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ARAB AND NEAR EAST PLANT PROTECTION BULLETIN

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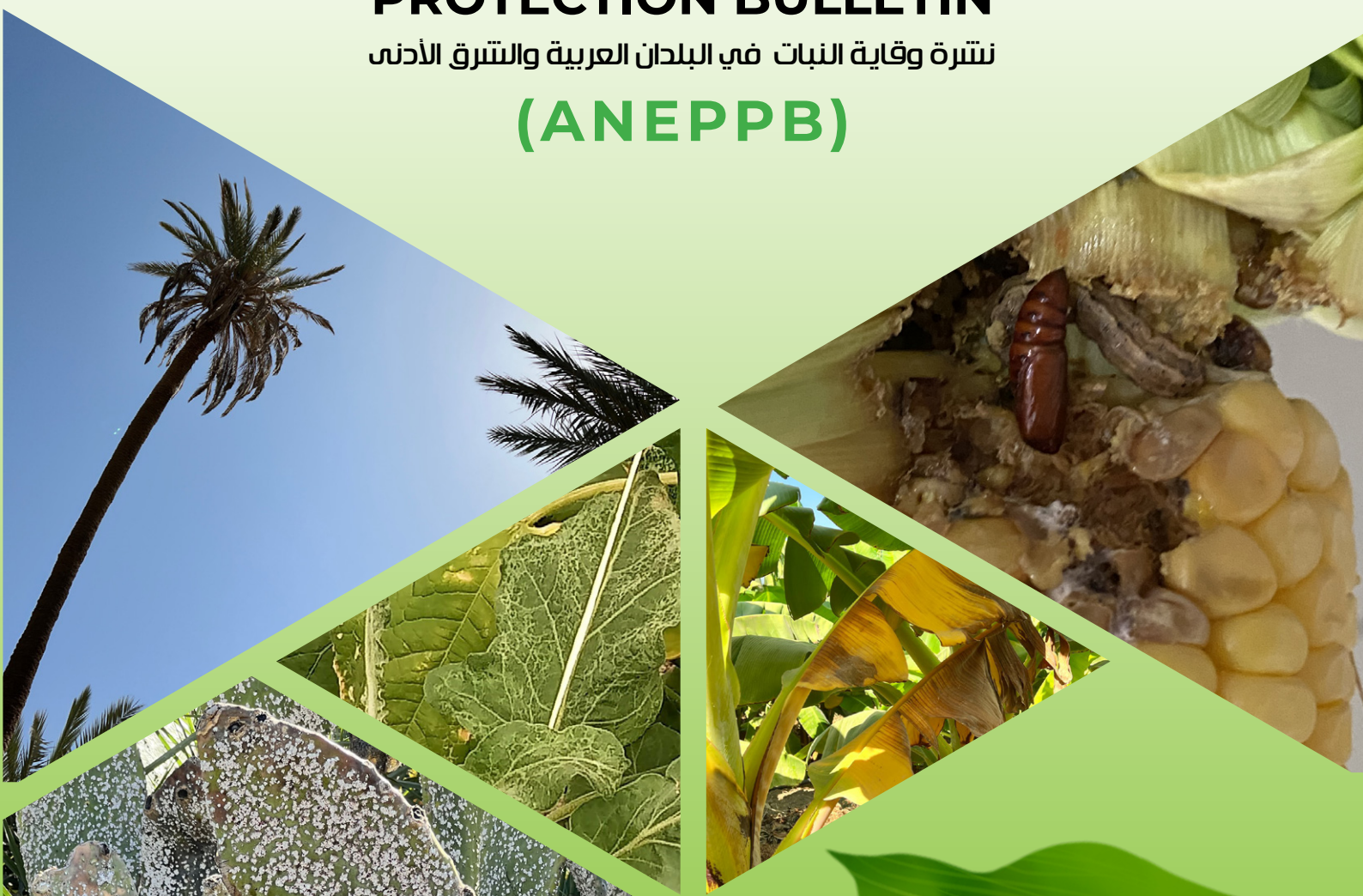
(ANEPPB)



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EDITORIAL

Opening Remarks at FAO Regional Workshop on the Implementation of the Global Action for Fall Armyworm Control in NENA Region

Beth Bechdol, FAO Deputy Director General

"At FAO Regional Workshop on the Implementation of the Global Action for Fall Armyworm Control in NENA Region **Beth Bechdol**, the FAO Deputy Director General delivered an opening remark on the importance of FAW and verbally agreed to add it as an editorial to ANEPPB."

The Fall Armyworm (FAW) has become a significant problem for food security around the world. In 2016, only six African countries reported this insect pest. However, today, 79 countries in Africa, the Near East, Asia, and the Pacific are reporting the presence of FAW. In this region alone, 12 of 17 countries are now confronted by FAW.FAW's negative impacts include yield losses worth an estimated USD 9.4 billion per year in Africa alone. Clearly, FAW poses enormous threats to food security, household incomes, and the well-being of smallholder farmers. Unfortunately, there are other consequences beyond crop damage and loss of income.

The spread of this insect pest is also driving intensified pesticide use, with associated threats to human and environmental security. In response, our Director General launched the global action for FAW control in 2019. This included designing and engaging 8 demonstrations and 54 pilot countries in Africa, Asia, the Pacific, and Near East and North Africa. Egypt is the only demonstration country in the RNE region. At a global level, I am pleased to say that our collective efforts have resulted in some achievements:

i) Regional Integrated Pest Management (IPM) strategies are being validated and disseminated in several geographic zones.

ii) Guidelines for phytosanitary measures have been produced and disseminated.

iii) Over 400 Farmers Field School (FFS) master trainers and over 15 300 FFS facilitators have been trained on FAW management in over 30 countries.

iv) Total acreage infested by FAW and estimated yield losses have been decreased in some of the demonstration and pilot countries.

At the regional level, here in the Near East and North Africa, significant work is underway, such as:

i) Surveys for potential natural enemies of fall armyworm are being conducted in Syria, Palestine, Lebanon, and Egypt.

ii) Monitoring for the presence of FAW using early warning systems has been promoted in Libya and Mauritania.

iii) Training on the use of pheromone traps and bio-pesticide has been carried out in Iraq and Yemen; and

iv) The capacities of bio-control laboratories have been strengthened in Egypt, Jordan, and Syria.

Significant progress has been made in Egypt as the region's demonstration country:

i) The training on monitoring and early warning has been extensively organized by using the FAMEWS mobile app.

ii) Four maize hybrids have been developed both by the private and public sectors showing reasonable tolerance to FAW infestation.

iii) Changed cultural/production practices, such as early planting dates and intercropping, have shown early promise.

iv) Out of eight tested commercially available pesticides, four have been recommended, including two botanical pesticides.

More broadly, the work under the Global Action continues in collaboration with national governments and agencies, research organizations and universities, and the private sector. Overall, we are seeing positive outcomes from these multiple efforts for coordination.

Turning to our time together today, I see there are three major objectives for this regional workshop:

i) First, this is an opportunity for us to promote information exchanges among countries in the NENA region on integrated pest management techniques and technologies against fall armyworm.

ii) Second, I hope that we are also here to learn about the progress and results from the implementation of the Global Action in the demonstration and pilot countries in the region over the last three years.

iii) And finally, I am confident that this day affords us the opportunity to gather suggestions from you – our relevant stakeholders and partners - on the way forward for the Global Action on FAW control.

Iencourage you to be actively engaged with all activities of the workshop, and look forward to being with you for today's valuable exchanges and discussions.

Crop Protection News from Arab and Near East Countries

invasivE, new pests and beneficials

Algeria

Invasion of the Plant Cynanchum acutum L. of Agrosystems in Hot Hyper-arid Zones

Cynanchum acutum is a heliophilous herbaceous perennial plant with an invasive character belonging to the Apocynaceae family has an ability to adapt to several habitats and environments. In the work New flora of Algeria and southern desert regions (Quézel and Santa ; 1963), this plant was very common in the Tell and very rare elsewhere (northern Sahara: Oued Righ), and currently present in the extreme south of Algeria. This plant of Mediterranean-Asian origin which causes damage to crops not only by its propagation, but also it constitutes a host plant for several bioaggressors. Observations carried out in the agrosystems of the wilaya of Adrar during the month of November 2022 showed that Cynanchum acutum is in full bloom and develops according to two forms of morphological adaptation strategies; the climbing form on the plants and the creeping form, that is to say spread out on the ground. Through these two strategies this plant competes with cultivated plants for available natural resources (water, nutrients and light). This plant, undesirable to crops, after its development prevents light from reaching the plant resources planted in the agrosystems of hot hyper-arid zones and consequently causes damage or even the death of cultivated plants. Indeed, monitoring measures and scientific research studies to control the proliferation and development of this invasive species are supported as part of research projects on phytogenetics resources in hot hyper-arid areas. **[Bouallala M'hammed[1,2]*, Souddi Mohammed[1] (Algeria), [1]Saharan Natural Resources Laboratory, Faculty of Sciences and Technology, University of Ahmed Draia, 01000 Adrar, Algeria.[2]Higher School of Saharan Agriculture-Adrar, Algeria, 2022].** mha.bouallala@univ-adrar.edu.dz, alim39hammed@yahoo.fr

Jordan

First Record of the Poplar Lace Bug, *Monosteira unicostata* (Mulsant & Rey, 1852) (Hemiptera: Tingidae), from Jordan

The poplar lace bug, *Monosteira unicostata* (Mulsant & Rey, 1852) (Hemiptera: Tingidae) is recorded for the first time from Jordan. It was found in many localities in Amman associated with the predator *Oenopia conglobata* (Linnaeus, 1758) (Coleoptera: Coccinellidae) which is recorded also for the first time in Jordan. In addition, a predatory bug, *Anthocoris* sp. (Hemiptera: Anthocoridae) was observed consuming the immatures of the lace bug. **[Ahmad Katbeh Bader[1] and Ibrahim J. Al-Jboory[2], (Jordan) [1]Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman, Jordan, [2]Department of Plant Protection, College of Agriculture, University of Baghdad, Baghdad, Iraq, 2022]. Jordan Journal of Natural History, 9 (2), 2022**

First Record and Molecular Identification of Amantia Manginiana in Jordan

The occurrence of the basidiomycete Amantia manginiana is reported for the first time in Jordan. The large crumbly white wild mushroom was collected from woodland during December 2014 from Dabouq in Jordan. All morphological characteristics including cap, stem, gills, and spores were recorded. The mycelium was isolated by aseptically removing a small part of the fruiting body and transferring it onto the potato dextrose agar plate. After four days of incubation at 25-30 °C in the dark, a pure culture was obtained. Sequence analysis of a partial fragment of 28S nuclear large subunit (nLSU) in the ribosomal RNA gene of the isolated strains included the new strain within taxon Amanita manginiana with 95% similarity to Genebank accession No. KP161281 and 91% to Genebank accession No. AF024463.1 respectively. According to morphological characteristics and molecular sequence analysis, the mushroom was identified as Amanita manginiana and recorded for the first time in Jordan**. [Ahmad Mohamad Al-Momany, Hanan Aref Hasan and Ayed M. Al-Abdallat (Jordan), Jordan Journal of Agricultural Sciences, Volume 18, No.2 2022].** DOI: https://doi.org/10.35516/jjas.v18i2.172

LEBANON

First record of the parasitoid *Cotesia congregata* (Hymenoptera: Braconidae) on the larvae of *Spodoptera frugiperda* (Lepidoptera, Noctuidae) in Lebanon.

A high number of pupae of *Cotesia congregata* (Hymenoptera: Braconidae) were recorded on corn plants associated with colonies of the fall armyworm, *Spodoptera frugiperda* (Lepidoptera: Noctuidae) at Bekaa valley in Lebanon during September 2022, under 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". Pupae were collected, reared, and emerged adults were identified by the national consultant and confirmed by the regional consultant of the project Dr.Ibrahim Al-Jboory.

This is the first record of this species in Lebanon. *C. congregata* is a gregarious endoparasitoid that attacks many species of caterpillars and noctuids. The genus is particularly noted for its use of polydnaviruses which knock down the internal defensive responses of the host worm. The wasp larvae emerge to spin individual white cocoons on the cuticle of the host or on the host plants.

Adult parasitoid is small around 2-3 mm for both adult males and females with black antennae length nearly equal to body length. The body and eyes are black and the wings are translucent with pterostigma. [**Zinette Moussa:** Lebanese Agricultural Research Institute and national consultant at TCP/RAB/3803, Lebanon. zmousa@lari.gov.lb**]**



Syria

First Record of *Iridothrips iridis* (Watson, 1924) (Thysanoptera: Thripidae) and *Erythraeus* (Erythraeus) phalangoids

The thrips *Iridothrips iridis* (Watson, 1924) (Thysanoptera: Thripidae) was recorded on *Galium aparine* (cleavers) (Gentianales: Rubiaceae). The adult female insect is mostly wingless, sometimes winged. The body color is brown to dark brown, wrist and crest. The Legs are yellow;the antennae 8 brains, front wing (if present), 3rd to 5th antennae pale in colour, 7th antennae barely longer than the eighth Head length slightly more than width .This thrip is recorded as host/prey for *Erythraeus* (Erythraeus) *phalangoids* (De Geer, 1778) (Acari: Erythraeidae), larva light orange, body hairs 34-36, with characteristic yellowish rings on the legs of the first and second pairs of legs, whole mite reddish with red eyes The mites of this family are external parasitoids in the larval stage on their insect hosts (aphids, psella and a large number of hemiptera, and for the first time recorded on thrips), and they are considered general predators in the adult stage. **[Muhammad Qanu`, Abdulnabi Bashir and Muhammad Imad Al-Araj (Syria), Department of Plant Protection, Faculty of Agriculture, Damascus university, 2022].**

Figure 1. Thrips *Iridothrips iridis* and the meet *Erythraeus phalangoids*

First Record of the Brown House Moth *Hofmannophila pseudospretella* (Stainton, 1849) in Syria

Hofmannophila pseudospretella, the brown house moth, is a moth species in the concealer moth family (Oecophoridae), belongs to the subfamily Oecophorinae. It is the only known species of the monotypic genus. Mature individuals have pale ochre forewings interspersed with blackish brown patches. Each wing has a prominent discal spot and smaller blackish brown cellular spots.

The hindwing is brownish grey, while the head, thorax, and abdomen dark grey-brown. Antennae are simple and threadlike.[2] Wing span is 15 – 26 mm. The length of the Mature individuals is about 9 mm. Larvae have a brown head with a translucent dull white body and pale yellowish-brown legs. Because of the translucency of the body, it may change colour depending on gut content, in turn dependent on the colour of the fabrics ingested.

The brown house moth is considered a serious pest in domestic and commercial settings due to the larvae's destructive feeding habits. Larvae feed on various manmade foodstuffs and household materials. These include stored cereals, dried fruit, seeds, clothes and furniture fabric, fur, and wood floor inlays, book bindings, wine bottle corks and leather. **[Abdulnabi Basheer, Mohamad Kanouh`(Syria), Department of Plant Protection, Faculty of Agriculture, Damascus University, Syria, 2022].**

First Record of Elderberry *Aphis sambuci* Linnaeus, 1758 (Hemiptera:Aphididae) on Bailasan Elderberry *Sambucus nigra* L. in Syria

Elderberry *Sambucus nigra* L. (Dipsacales: Caprifoliaceae) is an aromatic, medicinal plant and cosmetic industries, deciduous perennial shrub, containing flavonoids, anthocyanins and vitamin A, C. Elderberry *Aphis sambuci* Linnaeus, 1758 (Hemiptera: Aphididae) was recorded for the first time in some Damascus gardens during autumn 2022, Syria. Colonies of adults and immatures apterae were found varying in color between dark green and yellowish-brown covering the top growing and stem of plants. In general, the infestation was accompanied by atrophy of branches and deformation of inflorescences and associated with numbers of ants, the body length of wingless adult ranges between 2 and 3.5 mm. Both adults and immatures have white waxy stripes across sides of the abdominal segments. Antennae, siphunculi and legs are black in color, Alates are characterized by larger post siphuncles, well developed marginals, stronger bands on tergites 7-8, tergites 1-4 and 7 have marginal tubercles, cauda dark color tapering. **[Houda Kawas and Abdulnabi Basheer (Syria), Damascus University, Faculty of Agriculture, Department of Plant Protection, Syria, 2022].**

First Record of the Predatory owlfly, *Bubopsis hamata* (Klug, 1834) (Neuroptera: Ascalaphidae) in Syria

The presence of the predatory owlfly *Bubopsis hamata* (Klug, 1834) (Neuroptera: Ascalaphidae) reported in an onion field in the Eastern Qalamoun area of Jayroud, Damascus Countryside, during a survey conducted in January 2021. Adult owlflies are fast-flying, aerial predators, capturing and feeding on other insects in flight, are active during the day. These insects are characterized by possesses hunting-specialized eyes. Eyes divided by a transverse furrow almost equally. The antennae are very long and clubbed, almost as long as 2/3 of forewing. Wings hyaline, without brownish marking, elongated and narrow with rounded apex. The lateral part of thorax is covered with long dense white hairs. Abdomen black with yellow markings, Ectoprocts of male elongate (equal to the length of last four abdominal segments taken together) slightly bent with a rod-shaped branch downward. In the image we can see it in a resting position on Onion leaf. Body length 28-30 mm. The larvae too are predatory, making owlflies important in maintaining a natural ecological balance and helping to control pest insects **[Alaa Turkey Saleh and Mohammad Weam Waled Taleb (Syria), Biological control studies and Research Center, Faculty of Agriculture, Damascus University, 2022].**

Production and Manufacturing of entomopathogenic *bassiana* (Bals.) for the First Time in Syria

Entomopathogenic fungi, *Beauveria bassiana* (Ascomycota: Hypocreales) was produced, formulated and manufactured for the first time at Lattakia Center for Rearing Natural Enemies, Syria. as a wettable powder (WP) of 1×10^8 conidia /ml and dusting powder concentration of 1×10^9 conidia /ml using solid-state fermentation technology (SSF). The fungus *Beauveria bassiana* was tested on *Galleria mellonella* (Lepidoptera: Pyralidae), *Chrysodeixis chalcites (ESPER, 1789), Spodoptera littoralis* (Fab), *Spodoptera frugiperd*a (Smith, 1797) (Lepidoptera: Noctuidae), *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae) and *Tetranychus urticae* Koch (Acari: Tetranychidae). This Biopesticide is not currently available at the Ministry of Agriculture or private companies in Syria. Field applications of *B. bassiana* was tested showed high efficacy on the above mentioned insects. The registration process is running by MOA. **[Nadia Al-Khateeb[1],**

Eyad Mohamed[2], Mohammed Hssieno[1], Arij Saleh[1] and Rod Hejazi[1] (Syria), [1]Biological Control Center, Lattakia, Syria. [2]Plant Protection Department, Ministry of Agriculture, Damascus, Syria,2022]. alkh.nadia@gmail.com

Three New Records of Psyllid Species (Psylloidea, Insect) From Syria

During regular investigation of plant sanitation in the area of Latakia center for Scientific Agricultural Research activities, some abnormal waxy secretion on terminal buds of three tree species, Indian cherry, *Cordia myxa* L. (Boraginaceae); Indian laurel tree, *Ficus microcarpa* L. f. (Moraceae) and green olive tree, *Phillyrea latifolia* L. (Oleaceae) were noticed. Those insect species responsible were identified as *Diaphorina aegyptiaca*, *Macrohomotoma gladiata* and *Euphyllura phillyreae*, respectively. This is the first record of those species, as well as, a new record of *Diaphorina* and *Macrohomotoma* genera from Syria. **[Mahran Zeity (Syria), Agriculture Research Center in Lattakia, General Commission for Scientific Agricultural Research, (GCSAR), Damasucus, Syria. Syrian Journal of Agricultural Research –SJAR 9(4): 324-333 August 2022].**

First Record of the Parasitod, *Chelonus oculator* (Fabricius) and tachinid fly, *Phryxe vulgaris* (Fallén) on Fall Armyworm *Spodoptera frugiperda* in Syria

The fall armyworm, *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae), is an important maize pest in Syria. Insect specimens that were used for the taxonomic study were collected from the injured maize plants in two locations in Damascus and Lattakia governorates during the 2022 season. Out of the total collected samples of fall armyworm , two species of parasitoids emerged of late-instar larvae, *Chelonus oculator* (Fabricius) (Hymenoptera: Braconidae) is a solitary endoparasitoids, egg-larval parasitoid. Length of body 4.5–5.1 mm, with 27 (♂) flagellomeres; body dark brown to black; carapace with a pair of subbasal rounded yellowish or ivory lateral spots; and a tachinid fly, *Phryxe vulgaris* (Fallén) (Diptera: Tachinidae) body length 7.5 mm, body color blackish gray, arista thickened, scutum with 4 dorsocentral setae behind the suture; scutellum reddish-yellow at the posterior 1/3; apical setae of scutellum strong. **[Alaa Turkey Saleh[1] Nadia Ibrahim Al-Khateeb[2]. [1]Biological control studies and Research Center, Faculty of Agriculture, Damascus University. [2]Lattakia Center for Rearing Natural Enemies, Directorate of Agriculture, Lattakia, Syria, 2022].**

The First Record of Nine Predators on Fall Armyworm *Spodoptera frugiperda* in Syria

The fall armyworm, *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae), is a harmful pest of many crops, It was recorded for the first time in Daraa-Syria, 2022 and then moved to other governorates. Nine predators were recorded in Lattakia and Damascus governorates during 2022. Feeding on the eggs and larvae of FAW *Hippodamia variegata* (Goeze), *Oenopia conglobata* (Linnaeus), *Propylea quatuordecimpunctata* (Linnaeus), *Exochomus nigromaculatus* (Goeze), *Scymnus interruptus* (Goeze (*Hyperaspis quadrioculata* (Motschulsky), *Cheilomenes propinqua* (Mulsant((Coleoptera: Coccinellidae). *Geocoris ochropterus* (Fieber) (Heteroptera: Geocoridae) and *Ischiodon scutellaris* (Fabricius) (Diptera: Syrphidae). **[Nadia Ibrahim Al-Khateeb [(1)], Alaa Turkey Saleh [(2)]. [(1)] Lattakia Center for Rearing Natural Enemies, Directorate of Agriculture, Lattakia, Syria. [(2)] Biological Control Studies and Research Center, Faculty of Agriculture, Damascus University. 2022].**

Distribution and Predators of the Invasive Spider mite *Tetranychus evansi* (Acari: Tetranychidae) in the Syrian Coastal Region, with First Record of Predation by the Native *Scolothrips longicornis* (Thysanoptera: Thripidae)

The tomato red spider mite, *Tetranychus evansi* Baker & Pritchard, has emerged as a destructive invasive pest of solanaceous crops worldwide. It was first recorded in Syria in 2011, in Latakia governorate, in the coastal region. Successful management of *T. evansi* in a given region benefits from information about its distribution, host plants, and associated natural enemies. Therefore, we investigated, in 2019 and 2020, the status of *T. evansi* on solanaceous plants in the Syrian coastal region, an important producer of solanaceous crops. A total of 237 samples were collected at 187 sites in Latakia and Tartus governorates. *Tetranychus evansi* was found in 34 cultivated and wild solanaceous plant samples collected at 29 sites distributed across all districts in those governorates, and in a variety of landscapes and elevations, ranging from the coastal plains to high altitudes in the Syrian Coastal Mountain Range. It was collected from three solanaceous crops, namely tomato (*Solanum lycopersicum* L.), eggplant (*Solanum melongena* L.) and potato (*Solanum tuberosum* L.), as well as from two wild solanaceous plants: black nightshade (*Solanum nigrum* L.) and red nightshade (*Solanum villosum* Mill.). A total of 14 species of predatory insects and mites, and five species of phytophagous mites, were identified in association with *T. evansi*. Predatory insects were more frequent and abundant than predatory mites. The insect predator *Feltiella acarisuga* (Vallot) was the most common and abundant species among the predators, followed by *Stethorus gilvifrons* (Mulsant) and *Scolothrips longicornis* Priesner. The predatory mite *Phytoseiulus persimilis* Athias-Henriot was the most frequent and abundant species of associated predatory mites. **[Ahmad Malek Dayoub, Hazem Dib, and Angham Boubou (Syria), Department of Plant Protection, Faculty of Agriculture, Tishreen University, Latakia, Syria. Acarologia, 62(3): 597-607, Published 09 June 2022].** https://doi.org/10.24349/0k8s-gas6

Tunisia

First report of Diplodia scrobiculata causal agent of Tetraclinis articulata branch canker in Tunisia

In May 2017, dieback of *Tetraclinis articulata* (Vahl) Mast. (Juniper gum) associated with branch cankers was detected in Bizerte Forest in Tunisia (alt. 41 m a.s.l.; 37°17' 48''N; 10°0' 2''E). Innumerable pycnidia were found on the surface of diseased branches. Symptoms were observed on 60% of 40 plants surveyed. Symptomatic branches were collected from declining *T. articulata* trees and small fragments from the margins of cankers were surface-disinfected. Each fragment was transplanted to potato dextrose agar (PDA) and incubated at 25 °C in the dark. Colonies on PDA showed adpressed white mycelium becoming grey-black with age. After one-week dark pycnidia measuring 325–470 µm in diameter were noticed on pine needles, placed over cultures incubated in light. Conidogenous cells were smooth, dark and discrete. Conidia were brown clavate with truncate bases. They were aseptate and rarely appeared one to three septa, 32.5 to 42 × 11 to 13.8 µm. The fungus was morphologically identified as *Diplodia scrobiculata* J. de Wet, Slippers & M.J. Wingf. Molecular characterization was achieved by sequencing the internal transcribed spacer (ITS)-rDNA and part of the translation elongation factor 1-α (EF1-α) region. BLAST searches of the ITS (GenBank Accession No. MN846269) and EF-1-α (MT219993) sequences exhibited 99.54% identity with reference sequences of *Diplodia scrobiculata* strain CAP163 (EU392283 and EU392260, respectively). Pathogenicity assay was performed according to Linaldeddu et al. (2014) by inoculating the pathogen on five excised *T. articulata* branches. Four weeks post-inoculation, all inoculated branches showed brown necrotic lesions. Branch lesions measured 6.10 ± 0.35 cm. The pathogen was recovered from infected tissues (90%). Control branches were asymptomatic, thus fulfilling Koch's postulates. To our knowledge, this is the first report of *Diplodia scrobiculata* on *Tetraclinis articulata* in Tunisia and worldwide**.**

[Sawssen Hlaiem, Islem Yangui, Olfa Ezzine & Mohamed Lahbib Ben Jamâa. LR11 INRGREF01 Laboratory of Management and Valorization of Forest Resources, University of Carthage, National Institute for Research in Rural Engineering Water and Forests, Carthage, Ariana, Tunisia. Department of Phytiatry, University of Carthage, National Agronomic Institute of Tunisia (INAT), Tunis Mahrajene, Tunisia. Department of Biology, Laboratory of Nanobiotechnology and Medicinal Plants, University of Carthage, National Institute of Applied Science and Technology (INSAT), Tunis Cedex, Tunisia. LR11 INRGREF03 Laboratory of Forest Ecology, University of Carthage, National Institute for Research in Rural Engineering Water and Forests (INRGREF), Carthage, Ariana, Tunisia, **Journal of Plant Pathology, 08 December 2022**]

Yemen

Some Insect Fauna Found on Some Plants in Yemen

A survey of insects on some plants was conducted in Sana'a and Hajjah governorates of Yemen. Eleven specimens of the collected insects were monitored, seven of them were completely identified to the species. All of them belong to 3 families and 2 orders. The data obtained revealed that these insects represent a new record for Yemeni fauna:

a. *Ficus nitida*, Sana'a (13 Feb.2022)

1. The Fig Wax Scale,***Ceroplastes rusci* Linnaeus, 1758 (**Coccidae: Homoptera**)**

2. Black Scale (Nigra Scale) ,***Parasaissetia nigra*** **(Neitn) (**Coccidae: Homoptera**)**

b. *Nerium oleander*, Sana'a (13 Feb.2022)

3. Vine mealybug ,*Planococcus ficus* (Signoret) (Pseudococcidae: Homoptera**)**

c. *Coffea arabica*, Hajjah, (16-21 Mar., 2019)

4. The pink hibiscus mealybug ,*Maconellicoccus hirsutus* (Green) **(**Pseudococcidae: Homoptera**)**

5. Coffee Bug (*Antestiopsis intricata* (Ghesouiere & Carayon) (Pentatomidae: Hemiptera)

d. *Aptenia cordifolia* (Aizoaceae), Sana'a (13 Feb.2022).

6. Soft Brown Scale ,*Coccus hesperidum* L. (Coccidae: Homoptera)

e. *Nephrolepis exatata*, Boston fern (Sana'a (19 Feb.2022).

7. Helmet Scale (Hemispherical Scale) ,*Saissetia coffeae* (Walk.) (Coccidae: Homoptera)

[Hassan Sulaiman Ahmed Mahdi (Yemen), Plant Protection Department- Faculty of Agriculture, Food, Environment- Sana'a University, Maeen Post office, P. O. Box 14430 Sana'a, Republic of Yemen,2022]. hsamahdi@yahoo.com

RESEARCH HIGHLIGHTS

Algeria

Identification, in Vitro Growth and Pathogenicity of *Microdochium* spp. Associated with Wheat Crown Rot in Algeria. *Microdochium* spp. are the causal agents of seedling blight, crown rot, leaf blotch, and head blight on wheat and other smallgrain cereals grown in many areas worldwide. Twenty isolates of *Microdochium* sp. obtained from symptomatic wheat crowns were collected from nine provinces in the center and to the east of northern Algeria. The assignment of isolates to the genus *Microdochium* was based on microscopic and macroscopic morphological criteria. Using species-specifc primers, the two species *M. nivale* and *M. majus* were identified. Molecular identification revealed that 75% of isolates were *M. nivale* (n=16), and 25% of isolates were *M. majus* (n=4). The two species showed optimal conidiation and mycelial growth at 20 °C and 25 °C, respectively. Furthermore, potato sucrose-salt agar together with potato dextrose agar media appeared to be the most favorable for conidiation and mycelial growth, contrary to synthetic nutrient-poor agar, which was unfavorable for both conidiation and mycelial growth. The aggressiveness of *Microdochium* spp. isolates was assessed by *in vitro* and *in planta* bioassays on wheat leaves, crowns, and heads. The results obtained showed no signifcant difference between the crown rot severity of *M. nivale* and *M. majus* (P=0.22), with mean disease indices of 1.7 and 1.38, respectively. In contrast, *M. nivale* was more aggressive on wheat leaves and heads than *M. majus* (P<0.01 and P<0.05). The data obtained in the current study revealed that *M. nivale* isolates were more aggressive than *M. majus* isolates on Algerian wheat. **[Oussama Bouaicha[1], Imane Laraba[2], Houda Boureghda[3],(Algeria), [1]Faculty of Science and Technology, Free University of Bozen-Bolzano, Piazza Università, 1,39100 Bolzano, Italy. [2]ORISE Fellow, Agricultural Research Service, National Center for Agricultural Utilization Research, Mycotoxin Prevention and Applied Microbiology Research Unit. 1815 N. University, Peoria, IL, USA. [3]Laboratoire de Phytopathologie Et Biologie Moléculaire, Département de Botanique, Ecole Nationale Supérieure Agronomique (ENSA), Algiers, Algeria, Journal of Plant Pathology, 2022].** https://doi.org/10.1007/s42161-022-01214-

Survey and Evaluation of Olive Leaf Spot caused by *Venturia oleaginea* (Castagne) Rossman & Crous (2015) on Olive Trees in Algeria. Objective: Olive Leaf Spot fungal disease caused by *Venturia oleaginea* (Castagne) Rossman & Crous (2015). It has a significant negative impact on certain olive growing regions of Algeria. Methodology and results: A survey was conducted from 2013 to 2015 during periods at risk of contamination (i.e. autumn, winter and early spring) to map the geographical distribution of this pathogen. The results obtained showed that Olive Leaf Spot is present in all olive- growing regions in Algeria but not in all states. Twenty seven (27) states out of the 35 surveyed states were reported to be infested, with a total of 1163 infected orchards out of the 1696 orchards surveyed, and a percentage of infection also varying from one region to another and depending on the year. The results of the statistical analyses based on Tukey HSD test at show very highly significant differences between the Wilayas affected. The western regions are very highly significant, whereas in the east the infection is less important. This difference may be explained by the more favourable climatic conditions, the dominance of a single olive variety "Sigoise" which seems to be more susceptible to the disease and the lack of a technical itinerary. Conclusion and application of results: This survey is the first on the situation of olive leaf spot in the olive growing regions located in the East, West and Center of the country, allowing to map the distribution of this pathogen, and the use of resistant varieties as biological control agents in the treatment of OLS disease in Algeria. **[Nadia Kheddam Benadjal[1,2], Abdelmajid Benzehra[3], Mohamed Kheddam and Zouaoui Bouznad[2], [1].National School of Agronomy, El Harrach (Algeria), [2]Laboratory of Phytopathology and Molecular Biology, ENSA EL Harrach, Algeria. [3]Laboratory of Plant Protection, ENSA El Harrach, Algeria. Journal of Applied Biosciences, 174: 18093 – 18102, 2022].** https://bit.ly/3Vbfcuw

Development of a Molecular Marker for the Resistance Gene R11 of Potato to Late Blight. Cultivated potato (*Solanum tuberosum*) is susceptible to many pests and pathogens, but the most important threat to potato production is, so far, the late blight disease, caused by the oomycete *Phytophthora infestans*. Resistance genes from the wild *Solanum* sp. have been used by breeders to develop late-blight-resistant cultivars. Two sets of Black differentials potato genotypes (R1, R2, ..., R11) were used to identify a new marker for resistance gene R11 of potato to late blight. RAPD polymorphic bands were isolated, cloned, and converted into SCAR primers. By amplification of genomic DNA with SCAR primers followed by enzymatic digestion with HinfI restriction enzyme, and verified by Southern blotting, a marker of R11 resistance gene of potato *to Phytophthora infestans* was identified. **[Abdelmoumen Taoutaou, Ioana Virginia Berindean, Erika Csete, Doru Pamfil, Constantin Botez, (Algeria), Romanian Agricultural Research, No. 39, 2022].**

Egypt

Flupyradifurone Induces Transgenerational Hormesis Effects in the Cowpea Aphid, *Aphis craccivora*. With low-dose stimulation and high-dose inhibition, insecticide-induced hormesis, a biphasic phenomenon, can contribute to pest resurgence. The cowpea aphid, Aphis craccivora (Koch) (Homoptera: Aphididae), is a vital insect that infests legume crops. Its hormesis of flupyradifurone has not been previously established. Age-stage two-sex life analysis is used to investigate the sublethal and transgenerational effects of flupyradifurone on two successive generations of *A. craccivora*. A leaf-dip bioassay method revealed high toxicity of flupyradifurone against *A. craccivora*, with lethal concentration 50% value (LC_{50}) of 1.82 mg L−1 after 48 h exposure. Treatment of parent generation (F_0) with LC_{10} and LC_{25} of flupyradifurone significantly increased the longevity and

fecundity of the directly exposed adults. The results of transgenerational effects showed that the treatment of (F_0) with LC_{25} induced significant hormetic effects in progeny generation (F_1). Furthermore, flupyradifurone at LC_{25} significantly enhanced the biological traits, such as intrinsic rate of increase (r), finite rate of increase (λ), and net reproductive rate (R_0) compared with the control. Similarly, both LC_{10} and LC_{25} induced a significant increase in the mean generation time T (d). Conversely, both treatments caused a significant decrease in the doubling time (DT). Data in the present study demonstrate that the exposure of (F_0) to flupyradifurone at LC_{10} and LC_{25} enhanced longevity and fecundity in the directly exposed adults of *A. craccivora*, and induced transgenerational hormesis across the subsequent (F_1) generation. These results should be taken into consideration when using flupyradifurone for controlling cowpea aphid. **[Eman A. Fouad[1], Sherifa A. N. El-Sherif[1], El-Sayed M. S. Mokbel[2] (Egypt), [1]Bioassay Department, Central Agricultural Pesticides Laboratory, Agricultural Research Center (ARC), Giza, Egypt, [2]Stored Product Pest Department, Plant Protection Research Institute, Agricultural Research Center (ARC), Giza, Egypt. Ecotoxicology. 31:909–918, 2022].**

Monitoring and Biochemical Impact of Insecticides Resistance on Field Populations of *Spodoptera littoralis* (Boisd.) (Lepidoptera: Noctuidae) in Egypt. Cotton leafworm, *Spodoptera littoralis* (Boisd.) is a key pest affecting many field crops and vegetables in Egypt. Therefore, in the current study, the susceptibility of the 2nd instar larvae of *S. littoralis* laboratory strain to eight insecticides was investigated and the insecticide resistance levels of two field populations were monitored. The two populations were collected from two governorates in Egypt, namely El-Monufia (MS) and El-Fayoum (FS). Resistance monitoring showed that the field population from El-Fayoum was highly resistant to chlorantraniliprole, emamectin benzoate (EMB), spinotram, and spinosad. However, the El-Monufia field population only exhibited high resistance to chlorantraniliprole and spinosad. The relative toxicity showed that the laboratory strain is highly sensitive to EMB (LC_{50}= 0.001 ppm) followed by spinotram (LC_{50}= 0.006 ppm), chlorantraniliprole (LC_{50}= 0.008 ppm), spinosad (LC_{50}= 0.008 ppm), and indoxacarb (LC_{50}= 0.021 ppm), while chlorfenapyr, fipronil, and alpha-cypermethrin exhibited low toxicity to the laboratory strain of *S. littoralis*. Moreover, the biochemical determinations of detoxification enzymes revealed that carboxylesterase (α, and β -esterase), and AChE activity were significantly increased in the FS population. Thus, Glutathione *S*-Transferase (GST) showed significant increase in the two populations. **[Eman A. Fouad[1], Fatma S. Ahmed[2], Moataz A. M. Moustafa[2](-Egypt),[1]Department of Bioassay, Central Agricultural Pesticides Laboratory, Agricultural Research Center, 12618 Giza, Egypt. [2]Department of Economic Entomology and Pesticides, Faculty of Agriculture, Cairo University, 12613 Giza, Egypt. Polish Journal of Entomology 91 (3):109–118, 2022].**

Distribution of *Phenacoccus solenopsis* Infesting Okra Plants: Evidence for Improving a Pest Scouting Method. Understanding insect behaviour is a prerequisite for establishing pest scouting tools for determining possible damage and implementing control measures for the cotton mealybug, *Phenacoccus solenopsis* (Hemiptera: Pseudococcidae) on okra plants. Field trials were conducted to estimate the distribution modalities of *P. solenopsis* on plants in different cardinal directions, plant strata, leaf surfaces, and field depth (spaces from field boundaries), in a private okra field (Balady cultivar) at Esna district, Luxor Governorate during two consecutive seasons (2021 and 2022). Results revealed that *P. solenopsis* attacked okra plants, were observed from the first week of March through the end of July during each season, and occurred on all okra

field directions in all plant levels and on leaf surfaces, on all the dates of weekly inspections. During the two seasons, there were highly significant differences in population, as well as infestation percentages in various cardinal directions, and very significant changes between the various stratums of plant and on leaf surfaces, as well as between the various distances from field boarders. *P. solenopsis* favours the lower leaf surface of the top stratum of the plant, in the south and east aspects, where its population was constantly abundant throughout the season, and pests more highly attacked okra plants distant from the farm borders than close plants over each season. The current information can be used to help design mealybug monitoring and control programmes on okra plants. **[Moustafa M.S. Bakry (Egypt), Journal of Advanced Zoology, 43 (1): 56-72, 2022].**

Physiological and Morphological Response of Tomato Plants to Nano-Chitosan Used Against Bio-Stress Induced by Root-knot Nematode (*Meloidogyne incognita*) and Tobacco Mosaic Tobamovirus (TMV). Root-knot nematodes (*Meloidogyne* spp.) have been reported to be responsible for large economic losses of agricultural crops due to their wide host range and variety of suitable climates. The control measures of these parasitic nematodes depend upon synthetic nematicides and a small number bio-based products. Chemical nematicides are eliciting adverse effects on the environment and human health. In the present study, an alternative tool, nano-chitosan was tested for the control the root-knot nematodes, *Meloidogyne incognita*, and Tobacco mosaic tobamovirus (TMV) in greenhouse-cultivated tomato. The effect of nanochitosan on morphological (weight and length of shoot and root systems) and biochemical responses (Polyphenol oxidase, Peroxides, Total soluble phenol and Total protein) was assessed. The obtained results indicated that densities of Meloidogyne incognita alone or in the presence of TMV were decreased by nano-chitosan at a range of 45.89 to 66.61%, while root gall desntiy was reduced between 10.63 and 67.87%. Moreover, the density of TMV on tomato leaves singly or in the presence of *M. incognita* was suppressed at range of10.26to 65.00% after 20 days of infection, and reached up to 58.00% after 40 days of infection. However, soil application of nano-chitosan pre infection reduced TMV density only by 5.48%. Morphogenesis of tomato plants such as shoot and root systems were significantly improved. The impacts of nano-Chitosan applications on total soluble phenol, total protein, polyphenol oxidase and peroxides after 20 and 40 days of infections varied. **[Mohamed Salah Khalil, Mahmoud Hamdy Abd El-Aziz and Rasha El-Sayed Selim (Egypt), European Journal of Plant Pathology, Volume 163, Pages799–812, 2022].**

Foliar Application of Nanoclay Promotes Potato (*Solanum tuberosum* L.) Growth and Induces Systemic Resistance against Potato Virus Y. Potato virus Y (PVY) is one of the most harmful phytopathogens. It causes big problems for potatoes and other important crops around the world. Nanoclays have been extensively studied for various biomedical applications. However, reports on their interactions with phytopathogens, particularly viral infections, are still limited. In this study, the protective activity of Egyptian nano-clay (CE) and standard nanoclay (CS) against PVY was evaluated on potato (Solanum tuberosum L.) plants. Their physicochemical and morphological properties were examined with scanning electron microscopy (SEM), transmission electron microscopy (TEM), Fourier-transform infrared spectroscopy (FTIR), and energy dispersive spectrometer (EDS). SEM and TEM analyses revealed that CE has a spherical and hexagonal structure ranging from 20 to 80 nm in size, while CS has boulder-like and tubular structures of about 320 nm in size. FTIR and EDS showed that both nanoclay types have different functional groups and contain many vital plant nutrients that are necessary for every stage and process

of the plant, including development, productivity, and metabolism. Under greenhouse conditions, a 1% nanoclay foliar application enhanced potato growth, reduced disease symptoms, and reduced PVY accumulation levels compared with non-treated plants. Significant increases in levels of antioxidant enzymes (PPO and POX) and considerable decreases in oxidative stress markers (MDA and H2O2) were also reported. Moreover, a significant increase in the transcriptional levels of defense-related genes (PAL-1, PR-5, and CHI-2) was observed. All experiment and analysis results indicate that the CE type is more effective than the CS type against PVY infection. Based on these results, the foliar applications of nanoclay could be used to manage plant viral infections in a way that is both effective and environmentally friendly. To our knowledge, this is the first report of the antiviral activity of the foliar application of nanoclay against PVY infection. **[Dalia G. Aseel, Ahmed Abdelkhalek, Fatimah O. Alotibi, Marwa A. Samy, Abdulaziz A. Al-Askar, Amr A. Arishi and Elsayed E. Hafez (Egypt), Viruses, 14, 2151, 2022].** https://doi.org/10.3390/v14102151

Screening and Biocontrol Evaluation of Indigenous Native *Trichoderma* spp. Against Early Blight Disease and their Field Assessment to Alleviate Natural Infection.

Background: Early blight disease of tomato caused by pathogenic fungi, *Alternaria solani* is the most significant and common disease throughout the world as well as in Kingdom of Saudi Arabia. The aim of this study was to isolate and identify native *Trichoderma* species from the Jeddah region in Saudi Arabia; evaluate their antagonistic potential against *A. solani*; and study their influence early blight disease severity in greenhouse and in open field. **Results**: The present study focused to explore the bio-controlling potential of native *Trichoderma* spp. against *A. solani* strain to compare with a conventional fungicide. Out of 21, 3 *Trichoderma* isolates showed an antifungal activity and and *T. longibrachiatum* by their ITS region sequence analysis. Strong *in vitro* mycelial growth suppression (70.66%) was also recorded at 400 ppm Mancozeb (90%WP®) fungicide. Further, these *Trichoderma* bioagents and fungicide were further evaluated in greenhouse (artificially inoculated) and in field on naturally infected tomato plants. In greenhouse, (13.74%) disease severity after *T. harzianum* treatment was recorded, followed by *T. longibrachiatum* (25.83%) and *T. atroviride* (21.67%). The disease severity after fungicide (50 mg/L; 10 ml per plant) application was (7.91%). Further, positive impact on the plant biomarkers was demonstrated by all selected *Trichoderma* isolates in greenhouse. Under natural infection in season I, the disease severity (%) after *T. longibrachiatum*, *T. atroviride* and *T. harzianum* treatments was 11.5, 13.26 and 16.81%, respectively, followed by control (32.12%), whereas 7.18% disease severity was recorded after fungicide application. **Conclusions**: The results revealed that native *Trichoderma* of this region had potential to mitigate the early blight disease intensity in the field. **[Muhammad Imran, Kamal A. M. Abo-Elyousr, Magdi A. Mousa and Maged M. Saad (Egypt), Egyptian Journal of Biological Pest Control, 32:40, 2022].**

Virulence Effect of *Metarhizium anisopliae* (Met.) and *Beauveria bassiana* (Bals.) Fungi against the Peach Fruit Fly, *Bactrocera zonata* (Saunders) (Diptera: Tephritidae).

Background: The peach fruit fly, *Bactrocera zonata* (Saunders) (Diptera: Tephritidae), is a key pest of fruits in Egypt. Insect-pathogenic fungi are one of the biocontrol agents that increasingly substitute the traditional pesticides to overcome pesticide risks. Therefore, the present study aimed to assess the fungal virulence of *Beauveria bassiana* (Balsamo) and *Metarhizium anisopliae* (Metchnikoff) against *B. zonata* pupae. Also, extended path-

ogenicity effect of these fungi on adult flies was studied. **Results**: The results showed that *M. anisopliae* fungus had more pathogenicity to *B. zonata* pupae on the 2nd, 3rd and 5th days post-treatment than *B. bassiana*. Pathogenicity fungal effects of treated larvae extended to the surviving adults. Fungal concentration and post-exposure interval reversely impacted the pupae by 63.88 and 63.59% mortality in the case of *M. anisopliae* and *B. bassiana*, respectively. The lethal concentration of treated fly by *M. anisopliae* (LC_{50} = 9.5 × 106 conidia/ml and LC_{90} = 9.9 × 107 conidia/ml) was lower than that of *B. bassiana* (LC_{50} = 5.1 × 107 conidia/ml and LC_{90} = 1.9 × 109 conidia/ml). Median lethal time (LT_{50}) value was fungal species-dependent, and concentration. *Metarhizium anisopliae* was more virulent than *B. bassiana*; the lowest LT50 value was 9.48 days by *M. anisopliae* and 13.33 days by *B. bassiana*, depending on the fungal tested concentration of 2.3 × 106 conidia/ml. **Conclusions**: The tested entomopathogenic fungi could be considered promising biocontrol agents against *B. zonata* and could be used for fly suppression through soil application in IPM programs. **[Ismail R. El-Gendy, Mohamed F. M. Zawrah and Mona I. El-Banobi (Egypt), Egyptian Journal of Biological Pest Control, 32:43, 2022].**

Strobilurins: New Group of Fungicides

Strobilurin is a group of natural products and their synthetic analogs have been widely used to control and prevent fungal diseases. Strobilurins were firstly isolated in 1977 from the mycelium of *Strobilurus tenacellus*, a saprobic Basidiomycete fungus causing wood-rotting on forest trees. This group of pesticides was designed to manage fungal pathogens classes such as Ascomycetes, Basidiomycetes, and Oomycetes. Also, Strobilurin commercialized included derivatives such as are azoxystrobin, kresoxim-methyl, picoxystrobin, fluoxastrobin, oryzastrobin, dimoxystrobin, pyraclostrobin and trifl oxystrobin. This group is a part of the larger group of QoI inhibitors, which act to inhibit the respiratory chain at the level of Complex III. Strobilurins group control an unusually wide array of fungal diseases, included water molds, downy mildews, powdery mildews, leaf spotting and rusts. This group are used on cereals, field crops, fruits, tree nuts, vegetables, turfgrasses and ornamentals. Also, Strobilurins found to enhance the plant growth in some cases. **[Rasha E Selim and Mohamed S Khalil (Egypt), J Plant Sci Phytopathol, 5: 063-064, 2021].**

Fluorinated Nematicides: Novel Classes in the Way

The demand on non-fumigant nematicides was strongly increased in the last few years, and this interesting in nematicides are due to farmers are needed for safer pesticides and increasing of the regulatory pressure on many of the traditional nematicides. The control of plant parasitic nematodes with synthetic nematicides is the most widespread and preferred method, but not always effective enough. The most of synthetic nematicides especially non-fumigants are high toxic to non-target organisms. Thus, Novel non-fumigant nematicides were appeared as alternatives. The group of trifluoromethyl contains both fluensulfone and fluopyram which are different in mode of action than traditional nematicides as organophosphate and carbamate. Meanwhile, results indicated that fluensulfone and fluopyram are promising nematicides. These new nematicides are very different from traditional nematicides; they are more s

ective, less toxic and safer to use. **[Mohamed S Khalil and Rasha E Selim (Egypt), Agricultural Research Center, Central Agricultural Pesticides Laboratory (CAPL), El- Sabaheya, Alexandria, Egypt. J Plant Sci Phytopathol, 5: 014-016, 2021].**

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Iraq

Assessment of Ozone Gas Efficiency on the Biological Aspects of the Fig Moth *Ephestia cautella* on Zahdi Date.This study aimed to assess the efficiency of ozone gas in controlling the different stages of the fig moth *Ephestia cautella* (Pyralidae: Lepidoptera) (eggs, larvae, pupa, adults) that infect dates in storage. Four gas exposure periods (30, 60, 90, 120 minutes) were evaluated and the mortality rate of the different insect stages increased with increase in the exposure time. The mortality rate of insect adults reached 100% after an exposure period of 120 minutes, whereas the mortality rate of insect pupa was 66.66%. The mortality rate of larvae reached 100% following an exposure period to ozone gas of 120 minutes and five days after exposure. The study also showed that exposure of eggs to 120 minutes of ozone gas led to an inhibition of egg hatching rate of 37.47%, whereas the lowest insect eggs inhibition rate following 30 minutes exposure to ozone gas was 16.66%. The study also showed that the adults of *Ephestia cautella* were most affected when treated with ozone gas followed by larvae, whereas pupa and eggs were the least affected when treated with ozone gas. **[Thuraya Abdul Abaas AL-Saadi and Feryal Bahjat Hermize (Iraq), College of Agricultural Engineering Sciences, University of Baghdad, Iraq, Arab Journal of Plant Protection, Vol. 40, 3, 2022].** thurayaalsaadi05@gmail.com

LEBANON

Impact of *Beauveria bassiana* and *Metarhizium anisopliae* on the Metabolic Interactions between Cucumber (*Cucumis sativus* L.) and Cucumber Mosaic Virus (CMV)

In natural systems, plant–endophyte interactions are important for reducing abiotic and biotic stresses in plants by producing a variety of metabolites that protect plants from pathogens and herbivores. Biocontrol strategies are increasingly being used as a viable alternative to chemical pesticides. Entomopathogenic fungi (EPF) are one of them, and they have been touted as a successful method for biological pest control in plants. Because EPF strains are sensitive to environmental conditions when sprayed, the recently discovered endophytic behavior of several EPF strains has improved their management. Cucumber mosaic virus (CMV) is one of the most common and serious plant viruses worldwide, infecting over 1200 plant species and being spread by more than 80 aphid species. CMV control is directed towards the use of chemical insecticides to eradicate its insect vectors. Endophytic EPF is currently being studied to control plant virus infection, and antagonistic effects have been reported. Metabolomics is an emerging research field for plant metabolite profiling and is employed to study plant–endophyte interactions. In the present research, metabolomics approaches were conducted to gain information into mechanisms involved in defense against CMV in endophytes Beauveria bassiana and Metarhizium anisopliae (EPF)-treated diseased cucumber plants. In addition, CMV-induced metabolic changes in cucumber plants were investigated. Our analysis indicated large differences in cucumber metabolites due to endophytes application. In total, six hundred and thirty-one metabolites were differentially expressed in endophyte-treated CMV diseased cucumber plants.

Regulation of different kinds of amino acids, organic acids, and phenylpropanoids metabolites could provide insight about plant defense mechanism against CMV pathogen. Important metabolites were found to be regulated in diseased cucumber plants due to fungal endophytes treatment that could possibly confer tolerance to CMV disease. [**Roshan Shaalan, Ludmilla Ibrahim, Falah As-sadi and Walid El Kayal,** Department of Plant Protection, Faculty of Agronomy, University of Forestry, 1700 Sofia, Bulgaria; Department of Plant Protection, Faculty of Agriculture and Veterinary Medicine, Lebanese University, Beirut 999095, Lebanon; Faculty of Agricultural and Food Sciences (FAFS), American Uni-

versity of Beirut, P.O. Box 11-0236, Beirut 1107, Lebanon; Correspondence: we21@aub.edu.lb. Horticulturae **2022**, 8, 1182. https://doi.org/10.3390/horticulturae8121182

Endophytic colonization by *Beauveria bassiana* and *Metarhizium anisopliae* induces growth promotion effect and increases the resistance of cucumber plants against *Aphis gossypii*

The entomopathogenic fungi (EPF) are characterized as fungi with various functions and numerous mechanisms of action. The ability to establish themselves as beneficial endophytes provides a sound ground for their exploitation in crop production and protection. The purpose of this study was to evaluate the entomopathogenic strains of *Beauveria bassiana* and *Mertarhizium anisopliae* for their potential to colonize cucumber plants under natural environmental conditions in non-sterile substrate. Seed submersion in conidial suspension resulted in systemic colonization of cucumber plants 28 days post-inoculation. Scanning electron microscope micrographs demonstrated that conidia of both fungal genera have adhered, germinated and directly penetrated seed epidermal cells 24 hr post-submersion.

Treated with EPF cucumber seeds resulted seedlings tissues of which contained a significantly higher amount of total phenolic compounds and unchanged amounts of chlorophylls. There was a significant negative effect of endophytic colonization on the *Aphis gossypii* population size after 5 days of exposure as well as a positive effect on cucumber growth and development 7 weeks post-inoculation. We suggest that reduction of *A. gossypii* population on mature *Cucumis sativus* plants is caused via an endophyte-triggered improvement of plant's physiological parameters, such as enhanced plant growth with subsequent increase in plant resistance through augmented production of phenolic compounds. [**Roshan S. Shaalan , Elvis Gerges, Wassim Habib, Ludmilla Ibrahim,** Department of Plant Protection, University of Forestry, Sofia, Bulgaria; Department of Plant Protection, Lebanese Agricultural Research Institute, Lebanon; Department of Plant Protection, Lebanese University, Beirut, Lebanon. Corresponding address:

roshan.shaalan23@hotmail.com . Journal of Plant Protection Research 61 (4), 2021]

Syria

Evaluation the Efficiency of The Coccinellid *Serangium parcesetosum* Sicard (Coleoptera: Coccinellidae) for Controlling Bemisia tabaci Genn. (Homoptera: Aleyrodidae) on Eggplant in Hama- Al-Ghab. The research was carried out at the Jeb Ramleh Station (Al-Ghab Research Center) in Hama province in a 1000 m2 square for the 2019 and 2020 seasons to evaluate the efficacy of the predator *Serangium parcesetosum* Sicard (Coleoptera: Coccinellidae) for controlling the cotton whitefly Bemisia tabaci Genn. (Homoptera: Aleyrodidae) on eggplant in cages and in the open field. The *S. parcesetosum* was released in three times (29/7, 20/8 and 4/9/2019) for the 2019 season and on (16/7, 23/7, 29/7) for the 2020 season at a rate of 2 adults / plants in cages and 100 adult predators/ 1000 m2 per time. The data were recorded weekly, after the first release of the predator's release, when the immature stages of the cotton whitefly (eggs, nymphs) were recorded on an area of 1 cm2 from the under thesurface of the leaves, which were randomly selected from the top, middle and bottom of the plant. The mortality, parasitism, and emergence ratios of whitefly adults were also calculated within an area of 5 cm2 from the underside of leaves. The intensity of adult and immature stages of whitefly was significantly decreased after the sixth week of release in the two treatments of the predator *S. parcesetosum* compared with control without release either in the open field or in

cages. The average death rate of nymphs of whitefly was more than eight times greater in treatments of the predator compared to the control. The results showed the ability of the predator to control the cotton whitefly population on the eggplant in Hama, Al-Ghab area. **[Bahaa Alrahban, Magda Mofleh, Rafeek Abboud, Nader Asaad, Hanan Habak, Raeed Sbaih and Mohamad Ahmad (Syria), Syrian Journal of Agricultural Research –SJAR 9(4): 344-355 August 2022].**

Biological Control of Tomato Damping-off and Potato Black Scurf by Seed Treatment with *Trichoderma harzianum*. During the present study, the antagonistic potential of *Trichoderma harzianum* Rifai against *Phytophthora infestans* (Mont.) de Bary and *Rhizoctonia solani* Ktihn. was evaluated by dual culture technique. Its efficacy to inhibit pathogenic effects caused by these two pathogens was also evaluated on tomato and potato, under artificial inoculation conditions. On PDA medium, *T. harzianum* showed high level of antagonistic activity against all tested isolates of two pathogens. Appressorium – like structures were observed on *R. solani* hyphae. Treatment of tomato seeds with spore suspension of **T**. *harzianum* showed considerable decrease in pre-emergence damping-off disease incidence caused by *P. infestans* and *R. solani*, with biological control efficacy of 49.3% and 64.33% respectively. Seed treatment with *T. harzianum* also showed biological control efficacy of 66.03% for stem canker disease of tomato seedlings caused by *R. solani*. *Trichoderma* treatment significantly (≤ 0.05) reduced black scurf disease incidence caused by *R. solani* on potato during pot test experiments by 77.95% over untreated control. Although 0.2% carbendazim treatment highly protected tomato and potato plants, but it had a phytotoxic effect, however *Trichoderma* treatments had a positive effect on growth parameters studied as compared to the untreated control. **[Naffaa Walid, Lubana Al-Jaramany, Ahed Elbenay, Reema Al-Mhethawi (Syria), Damascus University, Faculty of Agriculture, Department of Plant Protection, 30621 Damascus – Syria. Jordan Journal of Biological Sciences, 15 (3): 373 – 380, September, 2022].** https://doi.org/10.54319/jjbs/150305

Tunisia

Expansion in the Distribution of *Pauesia silana* Tremblay (Hymenoptera, Braconidae, Aphidiinae), Across North Africa, A Recent Discovery in Tunisia. The occurrence of *Pauesia silana* Tremblay, as an aphid parasitoid (Hym., Braconidae, Aphidiinae) in Tunisia is documented. The parasitoid was found in association with the Aleppo pine aphid, *Cinara palaestinensis* Hille Ris Lambers (Hemiptera: Aphididae), infesting *Pinus halepensis*. Specimens were collected by the rearing of the mummified aphids from the colonies infested the pine trees in the Arboretum of the Institut Supérieur Agronomique Chott Mériem (ISA CM - Tunisia) during March–April 2021. A brief diagnosis is provided for the recorded parasitoid. This is the first record of a *Pauesia* species in Tunisia (out of the purposeful introduction of *Pauesia antennata* Mukerji). Two secondary parasitoids including *Asaphes vulgaris* Walker and *Pachyneuron aphidis* (Bouché) (Hym., Chalcidoidea, Pteromalidae) have also emerged from the mummified aphids. The known *Cinara* aphids and their associated parasitoids in the North African countries are reviewed. Both Aleppo pine aphid and the newly detected parasitoid might be considered exotic species in North Africa, sourced from a recent accidental introduction inside the Mediterranean area, or a horizontal expansion across the North African countries. **[Ben Halima Kamel, M., Zouari, S., Barahoei, H., Rakhshani, E. (Tunisia/Iran), Journal of Insect Biodiversity and Systematics 8(3): 435–448, 2022].** https://doi.org/10.52547/jibs.8.3.435

Plant Protection News in the Arab and Near East Countries

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

Evaluation of Resistance of some Tomato (Solanum lycopersicum L.) Varieties for *Tomato yellow leaf curl virus* and Study of Resistance Inducers Effects

Tomato yellow leaf curl virus (TYLCV) is one of the most important viruses of the genus Begomovirus. Using polymerase chain reaction (PCR), several strains of TYLCV virus were detected on tomato plant (*Solanum lycopesicum* L.) in several Greenhouses in the Syrian coast, which are TYLCV-Mld, TYLCV-IL, Spanish TYLCSV-ES, and Sicilian TYLCSV-Sic. The full nucleotide sequence of the genome of the detected strains was determined, Phylogenetic tree of local isolates of detected TYLCV strains showed similarity to neighboring countries' strains. A single-leaf grafting method (lingual) was used to transmit TYLCV to healthy plants. The results confirmed that the grafting ensures the transfer of a sufficient amount of the virus to the grafted seedlings. The resistance of twelve (12) tomato cultivars (hybrids) to TYLCV virus was evaluated, and it was found that there is a big variance between these cultivars in the extent of their resistance to the virulent strain TYLCV-IL of this virus.

The effectiveness of BTH resistance inducers had been studied at a concentration of 50ppm, fung Serendipita indica, and two bacterial strains Bacillus subtillis B27 and Pseudomonas Chlororaphis Ma 342, on the growth of healthy tomato cultivars (OURJOAN) and (NEENAR), and infected ones with TYLCV , which showed that the disease severity in plants treated with different resistance inducers (separately) in the infection symptoms with TYLCV had been decreased. The best results for stimulating growth indicators were by using BTH with the two bacteria strains and *S. indica* together, The results showed a significant effect in stimulating the studied growth indicators in plants treated with a percentage increase of (39.2%, 51.1%, 79.4%, 34.3%, 55.2%) in the plants of the cultivar ARJUN, and (37.6%, 40%, 61.5%, 41%, 47.2%) of NINAR plants for indicators (plant length, main stem diameter, number of flowers, shoot and root weight) respectively compared to virus-infected control plants untreated with resistance inducers. The disease severity decreased in plants of this treatment to reach 45% at the end of the experiment for the ARJWAN cultivar and 35% for the NINAR cultivar.

The plant reached a more sustainable resistance to TYLCV through a significant increase in different growth indicators, and a decrease in the viral infection rate. **[Aus A. Hasan, National Commission for Biotechnology- Damascus- Syria. Ahmad M. Mouhanna, Faculty of Agriculture -Damascus University and Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD) and Syrian Private University (SPU)- Damascus – Syria. (Doctorate, 2022)].** A.M.Mouhanna@gmail.com

Study of Pathogens Involved in Dieback Pines and Shrubs of the Coastal Dunes in Northern Tunisia.

Pathogenic fungi are amongst the main causes of forest trees and shrubs diseases. This study aims to investigate the Dieback disease in two forests in the north-east (Henchir kort) and north (Rimel) of Tunisia. The identification of the fungus was carried out by means of morphological and molecular features; Then the virulence of the isolates was evaluated and the fungal growth was evaluated at temperatures ranging from 5 to 40 °C on PDA medium. Antagonism tests were performed using direct and indirect confron-

tations between pathogenic fungi and the antagonist strain of *Trichoderma* obtained in this study. A collection of 115 fungal isolates was obtained from *Pinus* trees (*P. halepensis* and *P. pinea*) and shrubs species (e.g. *Juniperus oxycedrus*, *Tetraclinis articulata*, *Pistacia lentiscus*, *Olea europeae, Erica arborea, Retama raetam, Quercus coccifera*) showing symptomatic branches. 6 different genera have been characterized: *Diplodia* spp., *Pestalotiopsis* spp., *Neofusicoccum* spp., *Heterotruncatella* spp.

Alternaria spp. and *Fusarium* spp. The results showed that *Diplodia* spp. were the most isolated fungus associated with symptomatic branches in Tunisia, followed by *Pestalotiopsis* spp. Their isolation frequency has been noticed to be significantly correlated to the dendrometric parameters and ecological factors ($P<0.000$). Morphological identification and genetic analysis of internal transcribed spacer region (ITS) of rDNA, and partial sequencing of the translational elongation factor 1-alpha (*Tef-1* α) and β-tubulin (TUB) genes identified 12 fungal species: *Diplodia pseudoseriata*, *D. seriata*, *D. scrobiculata*, *D. africana*, *Neofusicoccum luteum*, *Pestalotiopsis biciliata*, *P. chamaeropis, Heterotruncatella spartii*, *Alternaria alternata*, *A. infectoria*, *A. tenuissima* and *Fusarium oxysporum*. The evaluation of the pathogenicity of the isolates confirmed their virulence towards their host plants. *Diplodia scrobiculata* isolate was the most virulent species. The results of tested temperatures suggested that the optimum growth temperature of the tested isolated was 25 °C. The temperatures of 5 °C and 40 °C inhibited the mycelial growth of all the examined fungi except *D. seriata*, which could grow at 40 °C. The genus *Trichoderma* is the most fungal used as biocontrol agent. Morphological and molecular characteristics of the ITS region allow to identify 15 isolates as *Trichoderma harzianum* isolated from asymptomatic branches of *P. pinea* trees. Direct (on PDA medium) or indirect (remote) confrontation tests between fungal isolates and *T. harzianum* showed that the antagonist has inhibited mycelial growth of the pathogenic fungus compared to the untreated control.

The results show that the biological control test using *T. harzianum* against the pathogenic fungi associated with branch canker and dieback disease of forest species showed great results. In conclusion, this study indicated that the majority of the investigated forest types are threatened by degradation, and the forest in northern Tunisia (Rimel) appears to be the most affected. This decline in forests could be mainly linked to the impacts of climate change. **[Sawssen Ali Hlaiem (Tunisia), University of Carthage, National Agronomic Institute of Tunisia (INAT), Department of plant protection, Supervision of Prof. Dr. Mohamed Lahbib Ben Jamaa, (Doctorate, 2022)].**

Risk Assessment of Widely Used Herbicides on Some Fruit Orchards in Egypt

The herbicide glyphosate has been widely used all over the world. In light of the extensive use of the pesticide, some opinions have emerged calling for the importance of evaluating its environmental risks and studying its acute and chronic effects on non-target species after it was classified by the International Agency for Research on Cancer (IARC) in 2015 as a human carcinogen (probably Group 2a). Accordingly, the thesis

aimed to study the behavior and fate of glyphosate and its environmental and health effects under Egyptian conditions, and the possibility of using glufosinate ammonium as a suitable alternative in the event of restriction or ban of glyphosate in the future.

Results of toxicological tests (acute toxicity, biochemical effects, genotoxicity, and molecular heredity) showed different effects of both herbicides on rats exposed to the tested doses than those without treatment, represented in changes in some biochemical parameters indicative of liver and kidney functions, sperm abnormalities, stimulating effects of the activity of some Genes associated with encephalitis and hepatitis.

The histopathological study confirmed close changes in the tissues of the brain and liver. On the contrary, the analysis of the results of the risk assessment for each of the herbicides using the environmental impact quotient (EIQ) model showed a moderate value of the field application rate (EIQ FUR) for glyphosate, and a low rate for glufosinate ammonium, which indicates that it is safer in terms of the environmental impact quotient of glyphosate, and that it can be used as a substitute for it if it is restricted or stopped from being used on orchids and other crops.

These results confirm the importance of recommending users and implementers of both herbicides to consider safety procedures and to use protective clothing and tools to avoid exposure to the herbicide, in addition to adhering to good agricultural practices when using them. **[Amira Salah Mahmoud Othman (Egypt), Department of Plant Protection, Faculty of Agriculture, Ain Shams University, Egypt, Advisors Committee: Prof. Mohammed El-Said El–Zemaity, Prof. Walaa El-Sayed, Prof. Ahmed Hanfy (Doctorate, 2022)]**

Molecular and Bioassay of Lepidopteran Larvae Resistance Cry gene in Maize

Genetic engineering has been used to transfer genes from other organisms, in a way that cannot be achieved by conventional breeding, and has improved the performance of plants in the field, increasing their tolerance to certain biological and abiotic stresses. The *Cry* gene has been isolated from *Bacillus thuringiensis* subsp. Kurstaki HD1. It is toxic to nematode, insect pests, especially species of the Lepidoptera, Coleoptera, and Diptera, which cause significant economic losses to major crops grown around the world. Different forms of PCR are the most common.

the current study aimed to investigate the presence of *Cry* gene in maize exist in the local market in Aleppo by nested PCR, and bioassay of some maize products using a Mediterranean flour butterfly *Ephestia Kuehniella* as an alternative host. 15 samples of grains and maize products were collected, DNA was extracted by CTAB method, then its concentration and purity were measured, and its quality was tested. The conventional PCR was used to detect the endogenous gene Zein and the P35S promoter. Whereas, the Nested PCR was used to detect the cry gene by using specialized primers on all these constructs. Plastic boxes divided with plastic barriers, containing 100 g of corn flour per replicate, were used in the bioassay.

The second instars were transferred to the boxes (replicates), twenty larva each and the sample was repeated for three times. The boxes were covered with a piece of muslin and fixed with a rubber band. The boxes were incubated at a temperature of 23 ± 2 °C, relative humidity 50 ± 5%, illumination (16 h light: 8 h dark), and the following readings were taken: corrected kill percentage, larval longevity, length of pupal period, and the sexual

fecundity for adults larval weight. The DNA concentration was estimated with 350 ng/µl, in average and the purity was 1.9-2.0 from the grains samples, while the average was 200 ng / µl and the purity was 1.2-2.7 in the food product samples. The results of the conventional PCR showed the predicted fragment of 277 base pairs of the Zein gene and 118 bp for the P35S promoter. The results of the nested PCR revealed the presence of the *Cry* gene in 85.71% of the tested samples. The results of the statistical analysis showed that there were significant differences in the corrected percentage of killing, which ranged between 47.75 -100% in all larval ages.

The results also showed an increase in the length of the larval age, which ranged between 32-46.06 days, while it reached 25 days in the control treatment. It also recorded a decrease in larval weight, which ranged between 0.43 - 0.77 mg for the second larval age, 1.47 - 2.27 mg for the third larval age, 2.8 - 3.8 mg for the fourth larval age, and 12.67 - 14.47 mg for the fifth larval age, while the average weight of the larvae was In the control treatment and for all larval ages, 1.07, 2.8, and 4.67,18 mg, respectively. The results also recorded a decrease in the number of eggs in insects whose larvae fed on corn grain and its genetically modified food products, which ranged between 101.3 - 143.3 eggs, comparing to 203 eggs in the non-transgenic control. Deformations were also observed on the adults, especially on the hind wings.

When its larvae fed. On genetically modified corn flour. **[Esmail Dahham (Syria), Department of Plant Protection, Faculty of Agricultural Engineering, University of Aleppo. Supervisor Dr. Fateh Khatib (Master, 2022)**

Biological and Genetic Diversity of Dodder

The genus *Cuscuta* (field dodder) is an obligate parasitic weed with approximately 170 species distributed throughout the world, that attacks the aerial parts of any plants, shrubs, weeds and cultivated crops, which leads to the reduction of production or sometimes leads to the death of host plants.

the present study aimed to identify the species of dodder in Al-Safira region, based on the morphological characteristics and studying the genetic diversity. A survey was conducted for 46 fields distributed in Al-Safira and Al-Ghab regions, which were planted with crops belong to different plant families. Furthermore,The survey was extended to identify the hosts of relative weeds on the roadsides and irrigation canals during 2018 and 2019.

In 2018, the survey results showed that the dodder was spread in 20 fields, that were planted with 8 types of crops belong to 5 plant families, and the most important of which is the Solanaceae family, 4 wild species belong to 4 plant families, the most important of which is the Camel thorn (*Alhagi maurorum*) from the legume family.

While in 2019, the survey included 26 fields, in which 7 plant species were infected with 5 species, the most important of which was also the *Solanaceae* family. The infection was spread on 8 relative weeds belong to 7 plants families, also, the camel thorn (*Alhagi maurorum*) was more abundant as host plant. A survey was also conducted in Abu jirin village in Al- Safira area. Whereas, the spread of infection with the dodder plant was reported by a Questionnaire for 99 farmers in 46 fields planted with crops belong to the *Cucurbitaceae* family, followed by crops belong to the *Solanaceae* in 37 fields, 10 fields of the *Malvaceae* and 6 fields of the *Apiaceae*. Several treatments were tested in breaking the dormancy phase of dodder seeds (concentrated sulfuric acid, scratching with sand-

paper, gibberellic acid, osmotic pressure). The results showed that there were significant differences between the treatment of scratching with sandpaper for 1, 2, 3 minutes and the other treatments in terms of speed and percentage of germination. dodder samples were characterized based on the morphological and quantitative characteristics of flowers (24 character) as differential traits using classification key in Flora of Syria and Lebanon by Mouterd, Two new species was recorded (*Cuscuta* approximata on cumin (*Cuminum cyminum*) and *Cuscuta europaea* on Camel thorn (*Alhagi maurorum*) for the first time in Syria, in addition to *Cuscuta campestris* as the most frequent species in the survey region.

The results of the cluster analysis of all readings and data related to the morphological, quantitative and qualitative characteristics of dodder flowers showed the distribution of the studied species into three clusters: The first cluster included 30 samples. One of the most important common characteristics in it is that the diameter of the stalk does not exceed 1 mm, the styles are separate, not fused (united) , the flowering inflorescences are tent and carried on the stalk, and the stigma has a spherical top, The second cluster included three samples, the most important characteristics of which are that the diameter of the stalk is 1 mm, the stalk is strong and very branched, the styles are developing, the calyx lobes and the corolla are round or sharp, While the third cluster contains one species *Cuscuta approximata* , as its flowering inflorescence is sessile, tent shape , and circular, with a diameter of 7 mm, the pens are longer than the ovary, Corolla lobes are cycloid, the lobes of the calyx are not swollen and tubular, the calyx is yellow in color.

The percentage of similarity based on the morphological and quantitative characteristics of the dodder plant ranged between 45-100%. DNA was extracted using CTAB protocol, the quality, purity and quantity were determined for the genomic material.

ISSR technology was used to study the genetic diversity of dodder. Binary system was used for data scoring (1 present, 0 abscent) and Cluster analysis. The DNA extracts yielded 41.9-2200 ng/µl, with A_{260}/A_{280} values within 1.48 to 2.0, which indicates that the majority of samples were free of protein.

The DNA degradation was evaluated by 1% agarose gel electrophoresis, which showed a high–molecular-weight band for each sample.Inter simple sequence repeat (ISSR) markers were used to evaluate intra-specific genetic diversity among 24 dodder samples. all markers produced 60 amplification products, which were 100% polymorphic with PIC values within 0.14 to 0.4. The samples varied greatly, the pair-wise Jaccord's similarity coefficient ranged from 0.04 to 0.89, revealing a wide diversity in the studied samples. The dendrogram prepared through unweighted pair group method with arithmetic mean (UPGMA) distinguished four main clusters, cluster I consisting of 12 samples, while cluster II contained 10 samples, and 1 sample for cluster III and IV each. **[Hala Al Zaher (Syria), Department of Plant Protection, Faculty of Agricultural Engineering, University of Aleppo. Supervisors Dr. Fateh Khatib and Dr. Naeim Al Hussien (Master, 2022)].**

Genetic Diversity of Bacterial Leaf Streak and Reaction of Wheat Varieties to Infection in the Seedling Stage

Bacterial leaf streak on wheat is one of diseases that may cause great losses to the durum and bread wheat. Resistant varieties are one of the most important options proposed for managing this disease. This study aimed to the Isolation of the bacteria causing wheat leaf disease from different regions of Syria, and study of its cultural and biochemical char-

acteristics and its pathogenicity, Evaluation of the reaction of 35 cultivars and promising strains of durum and bread wheat against infection with wheat streak disease caused by the bacteria *Xanthomonas translucens* pv. *Undulosa*, and Studying the genetic diversity of isolates based on the molecular markers of DNA. Fifty-six bacterial isolates were obtained from wheat grown in different regions of Syria, the microscopic, cultural and biochemical characteristics of these isolates were studied, and the pathogenicity of the pure isolates was tested, and their virulence against susceptible Morocco wheat cultivar.

Bacteria were isolated on the nutrient agar NA medium from infected wheat leaves, and then the isolates were tested for their pathogenicity and virulence against susceptible morocco wheat cultivar.

The cultural properties and biochemical characteristics of one of the virulent isolates were also tested, which in turn was used to test the reaction of the cultivars in the seedling stage. Twenty-four pathogenic isolates were obtained, divided into four groups according to their virulence, 7 isolates were highly virulent, including isolate *Xtu*.8, whose cultural and biochemical properties showed that it follows the species *Xanthomonas translucens* pv. *undulosa*.

The tested cultivars varied in their reaction to the pathogen, as there were five promising lines (Icajihan2013, Lahnmiki, Icamoram8, Icarhani, (Mgni3/Ainzen-1//Maamouri-3) and two durum wheat cultivars, Bohouth 7 and Bohouth 9, were resistant to the bacterial leaf streak disease, while none of the tested cultivars was immune to infection. The rep-PCR technique was used to assess the genetic diversity of bacterial isolates (*Xtu*. 1-24). Where the DNA was extracted and its concentration and purity were measured by spectrophotometry, at a wavelength of 260 nm for DNA and 280 nm for protein. Molecular analysis of the repeat elements was carried out with the following primers: M13-PCR, BOXA-PCR, and ERIC-PCR.

The studied isolates were divided into four main clusters according to their virulence when using the M13-PCR marker, and within three clusters when using both the BOXA and ERIC markers, Or all three markers.

The used molecular markers showed great genetic diversity among the isolates, as the similarity ratio was 0.33 - 0.92 according to the M13-PCR index, and the similarity ratio was 0.21 - 0.92 according to the PCR-BOXA marker.

Both markers also showed similar values in the PIC information content value, which was 0.30 and 0.32, respectively. The ERIC marker showed the highest degree of genetic variance among the studied isolates, where the similarity ratio ranged between 0 - 0.80. The combined markers showed genetic variance in 12 isolates, where the similarity ratio ranged between 0.23 - 0.81. **[Deema Abou Shaar (Syria), Department of Plant Protection, Faculty of Agricultural Engineering, University of Aleppo. Supervisors Dr. Fateh Khatib and Dr. Ameen Haj Kassem (Master, 2022)].**

Induction of Systemic Resistance in the Tomato Plant *Solanum lycopersicum* L. against the Fungus *Alternaria alternata* that causes Spotting Disease in Basrah Governorate

The laboratory study demonstrated the ability of isolates of leaves and fruits from the pathogenic fungus A.alternata in the Water Agar medium to infect tomato plant seeds and seedlings.

The isolate of fruits was more severely infected, reaching (56 and 52.36)%, respectively, compared to isolate leaves, which amounted to (47 and 40.33). % Straight. Experiment of antagonism with two fungi *T.viride* and *T.koningii* in PDA culture medium, high antagonistic ability against A.alternata by double culture and spot method.

Also, the bio-resistant fungi infiltrates inhibited the pathogenic fungus A.alternata when used at concentrations of (10, 20, 30)% with PDA culture medium.

The addition of riboflavin with the PDA medium encouraged the growth of T.viride and *T.koningii* at a concentration of (5, 10 and 15) mmol and did not affect the pathogenic fungi in vitro. When the filters of *T.viride* and *T.koningii* were analyzed by GC-MS technique, they were obtained.

Many chemical compounds that have a role in inhibiting pathogens, which led to a reduction in the severity of the infection with the pathogen A.alternata in the pots and the field and an increase in the content of peroxidase enzyme in the roots and leaves of the tomato plant and the total phenol content in the leaves of the tomato plant and the content of ascorbic acid in the tomato fruits and chlorine The total, which was reflected on the increase in growth indicators (fresh weight of the vegetative and root systems) compared to the comparison treatment. **[Hadeel Jasib Abas and Abdulnabi Matrod (Iraq), Plant Protection Department, Agriculture College, Basra University - Iraq (Master, 2022)].**

Application of Next-generation Sequencing in the Identification of Begomovirus Species Infecting Tomato Plants in Karbala Province-Iraq

The study aimed to identify the plant viruses from the *Begomovirus* genus infecting tomato crop in Karbala Province, Iraq.

The results proved that the *Tomato yellow leaf curl virus* - Mild strain (TYLCV-Mld) was predominant in the surveyed tomato fields. The whole genome of this strain (named Karbala-1) was obtained and deposited in the NCBI-GenBank data under accession number ON254272.1.

Furthermore, the complete genome of the Beta satellite associated with the TYLCV-Mld was obtained and saved under the name of Cotton leaf curl Gezira beta satellite isolate Karbala (ON206651.1), which is considered the first report to this satellite in Iraq. (Published in Plant Health Progress journal; https://apsjournals.apsnet.org/doi/10.1094/PHP-04-22-0040-BR).

Moreover, the *Tomato leaf curl Palampur virus* (ToLCPaLV) 's whole genome was identified. Although this virus was previously identified on zucchini, datura, and cucumber plants, this is the first report of it infecting tomato plants in Iraq. (Accepted to be published in the Journal of Plant Pathology).

Additionally, the complete genome of the endogenous pararetrovirus *Tobacco vein clearing virus* in the host genome of tomato (*Solanum lycopersicum*) was identified and confirmed through the phylogenetic analysis. The genome sequence was deposited in the NCBI-Genbank under accession number ON684329 with the same name. (Accepted to be published in Arab Journal of Plant Protection Journal). **[Mahmood Othman Abass (Iraq), Under the Supervision of Professor Dr. Adnan A. Lahuf, Plant Protection Department, Agriculture College, University of Karbala/Iraq], (Master, 2022)].**

Susceptibility of some Maize, *Zea mayes* L genotypes against Fall Armyworm, *Spodoptera frugiperda* J.E Smith, (Lepidoptera: Noctuidae) Infestation at White Nile State, Sudan

Maize (*Zea mays* L.) is the third world most important cereal and considered as the fourth cereal crop after Sorghum, Millet and wheat in Sudan. The fall armyworm (FAW) was an important insect pests attacking maize detected in Sudan 2017 on rain fed areas at Damazin. The main objective of this study is to assess the susceptibility levels of 15 corn genotypes to FAW infestation. The experiments were conducted at White Nile Research Station farm during two seasons (2018/19 and 2019/20). Fifteen maize genotypes and hybrids seeds were tested. These genotypes included; TZBR Eld.-4-W C2, TZBR Eld.-4-Y C2, BR 9928-DMRSR C1, BR 9943-DMRSR C1, BR TZL Comp 4 DMRSR , Ama TZBR-W C4 , TZBR Comp 1-Y C2 , TZBR Comp 2 – Y C2 , Ama TZBR-Y C1, TZBR Comp 1-WC2, TZBR Comp 2-W C2, BRLNTP-Y C6, Ama TZBR-Y plus two varieties of Hudieba (check1 and check2). The experiments were arranged in a Randomized Complete Block Design (RCBD) with four replicates. The performance of different maize genotypes towards fall armyworm infestation was studied. Genotypes obtaining promising resistant/tolerant entries were assessed. The damage caused by FAW, number of eggs, larvae and number of infested ears were taken randomly from each accession by weekly interval were recorded and at the end of each season at maturity stage, the infested cobs were recorded. The results indicated that six maize genotypes have relatively recorded high infestation during 2018/2019, whereas 8 recorded high infestation in 2019/2020 season. The obtained results indicated that the genotype Ama TZBR-W C4 showed significantly lower infestation in the 2018/2019 and the lowest infestation in season 2019/2020. The genotype Ama TZBR-Y C1 should be further screened for resistance/tolerance. **[Assya Idreis Abdalla Idreis (Sudan), Crop Protection (Entomology) Department Crop Protection, Faculty of Agricultural Sciences U. of Gezira-Sudan. In Main Supervisor: Dr. Faiza Elgaili Elhassan Salah and Co. Supervisor: Dr. Omer Abdel Gazer Elnour (Master, 2022)].**

Identification of Whitefly (Hemiptera: Aleyrodidea) Species, Using Morphological Characteristic and Molecular Tools, in Wad Medani, Gezira State, Sudan

Whiteflies (Himiptera: Aleyrodidae) are one of the most important agricultural pests causing direct and indirect damage. The objective of this study was to identify whitefly species associated with some host plants using morphological and molecular identification. The samples of whiteflies were collected from three sites; the Gezira Research Station Farm (ARC), greenhouse and the Experimental Farm of the University of Gezira, Wad Medani, Sudan, from host plants cotton (*Gossypium hirsutum),* tomato *(Lycopersicon esculentum)* at field and green house and gubein (*Solanum dubium*). The morphological taxonomy of white flies was compared with reference specimens at the National Insect Collection Unit in (ARC). DNA was extracted from each sample of whitefly and amplified by Polymerase chain reaction (PCR) fragment of the mitochondrial cytochrome oxidase I (COI) gene was used to differentiate between the different species of the whiteflies. Morphological identification results showed that the specimens collected from cotton (*Gossypium hirsutum)* were identified as *B. tabaci, B. argentifoli*, and *Trialeurodes* sp. *B. tabaci* was also identified from tomato *(Lycopersicon esculentum)* and wild host gubien. The results of molecular identification used PCR of COI gene by universal primer LCO1490 and HCO 2198, showed that fragment about 700-750 in length, this length of whitefly name *B.argentifolii*. Both morphological characteristic and molecular tools, identified three species of whitefly *Bemisia tabaci*, *B. argentifoli* and *Trialeurodes* sp. Many studies are needed using morphological characterization and molecular tools, to identify the existing species of whitefly in Sudan. **[Mawada Yahya Mohamed Alzein (Sudan), in Crop Protection (Entomology), Department Crop Protection, Faculty of Agricultural Sciences,Sudan. Main Supervisor Dr. Faiza Elgaili Elhassan Salah and Co-Supervisor Prof. Yasir Gasm Elssed A. Bashir (Master, 2022)].**

Food and Agriculture Organization (FAO) Plant Protection Activities

FAO Director-General Meets His Majesty King Abdullah II of Jordan, 8 November 2022

Amman - FAO Director-General QU Dongyu today met His Majesty, King Abdullah II of Jordan, at the Basman Palace on the first of his two-day visit to the country. The meeting covered means of bolstering cooperation between Jordan and FAO, especially in supporting agricultural enterprises and addressing food security and climate change challenges. King Abdullah expressed appreciation for the support that Jordan receives from FAO in developing the national food security strategy. His Majesty called for stepping up regional and international efforts and close coordination to counter the impact of global crises on food security and other challenges. Director-General Qu spoke about FAO's programs in Jordan, the main one supporting the Kingdom's national food security strategy to strengthen food supply and storage, ensuring sustainable development.

Meeting with Minister for Agriculture

Qu also had a bilateral meeting with Jordan's Agriculture Minister, Khalid Al- Hanifat. The Director-General commended Jordan on its achievements in the area of food security over the past years and briefed him on some of the key initiatives taken by FAO, including its recent World Food Forum and its flagship Hand in Hand Initiative, which supports the implementation of nationally led, ambitious programmes to accelerate agrifood systems. The minister thanked Qu for his leadership and expressed strong support for the ongoing positive changes at FAO, adding that Jordan would like to see this momentum continue in the years ahead. The minister noted that Jordan has many programmes supported by FAO to address its challenges in food security, nutrition and climate change, particularly during the COVID-19 pandemic. The two also discussed the many challenges facing Jordan and the region regarding food security. These include climate challenges, water scarcity, regional conflicts and war, refugees, as well as surging agricultural input prices. Looking ahead, the Director-General said bilateral cooperation between FAO and Jordan should focus on water efficiency, mechanization and agricultural machinery for small-scale farmers, and the digitalization of agrifood systems. The minister said he fully agreed with the Director-General's proposals and highlighted the importance of FAO's support for Jordan's Initiative for a Food Security Hub for the Region, a regional network designed to make full use of digital technologies and provide timely data for early warning and anticipatory actions in agriculture.

Field visit with Her Royal Highness Princess Basma bint Ali

Accompanied by Her Royal Highness Princess Basma bint Ali, FAO Goodwill Ambassador for the Near East and North Africa Region, the Director-General also conducted a field visit to the Royal Botanic Garden of Jordan to better understand Jordan's efforts and initiatives to conserve biodiversity for mitigating the impacts of the climate crisis. In the Royal Botanic Garden, the Director-General tasted locally produced olive oil, supported by the FAO Investment Centre, through investment interventions by the International Financial Institutions (IFIs). https://www.fao.org/director-general/news/news-article/en/c/1617826/

FAO Launches A Project to Enhance Climate Change Adaptation in Jordan, 9 November 2022

9 November 2022 Amman, Jordan – Today, the Food and Agriculture Organization of the United Nations (FAO) in Jordan held an inception workshop for the project "***Building resilience to cope with climate change in Jordan through improving water use efficiency in the agriculture sector (BRCCJ)***". The event was held under the patronage of the Prime Minister, Dr. Bisher Al-Khasawneh, attended by FAO Director-General QU Dongyu and brought key stakeholders together to mark the start of the seven-year project's activities, which will increase the country's resilience to climate change by ensuring the long-term sustainability of its water management systems. Participants discussed the core elements of the project, such as implementation plans to increase the country's water supply through the storage of treated wastewater and rooftop water harvesting and by reducing household water consumption through water-saving devices. Project partners gathered to discuss the implementation of project activities – valued at USD 33.2 million – in four Governorates in the Dead Sea Basin – Karak, Madaba, Tafilah and Maan – which are particularly vulnerable to climate change and climate-induced water scarcity.

The event saw the participation of the Green Climate Fund (GCF), the main financier of the project, as well as partners and co-financiers, including representatives from Jordan's ministries of Environment (MoE), Agriculture (MoA), and Water and Irrigation (MWI); FAO; and the United Nations Development Programme (UNDP).

FAO Director-General Mr. QU Dongyu stated, "Jordan is one of the most water-stressed countries in the region and in the world, made worse by climate change. This project is important to the country and the region's climate action agenda. It will help the country address the complexity of the climate crisis." On behalf of the Prime Minister, Engineer Khaled Hnaifat, Minister of Agriculture, explained that water resources are among the most important challenges facing the agricultural sector, which needs concerted efforts at the national and regional levels.

And the international community to help Jordan improve the efficiency of use, whether at the level of legislation or initiatives that can contribute to providing the quantities of

water needed for the agricultural sector. The GCF Forest and Land Use Specialist, Marc Dumas-Johansen, said, "The project will shift the paradigm in the agriculture sector from looking at crop productivity per unit of land to crop productivity per unit of water. By reducing the demand on groundwater sources through efficient cropping and water use practices, the project will bolster vulnerable farmers' climate resilience - particularly women who play a critical role in Jordan's agricultural sector." He added, "The lessons we will learn from this project will be extremely important to the global community allowing us to replicate and be inspired when developing and implementing projects in other places in the world facing similar challenges."

The main objectives of the workshop were to strengthen collaboration between all project partners, including GCF, the Government of Jordan, non-governmental partners and stakeholders. Part of the session was dedicated to reviewing the Project Implementation Manual and confirming the respective roles, responsibilities and interventions of the Executing Entities within their respective mandates. Overall, the Inception workshop underscored the urgent need to take action and address the impacts of climate change at the country and regional level, particularly in drylands and vulnerable ecosystems, where rural communities' livelihoods are at risk. https://www.fao.org/neareast/news/view/en/c/1617877/

Congratulations to Dr. Elkahky

FAO recognized our colleague Dr. Elkahky for his outstanding performance in 2022. Dr. Maged Elkahky is an Agricultural officer and assistant team Leader of Locusts and transboundary plant pests and diseases at FAO-HQ Rome-Italy. HE is Egyptian and joined FAO in 2017 as a consultant at the Cairo regional office before moving to HQ in 2018 to work in Plant Production and Protection Division.

The FAO Employee Recognition Awards 2022 recognized number of employees, as well as Teams, from across all streams and offices, for their exceptional achievements in serving the Organization and their contributions to innovation, diversity, inclusion, and gender equality in the workplace, knowledge sharing, operational effectiveness and efficiency, and teamwork. The Arab Society for Plant Protection congratulates our colleague Elkahky for this honoured awards and wishes him more success in his future work.

Global Conference on Sustainable Plant Production Innovation, Efficiency and Resilience Hybrid Event, Rome (Italy), 02/11/2022 - 04/11/2022

The Food and Agriculture Organization of the United Nations (FAO) is organizing the first-ever **Global Conference on Sustainable Plant Production (GPC)** with the theme *Innovation, Efficiency and Resilience* on 2-4 November 2022. The GPC will provide a neutral forum for FAO Members, farmers, scientists, development agencies, policy makers, extensionists, civil society, opinion leaders, and the private sector for focused dialogues on **innovation** that creates **efficient** plant production systems with **resilience** to biotic and abiotic stresses, climate change, natural hazards and geopolitical disruptions. Tomorrow›s agriculture will need to produce more food with less environmental footprints and contribute to strong local and diversified agrifood systems that are more resilient to shocks and disruptions. The GPC will generate authoritative evidence for actions to realize the goals of FAO Strategic Framework 2022-31 for the transformation to MORE efficient, inclusive, resilient and sustainable agrifood systems for ***better production***, ***better nutrition***, a ***better environment*** and a ***better life***, leaving no one behind, thus contributing to achieving the Sustainable Development Goals (SDGs), especially SDGs 1, 2 and 12. https://bit.ly/3TW2v65

Objectives of the conference

- Raise awareness of the contribution of sustainable plant production to implementing FAO Strategic Framework 2022-31, to attain the SDGs at global, regional and national levels.
- Share information and knowledge on the strategic direction and technical developments in sustainable plant production worldwide.
- Demonstrate FAO's technical leadership and convening power to support its Members for sustainable plant production.
- Provide a neutral platform and technical networks on sustainable plant production for demand-driven and context-specific multi-stakeholder dialogues.

Themes

The GPC focused on critical aspects of sustainable plant production systems around seven themes:

- **Seed systems**: use quality seeds of superior crop varieties that are nutritious, pest and disease-resistant, stress-tolerant and input-use efficient.
- **Field cropping systems**: agronomic practices to maintain crop productivity through diverse and context specific systems that are based on ecological interactions and reduce reliance on agro-chemicals.
- **Protected cropping systems**: high value and short -cycle vegetable productions systems that are adapted to technological needs to overcome constraints, e.g. land, water, nutrient, pests, diseases, seasons and climate.

- **Natural resource management**: practices that protect, enrich and preserve land, soil, water and nutrients through ecosystem approaches.
- **Integrated pest management**: practices and approaches to minimize crop losses while promoting biodiversity and reducing reliance on pesticides
- **Mechanization and digitalization**: appropriate mechanization technologies for sustainable crop production, precision agriculture and digitalization.
- **Farmers and enabling environment**: to support farmers to transition to sustainable crop production, through appropriate services and policies.

Related links

– FAO Plant Production and Protection Division (NSP). https://bit.ly/3Uf1ZQX

– The Global Conference on Sustainable Plant Production: what you need to know. https://bit.ly/3fDpZ17

– First Global Conference on Sustainable Plant Production focuses on increasing crop yields with less environmental impact. https://bit.ly/3heGxgq

International Plant Health Conference, 21 – 23 September 2022 Queen Elizabeth II Centre-London UK

Plant health is a key factor in any strategy to achieve food security, protect the environment and biodiversity, and facilitate safe trade.

The First International Plant Health Conference aims to address new and emerging plant health challenges, including climate change impacts, the risks associated with a significant increase in international trade, the rapid loss of biological diversity and new pest pathways such as e-commerce by exploring more efficient national, regional and global policies, structures and mechanisms. The Conference was held in London, the United Kingdom, on 21 – 23 September 2022 and was co-organized by the Department for Environment, Food & Rural Affairs (DEFRA) of the United Kingdom (UK) and the Secretariat of the International Plant Protection Convention. https://www.ippc.int/en/news/save-the-date-2/

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

FAO Concludes the Regional Workshop on the Sound Management of Pesticides in Amman/Jordan, November 30, 2022

The Food and Agriculture Organization of the United Nations (FAO) concluded the regional workshop on the Sound Management of Pesticides in the Near East and North Africa (NENA) region, which lasted for three days, from 28 to 30 November, in the Jordanian capital, Amman. The workshop came in cooperation with the FAO Plant Production and Protection Division (NSP) and the Ministry of Agriculture in the Hashemite Kingdom of Jordan.

The workshop introduced a set of recommendations on the Sound Management of Pesticides, calling for the adoption of the Farmer Field Schools (FFS), the launch of a training program for pesticide applicators, in addition to the creation of a regional information base to assess the risks of pesticides in coordination with FAO. At the end of the workshop, the recommendations also emphasized the need for the countries of the NENA region to cooperate in curbing pesticide smuggling by unifying and harmonizing legislation and adopting an electronic system for the validation of pesticide registration certificates.

"The responsibility of all supervising and operating parties in this sector lies in exerting great efforts and employing appropriate expertise for the better use of pesticides and the reduction of their residues in food," emphasized Dr. Thaer Yaseen, Regional Plant Protection officer at FAO Office for the Near East and North Africa. *"Our goal is to secure sufficient, safe, and sustainable food for all,"* added Yaseen. During the workshop, participants from NENA received training on the guidelines for the registration of microbial, botanical, and semi-chemical pesticides, as well as on how to mitigate the risks of highly hazardous pesticides (HHPs).

The training also touched on the International Code of Conduct for Pesticide Management and guidelines for Pesticide Quality Control and Advertising, in addition to explain-

ing guidelines on compliance and enforcement of a pesticide regulatory program. *"According to FAO data, the global use of pesticides has reached 4 million tons in terms of active ingredients, which has led to an increase in health and environmental problems,"* said Gu Baogen, FAO NSP Senior Agricultural Officer.On the other hand, it is expected that *"the world will reach more than 9 billion people by 2050, which requires a 60% increase in food production while preserving the natural resources and ecosystems of the Earth, and addressing the challenges caused by climate change and the effects of the COVID-19 pandemic*," added Gu.

During the workshop, the participants called for stricter penalties for violators in the field of pesticides, stressing the importance of FAO's support to the countries of the region in getting rid of obsolete pesticides and pesticide containers. For his part, Mohamed El-Hadi El-Sidat, FAO North Africa Plant Protection Officer, stressed the need to take measures at the national level to implement the Basel, Rotterdam, and Stockholm conventions to protect human health and the environment from the effects of pesticides and hazardous waste. *"Decision-makers must be aware that the good management of chemicals, as directed by FAO, contributes to reducing the financial resources directed to the health sector for the treatment of serious diseases,"* he added during his participation in the workshop.*"Many national authorities in the NENA countries face serious challenges that impede the effectiveness of the registration system, including the insufficient number of staff and the lack of an appropriate registration system,"* Nabil Assaf, FAO Representative to Jordan, stated.

"T*he limited technical expertise, the absence of risk assessment tools, and the limited access to information mean that the comprehensive assessment and recording of pesticides is not generally possible*," added Assaf. Pesticides play a significant role in the agricultural sector, achieving food security and improving farmers' livelihoods. Whereas the negative effects of pesticides on the environment and non-target beneficial organisms are often much greater than the benefits of using them to control pests, as they cause damage to the ecosystem, pollute water and soil, and affect human health.

FAO regional workshop trains Master trainers of FFS facilitators on sustainable solutions for Red Palm Weevil eradication

The Food and Agriculture Organization of the United Nations (FAO) held a regional workshop in Aswan, Egypt, for Farmers Field Schools (FFS) on the Red Palm Weevil (RPW) management, from 20 to 24 November 2022, with the participation of representatives and experts from 6 North African countries. The workshop, in which officials from Egypt, Libya, Tunisia, Algeria, Morocco, and Mauritania participated, supported the use of FFS and its role in implanting sustainable solutions for RPW eradication. Three experts from each country participated in the workshop. Since the beginning of this year, FAO RPW Eradication Programme has been supporting the implementation of FFS in Egypt, Iraq, Jordan, and Saudi Arabia to enhance the participation of farmers in the sustainable management of RPW.In his opening remarks, Thaer Yaseen, the Regional Plant Protection officer at FAO regional office for the Near East and North Africa, confirmed that RPW is one of the most dangerous palm pests that causes great losses to the date palm sector in the Arab region and the world.

"Despite the active role women play in the date palm value chain, their role in the FFS still needs to be valorized and should be strategically promoted", Yaseen emphasized.

The RPW regional programme addresses three principal areas: research, technology transfer, and capacity building. FAO is leading projects in RPW monitoring and early detection, farmer participation, control technologies, socio-economic impact, phytosanitary systems, border protocols, and production of certified palm material. "FFS works to consolidate knowledge awareness of farmers and contribute to increasing production and building great capabilities to adopt a system of joint scientific work aimed at increasing production and adopting modern technologies," said Ibrahim Al-Jubouri, FAO advisor.

"The workshop paves the way for exchanging information and experiences between farmers and transferring the experiences of North African countries," Mohamed Ali Bob, FAO Date Palm expert, explained. In addition to reviewing the information and the plan for training facilitators, the workshop assessed the FFS implementation in the countries of the region and discussed the experience of FFS for RPW management in Egypt. The regional workshop also discussed the FFS curricula for managing the RPW in North African countries and shared the FFS manual prepared by the RPW programme.

The workshop programme included lectures and brainstorming sessions focused on RPW GAP, FFS principles and pillars, the FFS manual, and implementing FFS, in addition to a field day focused on Agroecosystem analysis. The training sessions included a pre and post-workshop OMBEA evaluation to assess the level of knowledge by the trainees on RPW, FFS mandate, and RWP IPM new technologies, inter alia. According to the evaluation, the trainees' knowledge of the mentioned subject has significantly increased. Concluding the FFS workshop, SC members assisted in handing out the participation awards to the workshop trainees. On the last day of the workshop, Members of the RPW Eradication Programme SC joined the FFS team in a field visit where they witnessed a session on Agroecosystem analysis and a presentation on training BugVape dogs for RPW detection.

Highlights of Red Palm Weevil Eradication Programme achievements

The RPW programme has completed the drafting of regional standards for phytosanitary measures and those related to the production, conservation, and use of date palm-certified propagation materials. Preliminary results were also obtained from in-situ sensors to detect RPW infestation and captured high-resolution images using ultra-spectral sensors to detect RPW infestation. The socio-economic impacts of the RPW have been evaluated in Egypt and Saudi Arabia. Work is currently underway at the University of Genoa in Italy to verify the effectiveness of using microwave technology against the RPW on date palm trees. Experiments are underway at King Faisal University in the Kingdom of Saudi Arabia on improving the fumigation technique currently approved against the RPW, as well as optimizing a protocol for sterilizing palm offshoots by dipping in pesticide solutions, testing the effectiveness of insecticides against the weevil, and field experiments on the apical infestation of the RPW**.**

FAO in cooperation with the RPW programme published the "Guidelines on Practices for the Management of Red Palm Weevil" in both English and Arabic. It developed FFS school curricula, in addition to training FFS facilitators in the Arab Gulf countries, Jordan, Iraq, and North African countries. The programme issued the "Farmer Field Schools Manual for RPW Management in the NENA region".

RPW Eradication Project Steering Committee (SC) Meeting in Aswan

RPW Project Steering Committee (SC) of Food and Agriculture Organization of the United Nations (FAO) held a regional meeting on 23-24 November 2022 in Aswan, Egypt. The regional meeting was attended by members of the project SC from Oman and Saudi Arabia, leaders of Technical Working Groups (TWGs), members of the technical and advisory committees from ACSAD, AOAD, CIHEAM, ICBA, ICARDA, NEPPO, PRS, KFU, KACST and the University of GENOA, and of the LOA under the RPW Eradication Project. During the regional meeting, the SC reviewed and evaluated the progress and development achieved so far. The meeting also touched upon the developments of infestations by the Red Palm Weevil (RPW) in the Near East and North Africa (NENA) region and agreed upon the next steps. The members of the SC organized a field visit to a date palm field in a village in Aswan, where they observed a simulation of Farmer Field School (FFS) carried out by participants of the regional FFS Training of Master Trainers workshop on RPW management. The regional FFS training coincided with the SC meeting and took place over four days, with the participation of representatives and experts from 6 North African countries.

During the visit, the trainees presented the outputs of the training, field simulation, and

the essential practices that will be transferred to their countries. The SC and trainees have also examined a trial experiment on the possibility of training sniffer dogs to detect infestations of RPW. Dr.Suleiman Al-Khatib, Assistant Undersecretary for Agriculture Affairs at the Saudi Ministry of Environment, Water and Agriculture (MEWA) and the KSA SC representative said: "*Based on the presented progress of activities and events concluded, such as the FFS for the RPW management and the results-based management (RBM) outcomes show tangible progress so far. These efforts are expected to have a major role in assisting countries in building effective Integrated Pest Management (IPM), providing the necessary support to farmers, and raising their expertise in the prevention and control of RPW.*" "*In line with the keen commitment of the participating countries, significant efforts are being implemented to overcome the project's challenges. The RPW Eradication Project supports the Sultanate of Oman National Plan and Program on RPW eradication*," elaborated Dr. Salem Al Khatri, Director of the Plant Research Center in the Sultanate of Oman and the Sultanate's representative in the SC. "*All RPW Eradication Project stakeholders demonstrate eager commitment to achieve the project set goals, as indicated by the performance and progress in the Project countries,*" Thaer Yassin, Director of Plant Protection at FAO Regional Office for the Near East and North Africa (RNE) emphasized.

Highlights of project achievements

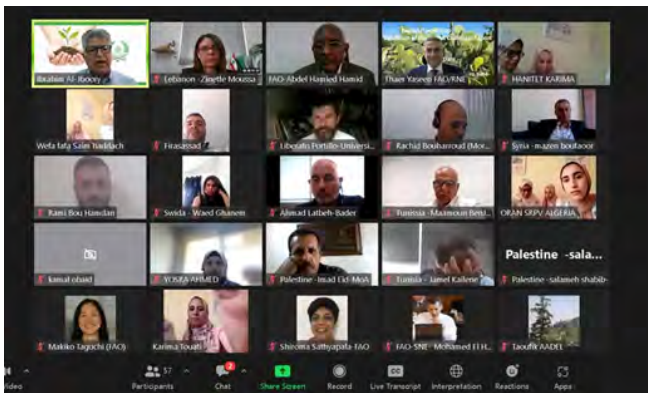
In the virtual training programme and planning meetings with the national focal points for the RPW in member countries, the programme held 15 sessions from December 20 to May 22. The training included lectures and technical discussions on the IPM of the weevil to enhance the capabilities of the countries. The basic data are necessary to evaluate the status of the RPW and the evaluation of the management capabilities of the RPW in 16 countries of the NENA region. Several news bulletins were published on several sites about the activities of the FAO RPW Eradication Programme. The programme organized two sessions at the Seventh International Date Palm Conference, Abu Dhabi (UAE). United Arab Emirates), 14-16 March 22 on the Regional Program for the Eradication of the RPW and another session on the development of the date palm value chain and regional cooperation. Numerous coordination meetings were also organized with donor countries, program committees, technical working groups, partner organizations in the program, and national focal points. Reports of the meetings were issued, and the status of the RPW and RPW management capacities in the following countries were reviewed: Tunisia, Yemen, Iraq, Palestine, Bahrain, Libya, Algeria, Egypt, Morocco, United Arab Emirates, Saudi Arabia, Kuwait, Syria, Mauritania, Jordan, Oman, and Sudan.

A Regional Training Workshop on Banana Fusarium Wilt Foc Tr4 Identification, Management Strategies, and Impact Assessment

South Africa 24-28 October 2022

FAO in collaboration with Stellenbosch University- South Africa organized a comprehensive workshop on Fusarium TR4. The workshop aimed at strengthening the capacity of participants from Africa and Middle East regions on the prevention, containment, and management of Fusarium Foc TR4. In addition to enhancing the participant's skills in the areas of disease diagnosis, surveillance, monitoring, impact assessments, and decision-making regarding appropriate management practices. The 4-day program covered a range of topics related to the disease, including the encountered difficulties during TR4 diagnosis, the economic impact of an incursion, surveillance techniques, biosecurity measures, awareness raising, and communication efforts, promising resistant/tolerant varieties, remote sensing technologies, procedures for the safe introduction of banana germplasm, and mobile applications**.** A one-day fieldwas conducted to an infected banana farm in Hazyview, a sub-tropical farming town in Mpumalanga, South Africa. The field visit provided a clearer understanding of disease symptomology, field inspection, and the mitigation measures that should be in place. The workshop also focused on simulation exercises as a component of an early warning and emergency response system. These exercises are useful for evaluating decision-making processes and validating emergency preparedness and response plans.Twenty-two participants attended the workshop representing 17 countries from Southern Africa (Tanzania, Comoros, Malawi, Mozambique), East Africa (Ethiopia, Somalia, Burundi, Kenya), West Africa (Cameroon, Ghana), and Near East (Lebanon, Turkey, Egypt), in addition to six trainers from Cuba, Colombia, South Africa, and FAO.

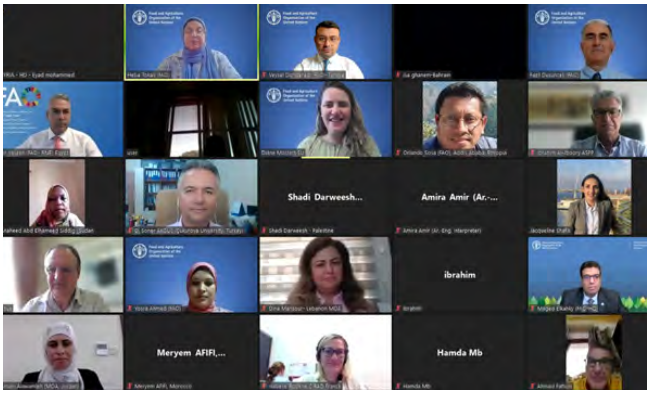
Regional Workshop on Validation of the Assessment Report on the Extent and Effects of Cactus Cochineal in the NENA Region and the Way Forward



The section of plant production and protection at FAORNE participated in the Regional Workshop on Validation of the Assessment Report on the Extent and Effects of Cactus Cochineal in the NENA Region and the Way Forward. The workshop focused on the importance of the cactus pear as a useful plant for livestock forage and the spread of the cochineal pest in the NENA countries. The workshop also aimed at validating the regional study undertaken in five pilot countries (Jordan, Lebanon, Morocco, Syria, and Tunisia). The study assessed the status of the cochineal pest insect and its impact on cactus pear, as well as the measures taken to control it in the NENA countries.

Regional Workshop on the Occurrence of Fusarium Wilt Disease TR4 in North and Eastern Africa and The Near East

13 October 2022 (Virtual)



The workshop was organized by FAORNE, FAO NSP, and Stellenbosch University, South Africa. The aim of the workshop was to exchange information and discussion on Banana Fusarium wilt disease of TR4 in North and Eastern and the Near East. The workshop covered the recent developments of Fusarium wilt Tr4 globally, the status of Fusarium wilt in East and North Africa and the Near East, country measures to prevent and manage the disease, and the development of regional and national strategies for disease prevention and management. Over 35 participants from around 20 countries in East Africa (Somalia, Ethiopia, Kenya, Uganda, Rwanda, Burundi, Sudan, and South Sudan), the Near East (Egypt, Lebanon, Jordan, Palestine, Syria, Iraq, and Turkey), and North Africa (Libya, Mauritania), Gulf Countries (Oman, Qatar, and United Arab Emirates) attended the virtual workshop. From The NENA region, Mr. Thaer Yaseen presented the status and risks of banana Fusarium wilt disease Foc TR4 in the NENA region and FAO efforts to manage Foc TR4 in the Near East through strengthening the technical national capacities on disease surveillance, early detection, and raising awareness among the relevant stakeholders. Representatives from Egypt, Sudan, Lebanon, Oman, and Jordan) briefed on the national banana production and trade and the status of banana Fusarium wilt disease in their country, and the national regulation related to the disease. The participants also talked about any projects or programs that are currently being implemented to address Fusarium wilt TR4 risks.

Regional Workshop on Fall Armyworm (FAW) Management in the Near East and North Africa Region 3-4 October 2022

Fall armyworm (FAW) is a major threat to crop production. It has a direct effect on the socio-economic level by negatively impacting food and income. It increases global food insecurity, malnutrition, and poverty among smallholder farmers. In the last five years,

FAW had spread across almost all of sub-Saharan Africa, North Africa as well as in many Asian countries. FAO has mobilized resources to combat the Fall Armyworm and reduce the risk of its spread in many countries, including Egypt. In 2020, FAO launched the Global Action for FAW control, as an urgent response to the FAW's rapid spread that threatens food security and livelihoods in many areas worldwide. Egypt was selected as a demonstration country to implement the National Integrated Pest Management Strategy for FAW control in Egypt and to develop a regional pest management plan that can be applied in different countries in the NENA region. The Regional Workshop on Fall Armyworm (FAW) Management in the in Near East and North Africa Region will discuss the FAO global action activities in the NENA region. It will present the Egyptian experience and the results of assessing the technologies of FAW management. This will allow other pilot countries to gain from Egypt's experience and best practices learned. The workshop will also provide regional guidance and recommendations on the reduction of FAW spread and control measures. https://www.fao.org/neareast/events/fawworkshop/en/

Deputy Director-General Beth Bechdol Visits Egypt on Her First Official Visit to the NENA Region

Cairo, Egypt, 3-4 October 2022

The FAO Deputy Director-General completed a four-day visit to Egypt aimed at boosting collaboration between the Organization and the most populous Arab country; and attending a regional workshop on Fall Armyworm control that gathered representatives from all countries in the region, research organizations, universities, and the private sector. During the workshop, Bechdol highlighted that Fall Armyworm control is a priority, as it is one of the world's most invasive plant pests that is still destroying billions of dollars' worth of crops despite progress and a raft of measures to tackle it. "FAO has convened this workshop to gather representatives from across the region to scale-up good management practices, coordinate action, and strengthen cooperation among all stakeholders to exchange information on innovative solutions and digital techniques to mitigate the impact of the rapid spread of fall armyworm," she added. On her last day of the visit, the Deputy Director-General met the staff of FAO's Regional Office for the Near East and North Africa. During the meeting, Bechdol Qu shared her appreciation for the staff's dedication towards achieving FAO's strategic framework: Better Production, Better Nutrition, a Better Environment, and a Better Life. On the sidelines of the regional workshop on Fall Armyworm in Egypt, FAO Deputy Director-General Beth Bechdol, and the director of Plant Production, and Protection Divisional (NSP) Mr. Jingyuan Xia visited Fall Armyworm demonstration plots in Luxor for assessing the solutions and technologies to control Fall Armyworm.

FAO Concludes Training on Facing Climate Change Challenges by Controlling Fall Armyworm Using Environmentally Sustainable Methods

Egypt (4-7 December 2022)

The Food and Agriculture Organization (FAO), in cooperation with the Plant Protection Research Institute of the Egyptian Ministry of Agriculture, implemented three training programs to transfer the technology of mass rearing of the natural enemies of the Fall Armyworm (FAW). The training program involved 85 trainees, including researchers and stakeholders, who received guidance on the latest technology transfer skills to face the challenges of climate change by controlling FAW. Three different governmental research stations covering the governorates of Upper, Middle, and Lower Egypt hosted these training programs for technology transfer. The training focused on exchanging practical knowledge between researchers and technicians specialized in pest biocontrol on the technology of mass rearing of FAW egg- parasitoids (*Telenomus Remus*). This parasitoid was originally discovered in maize fields in Upper Egypt, through a pilot survey that targeted the presence of natural enemies of FAW in the Egyptian environment.

These training programs are part of the activities of the Fall Armyworm (FAW) Global Action Project, which is currently being implemented in Egypt as a model country for the Near East and North Africa (NENA) region.

Furthermore, local research studies are being conducted at the Shandaweel Research Station in Sohag Governorate to evaluate the efficacy of the Telenomus parasitoid in controlling FAW, both under laboratory and field conditions. The potential efficacy of Telenomus on FAW represents a promising strategy to mitigate and control the risk of FAW infestation in Egyptian maize fields.

The information collected during these training programs from participants, who come from different backgrounds, contribute to the establishment of a protocol for the mass rearing of this parasitoid, and its main and alternative hosts, to be shared with other specialized laboratories in Egypt as well as the countries in the NENA region.The adoption of the protocol in the biological control laboratories in Egypt will lead to strengthening the national capacities for the mass rearing of the Telenomus parasitoid in all maize fields. This protocol would help reduce maize crop losses resulting from FAW infestation as well as increase farmers' reliance on biological control as an alternative to pesticides.

During the program, the trainees recommended limiting the use of hazardous chemical pesticides and maximizing the use of sustainable and environmentally friendly methods to include natural enemies and biopesticides, which have shown a significant impact on the rate of FAW infestation, thus reducing crop yield loss.

FAO Concluded Graduation Ceremonies for Nine Farmer Field Schools (FFSs) in Four Egyptian Oases

Egypt, 6-9 December 2022

The Food and Agriculture Organization of the United Nations (FAO) in cooperation with the ministry of agriculture has implemented nine FFSs in New Valley and Giza, Egypt under the framework of the FAO Regional Red Palm Weevil (RPW) Eradication Program. The FFS is a participatory education approach where a group of small-scale farmers is gathering to discuss their problems in order to find solutions based on sustainable agriculture practices. The main goal of the FFSs is to strengthen the farmers' skills and sharpen their ability to for critical analysis and decision-making.

One of the basics of FAO's FFS methodology is to implement a graduation ceremony at the end of every FFS season. In the presence of representatives of the FAO and representatives of the Ministry of Agriculture, graduation ceremonies were organized for nine FFSs on date palm farms at the Dakhla, Kharga, and Baris in the New Valley and Bahariya Oasis in the Giza. A total of 204 participating farmers graduated from the schools. During one year of date palm plantation, an experimental field was made for each school in which all agricultural and control operations were carried out by the farmers and under the supervision of skilled FFS facilitators. The farmers witnessed the difference between the experimental fields and compared them to what they do in their farms and notice a significant decrease in infection. The graduation ceremonies included opening speeches from representatives of the FAO and the ministry, testimonials for the farmers and facilitators, and highlights of the results of the experimental fields.

FAO Supports NENA Countries in Combating the Threat of Fusarium TR4 Wilt Disease in Bananas

Lebanon 7 December 2022

For over a century, fusarium wilt has been a major impediment to banana world production. *Fusarium oxysporum f. sp. cubense*, a soil-borne fungus, causes the disease. The pathogen can survive in the soil for decades and is thus difficult to eradicate. This fungus has recently developed a new race known as Tropical Race 4 or TR4. According to the FAO, the annual direct damage caused by TR4 in Southeast Asia is estimated to be around $400 million, excluding indirect socioeconomic impacts. FAO has launched the technical Cooperation Program

Banana Fusarium FOC TR4 TCP/LEB/3803"to support Lebanon in combating the spread of Fusarium wilt TR4 after the arrival of the TR4 strain. The project aims to improve the management of Fusarium banana wilt in the south of Lebanon.This FAO project will assist Lebanon in developing regional and national action plans, increasing their capacities to prevent, diagnose, monitor, and contain outbreaks, and raise awareness and disseminate information among farming communities and the relevant stakeholders. On a side of his visit to Lebanon, Mr. Thaer Yaseen, the Regional Plant Protection Officer, FAO-RNE met with the project team and discussed the work plan and activities of the project. He also made a field visit to the infected banana areas at Mansouri village in the Tyre District - South Lebanon. The visit aimed at evaluating the disease distribution and damage it caused in the region.

Extension of the FAW project in Mashreq countries till End of March 2023

The FAO project of "Emergency preparedness and response to strengthen the capacities of NENA countries to mitigate the risk of Fall Armyworm (FAW) in the region" TCP/RAB/3803 (E) was extended until the end of March 2023. With this extension, many of the activities and procurements will be accomplished. For instance, supporting the establishment of a biocontrol lab for FAW as requested by Jordan and the training of three Jordanian specialists in Syria on the mass production of the FAW's natural enemies. Moreover, completing the remaining planned activities of the project in Lebanon. The project's no-cost extension until the end of March 2023 will allow for better planning of the regional wrap-up workshop in Amman, Jordan, by the middle of March 2023. It will also enable project output delivery and improve support for the recipient countries (Jordan, Lebanon, Syria, the West Bank, and Gaza Strip). This will significantly increase the overall impact of the project on maize production.

Obsolete pesticides: A technical backstopping Mission to Lebanon

Lebanon, 20 May 2022

A technical backstopping mission for the Regional Plant Protection Officer FAORNE was organized on 20 May 2022 to Lebanon concerning the project "Urgent Safe disposal of obsolete pesticides stocks in Lebanon" TCP/LEB/3801. The mission provided an opportunity to interact with the involved national counterparts and go over the status of the work. This meeting helped evaluate the remaining project work thoroughly and create a more detailed schedule for each component.

The discussions focused mainly on the activities that would be carried out without further delays. The project was delayed due to the need for more containers to repack the remaining quantities of obsolete pesticides in the Kfarshima warehouse and Beirut's seaport. Following an inspection of the Kfarshima warehouse and examination of the stored materials, two containers containing additional quantities of obsolete pesticides and others having liquid mineral oil and fertilisers were found. It was agreed with the project team that only materials identified as obsolete and unused pesticides will be included in the repacking and safeguarding process outside Lebanon. Due to the late arrival of the required quantity of transportation containers, a request to extend the TCP/LEB/3801 project is required.

Critical Challenges in Plant Health Were Discussed at the First International Conference on Plant Health

London UK, 21 - 23 September 2022

The International Plant Health Conference (IPHC) was co-organized by FAO, the Secretariat of the International Plant Protection Convention (IPPC), and the Department of Environment, Food, and Rural Affairs (DEFRA) in the United Kingdom. The conference aimed to address new and emerging plant health challenges, including climate change impacts, the risks associated with a significant increase in international trade, the rapid loss of biological diversity, and new pest pathways such as e-commerce by exploring more efficient national, regional and global policies, structures and mechanisms. The conference was themed around food security, environmental protection, and trade, with the aim of boosting collective efforts on plant protection. Mr. Thaer Yaseen, the Regional Plant Protection Officer, FAO-RNE also participated in the conference where he discussed with different partners and stakeholders the main challenges for plant health in our region. The discussions focused on the implementation of the ePhyto solution and the way forward to establish the regional strategy for sustainable management of transboundary pests and diseases in the NENA region.

FAO RNE Regional Office at the 3rd World Conference on the Revitalization of the Mediterranean Diet

Bari, 28-30 September 2022

The International Center for Advanced Mediterranean Agronomic Studies (CIHEAM), the Bari Institute of CIHEAM has organized the Third World Conference on the Revitalization of the Mediterranean Diet.

The Conference was held on 28-30 September 2022 in Bari under the patronage of the Italian Ministry of Affairs and International Cooperation and the Italian Ministry of Agriculture, Food and Forestry, focused on the theme: “Change of Course Towards More Sustainable and Resilient Food Systems in Mediterranean Countries: the Mediterranean Diet as a Strategic Resource to Accelerate the Agenda 2030 in the Region”.

The Conference addressed the priority issues identified during the Second World Conference on the Revitalization of the Mediterranean Diet (Palermo 2019) and builds on the orientations of three SFS-MED independent Food Systems Summit Dialogues, organized in 2021. It served to boost the operationalization of the SFS-MED Platform, a multi-stakeholder initiative on sustainable food systems in the Mediterranean, jointly initiated as an OPN-SFSP's affiliated project by CIHEAM, FAO, and UFM, with the collaboration of the PRIMA Foundation and its Coordination Desk hosted at the CIHEAM Bari. The aim of the Conference was to trigger a change of route in the current perception of the Mediterranean diet as a sustainable food model, with multiple benefits on health/ nutrition, environment (including biodiversity), economic, social, and cultural sustainability, taking in due consideration their contextual differences in Mediterranean countries.

Mr. AbdulHakim Elwaer – Assistant Director and General (ADG) and Regional Representative for the Near East and North Africa gave an important presentation entitled "Sustainable food systems as an effective trigger for one health to promote resilience and sustainable growth in the Mediterranean and beyond". His presentation aimed to identify concrete tools for the application of "One Health" in contexts where production systems are crucial for food security and human health. He drew attention to the importance of establishing the Food Security Observatory in the NENA region.

Mr. Thaer Yaseen, the Regional Plant Protection Officer, FAO-RNE also participated in the conference and was delegated by the ADG to collect and present the concluding remarks at the session entitled "Change of Route in The Mediterranean to accelerate the 2030 agenda: A Call for a Joint Action. "The conference provided an excellent opportunity to meet with various partners in order to discuss future partnership and resource mobilization plans," said Mr. Yaseen.

FAORNE Participated at the 13th Arab Congress of Plant Protection

Tunisia, 16–21 October 2022

The 13th Arab Congress of Plant Protection was held in Hammamet, Tunisia, from 16–21 October 2022 and is organized by the Arab Society for Plant Protection (ASPP) & Ministry of Agriculture, Water Resources, and Fisheries of Tunisia and represented by the National Institute of Agronomic Research of Tunisia (INRAT). More than 270 participants from over 30 countries, mainly from the Near East and Mediterranean regions, participated in the

congress, in addition to the presence of experts and research professors from Europe, America, and Africa. The FAORNE was the congress's gold sponsor, and the funds provided, through a Letter of Agreement, were used to support four symposia. These four symposia focused on different aspects, including plant health for food security and safety, molecular plant protection and its applications in pest management, research and innovation for sustainable crop protection, and the application of behavioural control tools as a safe and effective alternative in pest management. The five-day meeting provided an excellent opportunity for academics, regional and international organizations, research centres, policymakers, and representatives from the public and private sectors to share their common interests and priorities. Additionally, the congress significantly contributed to FAO/RNE visibility as the role of the FAORNE Office was presented in both the congress program and the abstract book. **Mr.Thaer Yaseen**, Regional Office for the Near East and North Africa Region (RNE), Food and Agriculture Organization of the United Nations (FAO), Cairo, Egypt, chaired the first session and delivered a lecture on *Fusarium oxysporum* f.sp. *cubense* tropical race 4 on bananas in the NENA region.

FAO Signs Statement on the Urgent Need to Address Food Security Challenges in the Arab Region The Statement was Signed by Member States of the Arab Initiative to End Hunger

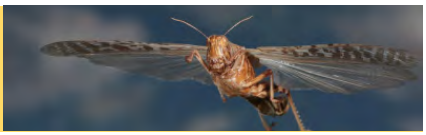
13 October 2022, Cairo, Egypt

"The signing of this statement is an extension of the long-term partnership between Members States of the Arab Initiative to End Hunger, which seeks to advance joint efforts to achieve zero hunger in the region," said Abdulhakim Elwaer, FAO Assistant Director-General and Regional Representative for the Near East and North Africa. This statement came today during the signing of the statement on the Urgent Need to Address Food Security Challenges in the Arab Region, which took place in the League of Arab States in Cairo, Egypt. Members of the Arab Initiative to End Hunger signed the statement, which include the League of Arab States (LAS), the Food and Agriculture Organization Regional Office for North Africa and the Near East (FAO-RNE); the United Nations Economic and Social Commission for Western Asia (ESCWA); the World Food Programme(WFP) Regional Bureau Cairo; the International Fund for Agricultural Development (IFAD) Regional Office in Egypt; the Arab Organization for Agricultural Development (AOAD); the Arab Center for the studies of Arid zones and Dry lands (ACSAD); the Arab Water council (AWC); the Arab Federations for Food Industries (ARABFFI); the Food Bank Regional Network (FBRN); and the Arab Group for the Protection of Nature (APN)."I commend the great effort made by the Member States of the Arab Initiative to End Hunger, which is the culmination of a successful partnership to support the Zero Hunger Initiative that has gotten us here today as we sign this important statement," said Nada El Agizy, Director of Sustainable Development and International Cooperation in the League of Arab States.

"We recognize the food security challenges facing countries in the Arab region as well as the impact of the COVID-19 pandemic and the ongoing Ukraine crisis further worsening the food security situation in the region," added Elwaer, highlighting main points in the statement. The statement also highlights the exacerbating impact of climate change on the already stressed agricultural resources, particularly water, which are negatively affecting lives and livelihoods. Member States are called upon to take several short-term actions, including strengthening social protection and safety nets to provide food and other assistance to the most vulnerable, providing direct support to boost food production for critical staple commodities, and engaging with different stakeholders in the design

and implementation of shock response measures. The statement also called Member States to adopt "The Arab Regional Strategic Framework and Action Plan for Zero Hunger,"which emphasizes enhancing agriculture and water productivity to at least double its yields by 2030, promoting integrated rural development to close the urban-rural gap, promoting a strategic shift towards healthier, affordable, and more sustainable diets, and achieving lasting peace and mitigating the effects of conflicts. FAO and the Arab League are working collaboratively on several regional challenges, such as water scarcity, drought management and achieving UN Sustainable Development Goal 2. https://www.fao.org/neareast/news/view/en/c/1608730/

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



Desert Locust Situation

Warning level: Calm

General situation during November 2022 Forecast until mid-January 2023

Provided by the FAO Emergency Centre for Desert Locust (ECLO).

General Situation

Calm situation

The Desert Locust situation continued to remain calm during November. A small outbreak developed in early November where hoppers, groups, and bands were seen in an area of about 100 km by 70 km in northwestern Mauritania. Ground teams treated 2 298 ha. In Sudan, low numbers of adults were first seen in the winter breeding areas this year along the Red Sea coast where a few copulating had started. Isolated adults were else seen in coastal areas of Eritrea, southeast Egypt, and northwest Somalia. In Yemen, low numbers of adults have been on the coast since September. In the Western Region, the summer breeding area has finished.

During the forecast, December and January may have slightly above-normal rainfall in the northern parts of the Red Sea coast in northern Saudi Arabia, Egypt, and Sudan while southern areas from Eritrea, southern Saudi Arabia, Yemen, and northern Somalia will be drier than normal.

As a result, a single generation of small-scale breeding is likely during the winter area. In northwest Mauritania, groups of adults are likely to form in December but should decrease due to control, vegetation that dries out, and rain which is not likely to occur. No significant development is likely.

Western Region: CALM

SITUATION. A very small outbreak developed in northwestern **Mauritania** (2 298 ha treated) with hopper, groups, and bands. Low numbers of solitarious adults in **Morocco**, central **Algeria**, **Niger**, and northeast **Chad**.

FORECAST. The hopper groups and a few small bands will form adult groups in the outbreak of northwest **Mauritania** during December which should help teams to control. Locust numbers will decrease in **Niger** and **Chad**, and a few locusts will remain in **Morocco** and central **Algeria**.

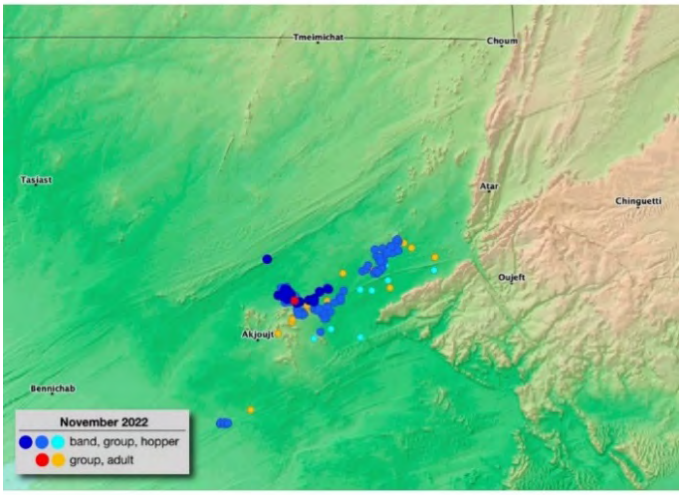
Central Region: CALM

SITUATION. Locust numbers decreased in the summer area of **Sudan** but increased slightly in the Red Sea coast where copulating started. Low number continues in the coast of **Yemen** and less in **Eritrea** and **Egypt**.

FORECAST. Small breeding will occur mainly in **Sudan** and **Yemen** with less in **Eritrea** and **Egypt**. Laying and hatching will occur in December. Low numbers of adults are likely to appear on the Red Sea coastal plains of **Saudi Arabia** and breed on a small scale. A few locusts may breed on a small scale if more rain fells in northwest coast of **Somalia**.

Easter Region: CALM

SITUATION. No locusts present. **FORECAST.** No significant developments are likely.



Map 1 locust situation November 2022

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

Other activities related to Desert Locust Commission

The Regional Training Course on "MANAGEMENT AND ORGANIZATION OF DESERT LOCUST CONTROL CAMPAIGNS"

In collaboration with the General Department for Locust Affairs and Agro-Aviation in the Ministry of Agriculture in Egypt, a regional training course on "MANAGEMENT AND ORGANIZATION OF DESERT LOCUST CONTROL CAMPAIGNS" was held in Hurghada city on the Red Sea coast of Egypt between 13 and 20 February 2022.

The course aims to enhance the national capabilities of the invasion countries of the CRC to deal with Desert Locust campaigns efficiently and effectively. In total, fourteen participants attended the course from eight countries.

The training course was part of the Regional Training Program (2023-2026), held in Cairo, Egypt, on 27-30 June 2022.

IITA–CGIAR International Institute of Tropical Agriculture (IITA)

First Release of Natural Enemies against FAW in farmers' fields in Cameroon

Published on 27.10.22

IITA–CGIAR has partnered with the Ministry of Agriculture and Rural Development (MINADER) and the Food and Agricultural Organization (FAO) to release the Fall armyworm (FAW) egg parasitoid *Telenomus remus* in West Cameroon. The collaborators have been developing innovations to manage FAW in Cameroon. Through the One CGIAR's Plant Health Initiative (PHI), the IITA-Cameroon IPM team, led by Komi Fiaboe, has identified several FAW natural enemies under the humid tropical forest and Sudano-Sahelian agroecologies of Cameroon.

They established that the egg parasitoid *Telonomus remus* was the most aggressive, frequent, and widely distributed in farmer fields. Through joint funding of PHI and the FAO-funded Integrated Management Strategy for the Fall armyworm in Central Africa project, the parasitoid was collected from fields and mass-produced in the IITA Cameroon Entomology Laboratory under the leadership of IITA researcher Samuel Nanga Nanga. https://bit.ly/3D-jkBYJThrough the One CGIAR's Plant Health Initiative (PHI), the IITA-Cameroon IPM team, led by Komi Fiaboe, has identified several FAW natural enemies under the humid tropical forest and Sudano-Sahelian agroecologies of Cameroon.

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roon Entomology Laboratory under the leadership of IITA researcher Samuel Nanga Nanga.

Farmers in Bangante receiving explanation on biological control strategy and the negative effects of chemical control.The current release aims to promote conservative and augmentative biological control in a small-scale maize production system. The first batch of 45,000 *T. remus* individuals was released from 3 to 5 October in Bangangte, Dschang, and Foumbot in the West Region of Cameroon by IITA researcher Albert Abang, in collaboration with Nguelo Collins from MINADER and Jeannette Florence Magni from FAO.

Farmers participate in pre-release evaluation and search for Fall armyworm eggs in maize in Sangwa village in Bantoum, a locality in the Nde division, West region of Cameroon.

The release was witnessed by nine FAO and MINADER field trainers (seven men and two women) and 42 farmers (12 women). Forty-two farmers (30 men and 12 women) were trained on conserving natural enemies in the maize production system and on the ecosystem services rendered by those invisible friends. Specifically, farmers learned to identify FAW egg batches, differentiate the characteristics of parasitized eggs from non-parasitized ones, and recognize the IITA researcher and farmer releasing parasitoids in Tsinbing village, Dschang subdivision of West region Cameroon.

presence of natural enemies and the detrimental effect of broad-spectrum pesticides on natural enemies.

The second release round will be conducted in the cropping season, and a similar release exercise is planned for the Centre Region of Cameroon. Post-release surveys will also be carried out to assess the improvement of egg parasitism rates. According to Abang, this release, the first of its kind in the Central Africa region, is expected to create awareness of conservative biological control of major pests in the maize production systems among farmers and extension officers. *Contributed by Dr Komi Fiaboe* . https://bit.ly/3DMCq46

ASPP GLOBAL PESTS SURVEY

- **First Report of the Aphid Tinocallis Zelkowae (Hemiptera: Aphididae) in Spain.** Casiraghi, A., V. Moreno-González, A. Umaran, and N. P. Hidalgo. 2022. First record of Tinocallis zelkowae (Takahashi, 1919) (Hemiptera Aphididae Calaphidinae) in the Iberian Peninsula, REDIA 105:3-10. August 25, 2022, from 1_Casiraghi_et_al_Redia_105_2022_18_05_22.pdf. https://bit.ly/3QB4me8 Pest lens: https://bit.ly/3DhRx5G

- ***Anastrepha ludens* (Mexican Fruit Fly): APHIS Removes Quarantine Areas in Palmview, Hidalgo County, and Zapata, Zapata County, Texas.** Richard Johnson, Fruit Fly National Policy Manager, at (301) 851-2109, 08/18/2022. https://www.pestalerts.org/.

- ***Orius laevigatus* and *O. majusculus* as Biological Control agents for leaf-dwelling Thrips.** Mouratidis A, de Lima AP, Dicke M, Messelink GJ (2022) Predator-prey interactions and life history of Orius laevigatus and *O. majusculus* feeding on flower and leaf-inhabiting thrips. Biological Control. EPPO Reporting Service 2022 no. 8. https://doi.org/10.1016/j.biocontrol.2022.104954

- **First Report of 'Candidatus Liberibacter Solanacearum' on carrot and parsley in Turkey**. Karahan A, Altundag S, Saracoglu M, Duman K, Ozdemir I, Ozdem A, Umar S, Ozden ED,(Turkey), Plant Protection Central Research Institute, Yenimahalle, Ankara, Turkey Aydınlıkevler, 06130Altında ğ, Ankara, Turkey DuzceUniversity, Faculty of Agriculture, Departmentof Plant Protection, Duzce,Turkey. New Disease Reports 45(2),e12095.2022]. https://doi.org/10.1002/ndr2.12095

- ***Bactrocera dorsalis* (Oriental Fruit Fly): APHIS Removes the Quarantine in North Hills, Los Angeles County, California.** Richard Johnson, Fruit Fly National Policy Manager, at (301) 851-2109, 10/24/2022 or richard.n.johnson@usda.gov , https://bit.ly/3DXkCTO

- ***Anastrepha ludens* (Mexican Fruit Fly): APHIS Removes the Quarantine in Harlingen and Reduces the Quarantine in Brownsville, Cameron County, Texas.** Richard Johnson, Fruit Fly National Policy Manager, at (301) 851-2109, 10/24/2022 or richard.n.johnson@usda.gov , https://bit.ly/3FIqthe

- ***Anastrepha ludens* (Mexican Fruit Fly): APHIS Reduces the Quarantine in Cameron and Willacy Counties, Texas.** Richard Johnson, Fruit Fly National Policy Manager, at (301) 851-2109, 10/24/2022 or richard.n.johnson@usda.gov , https://bit.ly/3ftL2D9

13th Arab Congress of Plant Protection "Hammamet, Tunisia, 16-21 October 2022

13th Arab Congress of Plant Protection/Tunisia

The 13th Arab Congress of Plant Protection, organized by the Arab Society of Plant Protection (ASPP) in collaboration with the Ministry of Agriculture, Water Resources and Fisheries of Tunisia, represented by the National Institute of Agronomic Research of Tunisia (INRAT), was held during the period 16-21 October 2022 in Hammamet, Tunisia. A total of 270 scientists and graduate students from Egypt, Jordan, Sudan, Syria, Lebanon, Morocco, Algeria, Tunisia, Libya, Oman, UAE, Palestine, Mauritania and Saudi Arabia participated in this event. In addition, experts from outside the region, USA, United Kingdom, Italy, France, Switzerland, Turkey, Germany, Kenya and Pakistan, also participated in this congress. International organizations such as the Food and Agriculture Organization of the United Nations (FAO), the International Center for Wheat and Maize (CIMMYT), the International Center for Agricultural Research in the Dry Areas (ICARDA), the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), the European Plant Protection Organization (EPPO), the Arab Center for the Studies of Arid Zones and Dry Lands(ACSAD), Arab Organization for Agricultural Development(AOAD), and the ISLAMIC ORGANIZATION FOR FOOD SECURITY (IOFS) were also represented in this meeting. The congress program included four symposia focused on different aspects, including plant health for food security and safety, molecular plant protection and its applications in pest management, research and innovation for sustainable crop protection, and the application of behavioural control tools as a safe and effective alternative in pest management. Thirty-nine oral paper presentation sessions and two poster sessions were presented, where 360 scientific papers in all plant protection disciplines, such as economic entomology, fungal, viral and bacterial diseases, nematodes, plant extracts, pesticides, weeds, biological control, integrated pest management, climate change & plant protection, food security & plant protection, Pest surveillance, and beneficial insects, were presented and discussed.

ASPP president, Dr Ibrahim Jboory, gave to the Chairman of the Congress Organizing Committee Dr. Asma Najar, a special plate in recognition of her efforts, which contributed to the success of the meeting. Towards the end of the ceremony, the ASPP President announced the names of the elected members of the new ASPP Executive Committee who will serve for the period 2023-2025 and is composed off:

Executive Committee of the Arab Society for Plant Protection (2023-2025)

President
Dr. Safaa Kumari
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Specialization : Plant Virologist
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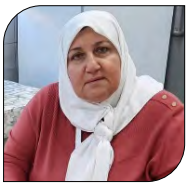

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Member & Editor-in-Chief, ANEPPB
Past ASPP President2017-2022
Dr. Ibrahim Al-Jboory
Nationality: Iraqi
Specialization: Entomologist, Acarologist
Current address: P.O. Box 17399, Amman 11195, JORDAN
ijboory@gmail.com

Congress Awards

A certificate and a financial award were given by Dr. Ahmad Katbeh Bader (ASPP Chairman of Honour and Awards Committee) to the top three graduate students who gave presentations during the congress; the students are:

Ms. **Takwa Wannassi,Tunisia**

Ph.D. student in Plant protection and environment Horticultural and plant protection engineer High Agronomic Institute of Chatt-Mariem.

Dynamic populations of the apricot seed wasp *Eurytoma samsonowi* (Hymenoptera: Eurytomidae) and control strategy.

Ms.Asma Neciabia,Algeria

Department of Botany, National Higher School of Agronomy (ENSA) -El Harrach, Algiers, Algeria.

Analysis of the Pathogenic Mycoflora of Barley seeds in Algeria and Occurrence of two new species: *Curvularia spicifera* and *C. lunata*.

Mr.Abdul Rahman Moukahel,Syria

International Center for Agricultural Research in the Dry Areas (ICARDA), Terbol Station, Lebanon

Comparison of serological and molecular methods for diagnosis of viruses causing yellowing and stunting symptoms for the pulse crops.

ASPP Members International Participation

- Dr.Ibrahim Al-Jboory, Chairing a thematic session on Integrated Pest Management, Challenges in plant pests and diseases, and Co-Chair a session on Solutions for plant pests and diseases management during the Global Conference on Sustainable Plant Production(GPC) 2-4 November 2022 Rome.

- Dr. Safaa Kumari delivered a lecture on the Prevention of the transboundary spread of pests and pathogens enhanced by farmer's support, Global Conference on Sustainable Plant Production (GPC) 2-4 November 2022 Rom.

- Dr.Ibrahim Al-Jboory chairing a session titled technology and innovation to foster resilience and sustainability in the date palm sector, at the International dates conference and exhibition, Riyadh, the Kingdom of Saudi Arabia on 7-10 December 2022

Congress Invited Speakers

Sophien Kamoun

PLANT HEALTH VISION FOR THE 21ST CENTURY: NEW KNOWLEDGE AND APPROACHES. Sophien Kamoun, The Sainsbury Laboratory, Norwich Research Park, Norwich, United Kingdom, Email: Sophien.Kamoun@tsl.ac.uk

Infectious plant diseases cause havoc to world agriculture and threaten to slow efforts to launch a second green revolution to meet the food security needs of a booming world population. Filamentous pathogens, such as the rice blast fungus, wheat stripe and stem rust, the Irish potato famine pathogen, and many others, continue to trigger recurrent epidemics with far reaching consequences.

In this talk, I will discuss how it is possible to perform cutting-edge research and significantly advance knowledge on economically important pathosystems, particularly in the post-genomics era. I will focus on the blast fungus *Magnaporthe oryzae*, a devastating cereal killer that infects the crops wheat, barley and rice, which are staple food for a majority of the world population.

I will discuss our personal experience with the appearance in Bangladesh of wheat blast and stress the importance of open-science platforms and crowdsourced community responses in tackling emerging plant diseases. Also, together with several collaborators, we gained an unprecedented level of detail of the molecular interactions that define host-pathogen recognitions by solving the crystal structures of effectors of the blast fungus in complex with plant proteins and reconstructing the evolutionary history of these molecular interactions. Our aim is to build on these discoveries to drive both basic and applied plant pathology.

We have started to develop a thorough understanding of the biophysical properties of pathogen effector binding to host proteins and their consequences on pathogenesis and immunity. Such knowledge, along with related mechanistic and evolutionary studies will guide the retooling of the plant immune system towards resistance to diseases. Ultimately, we will deliver traits and non-transgenic cultivars for breeding disease resistance in crops.

Antonio F. Logrieco

Mycotoxins as a hidden threat for food and feed safety: risks and challenges. Antonio F. Logrieco, Institute of Sciences of Food Production, Research National Council, Via Amendola 122/O, Bari, Italy, Email: antonio.logrieco@ispa.cnr.it

The management of good agricultural practices during pre-harvest is a key issue for minimizing the risk of mycotoxin accumulation in the Mediterranean crops. Such practices can involve crop rotation, tillage, proper fertilization and fungicide or biological control, variety selection, timely planting and harvests and the control of the insects which often act as vectors of toxigenic fungal spores.

On the other hand, the reduction of mycotoxins along the agro-food chain is also highly dependent on correct post-harvest management that must aim firstly at the separation of the infected crop products from the healthy material. Therefore, the use of different tools such as manual sorting or optical sensors is also crucial for reducing the level of mycotoxin contamination of a given crop. Moreover, it is extremely important to prevent post-harvest contamination during the storage by obtaining low temperature and humidity conditions, in order to

limit the development of toxigenic fungal genera. An update review will be given on integrated management of pre- and post-harvest practices aiming at minimizing the risk of mycotoxin contamination along the food chain and on main effective solutions developed by EU MycoKey and MycoTwin (https://www.mycotwin.eu/project) projects. *This presentation was supported by the EU Project N. 952337*

Nico Horn

IMPORTANCE OF PHYTOSANITARY REGULATIONS AND INTERNATIONAL STANDARDS FOR PLANT HEALTH TO ENHANCE FOOD SECURITY. Nico Horn, Director-General European and Mediterranean Plant Protection Organization (EPPO), 21 Boulevard Richard Lenoir, 75011 Paris, France, Email: nico.horn@eppo.int

An important aspect of protecting plant health is to prevent the introduction and avoid the spread of pests.

Thereby ensuring that these pests cannot threaten food security. This requires official action by the countries' authorities. This preventive action avoids more effort being needed at farm level to ensure food security. International trade is an important pathway for entry of pests. Regulation provides clarity to exporting and importing countries on the phytosanitary rules that apply to import. Legislation should also provide the legal power to the National Plant Protection Organizations (NPPOs) to take action, e.g. in the case of an interception or an outbreak, and for the right of access for inspections. Qualified inspectors and diagnosticians and adequate inspection and diagnostic facilities are needed. The inspectors and diagnosticians need guidelines and laboratories should have access to diagnostic protocols, for pests that are present and for those not yet present in their country.

The IPPC gives guidance in International Standards and implementation material, e.g. on the tasks and functions of an NPPO. EPPO provides Standards for inspection, for identification of pests, and for control of pests.

Other important elements for an effective phytosanitary system are surveillance, for early detection of outbreaks and for declaring pest status, horizon scanning and PRA, to focus the work of the NPPO on relevant pests. EPPO gives guidance to NPPOs via its horizon scanning activities, contingency planning exercises and workshops. EPPO also performs PRAs for the EPPO region, usable by countries to justify their measures. With international and regional standards and guidance material provided by the IPPC and EPPO, it is up to countries to put the required legislation into place and create an adequate structure, to implement the measures needed. Only then can the national system function optimally in an increasingly globalized economy and protect plant health and thereby enhance food security.

Ahmed Amri

Conservation and use of global plant genetic resources for enhancing insect pests and disease resistance: major foliar diseases of barley as an example. Ahmed Amri, Zakaria Kehel, Mariam Amouzoune, Houda Hiddar, Bouchra Belqadi, Rachid Benkirane and Sajid Rehman, International Center for Agricultural Research in the Dry Areas (ICADRA), Rabat, Morocco, Email: A.Amri@cgiar.org

Barley is an important crop worldwide with multiple uses as feed, food and malt and beverages and adapted to most harsh environments. Its production and quality are af-

fected by abiotic stresses and major foliar diseases. Successful breeding for resistance to these diseases will depend on continuous supply of sources of resistance to overcome the changes in virulence of pathogen populations.

Genetic resources conserved in genebanks constitute an important reservoir of traits needed by breeders. Due to large sizes of collections, random sampling of core collections were often used to identify sources of resistance.

The Focused Identification of Germplasm Strategy (FIGS)is developed and adopted by ICARDA to better target breeders sought traits using the relationship between environmental conditions and the trait.

FIGS showed its relevance for many adaptive traits including resistance to major diseases of barley. Reference set derived from the core collection, barley panel constructed by breeders and specific FIGS subsets constructed using filtering and modelling approaches, were screened for resistance to net blotch net and spot forms, leaf rust and scald.

The results showed that FIGS sub-setting allowed to identify sources of resistance for the three diseases in a reduced number of accessions at both seedling and adult plant stages. GWAS analysis is conducted to assess the differences in markers associated with resistance in different subsets.

In addition, the screening of a set of accessions of *Hordeum spontaneum* and of lines derived from crosses with *Hordeum bulbosum* showed the possibility of using barley wild relatives in extending the search for sources of resistance to major diseases.

Santa Olga Cacciola

Tomato Plants - *Trichoderma-Phytophthora nicotianae*, a Complex Interaction System for Understanding plant defence mechanisms. Santa Olga Cacciola, Department of Agriculture, Food and Environment (Di3A), University of Catania, 95123 Catania, Italy, Email: sacaccio@unict.it

The early activation of plant-defense-related genes during a three-way plant–antagonist–pathogen interaction in a tomato–*Trichoderma*–*Phytophthora nicotianae* model system was studied.

The defense mechanisms activated by tomato plants upon the simultaneous colonization of the root systems by *Trichoderma* spp. and *P. nicotianae* were evaluated 72 h post-inoculation by analyzing the transcriptomic profiles of genes involved in the pathways of salicylic acid (i.e., pathogenesis-related proteins—*PR1b1* and *PR-P2*-encoding genes), jasmonic acid (i.e., lipoxygenases enzymes—*TomLoxC*- and *TomLoxA*-encoding genes), and the tomato plant defensing protein (i.e., *SlyDF2*-encoding gene).

Genetic defense pathways in tomato related to the above pathways in this three-way interaction system are activated from the first stages of the infection process. Moreover, the results support the hypothesis that the ability to elicit a defense response in tomato plants challenged with a root pathogen, such as *P. nicotianae*, is a conserved feature within the same species of *Trichoderma*.

Silvan Rossbacher

PARASITOID PRE-ADAPTATION IMPROVES BIOLOGICAL CONTROL OF SYMBIONT-PROTECTED APHIDS. **Christoph Vorburger and Silvan Rossbacher, Eawag & ETH Zürich, Überlandstrasse 133, 8600 Dübendorf, Switzerland, Email: christoph.vorburger@eawag.ch**

Aphids are commonly infected by the heritable bacterial endosymbiont *Hamiltonella defensa*, which increases aphid resistance to parasitoid wasps. Laboratory cage experiments have shown that the release of parasitoids strongly selects for symbiont-protected aphids, resulting in failed biological control.

Other experiments have shown rapid counter-adaptation of parasitoids to the presence of *H. defensa* in their hosts. Taken together, these findings suggest that parasitoid pre-adaptation could be a viable strategy to improve biological control of symbiont-protected aphids. We tested this prediction in laboratory cage populations of black bean aphids (*Aphis fabae*) and their main parasitoid *Lysiphlebus fabarum*.

We had parasitoid lines adapted to two different strains of *H. defensa* by experimental evolution, as well as parasitoids evolved on *H. defensa*-free aphids. Their ability to control caged aphid populations comprising 60% unprotected and 40% *H. defensa*-protected aphids, was compared with both *H. defensa* strains present in the populations. Parasitoids that were not adapted to *H. defensa* had virtually no effect on aphid population dynamics compared to parasitoid-free controls, but one of the symbiont-adapted lines and a mixture of both symbiont-adapted lines-controlled aphids successfully, strongly benefitting plant growth. This study thus showed, for the first time, that parasitoid pre-adaptation can improve the control of partly resistant aphid populations harbouring a protective endosymbiont.

Marie-StéphaneTixier

INTEGRATED MODERN SYSTEMATICS AND APPLICATIONS FOR MITE BIODIVERSITY CHARACTERISATION. **Marie-StéphaneTixier, UMR CBGP, Institut Agro Montpellier, INRAE, CIRAD, IRD, University of Montpellier, Montpellier, France, Email: marie-stephane.tixier@supagro.fr**

Systematics is the Science that secures biodiversity knowledge for functional applications in agriculture, health and environment, with key issues for biological control and biodiversity management under global changes. Systematics aims to identify and position organisms in the tree of life, considering evolutionary aspects. Systematics has a long history meaning that classification and identification are permanent matters.

However, sometimes this history is complex, organisms are not well named, their classification is not consensual as authors have different opinions, especially for mites because of their very small size and associated difficulties to observe morphological characters and to assess evolutionary meaning (i.e. convergences, intra or interspecific variations). To cope with both correct identification and classification, integrated systematics combining the use of different characters (morphological/molecular char-

acters, biogeography/distribution, biological features) and associated analyses has been developed. Focusing on plant protection applications, we will present first how methods evolved to access more numerous and diverse characters for answering questions on synonymies, phylogeny, life traits and community ecology for pest control issues.

Second, we will present examples where taxonomy was applied to classical, augmentative and conservative biological control, for determining predator/prey interaction in a climate change context and to develop agroecological management in increasing functional diversity in crops. We will also focus on collaborative taxonomy, through advances in social networks, easier distant collaboration and associated tools for the development of databases and their use in mite systematics and ecology.

Finally, we will question the future of Acari systematics considering education of students, systematics attractiveness, international collaborations and perennial positions in our institutions.

James R Bell

THE CHALLENGES OF AUTOMATIC COUNTING AND IDENTIFICATION OF INSECT THREATS USING SMART TECHNOLOGY.James R Bell, Rothamsted Research, Harpenden AL5 2JQ, United Kingdom, Email: james.bell@rothamsted.ac.uk

In this presentation image processing and how the science has progressed will be discussed. Deep learning has promoted the use of smart camera traps and phone apps, but they are not without issue. I will show the limits of these algorithms to detect insects, using aphids as an example. I will focus my talk on detecting insects in flight.

The technical challenges of accurately identifying aphids and other small insect pests to species level using mVLR and opto-acoustic methods will be discussed. Aphids migrate at altitude and also just above crop height, producing a wingbeat signal that is an order of magnitude weaker than mosquitoes, making this group hard to detect. Given that there are thousands of aphid species, the challenges for automatic detection seem fraught with difficulty.

I will show how rigorous data processing coupled with biological knowledge can progress this activity. I will finish with a decision support slide from https://insectsurvey.com

Emanuele Mazzoni

HOW TO COPE WITH RESISTANCE TO INSECTICIDES TO IMPROVE PEST MANAGEMENT. Emanuele Mazzoni, Department of Sustainable Crop Production, Faculty of Agriculture, Food and Environmental Sciences – Università Cattolica del SacroCuore – Piacenza, Italy, Email: emanuele.mazzoni@unicatt.it

Insecticides since their introduction have played and still have a strategic role in sustainable production of food, animal feed and also for protection against disease vectors. But due to their intrinsic characteristics, they act as a strong driving and selecting force against insect pest populations, above all when crop protection is not approached with an integrated view and insecticides are considered the only possible tool.

Of course, misuses has created significant concern about their

side-effects like environment pollution, food safety and biodiversity reduction. One more negative effect of insect control only relaying on insecticide application, is the selection of individuals able to survive to the insecticide toxic effects.

Even if insecticide resistance is sometime a neglected issue, at least by the public, it is not of secondary impact and importance. Insecticide resistance is a serious threat for pest management and the knowledge of involved mechanisms as well as an understanding of insecticide mode of actions is a necessary pre-requisite to develop sustainable and efficacious integrated pest management strategies to delay insecticide resistance onset and to maintain crop production level and quality.

Nowadays we know that many pests have evolved resistant populations due to different mechanisms: from mutations in the insecticide target site to the presence of several enzyme families (e.g. esterases, mixed function oxidases, glutathione S-transferases) involved in insecticide detoxification, sequestration and excretion. Such mechanisms can have different relative importance within the various taxonomic groups and this must be considered to improve integrated pest management strategies.

Shaker Al-Zaidi

ROLE OF PHEROMONE APPLICATIONS IN SUSTAINABLE CROP PROTECTION. Shaker Al-Zaidi, Russell IPM, United Kingdom. Email: shakir@russellipm.com

Pheromones and other semiochemicals are playing an increasing role in providing targeted and sustainable crop protection strategies.

This is becoming more and more important at a time where blanket spray of pesticides is impacting severely on pollinators, natural enemies, and other non-target insects. Management strategies based on matting disruption, till recent years, were exclusive to high value crops due to its high production cost.

However, recent advances in biotechnology, made it more possible to make the active material at fraction of the previous cost. This in turn made it possible to attempt to manage serious pests impacting food commodities at a price affordable to farmers in Asia, Africa and Latin America leading to major reduction in insecticide input in the production of maize and rice.

Attract and kill proved to be a cost-effective tool in the management of fruit fly. Further successes have been achieved through deploying attractants and repellents within the framework of a strategy called “push and pull” against many pests such as whiteflies, thrips and blueberry midge to name few. More interestingly, all the approaches above showed more robust performance when the strategy was combined with soil treatment with entomopathogenic fungi such as *Metarhizium anisopliae*.

Baldwyn Torto

MANIPULATION OF PLANT PESTS HOST-FINDING AND ACCEPTANCE BEHAVIOR: PRACTICAL APPLICATIONS IN IPM. Baldwyn Torto, International Centre of Insect Physiology and Ecology (icipe), Behavioural and Chemical Ecology Unit, P.O. Box 30772-00100, Nairobi, Kenya, Email: btorto@icipe.org

The agricultural sector is important for many African economies. It offers a reliable source of employment and income to small and medium-scale farmers who cultivate a

wide range of crops. Despite its socio-economic significance, crop production in Africa is constrained by numerous biotic and abiotic factors.

Of the biotic factors, pests and diseases are of paramount importance, causing yield losses of 40-100% depending upon the crop.

The problem has been exacerbated in recent years with the introduction of invasive pests, which have established in certain regions of the continent because of the conducive bio-climatic conditions. Farmers coping strategies to reduce crop losses, including crop rotation, application of plant products and synthetic pesticides, to name a few, have been implemented with varying degrees of success, leading to over-reliance on synthetic pesticides. The over-reliance on pesticides has led to the evolution of pesticide-resistant pests.

Given the importance of the agricultural sector on the continent, researchers are encouraging farmers to embrace IPM strategies to control pests and to increase crop productivity. Innovative solutions, such as exploiting and integrating behaviour-modifying (semiochemical) based tools to disrupt the weak links in the life cycles of pests could prove effective in pest control. This presentation outlines recent research conducted at the International Centre of Insect Physiology and Ecology *(icipe*), Nairobi, Kenya on the chemical ecology of key above- and below-ground insect pests in Africa leading to the identification of behaviour modifying chemicals that can be used in IPM strategies.

• Pest Surveillance

Moderator Laura Mugnai

Anna Maria D'Onghia

PRECISION SURVEILLANCE SYSTEMS FOR EARLY DETECTION OF REGULATED DISEASES OF FRUIT TREE CROPS IN THE MEDITERRANEAN REGION. Anna Maria D'Onghia, Stefania Gualano, Franco Valentini and Franco Santoro, Centre International des Hautes Etudes Agronomiques Méditerranéennes (CIHEAM) of Bari, Via Ceglie, 9 - 70010 Valenzano (BA), Italy, Email: donghia@iamb.it

The establishment of quarantine diseases in an area can cause serious losses of agricultural produce and limit the cultivation of fruit tree crops because they are highly destructive and for many of them there are no direct control measures.

Early detection of these diseases is essential to prevent their establishment and spread. The integration of innovative tools and methods (e.g., geomatics, information technology, statistics, forecasting models, biotechnologies) is necessary for designing advanced pest defense systems on a territorial scale, even in inaccessible areas.

These systems provide plant protection services with accurate and real-time data on disease status in the area in order to undertake targeted interventions and evaluate their effectiveness. Examples of technological applications are: the combination of satellite data in a GIS environment for Citrus tristeza virus; the photointerpretation of high-resolution aerial images and time series high-resolution satellite images for the olive quick decline caused by *Xylella fastidiosa*; rapid pathogen diagnostic technologies (e.g., real time LAMP). Some precision systems that can be applied in the Mediterranean region for

the surveillance of main fruit tree diseases are: the integrated system (Remote sensing, GIS, IT) for *X. fastidiosa*; the IT Multitrace prototype system for monitoring different diseases and their vectors (e.g., *Ca* Phytoplasma vitis & *Scaphoideus titanus*); the Agreed IoT system under development for pest surveillance and management at field and territorial scales for regulated and key pests.

An important role in these systems is the accurate acquisition of data and real-time transmission through dedicated applications, most of which were initially developed for *X. fastidiosa* surveillance.

Blanca B. Landa

EARLY DETECTION OF EMERGING DISEASES: A FOCUS ON *X. FASTIDIOSA* OUTBREAKS IN THE MEDITERRANEAN BASIN. **Blanca B. Landa[1], Miguel Román-Écija[1], María P. Velasco-Amo[1], Luis F. Arias-Giraldo[1], Manuel Anguita-Maeso[1], Pablo J. Zarco-Tejada[1,2], Carlos Camino[3] and Juan A. Navas-Cortés[1]. (1) Institute for Sustainable Agriculture (IAS), Spanish National Research Council (CSIC), 14004 Córdoba, Spain. (2) School of Agriculture and Food (SAF-FVAS) and Faculty of Engineering and Information Technology (IE-FEIT), University of Melbourne, Melbourne, Victoria, Australia; (3) European Commission, Joint Research Centre (JRC), Ispra, Italy, Email: blanca.landa@csic.es**

Xylella fastidiosa (*Xf*) represents the major transboundary plant pest and one of the world's most damaging pathogens in terms of socioeconomic impact.

Development of preventive strategies and methods for surveillance, early detection and monitoring and accurate diagnosis of *Xf* and its vectors is key to successfully monitor this detrimental plant pathogen and assist in their timely eradication or optimise containment measures.

Some of the approaches that have been developed or implemented for early detection of *Xf* in Europe during outbreak surveys include: i) Development of regionalized climatic suitability risk maps for potential *Xf* establishment; ii) Airborne hyperspectral and thermal images from remote sensing and *in-situ* plant phenotyping to discriminate *Xf* infections from other biotic- and abiotic-induced spectral signatures; iii) New in field methods to quickly and accurately identify/quantify infected plants and vectors; iv) New molecular approaches to genetically characterize *Xf* strains in plant and insect vectors via hybridization-based capture and high-throughput sequencing technologies.

Each of these approaches have some benefits and constraints, but the combination of several of them may help to contain the spread of *Xf* epidemics in Europe.

Antonio Vicent

SURVEILLANCE AND PREPAREDNESS STRATEGIES FOR EXOTIC CITRUS PESTS IN THE EU

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Exotic pests and diseases such as the false codling moth (FCM), *Thaumatotibia leucotreta*, citrus black spot (CBS), caused by *Phyllosticta citricarpa*, and huanglongbing (HLB), caused by '*Candidatus* Liberibacter spp'. and their vectors *Diaphorina citri* and *Trioza*

erytreae represent major threats for the citrus industry in the Mediterranean Basin.

Actually, outbreaks of FCM, CBS and the HLB vectors have recently been reported in several countries. The new EU plant health law (Regulation EU 2016/2031) establishes a proactive framework against the introduction of quarantine pests and pathogens. Those with the greatest potential socioeconomic impacts, such as FCM, CBS and HLB, are considered priority pests (Regulation EU 2016/2031).

EU Member States should establish enhanced measures for priority pests concerning surveys, action plans for eradication, contingency plans and simulation exercises.

Yearly surveys should be implemented following the guidelines for statistically sound and risk-based surveys developed by the European Food Safety Authority (EFSA). To calculate the sample size, method sensitivity integrates both the sampling effectiveness by the phytosanitary inspector and the diagnostic sensitivity in the laboratory.

This latter is mainly based on the protocols by the European and Mediterranean Plant Protection Organization (EPPO).

The outcome of the survey should not be defined simply as pest absence, but in a more transparent way as the confidence level that the pest is below a given prevalence. Commodity risk assessments and climate suitability studies are also developed by EFSA and EPPO to identify and quantify the risks associated with the entry, establishment and spread of exotic citrus pests in the EU.

Thaer Yaseen

FUSARIUM OXYSPORUM F.SP. *CUBENSE* TROPICAL RACE 4 ON BANANAS IN THE NENA REGION

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Global production of bananas is seriously threatened by Fusarium wilt (FW), a disease caused by the soil-borne fungus *Fusarium oxysporum* f. sp. *cubense* (Foc). The epidemic caused by the Foc Race 1 of the pathogen destroyed the Gros Michel banana industry in Central America and the Caribbean in the 1950s.

The risk of Foc Race 1 was mitigated by a shift to resistant Cavendish cultivars, which are widely cultivated and are the source of 99% of banana exports. However, the disease re-emerged in Southeast Asia and Australia with the detection of a new race of Foc tropical race 4 (Foc TR4), causing mortality to Cavendish clones and other banana varieties. Since 2010, the disease has spread across Southeast Asia, and to the transcontinental level in the Middle East (Oman, Jordan, Lebanon, and Israel), Turkey and Africa (Mozambique).

The likelihood that the pathogen may be present in other countries within the NENA region such as Palestine, Syria, Iraq, and Egypt should also be assessed. The spread of Foc TR4 is of great global concern due to the limited knowledge about the aspects of disease epidemiology, the absence of phytosanitary measures, lack of effective management approaches, and also the lack of awareness among banana growers and stakeholders.

As a result, this led to staggering losses in banana production, impacting the livelihoods of farmers and compromising food security. It is estimated that by 2028, the dis-

ease will cause a worldwide loss of approximately 160,000 hectares and 2.8 million tons, representing a 2% reduction in world banana production in addition to the loss of direct employment for approximately 240,000 banana workers.

Prevention is the most effective mean of combating FOC through the implementation of appropriate plant health regulations and measures. Certain measures required to prevent spread include the use of certified disease-free tissue culture, regular surveillance, and the early detection. Developing new resistant genetic materials and making the banana production systems more resilient should also be considered in disease management. To help mitigating the risk and spread of Foc TR4, FAO has been providing technical assistance globally, and particularly in the NENA, through strengthening the disease surveillance, diagnosis, identifying risk pathways, and raising awareness. The regional FAORNE office recently launched a TCP project to develop national capacities to contain and manage Foc TR4 in Lebanon.

The project intends to improve phytosanitary measures, disease surveillance, diagnosis, raising awareness and management of Foc TR4 in order to limit its spread into new areas and manage the disease in the infested banana plantations.

• Soil-borne Pathogens

Moderator Amer Dababat (CIMMYT, Turkey)

Timothy Paulitz

SOIL HEALTH AND MICROBIOMES OF DRYLAND WHEAT IN THE PACIFIC NORTHWEST OF THE US

Timothy Paulitz, Daniel Schlatter, Jeremy Hansen, Bryan Carlson, Ian Leslie and David Huggins, USDA-ARS, Pullman, WA. Wheat Health, Genetics and Quality Unit and Northwest Sustainable Agroecosystems Unit, USA, Email: timothy.paulitz@usda.gov

With the development of next-generation sequencing, we can now look at the bacterial and fungal microbiome in the soil, rhizosphere and roots of wheat across the dryland Pacific Northwest of the US. These microbes play important roles in N and C cycles, nutrient availability, and resistance to biotic (disease) and abiotic (drought) stresses. Location (precipitation zone) and cropping systems are major drivers of bacterial communities, which may contain over 8000 species (OTUs).

Despite this geographical variability, is there a core set of bacteria and fungi associated with wheat roots that are common across all locations that the plant has selected from the soil? We sampled four locations across a range of precipitation zones, and found a core set present in 95% of the rhizosphere samples. This included the bacteria *Bradyrhizobium,* Sphingomonadaceae, *Massilia*, *Variovorax*, Oxalobacteraceae, and Caulobacteraceae.

There was also a large group of Actinobacteria present in the rhizosphere as well as the bulk soil. Core fungal taxa in the rhizosphere included Nectriaceae, Pleosporaceae, Trichocomaceae, and Mortierellaceae and *Ulocladium*, *Microdochium*, *Macroventuria*, and *Cadophora*. Bacterial communities are highly variable with soil depths. Shallow layers are dominated by copiotrophic Proteobacteria and Bacteroidetes, but deeper layers contain oligotrophic Actinobacteria. In long-term no till systems, where the N has been applied 10 cm below the soil surface without tillage, an acid layer has developed because of nitrification, and this layer is dominated by Acidobacteria.

But are these bacteria important for soil and plant health? At the Cook Agronomy Long Term Agriculture Farm, we sampled 120 locations on a long-term no-till farm and an adjacent conventionally tilled farm. At each sampled location, we had a long-term history of yield, biomass, pH, organic matter as well as soil properties, which extensively vary across the landscape of rolling hills with wind deposited loess soil.

Using these variations across the landscape and correlation analysis, we found some groups of bacteria that were highly positively correlated with yield, such as Caulobacteraceae, Pseudomonadaceae, Flavobacteriaceae, and Mycobacteriaceae. Other families such as Sphingomonadaceae, Chthonomonadaceae and Armatimonadaceae were negatively correlated. Are these bacteria directly responsible for plant health? We are presently isolating representatives of these groups to test in the greenhouse for disease suppressiveness and plant growth promotion.

Mustafa Imren

CEREAL NEMATODES IN CENTRAL AND WEST ASIA AND NORTH AFRICA (CWANA): CURRENT KNOWLEDGE AND FUTURE NEEDS .Mustafa Imren, Bolu Abant Izzet Baysal University, Faculty of Agriculture, Department of Plant Protection, Golkoy, Bolu, Türkiye, Email: mustafafaimren@ibu.edu.tr

Wheat is grown on roughly 230 million hectares worldwide, with 650 million tonnes of grain produced each year. It is the main staple food in many countries, particularly in Central Asia, West Asia and North Africa (the CWANA region), which has the world's highest per capita wheat consumption.

Wheat is grown on 50 million hectares across CWANA, but average productivity in the region is only 1.5 t/ha, half of the global average. Wheat has its origin in West Asia, most likely in the Fertile Crescent, where productivity can be very high. However, the region suffers from heavy periodic disease indence and insect pests outbreak that cause heavy crop losses.

Cereals in the CWANA countries are constantly at high risk of soil-borne pathogens. Root diseases caused by soilborne plant-pathogenic fungi and plant-parasitic nematodes are favored by the dry summers and either winter wheat monoculture or short rotations. Comprehensive studies of soilborne fungal pathogens, cereal cyst nematodes (CCN), and root-lesion nematodes (RLN) conducted in the CWANA for 80, 40, and 20 years, respectively.

The CCN *Heterodera avenae* and *H. latipons* are much more prevalent than *H. filipjevi*. The RLN *Pratylenchus thornei* is more prevalent than *P. neglectus*.

Mixtures of CCN and/or RLN are found in some fields. The greatest economic damage is caused by *Pratylenchus thornei*, *P. neglectus*, *H. avenae*, and *H. latipons*. These species reduce the productivity of wheat by an estimated US$50 million annually in the CWANA.

The management studies for CCNs have included crop rotations, tillage intensity, screening of nematicides, screening of cultivars for tolerance and resistance traits, and management of weeds.

The developed PCR tests such as PCR-RFLP, SCAR primers and sequencing could detect, identify and quantify these species quickly and accurately. The PCR tests revealed that a change from spring wheat to spring barley caused a change in dominance from *P. thornei* to *P. neglectus*. The PCR tests also revealed that our collection of 'H. avenae' samples from different locations in CWANA countries and several from Morocco and Syr-

ia that were actually *H. avenae*, or were mixtures of *H. avenae* and *H. latipons*.

Those tests, therefore, led to the first discoveries of *H. latipons* in North Africa, and they showed that the development of new RLN and CCN management strategies would be more complex than we had realized. These PCR tests, therefore, proved to be very valuable, and they are now being used routinely in several commercial nematode diagnostic laboratories and in many research laboratories internationally.

Currently, wheat and barley cultivars that express resistance to *H. avenae*, *H. latipons*, *P. thornei* or *P. neglectus*, or combinations of resistance plus tolerance to *H. avenae*, *P. thornei* or *P. neglectus were identified*. Before this knowledge can become truly useful for commercial agriculture, it will be necessary to develop cultivars with pyramided resistance/tolerance genes for both species of *Pratylenchus* and to both species of *Heterodera*. Cultivars that express resistance but are not tolerant are unlikely to become widely accepted by farmers. Other future needs for nematode management will also be discussed.

Houda Boureghda

WHEAT CROWN ROT IN ALGERIA: CURRENT STATUS AND DISEASE MANAGEMENT
.Houda Boureghda, Imane Laraba and Nora Abdallah, Laboratory of Phytopathology and Molecular Biology- Department of botany, The National Higher School of Agronomy (ENSA), El Harrach, Algiers, Algeria, Email: hou.boureghda@gmail.com

Wheat crown rot (CR) is a worldwide disease, which may affect yield and also kernel contamination by mycotoxins. CR is a serious and chronic problem where dry climatic conditions are present and when continuous wheat cropping is adopted. Indeed, both conditions exist in Algeria, where wheat cultivation is much more concentrated in arid and semi-arid regions and practiced continuously.

This disease was reported for more than two decades, in Algeria, but only recently large-scale surveys carried out in cereal growing regions in the north of the country have shown the presence of CR in almost all the surveyed regions.

The investigation carried out lead to more information on wheat crown associated species identification and distribution. Indeed, in Algeria wheat is grown mainly in monoculture, which increases inoculum density in the soil and promotes the presence of crown rot. In addition, no-till has been adopted by farmers in some areas which had further favored CR development. Unfortunately, seed treatment is conducted in an inappropriate manner and does not take in consideration the pathogenic fungi associated with crown rot.

Knowing that the presence of Fusarium head blight in the northern regions of the country can be a source of contamination in the following campaigns, where infested seed in the absence of appropriate fungicide treatment increases the soil inoculum concentration and cause damping-off of seedlings or make crown rot more severe later.

To manage CR, first we should reduce the soil inoculum density, by making farmers more aware about adoption of non-cereal crop rotation and application of appropriate seed treatment. Second, screening for sources of resistance among the wheat varieties cultivated and appreciated by farmers.

Finally, the ideal approach is to adopt an integrated management by combining the methods mentioned above and including local microorganisms selected for their effectiveness.

Brigitte Slaats

VIBRANCE®DUO – A NOVEL SEED TREATMENT TO BOOST ROOT HEALTH IN CEREALS.

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Cereal seedlings and plants are affected by a range of seed- and soilborne diseases. The level of damage and its impact on yield are dependent on resistance genetics, agronomic and weather conditions. Among other control options, chemical seed treatments have been developed to shield the seedling from soilborne diseases and to eliminate seedborne pathogens.

The immediate and lasting protection contribute to maximise the genetic yield potential of a plant. Syngenta Crop Protection AG has launched a new generation of cereal seed treatments based on the novel SDHI fungicide sedaxane which belongs to the class of Pyrazol-Carboxamide.

It was specifically designed and developed for seed treatment use to control key cereal diseases, e.g. *Microdochium nivale*, *Rhizoctonia solani*, smuts and bunts such as *Tilletia caries* and *Ustilago* spp.

The seed-applied fungicide VIBRANCE®Duo contains not only sedaxane but also fludioxonil which reinforces the fungicidal activity of sedaxane and extends the spectrum of performance to include *Fusarium* spp. providing first-class control against a range of key cereal diseases.

In soils inoculated with Microdochium and Fusarium, results showed improved crop establishment for VIBRANCE®Duo of approximately 20%. Even in non-diseased soil, studies showed that sedaxane seed treatment led to faster root development. Improved water and nutrient uptake are the consequence of improved rooting, thus allowing the plant to make better use of available resources laying the foundation for higher yields even under stress conditions. In addition to its excellent protection against diseases and rooting power benefits, VIBRANCE®Duo has an outstanding seed safety profile.

Fouad Mokrini

PLANT PARASITIC NEMATODES ON CEREALS IN NORTH AFRICA: OUTLOOK AND MANAGEMENT

Fouad Mokrini[1] and Abdelfattah A. Dababat[2]. (1) Biotechnology Unit, Regional Centre of Agricultural Research, INRA-Rabat, Morocco, Email: fmokrini.inra@gmail.com; (2) International Maize and Wheat Improvement Center (CIMMYT), P.K. 39 06511, Emek, Ankara, Türkiye.

Plant-parasitic nematodes (PPNs) are considered one of the most relevant biotic constraints limiting cereal production worldwide. PPNs have been overlooked in many countries around the world due to lack of expertise and funding. Globally, the crop losses value caused by nematodes is estimated at $157 billion per annum. Among the PPNs, the cereal cyst nematodes (CCNs) on wheat are the most widely studied genera and have been reported from many countries. The cereal cyst nematodes (CCN) (*Heterodera* spp.) and root lesion nematodes (RLN) (*Pratylenchus* spp.) are widely distributed pests to implicate significant economic yield loss in cereal crops worldwide.

Therefore, this study aimed to review the current status and impacts of those two nematodes on cereals in North Africa. The earliest report of nematodes attacking cereals in North Africa (especially Morocco) was in 1984, who recorded the presence of both nematodes attacking wheat. Since then, several surveys of nematodes associated with cereals were conducted in different countries including Morocco, Algeria and Tunisia, and revealed the presence of RLN and CCN on wheat and barley roots. Several species of RLN and CCN were identified associated with wheat.

Heterodera avenae, Pratylenchus thornei and *P. penetrans* were the most prevalent species. Etiological and epidemiological studies were performed including life cycle, virulence of geographical isolates, and effect of environment on the biology and pathology of this CCN. Cereal genotypes were screened against RLN and CCN in collaboration with experts from (CIMMYT).

The current status of RLN and CCN knowledge on cereals in North Africa is primitive in spite of few initiatives, and much work is still needed on the distribution, epidemiology and the management of these nematodes.

Research Coordination

Baldissera Giovani

THE EUPHRESCO NETWORK AND ITS ROLE IN THE COORDINATION OF PLANT HEALTH RESEARCH ACTIVITIES IN THE MEDITERRANEAN AREA

Baldissera Giovani[1], Géraldine Anthoine[2], Sylvia Blümel[3], Kris De Jonghe[4], Elena Rodriguez[5], Martijn Schenk[6], Elspeth Steel[7] and Silke Steinmöller[8]. (1) European and Mediterranean Plant Protection Organization, (EPPO) Paris, France.

Email: bgiovani@euphresco.net; (2) French Agency for Food, Environmental and Occupational Health and Safety (ANSES), Angers, France; (3) Austrian Agency for Health and Food Safety (AGES), Vienna, Austria; (4) Flanders Research Institute for Agriculture, Fisheries and food (ILVO), Merelbeke, Belgium; (5) National Institute for Agricultural Research and Food Technology (INIA), Madrid, Spain; (6) National Plant Protection Organization (NPPO), Wageningen, The Netherlands; (7) Department for Environment Food & Rural Affairs (DEFRA) London, United Kingdom; (8) Julius Kühn Institute (JKI), Braunschweig, Germany.

Over the last few years, the rate of introduction and establishment of economically or environmentally damaging plant pests, diseases and invasive species has risen alarmingly. The Mediterranean basin in particular is home to 25,000 plant species, of which 13,000 are endemic (i.e. they are found nowhere else on Earth) and it was identified as a biodiversity hotspot experiencing exceptional loss of habitat. The threats associated with climate change and the increase in global trade open new pathways for the introduction and emergence of plant pests and the need to tackle them is more important than ever.

The Euphresco network was initiated in 2006 as an EU funded ERA-Net project aiming at: developing phytosanitary research policy at the EU-wide level; optimizing the research provision that underpins EU quarantine plant health policy development and policy implementation; increasing the capacity of European phytosanitary science and research, in order to prevent the disappearance of EU expertise.

The benefits of phytosanitary research coordination and funding are not restricted to

Europe, and since the end of the EU-funding period, Euphresco (2014) has developed into a self-sustainable network of phytosanitary research programme owners, programme managers, national plant protection organizations and research institutes in more than 50 countries in Africa, America, Australasia and Europe.

By coordinating and funding phytosanitary research activities that provide scientific evidence to support policy, Euphresco is a platform for communication between scientists and policy makers. The activities of Euphresco, with a focus on Mediterranean plant health challenges, will be described.

Anna Maria D'Onghia

PLANT HEALTH RESEARCH PRIORITIES FOR THE MEDITERRANEAN REGION

Anna Maria D'Onghia, CIHEAM of Bari (IAMB), via Ceglie 9, 70010 Valenzano, Bari, Italy, Email: donghia@iamb.it

Over the last few years, the rate of introduction and establishment of economically or environmentally damaging plant pests, diseases and invasive species has risen alarmingly. The Mediterranean basin in particular, is home to 25 000 plant species, of which 13 000 are endemic (i.e. they are found nowhere else on earth) and it was identified as a biodiversity hotspot experiencing exceptional loss of habitat.

Mediterranean agriculture, forests and environment are seriously threatened by numerous quarantine and emerging pests, and their negative impacts on crops is expected to increase due to the acceleration of global trade and to climate change that respectively favor the movement of these organisms over long distances and facilitate their adaptation to new environments.

In facing these challenges, the Mediterranean region is particularly vulnerable due to the weakness of national quarantine systems, limited qualified human resources, phytosanitary infrastructures, and not least the lack of funds for research activities in support to statutory plant health.

Since 2019, experts from the Arab Society for Plant Protection (ASPP), the European and Mediterranean Plant Protection Organization (EPPO), the Food and Agriculture Organization (FAO-NENA), the Mediterranean Phytopathological Union (MPU), and the Near East Plant Protection Organization (NEPPO) have collaborated under the guidance of the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) of Bari and the Euphresco network for phytosanitary research coordination and funding on a compendium on the research priorities for the Mediterranean area.

The Compendium on the 'Plant Health Research Priorities for the Mediterranean Region' was published in 2020 to celebrate the International Year of Plant Health (IYPH). The compendium was prepared on the basis of information and views collected from national experts from the Balkan-Mediterranean, Eastern Mediterranean, Maghreb, and Western Mediterranean sub-regions on the important pests, the research priorities, the research infrastructures and the capacity.

A supplement to the Compendium was organized in 2022. The results of the discussions with country representatives and the main recommendations as highlighted in the Compendium will be presented.

Majid Siampour

SET UP OF RELIABLE DETECTION PROTOCOLS FOR THE SPECIFIC IDENTIFICATION OF '*CANDIDATUS* PHYTOPLASMA PHOENICIUM'

Majid Siampour[1], Yusuf Abou Jawdha[2], Natasa Mehle[3], Marianne Loiseau[4], Luca Ferretti[5], Yuri Shneyder[6], Vicken Aknadibossian[2], Alessandro Passera[7], Mohammad Jamil Kaddoura[2], Paola Casati[7], Hana Sobh[2], Fabio Quaglino[7], Baldissera Giovani[8] and Piero Attilio Bianco[7]. (1) Shahrekord University, Shahrekord, Iran, Email: msiam57@yahoo.com; (2) American University of Beirut POBox: 11-0236, Beirut, Lebanon; (3) National Institute of Biology, Ljubljana, Slovenia; (4) French Agency for Food, Environmental and Occupational Health and Safety, Angers, France; (5) Council for Agricultural Research and Agro-economy, Rome, Italy; (6) All-Russian Plant Quarantine Center, Bykovo, Russian Federation; (7) Università degli Studi di Milano, Italy; (8) European and Mediterranean Plant Protection Organization, Euphresco, Paris, France Almond witches'-broom (AlmWB) is a devastating phytoplasma disease which affects almond, peach and nectarine.

The causal phytoplasma described as '*Candidatus* Phytoplasma phoenicium', has been identified for a long time in Lebanon and Iran, and recently, in Italy. Multiple gene coding regions have been used for the genotyping of '*Ca*. P. phoenicium' strains. In this regard, the *inmp* gene sequence analysis allowed the identification of genetically distinct AlmWB- phytoplasma strains from diverse host plants. Early and reliable detection of '*Ca*. P. phoenicium' is crucial for effective disease management.

Several detection methods for '*Ca*. P. phoenicium' have been developed and include conventional and real-time RT PCR. The aim of the Euphresco project 2017-F-234 'Set up of reliable protocols for the detection and identification of 'Candidatus Phytoplasma phoenicium' (DIPCAPP)' was to comparatively evaluate different diagnostic tests for the specific detection of '*Ca*. P. phoenicium' through a test performance study (TPS). The TPS was carried out using 12 blind samples on two different DNA concentrations (undiluted and 1:10 dilutions) and 2 controls (negative, positive).

In the TPS, 6 different PCR-based tests were included: a specific conventional PCR test targeting the 16S-23S spacer region (EP1) and *inmp* gene (EP2); PCR-RFLP analysis of 16S rRNA gene using universal phytoplasma primers (EP3); PCR and sequence analysis of 16S rRNA gene using barcoding primers (EP4); real-time PCR test for the general detection of phytoplasmas (RT1) and for the specific detection of AlmWB phytoplasma (RT2). The TPS was carried out by 7 laboratories from 6 countries (FR, IT, IR, LB, RU, SI). The accuracy, specificity and reproducibility of the tests were evaluated for each laboratory and each test. Overall, the best result was obtained with the EP1 test closely followed by the RT1 test. Tests EP2 and RT2 were found to be satisfactory with high accuracy but lower reproducibility. Tests RT1 and RT2 had comparable ability in the detection of phytoplasma with very similar error rates.

Test EP3 and, especially, EP4 achieved unsatisfactory results with lower accuracy, specificity, and reproducibility values compared to other tests. The results obtained by the project partners were similar. The findings of this study were encouraging as the tests that achieved the best results (EP1, RT1, and even the RT2) are known to be less time-consuming and, especially in case of EP1, can be used in most laboratories without incurring significant expenses.

THE CITRUS BLACK SPOT IN TUNISIA: CURRENT STATUS, RESEARCH PROJECTS AND MAIN RESULTS TO DETECT THE INFECTION OF *PHYLLOSTICTA CITRICARPA*

Naima Boughalleb-M'Hamdi[1], Najwa Benfradj[1], Ibtissem Ben Salem[1], Sabrine Mannai[1], Amel Fathallah[1], Ahlem Bel Hajd Ali[2], Souad Mahmoud[2], Imed Jaouadi[2], Elena Lázaro[3], and Antonio Vicent[3]. (1) High Institute of Agronomy in Chott Mariem, LR21AGR05, University of Sousse, Tunisia, Email: n.boughalleb2017@gmail.com; (2) Plant Health and Control of Agricultural Inputs Direction; Ministry of Agriculture, Water Resources and Fisheries, Alain Savary, Tunis 1002; (3) Institut Valencià d'Investigacions Agràries (IVIA), Centre de Protecció Vegetal i Biotecnologia, Moncada, 46113, Valencia, Spain. Citrus products are economically important in Tunisia; they have a good share in the international trade of Tunisian agricultural crops.

In March and April 2019, citrus black spot (CBS)-like symptoms were observed on *Citrus* fruit (*Citrus limon* and *C. sinensis*) in Nabeul Governorate, and an intensive survey was undertaken in many orchards located in this area. These surveys were conducted by many groups of Plant Health and Control of Agricultural Inputs Direction (NPPO) in collaboration with the plant pathology team of ISACM.

Typical symptoms of CBS were observed in orchards of lemon and orange trees located in Bou Argoub, Beni Khalled, Menzel Bouzelfa, Soliman, Grombalia, Takelsa, Korba, Nabeul and Hammem Ghezaz areas. Symptomatic fruits showed freckle spots or hard spots bearing pycnidia and also typical symptoms were noted on leaves.

For these reasons, international research collaborations was initiated to address this threat. The team of the plant pathology laboratory (ISA-CM, Tunisia) is a partner in an EFSA project entitled "Reduction in risk assessment uncertainty: suitability of Mediterranean citrus production areas for *Phyllosticta citricarpa*" (Call reference: GP/EFSA/ALPHA/2019/04).

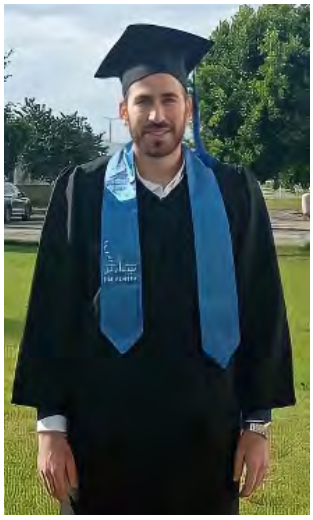
The general objective of the project is to reduce the uncertainties related to the risk of introduction of *P. citricarpa* in the Mediterranean citrus-growing areas, by improving the knowledge on CBS epidemiology and climate suitability in the Mediterranean Basin. ISA-CM is also involved in the Euphresco project "Sampling and analysis of asymptomatic *Citrus* fruits and leaf litter to detect infection with *Phyllosticta citricarpa*" (Call reference: 2019-A-318) to improve pathogen detection in asymptomatic samples.

In fact, *Phyllosticta citricarpa* presents a latency phase whose duration varies based on climatic conditions. Within the Euphresco project, the activities were distributed in three tasks. The first task focusses on the evaluation of methods that stimulate early development of symptoms and the production of pycnidiospores caused by *P. citricarpa* and *P. paracitricarpa*, on infected tissues, like ethephon fruit treatment.

The second task focusses on the evaluation of the currently available molecular diagnostic methods on leaf litter or asymptomatic leaf and newly developed tests for their ability to detect and identify *P. citricarpa* on asymptomatic infected citrus tissues, including their validation through a test performance study; possibly this molecular method should include the separation of *P. citricarpa* from *P. paracitricarpa*.The third task focusses on identifying the best sampling strategy to be used for those purposes.

ASPP MEMBER NEWS

Miloud Sabri successfully defended his doctoral thesis entitled "Fire blight ,*Erwinia amylovora*: Improvement of detection tools and development of sustainable control strategies based on phages, lactic acid bacteria and antimicrobial peptides" at Ibn Tofail University of Kénitra, in Morocco (UIT Kénitra), the National Institute of Agronomic Research of Meknes, Morocco (INRA Meknes), and the International Center for Advanced Mediterranean Agronomic Studies, Italy (CIHEAM-Bari).



Erwinia amylovora is the causal agent of fire blight, a destructive disease responsible for killing millions of fruit-bearing plants, including apple, pear, and quince, worldwide. Efficient and sustainable control strategies for this serious bacterial disease are still lacking, and traditional methods are limited to the use of antibiotics and some basic agricultural practices. This research project aimed to improve fire blight detection and develop sustainable control strategies based on bacteriophages, antimicrobial peptides (AMPs), and lactic acid bacteria (LAB).

For this purpose, a novel bacteriophage, Erwinia phage IT22, was isolated, characterized, and evaluated as antibacterial agent to treat experimental fire blight caused by *E. amylovora*. The nnewlyisolated phage was able to lyse 94% of E. amylovora cells in vitro and was found to have an antibacterial activity similar to that of streptomycin in inhibiting *E. amylovora* infection in pear plants. For AMPs-based control strategy, among the nine peptide tested, KL29 was the most potent peptide, which reduced fire blight symptoms by 85% when applied experimentally in vivo. In the third study, we investigated for the first time the possibility of using the LAB, Leuconostoc mesenteroides, in the control of fire blight.

Results showed that four strains of Leuconostoc mesenteroides were able to suppress fire blight disease on immature pear fruits. Furthermore, five protocols for extracting bacterial DNA were optimized for detecting *E. amylovora* quickly and directly from plant material using conventional polymerase chain reaction (PCR).Keywords: Fire blight, *Erwinia amylovora*, sustainable control strategies, bacteriophages, antimicrobial peptides, lactic acid bacteria, direct detection. Defence: 08/12/2022, miloud.sabri@uit.ac.ma

Some scientific publications of Dr. Miloud Sabri

- ✓ **Miloud Sabri**, Rachid Benkirane, Khoaula Habbadi, Soumia Sadik, Mohamed Ou-Zine, Mohammed Diouri & El Hassan Achbani (2021) Phages as a potential biocontrol of phytobacteria, *Archives of Phytopathology and Plant Protection*, 54:17-18, 1277-1291,

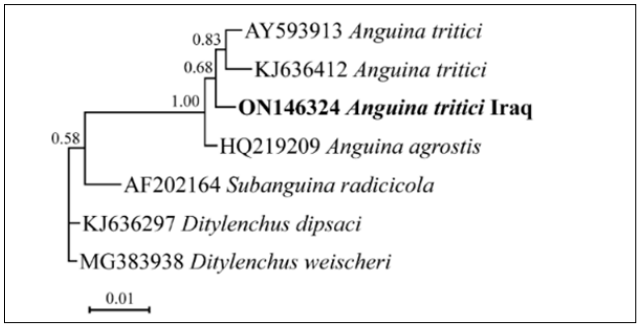
https://doi.org/10.1080/03235408.2021.1902033

- ✓ **Miloud Sabri**, Kaoutar El Handi, Franco Valentini, Angelo De Stradis, El Hassan Achbani, Rachid Benkirane, Grégory Resch, and Toufic Elbeaino. 2022. "Identification and Characterization of Erwinia Phage IT22: A New Bacteriophage-Based Biocontrol against *Erwinia amylovora*" *Viruses* 14, no. 11: 2455. https://doi.org/10.3390/v14112455

- ✓ **Miloud Sabri**, El Hassan Achbani, Mohammed Diouri, Rachid Benkirane, Mohamed Ou-zine, Kaoutar El handi & Khaoula Habbadi (2022) Simple direct DNA extraction protocols for efficient routine detection of plant pathogenic bacteria via conventional PCR, *Journal of Crop Improvement*, 36:4, 514-525, https://doi.org/10.1080/15427528.2021.1979158
- ✓ **Miloud Sabri**, Khaoula Habbadi, El Hassan Achbani, Rachid Benkirane, Kaoutar El Handi, Mohamed Ou-Zine, Taoufiq Benali & Toufic Elbeaino (2022) Antagonistic effect of *Leuconostoc mesenteroides* on grapevine crown gall and fire blight, *Journal of Crop Improvement*, https://doi.org/10.1080/15427528.2022.2108951
- ✓ El Handi, K.; Hafidi, M.; Habbadi, K.; El Moujabber, M.; Ouzine, M.; Benbouazza, A.; **Sabri, M**.; Achbani, E.H. Assessment of Ionomic, Phenolic and Flavonoid Compounds for a Sustainable Management of *Xylella fastidiosa* in Morocco. *Sustainability* 2021, 13, 7818. https://doi.org/10.3390/su13147818
- ✓ El Handi, K.; Hafidi, M.; **Sabri, M**.; Frem, M.; El Moujabber, M.; Habbadi, K.; Haddad, N.; Benbouazza, A.; Abou Kubaa, R.; Achbani, E.H. Continuous Pest Surveillance and Monitoring Constitute a Tool for Sustainable Agriculture: Case of *Xylella fastidiosa* in Morocco. *Sustainability* 2022, 14, 1485. https://doi.org/10.3390/su14031485
- ✓ Habbadi, K., **Sabri, M**., Benbouazza, A., Vial, L., Lavire, C., Kerzaon, I., & Achbani, E. (2021). La composition chimique et l'activité antibactérienne des huiles essentielles de quatre plantes aromatiques et médicinales marocaines contre *Allorhizobium vitis*. *African and Mediterranean Agricultural Journal-Al Awamia*, (131), 117-135.
- ✓ **Miloud Sabri**, Kaoutar El handi, Franco Valentini, Angelo De Stradis, El Hassan Achbani, Rachid Benkirane, and Toufic Elbeaino. Exploring antimicrobial peptides efficacy against fire blight (*Erwinia amylovora*). *Plants*. (Accepted)
- ✓ El Handi, Kaoutar, **Miloud Sabri**, Franco Valentini, Angelo De Stradis, El Hassan Achbani, Majida Hafidi, Maroun El Moujabber, and Toufic Elbeaino. 2022. "Exploring Active Peptides with Antimicrobial Activity *In Planta* against *Xylella fastidiosa*" Biology 11, no. 11: 1685. https://doi.org/10.3390/biology11111685.

Molecular Phylogenetic Characterization of *Anguina Tritici* (Steinbuch, 1799) Filipjev, 1936 (Rhabditida: Anguinidae) on Barley from Iraq.

During a nematological survey in Iraq, in the Bashika area, Ninevah province, an anguinid nematode population was isolated from galls of infected barley plants. The morphological characteristics indicated that the recovered species is identical to *Anguina tritici*.



The barley population of *A. tritici* was molecularly characterized by sequencing two ribosomal regions (ITS and 18S rRNA genes), and their phylogenetic analyses revealed

the newly generated sequences are in sister relation to corresponding sequences of *A. tritici* from wheat in the Bayesian tree, providing further evidence that the host plant can contribute to the separation of new isolates of plant parasitic nematodes. **[Elena Fanelli, Raied Abou Kubaa, Ali Kareem Al-Taee, Francesca De Luca.Journal of Nematology Volume & Issue: Volume 54 (2022)]** **https://doi.org/10.2478/jofnem-2022-0040**

Evaluation of copper, zinc and organic fertilizers for their side-effect against *Xylella fastidiosa* subsp. *pauca in vitro* and on naturally infected olive plants.

Xylella fastidiosa (Xf), a dangerous xylem-limited bacterium, can infect more than 600 plant species. The bacterium was first discovered in Europe in 2013 in the Apulia region (southern Italy) where the outbreak of *X. fastidiosa* subsp. *pauca* (*Xfp*) raised major concerns due to the deadly disease caused on infected olive trees (*Olea europaea*). The lack of effective therapeutic tools to cure infected plants is also a key factor boosting research for practical solutions to contain the infections.

In this framework, the screening for new antibacterial products such as zinc and copper phosphites, and an organic fertilizer based on a balanced mixture of seaweeds and vegetal polyphenols, evidenced a broad-spectrum antibacterial activity *in vitro* against various species of phytopathogenic bacteria. Through the optimization of specific protocols, the selected products were then tested *in vitro* also for their antimicrobial activity against *Xf* strains belonging to different subspecies.

Although with some differences related to *Xf* strain or subspecies, results confirmed the broad antibacterial activity of the tested compounds. Subsequently, in the framework of an integrated control approach, these products were tested in the field in naturally *Xfp*-infected olive orchards in the Salento Peninsula.

Upon two years of field assessments, positive effects of the application were recorded in terms of appreciable improvement of vegetative, productive and phytosanitary conditions of the treated plants. However, further observations are needed to assess the long-term effect and sustainability of selected products application, while additional researches are needed to optimize their formulation/application and understanding the mechanism of action.[**Carmine Del Grosso, Maria Saponari , Raied Abou Kubaa, Giuseppe Lima.***Department of Agricultural, Environmental and Food Sciences, University of Molise, Via F. De Sanctis, 86100 Campobasso, Italy; [2] Institute for Sustainable Plant Protection, National Research Council, via Amendola 122/D, 70126 Bari, Italy. E-mail: lima@unimol.it*] **The XXVII Congress of the Italian Phytopathological Society (SIPaV) September 21-23, 2022. University of Palermo, Palermo, Italy.**

Xylella fastidiosa NEWS

The European project BIOVEXO "Biocontrol of Xylella and its vector in olive trees for integrated pest management

Within the framework of the European project BIOVEXO "Biocontrol of Xylella and its vector in olive trees for integrated pest management" which explores innovative biopesticides that target the #Xylella_fastidiosa pathogen, which threatens olive and almond production in the #EU and the #Mediterranean_region, a scientific forum was organized at Hotel Costa Azul in Palma di Mallorca, Spain from 29 November to 01 December 2022 where experts from Italy, Spain, Austria, Belgium and Slovenia discussed the latest findings of the project, the current situation, measures, opportunities and proposed solutions at the European level. The forum also included a field visit to almond and olive orchards, and to the experimental fields of BIOVEXO project, which will be used to evaluate the effectiveness of the proposed innovative biopesticides on almond and olive trees in a preventive and curative way**. Dr. Raied Abou Kubaa from the IPSP, CNR, Italy and an ASPP member, has participated in this forum.**

Susceptible and resistant olive cultivars show differential physiological response to *Xylella fastidiosa* infections.

Olive quick decline syndrome (OQDS) is a severe disease, first described in Italy in late 2013, caused by strains of *Xylella fastidiosa* subsp. *pauca* (Xfp) in susceptible olive cultivars. Conversely, resistant olive cultivars do not develop OQDS but present scattered branch dieback, which generally does not evolve to severe canopy decline. In the present study, we assessed the physiological responses of Xfp-infected olive trees of susceptible and resistant cultivars. Periodic measurements of stomatal conductance (gs) and stem water potential (Ψstem) were performed using a set of healthy and Xfp-infected plants of the susceptible "Cellina di Nardò" and resistant "Leccino" and "FS17" cultivars. Strong differences in Δgs and ΔΨstem among Xfp-infected trees of these cultivars were found, with higher values in Cellina di Nardò than in Leccino and FS17, while no differences were found among healthy plants of the different cultivars. Both resistant olive cultivars showed lower water stress upon Xfp infections, compared to the susceptible one, suggesting that measurements of gs and Ψstem may represent discriminating parameters to be exploited in screening programs of olive genotypes for resistance to *X. fastidiosa*.

[**Antony Surano, Raied Abou Kubaa, Franco Nigro, Giuseppe Altamura, Pasquale Losciale, Maria Saponari, Pasquale Saldarelli. Department of Soil, Plant and Food Sciences, University of Bari Aldo Moro, Bari, Italy. Institute for Sustainable Plant Protection, National Research Council (CNR), Bari, Italy. CRSFA-Centro Ricerca, Sperimentazione e Formazione in Agricoltura Basile Caramia, Locorotondo, Italy.*Frontiers in Plant Science 20 September 2022 Sec. Plant Pathogen Interactions*] https://doi.org/10.3389/fpls.2022.968934**

Intraspecific Predation of Adult Red Palm Weevil, *Rhynchophorus ferrugineus* (Olivier) in the Artificial Breeding Colonies

The red palm weevil (RPW), *Rhynchophorus ferrugineus* is still one of the most threatening pests to palm trees worldwide, it is considered an insect pest from (category I) in the Gulf region and the Middle East, according to (FAO).

Since the insect entered the Arab peninsula in 1984, biological, ecological, and control aspects have been studied carefully; however, no glimpse or observation refers to the intraspecific cannibalism phenomenon between adult individuals within the artificial breeding colony. The behavior was noticed when many RPW adults stacked on each other. The insects began to cut the hind legs of one of the individuals and then separate the head from the body, feeding on the mouthparts and the contents of the head and abdomen, where the parts appear empty when taken out of the colony.

Only males were found in the colony when it was demolished. The co-author confirmed the phenomenon and noticed the same behavior between the two sexes in different countries. The cannibalism between RPW adults is reported from Jordan and the Kingdom of Saudi Arabia for the first time.

[Ibrahim Jaddoa Al-Jboory[1] and Wafa Mohamed Al-Otaibi[2] ,[1]The University of Baghdad, Faculty of Agriculture, Plant Protection Department, Iraq ,[2]Taif University, College of Science, Kingdom of Saudi Arabia 2022].

International Dates Conference and Exhibition 7-10 December 2022

Cognizant of the historical contribution of dates to food security and nutrition; and recognizing the cultural, social, and economic contribution of dates in the Kingdom of Saudi Arabia, the National Center for Palms and Dates aims to organize the “International Dates Conference and Exhibition”, in which industry leaders, academia, delegates, and officials from all over the world will participate.

It will provide a unique combination of scientific research and commercial strategy to exchange scientific knowledge and innovative technologies to enhance the safe production and Commercialization of these extraordinary Super-fruits.

The 3rd edition of the “International Dates Conference and Exhibition” mainly comprised of an Ambassadors Conference, Investment Symposium, Panel discussion, Planned presentations, Skill-building workshops, as well as NCPD International Prize distribution

ceremony, with an accompanying exhibition with the participation of numerous local, regional, and global companies to display the most prominent and important types of dates around the world to create a competitive business environment, open new markets for E-commerce, and encourage entrepreneurs to launch their businesses in the palms and dates sector.

It also reviews the most prominent investment opportunities in the sector. It highlights the most innovative products and technologies that are critical for the sustainability of the Palms and Dates sector.

The conference sessions are in 7 tracks, Dates: Investment Symposium, Bakery & Confectionery Innovative Products: Promoting Sustainable Consumption, Dates as nutritious Food: Beverage and Healthy Innovative Products, Technology and Innovation to foster resilience and sustainability in date PALM sector, Pathways For Sustainability in Palms and Dates Sector, Processing and Market Development of Palms and Dates Sector and Hot Topics in the Date Palms Sector.

The NCPD International Prize winners presented their inovations and scientific achievements in three different catigories 1) **Best Scientific Research 2) Date Palm Young Pioneer Entrepreneurship 3) Date Palm Innovative Technology Excellence.**

The winners represented different geographical areas who being evaluated by a high skilled committee of scientists.

Prof. Dr. Michael Purugganan
Ph.D. University of Georgia, Athens, GA , USA, (1993)

Prof. Dr. Suliman Ali Al-Khateeb
Assistant Deputy for Agriculture, Ministry of Environment, Water & Agriculture, Riyadh, Saudi Arabia

Dr. Abdul Mutlab Mohammad
Business Development Manager at Nibras International Trading Co

Mr. Raees Ur Rehman
Founder/CEO of Royal Trading Company

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Research Shows Impact of Root and Crown Rot in Wheat

By Sarah McLaughlin ,November 18, 2022

A unique study by CIMMYT scientists in Türkiye in collaboration with scientists from the Bolu Abant Izzet Baysal University, Türkiye demonstrate the prevalence of fungi species in wheat production areas in Kazakhstan, which could be affecting wheat yield and quality. Kazakhstan is the ninth largest country in the world and the fourteenth largest producer of wheat; in 2021 alone, the country produced 14.3 million tons (t) of wheat on 12.1 million hectares (ha).

Despite this impressive figure, wheat yield in the country falls below average at 1172.5 t/ha compared to 3474.4 t/ha globally. Research into wheat diseases in Kazakhstan has primarily revolved around airborne fungal foliar diseases, such as stem rust, leaf rust and stripe rust, which can be devastating for farmers and their crops.

However, the effects of fungi relating to wheat root and crown root were yet to be examined – these diseases affect yields, stands and grain quality due to infections that cause damping-off, blight, necrosis, and dry rotting. Using plant samples taken during the 2019 growing season, scientists from the International Maize and Wheat Improvement Center (CIMMYT) conducted a quantitative survey to determine the distribution of this fungi. Using morphological and molecular tools on 1,221 samples from 65 sites across the central, eastern, and southeastern region, scientists found that *Bipolaris sorokiniana* and *Fusarium acuminatum* were the most predominant fungal species isolated. In total, 74 isolates from 16 species were tested, revealing that *F. culmorum and F. pseudograminearum*, *B. sorokinaiana*, *Fusarium* sp., *R. solani*, *F. redolens*, *C. spicifera*, *C. inaequalis*, and *N. orvzae* were virulent fungi.

Results show the diverse spectrum of pathogenic fungal species linked to wheat crown and root rot in Kazakhstan and is highly likely to be the first report from the country on the presence of *F. seudograminearum*, *Fusarium* sp., *C. spicifera*, and *C. inaequalis*. With this new data, scientists can develop mitigations to prevent crop loss and improve wheat yield across Kazakhstan.

Read the study: Fungal Pathogens Associated with Crown and Root Rot of Wheat in Central, Eastern, and Southeastern Kazakhstan *Cover photo: The scientists from Turkey researching root and crown rot in Kazakhstani wheat:* ***Abdelfattah A. Dababat (CIMMYT), Mustafa Imren (Bolu Abant Izzet Baysal University), Göksel Özer (Bolu Abant Izzet Baysal University) and Rauan Zhapayev. (Photo: Abdelfattah A. Dababat/CIMMYT)***

https://www.cimmyt.org/news/research-shows-impact-of-root-and-crown-rot-in-wheat/

Contribution to the Study of the Possibilities of Preserving agro-ecosystems in the Mediterranean basin in the Face of Climate Change through Effective Pollination and Sustainable Beekeeping (SafeAgroBee – PRIMA Project)

The overall objective of the SafeAgroBee project is to contribute to the adaptation and mitigation of the effects of climate change and other factors negatively influencing the sustainability and resilience of the agricultural system in the Mediterranean basin, guaranteeing farmers' incomes and food safety. In this project, we focus on beekeeping and pollination provided by wild and managed bees as important drivers for governing food security and human existence. To this end, SafeAgroBee will specifically address the following points:

1. examine the resilience of pollinating bees (Apis and non-Apis bees) on a changing environment towards pollination services and productivity by a) documenting the contribution of wild and honey bees to the pollination of key crops; b) determining the carrying capacity of several crops as a new approach for bee productivity and c) projecting historical climate data and bee data under current conditions;
2. study the adaptability of local bee populations and the application of best practices

in the face of climate change to ensure sustainable beekeeping by monitoring the development and performance of local populations and their resistance to diseases over long periods;

3. support the development of mitigation strategies that ensure bee health and provide guidance to beekeepers by comparing the health and productivity of honey bee colonies between different agricultural ecosystems and implementing alternative and novel strategies to control bee diseases;
4. develop innovative monitoring tools and precision beekeeping systems for advanced data acquisition based on sounds, bee movements and heat detection, also enhancing market potential;
5. test and validate new models to predict the health of bees, such as the health status index, as well as their productivity in terms of honey and pollination services based on two strong conditions, i) on previous experience, developments and knowledge and ii) on large datasets with highly accurate data and from various climatological conditions**.**

[Noureddine Adjlane[1], Fani Hatjina[2] and PRIMA SAFEAGROBEE Project Partners. [1]Department of Agronomy, University of Boumerdes, Algeria noureddine.adjlane@univ-boumerdes.dz. **[2]Division of Beekeeping, Inst. of Animal Science, ELGO 'DIMITRA', Greece, 2022]**

Potential Effects of Climate Change on Plant Health

On Sunday, 11/20/2022, the Egyptian Society of Integrated Pest Management (ESIPM) held a symposium on the potential effects of climate change on plant health. Prof. Mohamed El-Said El-Zemaity, President of the society, has stated that climate changes are expected to lead to more favorable conditions for the establishment and spread of agricultural pests. Such changes are expected to change the suitability of the local climate for pests, and then change their distribution or the inevitability of their adaptation to suit new conditions.

Therefore, this symposium focused on answering some questions related to the potential effects of climate change on major agricultural pests and plant health, including insect pests, pathogens, and weeds. It also paid special attention to the effect of changes in temperature, carbon dioxide concentration, precipitation, and humidity on the spread and distribution of some dangerous invasive species such as the red palm weevil and

the Fall Armyworm, and other invasive pests that spread and caused massive damage recently or during the recent decades in Egypt and many Arab countries. The symposium also shed light on the repercussions of climate change on plant protection materials, especially pesticides. His Excellency confirmed that the society aimed, through this symposium, to emphasize the strategic directions for pest management in light of climate change conditions.

He added that the great success achieved by this symposium is due to the distinguished contribution to the lectures of a group of eminent personalities and scholars, starting with the sponsor of the symposium, Prof. Dr. Ahmed Galal Al-Sayed (Dean of the Faculty of Agriculture, Ain Shams University), who focused in his talk on the historical narrative and developments of interest at the international level in the problem of climate change, and the story of COPs (Conference of the Parties) until Cop 27 held in Sharm El-Sheikh, Egypt.

It was followed by the talk of Prof. Dr. Mohamed Abdel-Mageed (Chairman of the Agricultural Pesticides Committee) on pesticides and climate change, talk of Prof. Dr. Mohamed El-Said El-Zemaity on the potential effects of climate change on agricultural pests, talk of Prof. Dr. Ali Soliman (Chairman of the Coordinating Committee for Plant Health) on climate change and plant health - a case study of Fall Armyworm, talk of Eng. Said Abdallah (Group Life Consultant) on the challenges of Egyptian agriculture in light of climate change, talk of Prof. Dr. Adel El-Basiony (Secretary of the Society) on bees and the environment, and talk of Prof. Fathy Faheim (Plant Protection Research Institute) on control the red palm weevil and climate change. The seminar sessions were chaired by Prof. Dr. president of the university) Prof. Dr. Ahmed Shalaby, (advisor to the Arab Organization for Agricultural Development), Prof. Dr. Mohamedd El-Said El-Zamity, Prof. Dr. Mahmoud Abdel Samie (head of the plant protection department).

The symposium was participated by a large group of eminent personalities and scientists (about 200 participants) with a large proportion of young people from various disciplines and interested scientific bodies, which had a great impact in enriching the symposium with valuable discussions witnessed in the closing session, which came out with some important recommendations on the strategies and techniques necessary to respond to the challenges of changes climatic conditions commensurate with our local conditions. **[Prof. Dr. Mohamed Al-Said El-Zemaity (Egypt), President of ESIPM, 2022].**

The Army Ants *Dorylus fulvus* (Dorylinae, Formicidae, Hymenoptera) Attack Western Honey Bee Colonies Apis mellifera L. in Libya.

The western honey bee colonies, *Apis mellifera* L. are attacked by the army ants from genus *Dorylus* which kill adults of honey bees, larvae and brood. Also, takeover the honey, and their continue attack can destroy colonies.

There has been a case recorded, for the first time in Tajura east Tripoli, Libya that shows the ant army *Dorylus fulvus* had destroyed 46% of honeybee hives.

The primarily identification of the ant samples was *fulvus* species. **[Alfallah, H. A., Abuelnnor, N., Plant Protection Department, Faculty of Agriculture, University of Tripoli, Tripoli, Libya, P.O Box: 13538,Tripoli, Libya,2022].** h_mahdi32@yahoo.com , najatali12@yahoo.co.uk

The 3rd International Conference of Agricultural Sciences (ICSAGC), Sulaimani, Iraq

The College of Agricultural Engineering Sciences, University of Sulaimani, hosted the 3rd International conference of Agriculture Sciences (ICSAGC) under the them "Sustainable Agriculture and Global Challenges" in the city of Sulaimani, IKR, Iraq 15-16, June 2022. The conference was attended by 150 peoples from different scientific and research institutions.

The scientific program of the conference included seven lectures by keynote speakers from European and American countries and 50 oral presentations within seven main topics in the field of crop science, horticulture, animal production, natural resources, food sciences, Agribusiness and sustainable rural development, and plant protection and disease management. In addition to a special exhibition of Dr. Emad Al-Maaroof, a member of the Arab Plant Protection Society's administrative board, in the field of cultivar improvement and food security.

Dr. Emad Al-Maarouf also gave a presentation on the genetic variation in *Puccinia striiformis* f. sp. *tritici* in Iraq. The conference provided an excellent forum for debating critical challenges facing agriculture, the environment and economic sustainability on a local, regional and global scale. Ideas were shared, professional challenges were discussed, and efforts were made to identify the best sanswers through scientific research and expertise of local and international researchers. Steps were also taken to increase agricultural product product quality and production.

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What is ENDURE?

ENDURE brings together some of Europe's leading agricultural research, teaching and extension institutes with a special interest in Integrated Pest Management (IPM) within the general context of environmentally friendly and sustainable agriculture.

ENDURE was originally a Network of Excellence funded by the European Commission from 2007 to 2010. Network partners learned to work together as researchers and agricultural advisers tackled the complexities of helping European farmers meet the chal-

lenges of the new European regulatory framework regarding crop protection. This framework puts a special emphasis on IPM, demanding each Member State places it firmly at the centre of their agricultural planning as part of National Action Plans which must be produced as part of the new legislation.

ENDURE members were quick to seize the opportunities presented by working together. The synergies created, the possibilities offered by working in multi-disciplinary teams better able to unravel the complexities of understanding agricultural systems rather than single pests and diseases, and the possibility of pooling resources and applying results across national boundaries made it obvious that working together was the way forward. At the end of the European Commission funding period in 2010, partners committed to keeping ENDURE going as a self-funded European Research Group.Now, **ENDURE's** 15 partners continue to operate at the heart of IPM research and extension, working alongside others in this dynamic and challenging field to identify those areas where further research is needed, possible funding sources and providing expert assistance, both nationally and at a European level, to ensure IPM continues to develop as a sustainable, cost-effective and achievable way of contributing to food security and a better environment. **www.endure-network.eu**

Observations on Cochineal Pest Affecting Cactus Pear in the Mediterranean Area

The cactus/prickly pear cochineal (*Dactylopius opuntiae*) is one of the most dangerous pests of the cactus pear plant (*Opuntia ficus-indica*), so called "Hindi" in Tunisia. While the cactus pear is classified in some countries of the world (such as South Africa and Australia) as an invasive plant that must be controlled, this same plant represents a very important agricultural and economic crop that must be protected, as it is grown in Tunisia on an area of more than 600,000 hectares.

What is known more to the general public about the cactus pear is that it is food for humans with its fruits and fodder for livestock with its cladodes/stems, but it is also with its cladodes, fruits and seeds a good source for the manufacture of foodstuffs, such as drinks, juices, jams and ice cream, as well as many other materials such as cosmetics, pharmaceuticals and others. In addition, this valuable crop is distinguished by not requiring special care from farmers and by its adaptation to semi-arid climates that are very hot in summer, as it is the case in Tunisia and in most Arab countries.

The cactus pear cochineal is a type of mealy scale insect that lives on sucking the sap of the cactus pear cladodes, causing very great damage that ends with the death of the affected host plant within few months. Cochineal is a very effective biological agent that can be used for control with great success when the cactus pear is considered as a serious invasive plant, but the cochineal status turns into an aggressive pest when the cactus

pear is considered as a crop. The cochineal had moved with the cactus pear from their original habitat in the American continent towards many countries of the world through people movement and international trade, and it

is currently continuing to spread in other regions, including the Middle East and North Africa. The cochineal, which has been known for a long time in Europe (France and Spain since at least 2001 and 2009, respectively), may have moved with people movement and international trade to the southern and eastern shores of the Mediterranean, where it was found out in Lebanon in 2012, in Occupied Palestine in 2013, in Morocco in 2014, and in Cyprus in 2016, then in Jordan and Syria in 2018, and more recently in Algeria and Tunisia in 2021.

The species of cochineal (*D. opuntiae*) that infests cactus pear is divided into biotypes, including the biotype specialized in infesting the cropped cactus pear (*O. ficus-indica*), which is the biotype *D. opuntiae* biotype '*ficus-indica*', while there is another biotype of the same species called *D. opuntiae* biotype '*stricta*' that infests two species of wild cactus pear, *Opuntia stricta* and *Opuntia dillenii*, and does not infest cropped cactus pear. Therefore, some countries like the Kingdom of Saudi Arabia have excellently succeeded in eradicating the "invasive" wild cactus pear by using its specialized biotype cochineal without any damage to the cropped cactus pear.

It is also important to clarify the difference between the cactus pear cochineal pest (*D. opuntiae*) and the economically useful cactus pear cochineal (*D. coccus*). Contrary to what some people think, cochineal pest is not exploited to produce a colorant (carmine dye) because it is not economically profitable, as carmine acid represents only about 6-8% of the body weight of the cochineal pest, while the same carmine acid represents 18-26% of the body weight of the useful cochineal which is exploited to produce the natural carmine dye with increasing economic profitability due to the shift of many segments of societies in the world progressively towards natural materials instead of industrial chemical materials. Regarding the symptoms, it is easy to distinguish between the two cochineals, as the cochineal pest is light in color and covered with a white cottony-waxy substance, while the useful cochineal is dark in color and covered with a white powdery substance that flies like dust when blown on it.

Symptoms of cactus pear infestation: Cochineal pest Dactylopius *opuntiae* (right) and useful cochineal *Dactylopius coccus* (left).

The pressing question now is how do we effectively control cochineal when it is a pest? However, the answer to this question is not easy because when the cactus pear covers an area and is intertwined, it is very difficult to enter inside it to implement chemical control, and mechanical plant removal can only be applied within the scope of limited and isolated infested hot spots. Therefore, and pending the selection of cochineal resistant plant varieties, it is inevitable to use biological control as presently the only solution to control this insect pest.

In this regard, there is currently no biological control method completely ready for use, but short-term scientific research can be conducted to identify biological agents able to reduce the prevalence of the cochineal pest to an economically acceptable level. Here, the scientific references mention several predatory natural enemies of the cochineal, some of which can be brought from the indigenous land of the cochineal, and some others are already present on their lands. Among these biological agents are the beetle *Hyperaspis trifurcata*, the fly *Leucopis bellula*, and the beetle *Cryptolaemus montrouzieri*. Some other predators are also useful such as the butterfly *Laetilia coccidivora*, the beetle *Zagreus bimaculosus*, the lacewing insect *Sympherobius barberi*, the beetle *Chilocorus nigritus* and the beetle *Exochomus flavipes* which preys on insects of the genus *Dactylopius* Detailed studies should be conducted on the biology, ecology and predation capacity of the most important predators.

Hyperaspis trifurcata

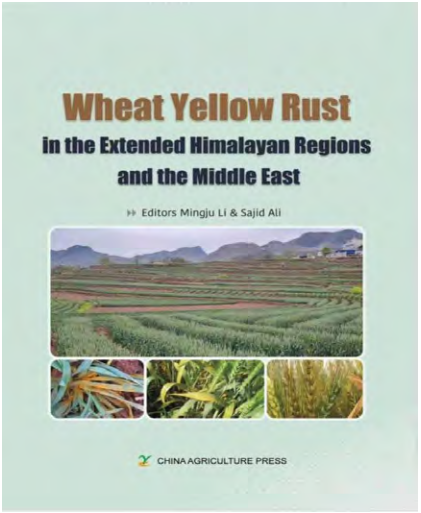
Leucopis bellula

Cryptolaemus montrouzieri

Dr. Bouzid Nasraoui, University Professor, National Institute of Agronomy of Tunisia (INAT), University of Carthage, Tunis - Tunisia

NEW BOOKS

New Scientific Book: "Wheat Stripe Rust in the Middle East and the Extended Himalayan Regions" 2022.



A new book entitled "Wheat Stripe Rust in the Middle East and the Extended Himalayan Regions" was recently released by the China Agricultural press, Beijing, Chinas The book is edited by Prof. Mingju Li (China) and Dr. Sajid Ali (Pakistan) in contributions of **Drs. Emad Al-Maaroof (Iraq),** a member of the Executive Committee of the Arab Society for Plant Protection, Baidya Nath Mahto (Nepal), Ahamd Abbasi Moghaddam (Iran), and Mohamed A. Gad (Egypt). The book contains six chapters, each of which discusses the advancement of research on various elements

of yellow rust in each country and will be recognized as an international contribution to the area.

The extended Himalaya region is identified as a hotspot of sexual recombination and genetic diversity as well as the putative center of the pathogen origin, while the Middle East is the origin center of wheat and the source of high-temperature adapted strain. These regions are critical for the worldwide epidemics of wheat stripe rust.

Therefore, it is crucial to understand the specifics of the wheat stripe rust conditions and research progress in these hotspot regions. However, there wasn't thorough book on wheat stripe rust that focusing on these significant areas. This provided the authors with motivation to write this book.

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

Risk Analysis for Invasive Pest Management book, recently published by **Dr. Mohamed Al-Said Al-Zamity**, for the ESIPM. The book was designed not only to be the first reference book in the Arab library in the field of risk analysis for the management of new/alien invasive pests but also to rely on it as a reference guide to be used in developing timely response plans to control trans boundary pests to avoid their risks based on sound scientific foundations.

The objective of the book is to evaluate and determine the risks that the country may be faced on a case-by-case basis. Also, measure's and tactics of its management. The book was published in fine color printing and hardcover consists of 667 pages in 18 chapters, of which 11cover information and knowledge related to the problem, its causes (particularly the role of climate change and international trade) and the professional skills needed to implement the Pest Risk Analysis (PRA) approach on ground.

In addition, seven chapters are devoted as examples to risk analysis of different cases of major invasive insect pests (Red palm weevil, *Tuta absoluta*, Fall armyworm), pathogens (citrus greening disease, banana disease/Panama disease, olive rapid decline syndrome/grape pierce disease) Herbal (parthenium weed).

The book was formulated simply to benefit both undergraduate and postgraduate students, and fellow faculty members in plant protection programs, diseases and plant production in agricultural colleges and institutes.

Also, interested colleagues in the position of responsibility, decision-makers, and those working in quarantine and plant health, and related research centers, and institutes. **[Dr. Mohamed Al-Said Al-Zamity, 2022].**

Selected Research Papers

- **Predicting Distribution of the Asian Longhorned Beetle, *Anoplophora glabripennis* (Coleoptera: Cerambycidae) and Its Natural Enemies in China.** Quan-Cheng Zhang, Jun-Gang Wang and Yong-Hui Lei, Insects, 13(8), 687, 2022. https://doi.org/10.3390/insects13080687

- **Natural and Synthetic Pyrethrins Act as Feeding Deterrents against the Black Blowfly, *Phormia regina* (Meigen).** Takeshi Kojima, Seiji Yamato and Shinichi Kawamura, Insects, 13(8), 678, 2022. https://doi.org/10.3390/insects13080678

- **A Non-Destructive High-Speed Procedure to Obtain DNA Barcodes from Soft-Bodied Insect Samples with a Focus on the Dipteran Section of Schizophora.** Frederik Stein , Stefan Wagner, Nadine Bräsicke, Oliver Gailing, Carina C. M. Moura and Monika Götz, Insects ,13(8), 679, **2022.** https://doi.org/10.3390/insects13080679

- **Live *Drosophila melanogaster* Larvae Deter Oviposition by *Drosophila suzukii*.** Trisna D. Tungadi, Bethan Shaw, Glen Powell, David R. Hall, Daniel P. Bray, Steven J. Harte, Dudley I. Farman, Herman Wijnen and Michelle T. Fountain. Insects , 13(8), 688, 2022. https://doi.org/10.3390/insects13080688

- **Bioprospecting Phenols as Inhibitors of Trichothecene-Producing *Fusarium*: Sustainable Approaches to the Management of Wheat Pathogens**. Wiem Chtioui, Virgilio Balmas , Giovanna Delogu, Quirico Migheli and Safa Oufensou, Toxins 2022, 14, 72. https://doi.org/10.3390/toxins14020072

- **First Report of South African obscure Scale, *Melanaspis corticosa* (Hemiptera: Diaspididae), in Portugal.** EPPO Reporting Service no. 08 - 2022 Num. article: 2022/166. https://gd.eppo.int/reporting/article-7398

- **Detection of the begomovirus *Cotton leaf curl Gezira virus* (CLCuGeV) in the Netherlands.** EPPO Reporting Service no. 07 - 2022 Num. article: 2022/153. https://gd.eppo.int/reporting/article-7398

- **Degree-day risk thresholds for predicting the occurrence of *Anarsia lineatella*, *Grapholita molesta* and *Adoxophyes orana* in northern Greece peach orchards.** Petros Damos , Polyxeni Soulopoulou, Dimitrios Gouderis, Dimitrios Monastiridis, Marianna Vrettou, Dimitrios Sakellariou, Thomas Thomidis, Plant Protect. Sci., 58: 234–244,2022. https://doi.org/10.17221/137/2021-PPS

- **Entomopathogenic fungus *Metarhizium anisopliae* (strain NCAIM 362) effects on soil inhabiting *Melolontha melolontha* (Coleoptera) and *Duponchelia fovealis* (Lepidoptera) larvae in sweet potato (*Ipomoea batatas* L.)**. Barna Putnoky-Csicsó, Ferenc Tóth, János Bálint, Endre Kentelky, Klára Benedek, Ciprian George Fora, Imre-István Nyárádi, Adalbert Balog, Plant Protection Science, 58, (3): 264–268, 2022. https://doi.org/10.17221/2/2022-PPS

- **Maize Anthracnose Stalk Rot in the Genomic Era.** Renata Belisário, Alison E. Robertson, and Lisa J. Vaillancour, Plant Disease, 106:2281-2298, 2022. https://doi.org/10.1094/PDIS-10-21-2147-FE

- **Design, Construction, and Evaluation of Equipment for Nighttime Applications of UV-C for Management of Strawberry Powdery Mildew in Florida and California.** Paulo P. Mello, Rodrigo B. Onofre, Mark Rea, Andrew Bierman, David M. Gadoury,

Kelly Ivors, Miranda Ganci, Jenny C. Broome, and Natalia A. Peres, 15 September, 2022. https://doi.org/10.1094/PHP-01-22-0002-RS

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- **Assessment of leaf spot disease on water leaf (Talinum triangulare (jacq.) Willd and in vitro effect of three medicinal plant extracts on pathogen(s) in the North-west Region of Cameroon.** Anembom C., Tacham W. N., Chia G. K., Bih J. N. and Kinge T. R., Article Number - 4EBDCD169619. Vol.18(9), pp. 688-703, September 2022. https://doi.org/10.5897/AJAR2022.16015
- **Insights into the Use of Eco-Friendly Synergists in Resistance Management of *Leptinotarsa decemlineata* (Coleoptera: Chrysomelidae).** Rana Muhammad Kaleem Ullah, Ayhan Gökçe ,Allah Bakhsh ,Muhammad Salim, Hai Yan Wu and Muhammad Nadir Naqqash, Insects ,13(9), 846, 2022. https://doi.org/10.3390/insects13090846
- **Epidemiology of the Microsporidium *Nosema ceranae* in Four Mediterranean Countries.** Clara Jabal-Uriel, Laura Barrios, Anne Bonjour-Dalmon, Shiran Caspi-Yona, Nor Chejanovsly,Tal Erez, Dora Henriques, Mariano Higes, Yves Le Conte, Ana R. Lopes, Aránzazu Meana, Maria Alice Pinto, Maritza Reyes-Carreño,Victoria Soroker and Raquel Martín-Hernández, Insects, 13(9), 844, 2022. https://doi.org/10.3390/insects13090844

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ECOLOGY

Study of the Factors Affecting Infestation Rate with Olive Moth *Prays oleae* (Bernard, 1788) in Three Olive Growing Locations Along the Syrian Coast

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https://doi.org/10.22268/AJPP-40.3.193200

EPIDEMIOLOGY

Flying Activity and Seasonal Abundance of Carob Moth *Ectomyelois ceratoniae* Zeller and its Population Dynamics on Different Hosts in Lattakia, Syria

A. Arab, E. Al-Jouri, I. Okasha, D. Fayoud, R. Yousef and N. El-Ali (SYRIA),Pages 201-208

https://doi.org/10.22268/AJPP-40.3.201208

SURVEY

First Record of the Two Insects *Megaselia halterata* and *Lycoriella ingenua* that Attack Some Edible Mushrooms in Iraq and Assessing the Damage Caused by them

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REVIEW PAPER: BIOSAFETY

Genetically Modified Crops, Production, Detection Methods and its Biosafety Implications: A Scientific Review

N.M. Ali Basha and A.M. Abdul Kader (SYRIA),Pages 260-279

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PLANT PESTICIDES

The Effect of Dried Powdered Leaves of Radish (*Rhaphanus sativus* L.) in Decreasing the Parasitism of *Orobanche ramosa* L. on Tomato (*Solanum lycopersicum* L.) Grown in Greenhouses

M. Hosh, S. Tabbache, D. Haddad and H. Habak (SYRIA),Pages 280-285

https://doi.org/10.22268/AJPP-40.3.280285

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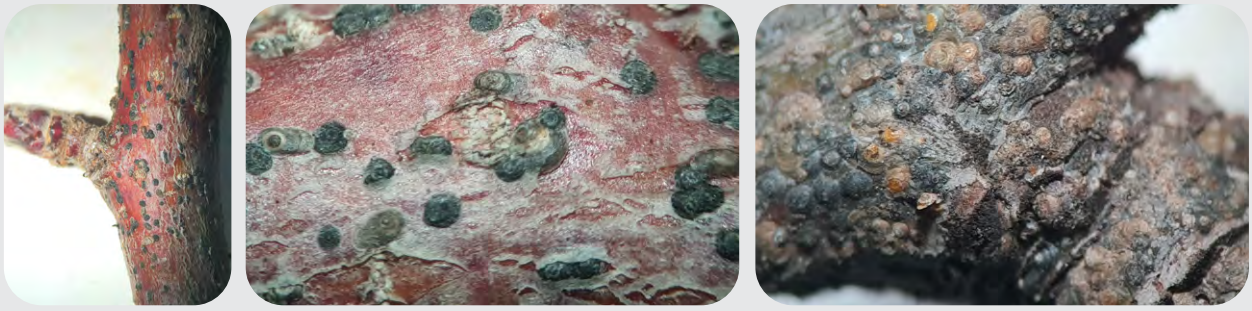
https://bit.ly/3HYdbxU

Events of interest 2022 - 2023

15-18 / 5/ 2023	.2nd International Molecular Plant Protection Congress, BURSA, TÜRKİYE /https://www.imppc2023.org/en
20-25 /8/2023	12th International Congress on Plant Pathology (ICPP2023) in Lyon, /France. https://www.icpp2023.org

San Jose scale

The San Jose scale, *Quadraspidiotus perniciosus* (Diaspididae) is a major pest of deciduous fruit trees. It was introduced to the area in 1974 and recorded on apples, cherries, peaches, and pears. They inject toxins into the plant through sap-sucking. A severe infestation weakens the tree, lowering fruit quality, and may kill the branches if not controlled. The photo showed a high infestation of apple trees in Bekaa, Lebanon causing the yellowing of leaves and death of the branches. The insect outbreak in the last few years is due to climate change and global warming.



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

Mohamad Kanouh (Syria), Alaa Turkey Saleh (Syria), Nadia Al-Khateeb (Syria), Mahran Zeity (Syria), Naffaa Walid(Syria), Aus A. Hasan (Syria), Fateh Khatib (Syria), Wafa Mohamed Al-Otaibi (Saudi Arabia), Eman A. Fouad (Egypt), Ahmad Mohamad Al-Momany (Jordan), Thuraya Abdul Abaas AL-Saadi (Iraq), Feryal Bahjat Hermize (Iraq), Moustafa M.S. Bakry (Egypt), Rasha E Selim (Egypt), Mohamed S Khalil (Egypt), Bouallala M'hammed (Algeria), Souddi Mohammed (Algeria), Ahmad Malek Dayoub (Syria), Adnan A. Lahuf (Iraq), Mahmood Othman Abass (Iraq), Sawssen Ali Hlaiem, (Tunisia), Faiza Elgaili Elhassan Salah(Sudan), Assya Idreis Abdalla Idreis(Sudan), Mawada Yahya Mohamed Alzein (Sudan), Noureddine Adjlane (Algeria), Zinette Mousa (Lebanon), Monia Kamel (Tunisia), Mohammed El-Said El–Zemaity(Egypt), Amira Salah Mahmoud Othman (Egypt), Dalia G. Aseel (Egypt), Maged Elkahky (FAO), AlSaraiAlalawi Mamoon (FAORNE), Heba Tokali (FAO-Egypt), Yosra Ahmed (FAORNE), Abid Hussein(NCPD), Roshan S. Shaalan(Lebanon), Mohammed, A. Fayyad(Iraq), Tsyer M. Khudair(Iraq), Alaa, O. Manea (Iraq), Mokhtar Abdulsattar Arif (Iraq), Emad Al-Maaroof (Iraq)

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

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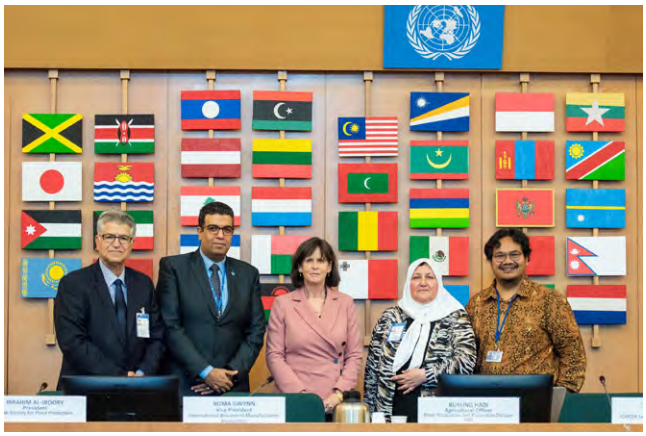
Selected Photos



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