2019 and 2020. Two dominant haplotypes, H1 and H2, were identified in 8 samples from different host plants and locations in Dubrovnik-Neretva and Split-Dalmatia counties. Haplotype H1 was prevalent on the Hvar Island, whereas H2 was primarily detected along the mainland coastline. The coexistence of both haplotypes suggests multiple introduction pathways, likely through plant material trade and possible natural spread from Montenegro. The neighbouring obtained results provide a basis for comparison with haplotypes in countries and with those from the pest's native range, which may contribute to clarifying the origin of populations in Croatia and suggest whether they result from a single or multiple introductions.**[Ivana PALADIN SOČE, Adrijana NOVAK, Raied ABOU KUBAA, Ivana KRIŽANAC, Journal of Central European Agriculture,** 2**026, 27 (1) p. 195-203]** University of Dubrovnik, Department for Mediterranean Plants, Čibača, Mlini, Croatia and Croatian Agency for Agriculture and Food, Centre for Plant Protection, Zagreb, Croatia and Department of Plant Pathology, UC Davis, California, USA. https://doi.org/10.5513/JCEA01/27.1.5069

The Influence of Irrigation Techniques on Date Palm Infestation by the Red Palm Weevil

This study investigates the impact of different irrigation methods on the infestation levels of the red palm weevil (RPW) in date palms. Results indicate that palms irrigated with bubbler systems experienced significantly higher infestation rates compared to those using surface drip and subsurface irrigation methods, with the latter showing no signs of infestation. Severe infestations in bubbler-irrigated palms necessitated the removal of three infested trees, while mildly infested palms under surface drip irrigation were successfully treated and fully recovered. The findings align with previous research, highlighting that flood irrigation leads to higher infestation rates, with 89% of infested palms in flood-irrigated areas compared to only 10% in drip- irrigated zones. The study emphasizes the importance of selecting appropriate irrigation techniques, such as surface drip and advanced subsurface systems utilizing ultra-low energy dripper technology, to enhance the health and productivity of date palm plantations while mitigating the risk of RPW infestation. Further empirical research is recommended to validate these findings. [**Arash Nejatian, Abdul Aziz Niane and Hamadttu El-Shafie, Outlooks on Pest Management, 36(5): 179-183, 2025].** DOI: 10.1564/v36_oct_02

Agave Associated Crinivirus A: a Novel Monopartite Crinivirus Homolog Isolated from Agave.

We describe the complete genome of the first monopartite and putative member of the genus *Crinivirus* which we propose naming agave associated crinivirus A (AaCA). AaCA was identified by high-throughput sequencing in an *Agave tequilana* leaf sample during a routine metagenomic screening of Agave plants from California. The 16,161 bp genome

contains the protein hallmarks of the family *Closteroviridae*, the HSP70h and the three coat protein homologs (CPh, CP, CPm), along with the open reading frames (ORFs) unique to criniviruses. Two ORFs downstream of the CPm are unique to AaCA. The monopartite nature of the genome was verified by PCR and Sanger sequencing. Phylogenetic analysis of the HSP70h gene clusters AaCA basally with existing criniviruses. **[Kristian A. Stevens, Juliana Osse de Souza, Haoran Li, Ashrafou Ouro-Djobo, Olufemi J. Alabi & Maher Al Rwahnih**. Foundation Plant Services, University of California-Davis, Davis, CA, USA and Department of Computer Science and Evolution and Ecology, University of California-Davis, Davis, CA, USA and Department of Plant Pathology, University of California-Davis, Davis, CA, USA and Department of Plant Pathology & Microbiology, Texas A&M AgriLife Research and Extension Center, Weslaco, TX, USA and Department of Plant Protection, School of Agriculture, The University of Jordan, Amman, Jordan. **Archives of Virology, Annotated Sequence Record. Published: 20 March 2026].** https://doi.org/10.1007/s00705-026-06580-x

Spring qPCR Provides Early Detection of Grapevine Red Blotch Virus Infection in Cabernet Franc Sentinel Vines.

Although knowledge of grapevine red blotch virus (GRBV) biology has grown substantially, uncertainty remains regarding the optimal timing of qPCR testing to detect newly positive vines before they contribute to secondary spread. Using 400 Cabernet franc sentinel vines planted in a vineyard with high GRBV incidence, we evaluated how early new positive vines can be detected by qPCR using petiole tissue and whether spring testing captures most new positives observed within a growing season. A single sentinel vine tested positive one year after planting. Across 2022–2025, nearly all newly positive vines were detected in spring, with few additional detections in summer or fall. Spring-positive vines exhibited high, uniformly distributed virus titers but remained asymptomatic for four months. These findings indicate that spring qPCR testing reliably identifies most newly GRBV-positive vines within a growing season and may enable timely removal of infected vines before peak *Spissistilus festinus* activity, thereby potentially reducing secondary spread**. [Vicki A. Klaassen and Maher Al Rwahnih,** [1]Foundation Plant Services, 455 Hopkins Road, Davis, CA 95616, USA.[2]Department of Plant Pathology, University of California, Davis, CA 95616, USA.[3]The University of Jordan School of Agriculture, Department of Plant Protection,Amman, Amman, Jordan. **Phytopathology, Published Online:11 Mar 2026]**. https://doi.org/10.1094/PHYTO-01-26-0014-SC

Plumeria ampelovirus 1, a Novel Ampelovirus Subgroup II Member Infecting *Plumeria* spp.

A novel ampelovirus, named as "plumeria ampelovirus 1" (PluAV1), was identified in plumeria (*Plumeria* spp.) through high-throughput sequencing. The PluAV1 genome was Sanger-sequenced independently, revealing a complete genome of 14,044 nucleotides and encoding 10 open reading frames. The amino acid sequences of the taxonomically informative gene products (RdRP, HSP70h, CP) of PluAV1 diverged from those of other ampeloviruses by over 25%, and maximum-likelihood phylogenetic analysis of these proteins revealed that PluAV1 belongs to the ampelovirus subgroup II. Two distinct PluAV1 phylogroups were identified underscoring the divergent nature of its natural populations. The species name *Ampelovirus plumeria* is proposed for PluAV1.[**Olufemi J. Alabi,**

Ashrafou Ouro-Djobo, Audrey A. Rodriguez, John O. Oladokun, Minsook Hwang, Cecilia Villegas, Kristian Stevens, Maher Al Rwahnih & Kevin Ong.

Department of Plant Pathology & Microbiology, Texas A&M AgriLife Research and Extension Center, Weslaco, TX, USA and Foundation Plant Services, University of California-Davis, Davis, CA, USA and Department of Plant Pathology, University of California-Davis, Davis, CA, USA and Department of Computer Science and Evolution and Ecology, University of California-Davis, Davis, CA, USA and Department of Plant Pathology & Microbiology, Texas A&M University, College Station, TX, 77843, USA.

Archives of Virology, Annotated Sequence Record. Published: 19 February 2026]. https://doi.org/10.1007/s00705-026-06589-2

Effects of Biopesticides on the Progression of Olive Quick Decline Symptoms caused by *Xylella fastidiosa* subsp. *pauca*

Xylella fastidiosa subsp. pauca (*Xf*p) is the causal agent of olive quick decline syndrome (OQDS), a devastating disease threatening olive groves in Apulia, Italy. Efforts are underway to identify effective strategies to limit its spread. In this study, two biopesticide formulations, one derived from an onion extract rich in organosulfur compounds and the other based on the bacterium *Paraburkholderia phytofirmans* strain PsJN, were tested under field conditions. Treatments were applied eight times per year over a four-year period to assess their potential to reduce Xylella populations and disease progression.

The results indicated that neither formulation lowered Xylella populations. Nonetheless, after four years of experimentation, the formulated PsJN treatment reduced both newly developed and pre-existing Xfp symptoms when applications started at the early stages of infection.

In contrast, no effect was observed when treatments were applied to trees already exhibiting widespread infection and severe symptoms. Physiological analyses of stomatal conductance revealed that both treatments alleviated the drought stress associated with Xfp infection, with the formulated PsJN treatment showing statistically significant improvements. Consistently, treated olive trees exhibited higher stomatal conductance and lower canopy temperatures compared with untreated controls. Based on these encouraging results, further studies are needed to explore the use of these products under different conditions and application timings, as well as in combination with other treatments, to support the development of an integrated management strategy for controlling infections.

[**Crescenza Dongiovanni, Carmine Del Grosso, Michele Di Carolo, Nicoletta Contaldo, Mauro Carrieri, Raied Abou Kubaa, Martino Tagliente, Roberto Argentieri, Tina Kogej, Ana Falcón-Piñeiro, Jose García-Madero, Stéphane Compant, and Pasquale Saldarelli.** Research, Experimentation and Training Center in Agriculture “Basile Caramia”, Locorotondo, Italy and National Research Council (CNR), Institute for Sustainable Plant Protection, Bari, Italy and Acies Bio d.o.o., Ljubljana, Slovenia and DMC Research Center, Granada, Spain and DOMCA SAU, Granada, Spain and AIT Austrian Institute of Technology, Center for Health and Bioresources, Tulln, Austria.

Plant disease, Published Online:7 Mar 2026]. https://doi.org/10.1094/PDIS-12-25-2489-RE

The 21st Conference of the International Council for the Study of Virus and Virus-Like Diseases of the Grapevine (ICVG 2026)

The 21st Conference of the International Council for the Study of Virus and Virus-Like Diseases of the Grapevine (ICVG 2026) was held in Napier from 23–27 March 2026, bringing together leading researchers and experts in grapevine virology from around the world. The conference provided an excellent platform for sharing the latest scientific advancements, exchanging knowledge, and fostering collaboration within the global grapevine research community

Dr. Maher Al Rwahnih participated in the conference and presented several research contributions related to the activities of Foundation Plant Services (FPS), including:

- Exploring HiPlex PCR for Simultaneous Detection of Grapevine Leafroll-Associated Virus 3 and Grapevine Red Blotch Virus
- Investigating the Seasonal Variation in Grapevine Red Blotch Virus Detection, Titer, and Within-Vine Distribution Using qPCR and Sentinel Vines
- Communicate Early and Often – Responding to Virus Detections in Foundation Grapevine Collection.

Phytoseiid Mites of Japan (Acari: Phytoseiidae).

A species list of phytoseiid mites (Acari: Mesostigmata: Phytoseiidae) in Japan is presented. The list was compiled from a survey of published literature, re-examination of accessible permanent slides, and from records obtained during field trips. A total of 97 taxa of phytoseiid mites, known to the species level, are so far reported as native to Japan. In addition, eight species are regarded as exotic, having been introduced into Japan. These phytoseiid mites are represented by the three subfamilies and 22 genera.


Phytoseiid mites of Japan (Acari: Mesostigmata)

MOHAMED W. NEGM, SHINGO TOYOSHIMA, HIDENARI KISHIMOTO, HIROSHI AMANO

Issue: Vol. 5782 No. 1: 23 Mar. 2026
DOI: 10.11646/zootaxa.5782.1.3
Published on: 2026-03-23
Page range: 51-85

The subfamily with the most known species is the Amblyseiinae Muma, with 64 species, among which 17 are in the genus *Amblyseius* Berlese, 15 in *Neoseiulus* Hughes, seven in *Typhlodromips* De Leon, four in *Scapulaseius* Karg & Oomen-Kalsbeek, three in each of *Euseius* Wainstein, *Paraphytoseius* Swirski & Schechter, and *Proprioseiopsis* Muma, two in each of *Amblyseiulella* Muma, *Gynaeseius* Wainstein, *Okiseius* Ehara, and *Transeius* Chant & McMurtry, and one in each of the genera, *Amblydromalus* (Garman & McGregor), *Iphiseius* Berlese, *Phytoscutus* Muma and *Phytoseiulus* Athias-Henriot. In the subfamily Phytoseiinae Berlese, there are 13 species of *Phytoseius* Ribaga, while the subfamily Typhlodrominae Wainstein, is represented by 28 species, of these, 23 in *Typhlodromus* and one species in each of the genera, *Chanteius* Wainstein, *Galendromus* Muma, *Kuzinellus* Wainstein, *Paraseiulus* Muma and *Typhlodromina* Muma. Identification keys to subfamilies, tribes, genera and species of the Phytoseiidae in Japan are presented. [**Mohamed W. Negm,** Ibaraki, Egypt. Shingo Toyoshima, Tsukuba, Japan. Hidenari Kishimoto, Iwate, Japan. Hiroshi Amano, Kyoto, Japan. Zootaxa 5782(1): 51-85, 2026]. https://doi.org/10.11646/zootaxa.5782.1.3

Evaluation of nucleic acids extraction methods for effective detection of citrus tristeza virus by TaqMan Real-Time RT-PCR

Citrus tristeza virus (CTV) is the primary viral disease impacting citrus. Given the limitations of available control methods, early detection of CTV is of paramount importance. Several molecular techniques are utilized for virus detection, with TaqMan real-time RT-PCR recognized as among the most sensitive ones. Nonetheless, effective CTV detection requires robust RNA extraction methods. In this study, a comparative analysis of RNA yield and purity, real-time RT-PCR performance, processing time, and cost of two extraction methods (Semi-automated magnetic bead-based method, Silica capture method), and a direct method (Tissue-print) was undertaken. The Semi-automated magnetic bead-based method demonstrated high efficiency with high RNA yield and purity, real-time RT-PCR performance, albeit at a relatively higher cost. Silica capture method showed moderate RNA yield and purity, real-time RT-PCR performance, and cost, but it is more time consuming. Tissue-print was rapid to execute and inexpensive. However, it comes with reduced real-time RT-PCR performance and low RNA yield. The results of this study may assist researchers making informed decisions regarding the selection of an extraction method that aligns with their specific requirements, considering the evaluated criteria. [**Aoutil Yassine[1], Minutillo Serena Anna[1], Depalma Andrea[1], Djelouah Khaled[1]*** [1]The Mediterranean Agronomic Institute of Bari (MAIB), EPPO Bulletin (In Press), 2026].

djelouah@iamb.it

EPPO/NEPPO contingency exercise workshop for Xylella fastidiosa, Hammamet, Tunisia, 2025-05-26/28.

Preparedness for plant pest outbreaks through contingency planning is an effective approach to ensure a rapid response. Within the European and Mediterranean Plant Protection Organization (EPPO) region, *Xylella fastidiosa* has significant economic, environmental and social impacts in some member countries, as well as its potential for spread to other member countries. To enhance preparedness for this pathogen, a contingency planning simulation exercise workshop was jointly organized by EPPO and the Near East Plant Protection Organization. The event took place over 3 days in May

2025 in Tunisia. A total of 69 participants from 21countries attended the workshop. The attendees came from diverse plant health backgrounds, including experts from National Plant Protection Organizations, international organizations, plant health scientists, policy officials, inspectors, quarantine officers, and pest control specialists. Participants were divided into six groups, each acting as an outbreak management team tasked with addressing the challenges of an *X. fastidiosa* outbreak. The scenario was based on the first detection of *X. fastidiosa* at an olive nursery in a fictitious country called Surveyland. As the scenario progressed over a simulated one-year timeline, each team had to organize themselves to manage a range of issues designed to mimic the fictitious but realistic development of an *X. fastidiosa* outbreak.[**Aoutil, Y., Ezzine, O., BenJamâa Habib, M., Jacques, M.A., Siddatt, M.H., Tikka, O.** et al. EPPO/NEPPO contingency exercise workshop for *Xylella fastidiosa*, Hammamet, Tunisia, 2025-05-26/28. EPPO Bulletin, 55, 503–510. Available from: https://doi.org/10.1111/epp.70013

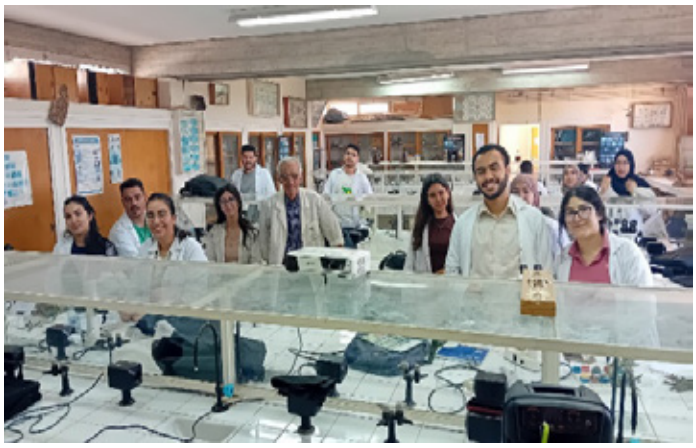
Distinguished Expert

Dr. Abdeslam Benazoun: A Lifetime of Agricultural Excellence

Professor Abdeslam Benazoun was born in the city of Ksar El Kebir, Morocco on November 5, 1950. The Moroccan agricultural landscape owes much to the tireless dedication of Dr. Abdeslam Benazoun, a preeminent authority in entomology and plant protection with over 40 years of profound experience. His academic journey began with an Engineering degree in Plant Protection in 1976, followed by a prestigious State Doctorate in Natural Sciences from the Pierre and Marie Curie University (Paris VI) in 1988. As a Professor at IAV Hassan II (Agadir Horticultural complex), he has masterfully bridged the gap between rigorous research and global scientific collaboration, contributing to more than 50 major scientific publications and didactic guides. Throughout his career, he held significant educational responsibilities, serving for several years as the Head of the Zoology and Plant Protection departments. He also coordinated numerous pedagogical activities for second- and third-cycle programs, playing a vital role in defining the strategic frameworks for training Moroccan plant protection engineers. Dr. Benazoun's expertise was pivotal in managing the Whitefly (*Bemisia tabaci*) crisis and protecting ancestral almond orchards, while his impact extends globally through research projects led in partnership with organizations such as the FAO, the European Union, and the University of Minnesota. Beyond his research, his greatest legacy lies in the hundreds of engineers and agricultural technicians he has mentored, many of whom now hold prestigious leadership positions within the Ministry of

Agriculture and international organizations. Throughout his teaching career, he has been defined by an unwavering scientific rigor, instilling in his students a culture of precision and analytical excellence.

By bridging science and soil, he continues to train the next generation of experts. Driven by a deep sense of generosity and a commitment to knowledge sharing, Dr. Benazoun has made his entire body of scientific work and didactic resources available to the global scientific community through open access on his official platform: www.abdeslambenazoun.com.



Researcher Spotlight

Ammar Abdalrahem

He is a postdoctoral researcher at the French National Research Institute for Sustainable Development (IRD). He earned his bachelor's degree in Biotechnology from Cairo University and a master's in Plant Genetics from CIHEAM Zaragoza, Spain. He completed his PhD at INRAE, University of Lorraine, where he specialized in the evolution of sexual reproduction in phytopathogenic rust fungi. His research focuses on fungal evolution, with current applications to the metagenomic study of rice pathobiomes.

Why fungal sex matters in plant pathogens?

Before my PhD work, fungi were just one branch on the tree of life to me, mysterious organisms with one of the most complex life cycles on Earth. If you work on plant pathogenic fungi like rust, you might notice they often evolve faster than we can breed resistance. While plants and animals follow mostly predictable mating patterns, fungi shuffle their genes like master card players, creating tremendous combinations through sexual recombination. Take poplar rust (my PhD model): the sexual cycle can generate new pathogen races that overcome the plant's defenses, while the asexual cycle supports spreading and invasion. Knowing how phytopathogenic fungi reproduce deepens our understanding of how plant diseases emerge, spread, and persist, making fungal sex a key driver of pathogen evolution and crop disease outcomes.

Beyond the textbook life cycle of poplar rust

During my PhD, I learned that poplar rust does not always behave like the life cycle diagram in textbooks. By conducting a population genetic study on more than 2000 samples

collected across France over 30 years, I showed that most populations are dominated by sexual lineages, but in the south of France, a different story appears. There, I found persistent asexual lineages that survive from year to year, probably helped by mild winters that allow them to persist asexually on poplar. These lineages carry the genetic signature of long-term clonality and seem to bypass the obligate sexual phase. Together, these results reveal that poplar rust can switch from the obligate sexual cycle to long-term clonal persistence, challenging the classic view of its life cycle.

Missing your fungus's mitochondrial genome?

During my PhD, I pursued a side project with international collaborators that reflects my broader interest in fungal genomics and evolution. By mining public short-read data, we recovered thousands of complete circular fungal mitochondrial genomes, nearly tripling the mitogenome diversity available for the fungal kingdom. This resource supports phylogeny and evolutionary questions. If your species seems to "lack" a mitochondrial genome, it may already be hidden in public datasets; check our assemblies first.

Recent Publications

Abdalrahem, A., Noûs, C., Duplessis, S., Frey, P., Stoeckel, S., & Halkett, F. (2025). Behind the shadow play: Shedding light on the population genetics of partially clonal organisms through clone age distributions (2025.10.03.680262). ***bioRxiv***. DOI.10.1101/2025.10.03.680262

Abdalrahem, A., Andrieux, A., Becheler, R., Duplessis, S., Frey, P., Marçais, B., Schiffer-Forsyth, K., Stoeckel, S., & Halkett, F. (2025). Long-lasting coexistence of multiple asexual lineages alongside their sexual counterparts in a fungal plant pathogen (p. 2025.03.28.645883). ***bioRxiv***. DOI.10.1101/2025.03.28.645883

Sarhan, M.S., **Abdalrahem, A**., Maixner, F. et al. De novo assembly of complete circular mitochondrial genomes from 2,695 fungal species. ***Scientific Data*** 13, 28 (2025). DOI. 10.1038/s41597-025-06447-x

Hug, L. A., Hatzenpichler, R., Moraru, C., Soares, A. R., Meyer, F., Heyder, A., Data Reuse Consortium (including **Abdalrahem, A**), Probst, A. J. (2025). A roadmap for equitable reuse of public microbiome data. ***Nature Microbiology***, 10, 2384 2395. DOI. 10.1038/s41564-025-02116-2

Rachid Bouharroud

Dr. Rachid Bouharroud is a distinguished entomologist and the Head of the R&D Department at **INRA-Morocco** (National Institute of Agricultural Research) in Agadir. His research focuses on **Integrated Pest Management (IPM)**, targeting major pests affecting tomatoes, citrus, argan trees, and, more recently, prickly pears and berries. His expertise encompasses biopesticides derived from plant and bacterial extracts, biological control, and the study of side effects on beneficial insects, alongside greenhouse climate management. A two-time recipient of the prestigious **Hassan II Prize for Innovation and Agricultural Research** (2021 and 2025), he also served as the National Coordinator for Morocco's cactus research plan (2021-2024). In addition to his research, Dr. Bouharroud is an Associate Professor at **IAV-Hassan II**, where he teaches pest management and conducts

field training for farmers. With a prolific academic record, he has supervised 7 PhD theses, published over 120 indexed articles and 10 book chapters, and has led or contributed to 14 major research projects. His full publication record and citations can be accessed on his Google Scholar profile

Alaa Saleh

Dr. Alaa Saleh: A Syrian researcher and academic specializing in entomology and biological control. He works as a researcher at the Research Center for Biological Control Studies. He serves as a lecturer and faculty member in the Department of Plant Protection, Faculty of Agricultural Engineering – Damascus University.

Holds a PhD in Plant Protection Sciences, specializing in the biological control of insects, from Damascus University, graduated with honors. Currently serves as the Head of the Department of Research and Studies on the Morphology and Taxonomy of Economic Insects at the Research Center for Biological Control Studies – Damascus University.

Dr. Alaa has published over 30 scientific papers in local and international journals indexed in Scopus.

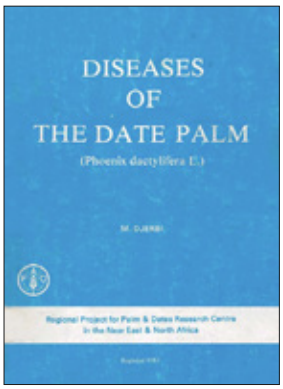
Has recorded numerous insect species and their natural enemies (parasitoids and predators) for the first time in Syria, notably within the FAO Syria project (2021–2023): Taxonomical and Biological studies of Fall Armyworm (FAW) and its Natural Enemies. Projects: the TCP project "Emergency preparedness and response to strengthen capacities of NENA countries to mitigate the risk of Fall Armyworm (FAW) in the region -TCP/RAB/3803".

Has contributed, in collaboration with research centers and the Ministry of Agriculture, to the taxonomic documentation of natural enemies in Syrian agricultural systems. He has peer-reviewed numerous articles for both local and international journals. His name has been included in the AD Scientific Index World Scientist Rankings for the years 2025 and 2026.

GENERAL NEWS

Condolences, Plant Protection Scientist

Condolences for a Colleague



The Arab Society for Plant Protection received with deep sorrow the news of the passing of the esteemed scholar **Dr. Mohamed Jerbi**, a pioneer in plant protection sciences in the Republic of Tunisia and a prominent Arab scientist who dedicated his life to advancing agricultural knowledge, particularly in date palm diseases and pests.

The deceased, may God have mercy on him, was a school of thought in himself, whose academic and professional career contributed to the development of generations of researchers and experts who continue to carry on his legacy throughout the Arab world. He also left a significant mark through his work with the Food and Agriculture Organization of the United Nations (FAO) from 1981 to 1994, where he led numerous regional projects. He was a model of dedicated scientific contribution and purposeful development work. His book on date palm diseases, available through the Iraqi Date Palm Network, is considered a key reference that laid the foundation for the study of date palm diseases: https://iraqi-datepalms.net/?p=19101

Highlights on the Department of Plant Protection and Integrated Pest Management Faculty of Agriculture, Mutah University, Jordan

The Department of Plant Protection and Integrated Pest Management at the Faculty of Agriculture, Mutah University, is considered one of the leading academic departments at both the national and regional levels in the fields of plant protection and integrated pest management (IPM). The department was established in 2009 and began admitting students in the 2010/2011 academic year in response to the agricultural sector's growing need for highly qualified professionals capable of addressing the increasing challenges facing agricultural production and the protection of natural resources.

Academic Transformation and Responding to Global Challenges

In alignment with Mutah University's vision of continuous development and responsiveness to global changes, the department has undergone a qualitative transformation in both its name and academic programs. A new specialization entitled Plant Protection and Integrated Pest Management Technologies has been introduced within the department.

This transformation reflects advancements in modern technologies and artificial intelligence, as well as contemporary global challenges, most notably climate change, water scarcity, natural resource degradation, and global food security issues, which have become central themes in agricultural policies and scientific research worldwide.

Academic Programs and Practical Orientation

The department offers a Bachelor's degree in Plant Protection and Integrated Pest Management, with a clear emphasis on applied and technical aspects. This approach qualifies graduates as agricultural engineers capable of working efficiently across various sectors of the agricultural industry. The program covers:

» Integrated Pest Management (IPM) programs
» Plant health management
» Protection of crops from insect pests and plant diseases
» Environmental protection and conservation of non-target organisms
» Safe and sustainable use of pest management technologies

The department is committed to integrating theoretical knowledge with practical application through laboratory work, field visits, and hands-on training, in line with labor market requirements.

Scientific Research and Academic Achievements

Scientific research is a top priority within the department. Faculty members have published more than 200 peer-reviewed scientific papers in reputable international journals, reflecting the department's distinguished academic presence at both regional and global levels**.**

International Collaboration and Scientific Conferences

The department has played an active role in organizing and participating in numerous local and international scientific conferences, particularly those held in collaboration with the United States Department of Agriculture (USDA), in addition to other research institutions and international organizations. Faculty members have also contributed to the establishment and management of international scientific conferences held at Mutah University and abroad, thereby strengthening the University's position as an advanced academic and research center.

Alumni Engagement and Community Service

The department is committed to maintaining strong relationships with its alumni through continuous communication at their workplaces and by organizing an annual Alumni Day. This initiative aims to build effective bridges between graduates and current students, facilitating the transfer of practical experience, guiding students toward labor market demands, and enhancing employment opportunities.

Future Vision

The Department of Plant Protection and Integrated Pest Management aspires to be a leading academic and research center in plant protection and advanced pest management technologies. It remains committed to safeguarding human health, preserving the environment, protecting non-target organisms, and actively contributing to the achievement of food security and agricultural sustainability at the local, regional, and international levels.

Plant Protection and Phytosanitary Directorate News – Q1-2026, Ministry of Agriculture, Jordan

Regional Participation in Desert Locust Survey Training in Tunisia

The Hashemite Kingdom of Jordan has announced its participation in a regional training program for desert locust survey and exploration experts, scheduled to take place in Tunisia from April 9 to 16, 2026. Representing Jordan, Eng. Mansour Al-Shugeirat will join regional experts to develop technical skills in early warning systems and exchange knowledge on the latest control technologies. This participation underscores Jordan's active role in international pest control networks and the Ministry's commitment to equipping its staff with global expertise to protect national crops from transboundary threats.

Cancellation of "Chlorpyrifos" Registration for All Uses

Following the recommendation of the Pesticide Registration Committee in its session on January 21, 2026, the Ministry has officially canceled the registration of the active ingredient "Chlorpyrifos" for all local applications. This ban covers agricultural use, public health, termite control, and desert locust control. Based on Article 23 of the 2023 Pesticide Regulations and the Agriculture Law of 2015, the decision encompasses all commercial brands containing this substance, such as Chlorofet-48%, Durmite 4 TC-EC, Chloryam-48%, and Termicide-40%EC, effectively prohibiting their trade and use within the Kingdom.

Strategic Cooperation with "CropLife" for Regional Planning

On February 2, 2026, a virtual meeting was held via Zoom with members of "CropLife" to discuss the priorities for agricultural activities in Jordan for 2026. The meeting emphasized the importance of collaborating with the Ministry of Agriculture to organize regional

events that will bring together Arab government representatives to harmonize pesticide registration standards. Furthermore, the meeting highlighted the need to issue awareness brochures on the safe use of pesticides to educate farmers about potential risks and best practices.

Combating Unlicensed Pesticide Trade on Social Media

The Pesticide Department has issued an official circular regarding the illegal trade and manufacture of unlicensed pesticides promoted via social media and online platforms. The Ministry warns citizens against purchasing unregistered products and urges them to use its official online portal to verify pesticide registration. According to Article 21 of the Agriculture Law, the production or trade of pesticides without a license is strictly prohibited, and legal action will be taken against any individual or entity advertising agricultural materials that are not registered with the Ministry.

Intensifying Field Inspections on Pesticide Warehouses and Outlets

The Ministry of Agriculture, represented by the Pesticide Department, has intensified its field inspection tours across various governorates to monitor pesticide warehouses and retail shops. These campaigns are designed to ensure that all traded materials comply with approved specifications and storage regulations, protecting both human health and the environment. Inspection teams are actively monitoring violations involving expired or unlicensed materials, while urging farmers to strictly follow the technical instructions and safety periods (PHI) listed on labels to ensure high-quality, safe national products for local and export markets.



National Campaign for the Control of the Red Palm Weevil


The Plant Protection and Health Directorate, through its Pest Control Department, continues to execute the national campaign to combat the Red Palm Weevil across various regions of the Kingdom.

Utilizing the latest monitoring and control technologies, field teams, particularly in the Northern Ghor region, are working to curb the spread of this pest. These efforts are part of a comprehensive strategy to safeguard the palm sector and ensure the sustainability of Jordan's date production.

Evaluating the National Strategy for Red Palm Weevil Control

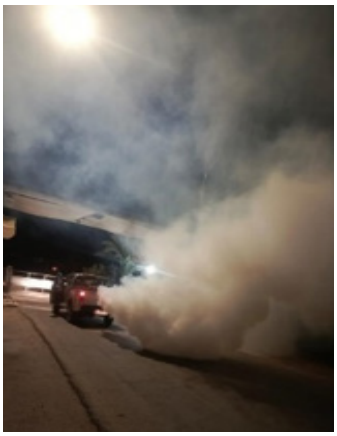
In cooperation with the Jordan Dates Association, the Directorate held a series of workshops in the Southern Ghor, Azraq, and Northern Ghor to review field survey results and the progress of the national control plan. These sessions provided an overview of Integrated Pest Management (IPM) principles and early detection procedures. The workshops also served as a platform for receiving feedback and suggestions from farmers, aiming to unify regional efforts and enhance coordination between the Ministry and agricultural stakeholders to protect the palm sector from infestations.



Implementation of the 2026 Housefly and Waste Management Plan

The Plant Waste Management and Housefly Control Department has implemented several strict measures as part of its 2026 operational plan. These include tracking and seizing smuggled untreated organic fertilizer, treating it with Bacillus bacteria, and installing GPS tracking devices on fertilizer transport vehicles in coordination with the Ministries of Transport and Environment. Additionally, the department has intensified thermal fogging operations in the Baptism Site and Dead Sea areas, distributed public health pesticides to relevant directorates, and conducted a comprehensive field survey in Aqaba to identify and address the causes of fly outbreaks.



Advancements in Plant Health Regulatory and Technical Work

The Plant Health Department has achieved a significant qualitative leap in regulatory oversight, conducting 56 risk analyses and 16 precautionary fumigation processes during the recent period. Technical committees prepared 10 official reports and held four meetings to review grievances regarding phytosanitary measures, ensuring transparency in decision-making. Furthermore, the department handled 21 shipments of treated seedlings, oversaw the destruction of non-compliant seedlings at two sites, and re-exported three shipments that failed to meet international standards, while establishing new protocols for treating imported fruits via cold treatment or hot water vapor.

Announcement of Winners of Khalifa International Award for Date Palm and Agricultural Innovation, 18th Session 2026, and the Launching of 8th International Date Palm Conference

Abu Dhabi, United Arab Emirates – Tuesday, 07th of April 2026

Khalifa International Award for Date Palm and Agricultural Innovation announced the winners' names in its 18th session, during a press conference held at the Zayed for Good Foundation in Abu Dhabi. The event was attended by distinguished officials, experts, and researchers in agriculture and agricultural innovation, as well as representatives of local and international media.

H.E. Dr. Abdelouahhab Alboukhari Zaid, Prof., Award's Secretary General, affiliated with Erth Zayed Philanthropies Foundation, UAE Presidential Court, reaffirmed the Award's ongoing commitment to consolidate its position as a leading international platform for supporting scientific research and agricultural innovation, as well as advancing sustainable development in the date palm sector.

This announcement was made during the press conference held on Tuesday, 07th of April 2026, at the Sheikh Nahyan bin Zayed Al Nahyan Hall, at the Zayed for Good Foundation in Abu Dhabi. Where the Award's Secretary General presented a speech in which he highlighted the Award's journey and achievements, announced the winners' names of

the 18th session, and presented the technical details of the 8th International Date Palm Conference. H.E. also added that this support has enhanced the UAE's pioneering role in serving the date palm tree, and developing the agricultural innovation field globally, as the Award over the past years has become a scientific and developmental platform that brings together experts, researchers, date growers, and innovators from across the world, contributing to the development of date palm cultivation, production, and the enhancement of associated value chains.

Award's Winners

The Award's Secretary General confirmed that the selection of winners of the 18th session was conducted in accordance with internationally accredited criteria and mechanisms, based on the reports of the Award's Scientific Committee and the evaluation of submitted work, and approved by H.E. Sheikh Nahayan Mabarak Al Nahayan. Where the results are as follows:

Distinguished Innovative Studies and Modern Technology Category (Equally won by):

- **Zero-Waste Innovation: Date Palms as a Sustainable Materials Frontier - Patents.**
- **Dr. Fawzi Ahmed Banat - Khalifa University of Science and Technology / Abu Dhabi –UAE**
- **Bio-derived sustainable graphene alternative for enhancing the mechanical properties of cement mortars.**
- **By: Dr. Tae Yeon Kim – Khalifa University of Science and Technology / Abu Dhabi – UAE.**

Pioneering Development and Productive Projects Category

- **Enhancing the Status of Date Palms in the UAE through Tissue Culture and Genetic Innovation at Green Coast Nurseries.**
- **By: Green Coast Nurseries Company - Fujairah / UAE.**

Distinguished Producers, Manufacturers, and Marketers Category

- **Al Alia Farm.**
- **By Mrs. Gumasha Saif Buti Al Mazrui / Al Wathba, Abu Dhabi – UAE**

Pioneering and Sophisticated Innovations Serving the Agricultural Sector Category (Equally won by):

- **Discovery of Growth Regulators and Applications in Agriculture**
- **By: Dr. Salim Al-Babili / King Abdullah University of Science and Technology / KSA**
- **Smart Urban Oasis: Khalifa Award Legacy and a Blueprint for Resilience**
- **By: Environment and Sustainable Development Unit (ESDU) / Faculty of Agricultural and Food Sciences - American University of Beirut / Lebanon**

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

- **Dr. Amgad Ahmed Mohamed El Kady / Arab Republic of Egypt**
- **Dr. Theib Yusef Theib Oweis / Kingdom of Jordan**

8th International Date Palm Conference

Dr. Ahmad Ali Al-Raeesi, Vice-Chancellor of the UAE University, confirmed that the Conference's Scientific Committee has approved the participation of 218 scientists and researchers from various countries worldwide (84 research papers and 74 scientific posters), in addition to more than 60 researchers who have registered their interest in attending. Dr. Al-Raeesi also highlighted that the Conference will include five main scientific sessions distributed over three days, covering the following topics: Red Palm Weevil: Present situation and control measure, Date Palm other pests and diseases, Biotechnology, genetic engineering, and tissue culture propagation, Date Palm cultivation and production, as well as Technical practices of Date Palm, and related general topics.

The Award's Secretary General also expressed his appreciation to all participants in the 8th International Date Palm Conference, which will be held at the Emirates Palace hotel in Abu Dhabi, from the 28th of April to 01st of May 2026. H.E. also added that the Conference will feature a high-level Ministerial session dedicated to decision-makers, with the participation of respected Ministers of Agriculture and a number of directors of regional and international organizations, in addition to the five scientific sessions held over three days.

Selected Research Papers

- **IBiological Activity of *Paenibacillus polymyxa* GT2 isolate from soil in Japan against anthracnose caused by *Colletotrichum orbiculare* in cucumberOriginal Paper**. Abdul Wali Haqyar, Masatoshi Ino, Naoto Kimura, Takumi Okido, Junichi Kihara, Makoto Ueno, Plant Protect. Sci., 62(1):47-57,2026. , DOI: 10.17221/104/2024-PPS
- **Occurrence of the White Cochineal Parlatoria Blanchardi in the fur of the Black Rat and Potential Risks for its Spread to the Date Palm standsOriginal Paper.** Randa Milk, Yasmina Kherbouche, Salim Meddour, Abdallah Aouadi, Makhlouf Sekour, Khawaja G. Rasool, Abdulrahman Saad Aldawood, Plant Protect. Sci., 2026, 62(1):71-78 , 2026. DOI: 10.17221/156/2024-PPS
- **Mycotoxigenic Potential of *Penicillium expansum* Isolates with Multiple Resistance Profiles to Thiabendazole, Pyrimethanil, and Fludioxonil.** Jonathan T. Puglisi and Achour Amiri, Published Online:6 Mar 2026. https://doi.org/10.1094/PDIS-04-25-0882-RE
- **Role of Infested Seed as Primary Inoculum for Cercospora Leaf Spot in Table Beet**. Pratibha Sharma, Sean Murphy, Julie R. Kikkert, and Sarah J. Pethybridge, Published Online: 14 Dec 2025. https://doi.org/10.1094/PDIS-12-24-2624-RE
- **Effects of Agricultural Systems on Ant Diversity (Hymenoptera: Formicidae) in Central Morocco Original article.** Asmaa FERNANE 1, Yousra BENYAHIA 1, Joaquín-Luis REYES-LÓPEZ 2, Ahmed TAHERI, Eur. J. Entomol. 123: 25-34, 2026. DOI: 10.14411/eje.2026.005
- **A Novel Susceptibility Locus to *Erysiphe necator* (SEN2) Identified by Genetic Mapping of Automated Microscopy Computer Vision Data in Grapevines.** Achyut Duwadi, Surya Sapkota, Cheng Zou, Li-Ling Chen, Lance Cadle-Davidson, and Chin-Feng Hwang, Published Online:10 Jul 2025. https://doi.org/10.1094/PDIS-10-24-2133-RE

When a child becomes an insect researcher

Natalie Abu Shouk's family has a small garden in front of their house in one of the areas of Amman, where a variety of wild plants grow and flourish with bright, natural flowers, especially this year, when the region has been blessed with abundant rainfall.

Natalie collects caterpillars, which she calls in her own language "Anqa," and observes them alongside various adult insects. One day, her father brought me one of these caterpillars, which had unknown structures attached to it. I identified the caterpillar as the Large Cabbage White butterfly, *Pieris brassicae*. As for the structures on it, they were cocoons of the parasitoid *Cotesia glomerata*, a diagnosis that was later confirmed by specialist colleagues.

She also noticed that these unusual structures (the parasitoid cocoons) were associated with what appeared to be ants. However, upon microscopic examination, it was revealed that they were, in fact, secondary parasitoids, which we will identify and describe shortly.

Her family's encouragement for the work she is doing has motivated her to continue exploring and investigating what she encounters in this garden and beyond. Such encouragement has become a true driver of creativity.

Editor-in-Chief

The images below are what the four-year-old child observed.

A 2026 calendar illustrated by school students, featuring various insects found in Jordan.

The artwork in this calendar was created by kindergarten students at the American Community School in Amman, inspired by Eric Carle's illustrations. This project was supported by Prof. Ahmad Katbeh-Bader and Eng. Wafa Nasir from the School of Agriculture's Insects Museum at the University of Jordan. The museum is a research hub, housing thousands of specimens and supporting ongoing scientific studies.

This initiative highlights the powerful role of early education in fostering environmental awareness. Integrating biodiversity concepts into school activities such as art, observation, and simple field exploration can build a generation that values ecosystems and understands the importance of insects and natural balance. Schools and scientific institutions should collaborate more closely to promote hands-on learning, linking children directly with nature and biodiversity conservation.

Events of interest

January 26-27,2026	International Conference on Agricultural, Biological and Ecosystems Sciences ICA-BES on, in Bengaluru, India.
January 28-29, 2026	International Conference on Plant Pathology and Plant-Microbe Biology in Istanbul, Türkiye. https://shorturl.at/fmqSY
May,06-10, 2026	7Th World Conference on Sustainable Life Sciences Wocols, Istanbul Esenyurt University, Istanbul, Türkiy. https://www.wocols.com/
July 20-24,2026	First Circular - XVII International Congress of Acarology - Montpellier, France. https://www.alphavisa.com/ica/2026/
September 06-09, 2026	Agbiol 2026. VIII. International Conference on Agricultural, Biological & Life Science, Istanbul,Turkey.www.agbiol.org
October 6-9 2026	17th International Agriculture Symposium "AGROSYM 2026", , Bosnia and Herzegovina. https://agrosym.ues.rs.ba/
August 19-25, 2028	13th International Congress of Plant Pathology (ICPP) during on the Gold Coast in Queensland, Australia. https://www.icpp2028.org/

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

Ammar Abdalrahem (France), Fatma Salem(Egypt), Nidá Salem (Jordan), Hamadttu El-Shafie(ICARDA), Jose Romeno Faleiro (India), Olfat E. Arafa(Egypt), Manar Ahmed Abbas(Iraq), AlSarai Alalawi Mamoon (FAORNE), Abdelmonim Ebrahim, (FAORNE), Heba Tokali (FAO-Egypt), Yosra Ahmed (FAORNE),Yassine Aoutil (EPPO/OEPP),

Khaled Djelouah (BARI-Italy), Nouraldin Youssef Daher Hjaij (Syria), Faiha'a Al-abbar (Syria), Mohamed W. Negm (Egypt), Mohamed Mannaa(Egypt), Alaa Saleh (Syria), Rachid Bouharroud (Morocco), Abd Alrahman Mukahal (ICARDA- Syria) Maher Al Rwahnih (USA), Nawfal Alamiri (Jordan), maram Al-masharawi (Jordan), Firas Ahmad Khalef Al-Zyoud (Jordan), Abdel Aziz Al-Barak (NCPD KSA),)

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

www.asplantprotection.org | **aspp@asplantprotection.org**

www. arabjournalpp.org | **ajpp@arabjournalpp.org**

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