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Humans not only spread Covid 19 but also plant viruses

The Covid 19 pandemic in 2020 made viruses famous worldwide, and people became aware of many terms related to the science of virology. Epidemiology, development of new strains or variants, vaccination, immunity, PCR test, mRNA vaccine became of common usage. People are less aware that plants can also be infected with viruses. As a matter of fact, more than 1200 well-characterized viruses infect crops globally, with significant annual crop losses caused by them. However, less attention is given to plant viruses because they do not affect humans directly, even though they often cause chronic food insecurity. The estimated annual economic impact of plant viruses worldwide is estimated at around 30 billion US dollars.

Even though human viruses are commonly spread by direct contact, plant viruses are naturally spread mainly through insect vectors such as aphids, leafhoppers, whiteflies and beetles in addition to mites, and consequently, these vectors are often the target in the disease control process. Less recognized is the spread of plant viruses through human activities such as: (i) trade of vegetative planting and tissue culture material, (ii) trade of infected seeds, (iii) accidental movement of insect vectors, (iv) virus-contaminated machinery, equipment and workers, (v) grafting and budding of infected plant material, (vi) use of infected cuttings, bulbs and tubers for propagation.

The corona virus pandemic clearly showed to the public the importance of containment measures such as self-isolation and quarantine in slowing down the spread of the disease. Likewise, effective containment programs can also be applied for the control of plant viruses spread. The success of this approach depends on actions taken by governments, as well as on the cooperation of individuals, which is not often the case.

Furthermore, communities also realized how important vaccination is to combat the spread of viruses. The question that remains: can we vaccinate plants to combat plant viruses? Scientists studying plant immunity are figuring out how to fight plant virus diseases. Some researchers plan to give our crops vaccines, just like the shots we take to protect ourselves from covid 19, flu, or smallpox. Work is in progress in many labs around the world using biotechnological advances such as modern breeding techniques and genetic engineering to strengthen the immunity of our crops and gardens.

Khaled Makkouk
Beirut, Lebanon

INVASIVE AND NEW PESTS

IRAQ

First Report of Ug99 race TTKTT of *Puccinia graminis* f. sp. *tritici* in Iraq.

During a wheat rust survey conducted by the national rust surveillance team in different wheat fields across Iraq in 2019, twenty-seven wheats (*Triticum* sp.) samples exhibiting typical symptoms of stem rust disease were collected, but only seven isolates were recovered and race typed at the regional cereal rust research center. Out of these seven isolates, four isolates were classified as race TTKTF, two isolates as race TKTTF and one from Halabja governorate, IKR was designated as race TTKTT due to its virulence on Sr24, Sr31 and Sr36 genes. Molecular analyses of the Kenyan TTKTT races and the newly Iraqi identified race confirmed that the new race belongs to Ug99 lineage group of the fungus *Puccinia graminis* f. sp. *tritici* the causal agent of wheat stem rust on wheat. This is the first report of detection of Ug99 race TTKTT in Iraq and the Middle East region. Since the discovery of Ug99 race TTKSK in Yemen in 2006 and Iran in 2007, this is only the third instance of a member of the Ug99 race group outside of Africa. Concerns have been raised about the continued spread of stem rust races with complex virulence, as well as the increasing frequency and early onset of stem rust infections that has great moral importance due to the significant risk to wheat cultivation not only in Iraq, but throughout the Middle East. (see also RS 2008/147). [Nazari K, Emad Al-Maarouf , Kurtulus E, Kavaz H, Hodson D, Ozseven I (Iraq), First Report of Ug99 race TTKTT of Wheat stem rust (*Puccinia graminis* f. sp. *tritici*) in Iraq. Plant Disease (early view),2021]. <https://apsjournals.apsnet.org/doi/pdf/10.1094/PDIS-02-21-0404-PDN>

LEBANON

Invasive Insects Associated with Oak Forests in Lebanon

Oak forests (Fagaceae) are native in Lebanon and occupy the largest areas of approximately 40,000 ha. The most common species are *Quercus calliprinos*, *Q. infectoria*, *Q. cerris* var. *pseudo cerris* and *Q. brantii*. Due to climate change and human activities, oak forests have become more vulnerable to native and exotic invasive pests. A total of 26 insect species associated with oak trees were recently identified in Lebanon. The most dangerous insect pest is the gypsy moth *Lymantria dispar* (Lepidoptera), on *Q. calliprinos* and *Q. Cerris*. The oak leafminer *Phyllonorycter libanotica* (Lepidoptera) and the Eriophidae (Accari) are the most species recorded on *Q. infectoria* and *Q. calliprinos* followed by the giant mealybug *Ceroputo pilosellae* (Hemiptera) on *Q. infectoria* and *Q. calliprinos* and the oak moth *Thaumetopoea* sp. (Lepidoptera) on *Q. calliprinos* and *Q. Cerris*. Eight new species were recorded for the first time in Lebanon on oak and are listed in this paper. Five species of Cinipidae (Hymenoptera): *Andricus caputmedusae*, *A. ceconi*, *A. sternlichti*, *Plagiotrochus quercusilicis* and *Neuroterus quercusbaccarum*, one species of Scolytidae, *Xylosandrus compactus* (Coleoptera), one species of Kermesidae *Kermes echinatus* (Hemiptera) and one species of Diaspididae, *Koroneaspis aegilopos* (Hemiptera). [Zinette Moussa, Elia Choueiri and Abdallah Hanna (Lebanon), Arab Journal of Plant Protection, 39 (2):164-172, 2021].

MOROCCO

First Report of *Globodera pallida* in Morocco

During surveys for potato cyst nematodes in 2019-2020, 1500 soil samples were collected just before the harvest of potato (*Solanum tuberosum*) in different potato-producing regions of Morocco: central-western (Casablanca-Rabat), eastern (Nador-Berkane), northern (Larache-Tangier), central (middle Atlas), south-eastern (Midelt-Errachidia), and south western (Agadir-Taroudant). Cysts were extracted and identified by morphological and molecular methods. The presence of *Globodera pallida* (EPPO A2 List) was confirmed in 3 regions: Berkane (Eastern Morocco), Gharb and Doukkala (Western Morocco). The situation of *Globodera pallida* in Morocco can be described as: Present, restricted distribution (Berkane, Gharb and Doukkala). [Hajjaji A., Ait Mhand R.,

First Report of Morphological and Molecular Characterization of Moroccan Populations of *Globodera pallida*

Potato cyst nematodes (PCNs) are the most important potato pest causing major crop losses across the world with a quarantine status in many countries. In Morocco, several potato crops are infected with PCNs, and the monitoring of potato production as well as the control of import and export of potato seeds are currently carried out by morphological methods. The present work was aimed to use molecular and morphometric methods for identifying and differentiating PCN species in Morocco for the first time. The morphological identification of PCN species from collected soil samples were carried out using the shape of the cysts, the length of the stylet, the number of cuticular ridges, and the Granek's ratio. The J2 had a slightly shorter body length, the number of cuticular ridges was nine, and the Granek's ratio averaged 2.2. The morphobiometric analysis revealed the proximity of the Moroccan population to *G. pallida* species. PCNs sampled from contaminated fields were analyzed molecularly using PCR. DNA amplification was performed using the multiplex PCR method and PCR-RFLP from the ITS region of the total genomic DNA compared to multiplex PCR-specific DNA sequences. All confirmed the presence *G. pallida* in all samples of the Moroccan PCN populations. [A. Hajjaji, R. Ait Mhand, N. Rhallabi and F. Mellouki (Morocco), *Journal of Nematology*, e2021-07 | Vol. 53, 2021]. [DOI: 10.21307/jofnem-2021-007](https://doi.org/10.21307/jofnem-2021-007)

First Record of *Macrohomotoma gladiata* Kuwayama, 1908 (Hemiptera: Psylloidea: Homotomidae), a pest of ornamental *Ficus microcarpa* L. f., in Morocco.

Ficus microcarpa L. f. (Moraceae) is a popular ornamental plant that grows in many urban zones in Morocco. The psyllid *Macrohomotoma gladiata* (Kuwayama, 1908) was found for the first time in Morocco, in August 2019, on 21 ornamental *Ficus microcarpa* L. f. trees in the urban area of Kénitra, on the Atlantic coast of Morocco. The new psyllid caused severe damage to the leaves and twigs of this host plant. Rolled leaves at the tip of the twigs, white and woolly waxy secretions were also observed in the infested trees. This first record of *M. gladiata* in Morocco, although still regarding a limited geographic area, represents a serious threat to *Ficus* in the country. A morphological description of this new pest is given. [Mohamed Afechtal, Moulay Chrif Smaili, Raied Abou Kubaa. (Morocco), *First published: 29 July 2021, EPPO Bulletin*, 00: 1–5, 2021]. <https://doi.org/10.1111/epp.12765>

SYRIA

Two New Records of Jumping Plant Lice (Hemiptera: Triozidae) from Syria.

During regular inspections of plants in the Latakia Governorate, Syria, two psyllid species previously unknown from Syria were discovered. These are *Phylloplecta trisignata* (Löw) from *Rubus* sp. and *Trioza brevigenea* Mathur from *Ficus microcarpa*. Both are new records for Syria. For *T. brevigenea* this is also only the second record of this species in the EPPO region, the previous one being a new record in Cyprus earlier last year. [Mahran Zeity(Syria) and Daniel Burckhardt, Agriculture Research Center in Latakia, General Commission for Scientific and Agricultural Research, (GCSAR), Damascus, Syria and Naturhistorisches Museum, Augustinergasse 2, 4001 Basel, Switzerland, *in press* to be published in *EPPO Bulletin*, August, 2021].



TUNISIA

First Report of Citrus Tristeza Virus in Tunisia

In Tunisia, following the observation of dieback symptoms in several orange (*Citrus sinensis*) orchards in the municipalities of Beni Khalled and Menzel Bouzelfa (Nabeul governorate), surveys were conducted by the NPPO. Laboratory analysis (serological and molecular tests) confirmed the presence of citrus tristeza virus (Closterovirus, CTV – EPPO A2 List). Phytosanitary measures are being implemented to eradicate the outbreaks and prevent any further spread. This is the first confirmed record of CTV in Tunisia. In the 1960s, infections had been reported on Meyer lemon (*Citrus x meyeri*), but these had subsequently been considered eradicated. The pest status of citrus tristeza virus in Tunisia is officially declared as: Present, only in some areas, subject to official control. **[Official Pest Reports – Tunisia (TUN-02/4 of 2021-03-29) Premier Signalement du virus de la tristeza ou Citrus tristeza virus (CTV) en Tunisie. [EPPO Reporting Service 2021 no.5 Diseases].**

https://www.ippc.int/fr/countries/tunisia/pestreports/2021/03/premier_signalement-du-virus-de-la-tristeza-ou-citrus-tristeza-virus-ctv-en-tu.

The Whitefly *Dialeurodes citri*: A New Pest on Citrus in Tunisia?

Whiteflies invaded citrus orchards in Tunisia in the 90's. Two species: *Aleurothixus floccosus* and *Parabemisia myricae* have been recorded successively infesting citrus and causing severe damage in Cap-Bon (North-East of Tunisia). These pests were first controlled by several insecticidal applications but with relative efficiency. Then two biological control programs have been deployed, completing the action of native natural enemies, especially for *P. myricae*. The result was a very satisfactory control of both whitefly species, to the point that they almost disappeared from orchards for about 30 years. In 2017, a third whitefly species, identified as *Dialeurodes citri*, was observed during a prospection in citrus orchards in Takelsa region (Cap-Bon). It was a common species in Algeria, but never caused damage in Tunisia. In 2020, *D. citri* was found again with very high population densities in the regions of Menzel Bou Zelfa (Cap-Bon) and Tunis. These observations confirmed its change of status and spread in Tunisia. The main morphological and biological traits to distinguish between *D. citri* and the other two whitefly species, already recorded in Tunisia, were described and first observations on its infestation were reported. Some recommendations to manage this new pest are given. **[Boulahia-Kheder, S.(Tunisia), Tunisian Journal of Plant Protection 16 (1): 11-18, 2021].**

TURKEY

First Report and update of the situation of *Scirtothrips dorsalis* in Turkey

Scirtothrips dorsalis (Thysanoptera: Thripidae – EPPO A2 List) was reported for the first time in Turkey from *Vaccinium myrtillus* in 2020 in Adana province (EPPO RS 2021/131). The NPPO of Turkey recently provided more details on this record to the EPPO Secretariat. *S. dorsalis* was recorded in blueberry seedlings grown in a greenhouse for adaptation studies in October 2020. Insecticides were applied in the infested site, and further inspections did not detect the pest. *S. dorsalis* is now considered eradicated from this site. Surveys were conducted in the area around this site from October 2020 to June 2021, both by the researcher who first identified the thrips and the regional plant protection service and no other *S. dorsalis* specimens were found. It is considered that the pest may have been introduced with imported plant material. There is no other blueberry production area in Adana Province. The pest status of *Scirtothrips dorsalis* in Turkey is officially declared as: Absent, pest eradicated. **[Source: NPPO of Turkey (2021-07)].**

BENEFICIALS NEW RECORD

IRAQ

Survey of Predator and Parasitoid Insects on Duhok Province Plantations, Kurdistan Region, Iraq.

A total of 47 species belonging to 46 genera, 34 subfamilies, 23 families and 7 orders of predator and parasitoid insects were collected and identified in Duhok province. The survey was conducted throughout the program held by the General Directorate of Agriculture-Duhok, in collaboration with the College of Agricultural Engineering Sciences in Duhok Province from May 2013 to April 2014. The species hosts, collecting date, locality and distributions are given. The current checklist also included some species previously collected by other researchers in Duhok Province. [Feyroz Ramadan Hassan (Duhok -Iraq), Department of Plant Protection, College of Agricultural Engineering Sciences, University of Duhok, Iraq. *Bull. Iraqi Nat. Hist. Mus*, 16 (3):267-282, 2021].

SYRIA

First Record of Parasitoid *Anomalon cruentatum* (Geoffroy, 1785) (Hymenoptera: Ichneumonidae: Anomaloninae) in Syria.

First record of the parasitoid wasp *A. cruentatum* collected in a Tomato greenhouse in Lattakia province at northwest of Syria. The wasp is a larval parasitoid on different families of Lepidoptera, Hymenoptera, Diptera, Coleoptera. The female body length is 6.0–11.5 mm, forewing length 3.91–4.58 mm, ovipositor sheath 1.3–2.3 mm, the color of body reddish-brown to black; head and thorax marked with yellowish spots. Antenna has 25–28 flagellomeres. Frons concave, finely punctate, with a distinct median vertical ridge; occipital carina incomplete. Scutellum convex; mid tibia with a single long, strong spur. [Rawa Muhsen Youssef (Syria), General Commission of Scientific Agricultural Research, Damascus, Syria, and Hossein Lotfalizadeh (Iran), Plant Protection Research Department, East-Azarbaijan Agricultural and Natural Resources Research & Education Center, AREEO, Tabriz, Iran. *Journal of Insect Biodiversity and Systematics*, 7 (3), 225–229, 2021]. <https://jibs.modares.ac.ir/article-36-49209-en.html>

First Report of the Parasitoid Wasp, *Aphelinus abdominalis* (Dalman, 1820) (Hymenoptera: Aphelinidae) on Sage Aphid, *Aphis passeriniana* (Del Guercio) (Homoptera: Aphididae) in Syria.

The parasitoid *Aphelinus abdominalis* (Dalman, 1820) (Hymenoptera: Aphelinidae) was recorded in association with *Aphis passeriniana* (Del Guercio) (Homoptera: Subfamily Aphidinae: Aphididae) infesting Common Sage *Salvia officinalis* L. (Lamiaceae) in Damascus and Damascus countryside. This species is reported from Syria for the first time; also *A. abdominalis* is introduced as a new host for this parasitoid. It is a solitary internal parasite of aphids, feeds on aphids haemolymph. Female adults lay their eggs inside the aphids, a parasitized aphid changes to a leather-like oblong mummy. Adults' wasp was developed, leaving an unequally rough notched exit hole in the back of the mummy. The main diagnostic morphological character of *A. abdominalis* is a small tiny parasitic wasp that will sting and parasitize the young stage of aphids. Adults are 2–3 mm with black thorax, yellowish-brown abdomen, the legs and antennae are relatively short and yellow. The winged adults are not strong fliers. Males are slightly smaller and darker; all stages develop within the host. The development time from egg to adults emergence of *A. abdominalis* were ranged from two to three weeks. [Houda Kawas, Abdunabi Basheer (Syria), Department of Plant Protection, Faculty of Agriculture, University of Damascus, Syria, 2021].



First report of The Ligurian leafhopper *Eupteryx decemnotata* (Rey, 1891) (Insecta: Hemiptera: Cicadellidae: Typhlocybinae) on Common Sage *Salvia officinalis* L. (Lamiaceae) in Syria.

The Ligurian leafhopper *Eupteryx decemnotata* (Rey, 1891) (Insecta: Hemiptera: Cicadellidae: Typhlocybinae) was recorded on Common sage *Salvia officinalis* L. (Lamiaceae), It is a perennial woody sub shrub, economically planted for its important and widely used for food, drugs and perfumery industries properties. In Damascus and Damascus countryside. *E. decemnotata* were found in February. The hopper is a sap-feeding insect, Feeding damage by leafhopper is associated with deformed leaves, severe stippling, yellowing and lead to leaf distortion, also branch drying and stunting of sage. The adult *E. decemnotata* length between 2 to 3 mm has a wedge-shaped head and a bristle-like antennae, with two pairs of yellow, brown, and white wings that are folded over the body at

rest. The vertex pattern consists of three pairs of dark marks, they possess five pairs of conspicuous spots on the head in anterior view. The long hind legs allow *E. decemnotata* to jump rapidly. Several rows of prominent spines on the hind legs are used to distribute water repellent secretions, known as bronchosomes across the exposed body parts. Adults females lay eggs within the leaf tissue of the host plant, the oviposition punctures were marked by corresponding brown discolorations on the leaf surface. Eggs as 0.86 mm in length and 0.16 mm in width, translucently white. Eggs hatch within 18 to 25 days, overwinter as eggs on sage. the Ligurian leaf hopper passes five nymphal instars, Wingless green nymphs are capable of hopping. And covered with hair-like structures called setae. The entire nymphal period is about 20 days. The Ligurian leafhopper *E. decemnotata* is recorded for the first time in Syria. [Houda Kawas, Abdalnabi Basheer (Syria), Department of Plant Protection, Faculty of Agriculture, University of Damascus, Syria, 2021].





First Record of the Parasitoid *Phryxe vulgaris* (Fallén, 1810) (Diptera: Tachinidae) in Syria.

The parasitoid *Phryxe vulgaris* (Fallén, 1810) was recorded on the larvae of *Pieris (brassicae, rapae)*, in the cabbage fields in Latakia Governorate during the period from October to December 2020. The parasitoid is larval-pupal parasitoid, was defined using specialized classification keys, depending on the morphological characteristics of the pupal and adult stages. Adult is yellowish-grey in color, about 7.5 mm in length, Abdomen with density black bristles at the end. At least the posterior 1/3 of scutellum reddish-yellow, wing cell R5 without petiole and open the wing edge. Pupa is cylindrical shape, reddish-brown, 7mm in length with two posterior spiracular. A tachinid fly emerged after two weeks. [Esraa Mahmoud Ahmad¹, Ali Mouhamad Ramadan¹, Louai Hafez Aslan² and Nadia-AL- Khateeb³ (Syria), ⁽¹⁾Department of Plant Protection, Faculty of Agriculture, Tishreen University, Lattakia, Syria; ⁽²⁾Department of Plant Protection, Faculty of Agriculture, Damascus University, Damascus, Syria; ⁽³⁾Lattakia Center for Rearing Natural Enemies, Department of Biological Control, Directorate of Agriculture, Lattakia, Syria, 2021].

			
Side view of <i>Phryxe vulgaris</i> adult	Reddish brown color of the Scutellum	Abdominal view of <i>Phryxe vulgaris</i>	The posterior spiracular of the pupa of <i>P. vulgaris</i>

First Record of the Parasitoid *Phryxe caudate* (Rondani, 1859) (Diptera: Tachinidae) in Syria.

The parasitoid *Phryxe caudate* (Rondani, 1859) was recorded on the larvae of *Thaumetopoea pityocampa* (Denis & Sciffermüller) (Lepidoptera: Thaumetopoeidae) in the forests in Latakia and Tartous Governorates during the months (February and March 2021). Thaumetopoeidae is the usual host family for *P. caudate* and which is commonly reared from *Thaumetopoea* spp. In Turkey, *P. caudate* is produced and released in nature against *T. pityocampa*. The parasitoid is a larval parasitoid, was defined using specialized classification keys, depending on the morphological characteristics of the pupal and adult stages. The adult is greyish black in colour, length ranging from 6-8 mm, Abdomen with density black bristles at the end. At least the posterior 2/3 of scutellum reddish-brown, wing cell r4+5 without petiole closed the wing edge. The pupa is a cylindrical shape, shiny reddish-brown, length ranging 5-7mm. [Esraa Mahmoud Ahmad¹, Ali Mouhamad Ramadan¹, Louai Hafez Aslan² and Nadia-AL-Khateeb³.(Syria), ¹Department of Plant Protection, Faculty of Agriculture, Tishreen University, Lattakia, Syria; ²Department of Plant Protection, Faculty of Agriculture, Damascus University, Damascus, Syria; ³Lattakia Center for Rearing Natural Enemies, Department of Biological Control, Directorate of Agriculture, Lattakia, Syria, 2021].

			
Dorsal view of <i>Phryxe caudata</i> adult	Reddish brown color of the Scutellum	Pupa of <i>P. caudata</i>	Symptoms of Parasitism on the larva of <i>T. pityocampa</i>

RESEARCH HIGHLIGHTS

ALGERIA

Control of *Tuta absoluta* using pheromone traps on tomato crops under greenhouse in Algeria. The present study aimed to assess the effectiveness of pheromone traps of adults of *Tuta absoluta* in 4 potential tomato production areas in Algeria: Tipaza (Center), Mostaganem (West), Jijel (East) and Biskra (South), during the 2012-2014 campaigns. Two tomato greenhouses were considered for each zone in which, one was protected by the setup of pheromone traps and the other as an insecticide sprayed control. Tomato leaf samples were taken from each greenhouse, each month of each year according to the areas of studies to calculate the rates of infestation. Higher infestation rates were recorded in the greenhouses with local agricultural practices (control) compared with those protected by pheromone traps. With the use of the pheromone traps, a remarkable reduction affected the infestation of the greenhouses in the 4 studied areas during the years 2012 to 2014. The southern area seemed to be the most infested and, at a least degree the areas of the West, the Center and the East, respectively. The temporal evolution of infestation rates showed an increase since January until July with June and July showing the higher infestation rates. These results showed the efficacy of trapping *T. absoluta* males and the importance of their sustainable use in the integrated control system against this devastating insect in Algeria. [Bellatreche, M., Messgo-Moumene, S., Guendouz-Benrima, A., and Chaieb, I. (Algeria/Tunisia) *Tunisian Journal of Plant Protection*, 16 (1): 1-10, 2021].

Morphological and Molecular Identification of some Algerian *Trichoderma* Isolates. Eighteen *Trichoderma* isolates with high potential antagonist against phytopathogenic fungi were obtained from soil, chickpea rhizosphere and seed. Based on the morphological character, two groups were distinguished among the eighteen *Trichoderma* isolates obtained. The first group consisted on 10 isolates (T1, T2, T4, T5, T8, T9, T10, T11, T14 and T17), of which the conidiophore morphology, as well as the branches and the phialides morphology, corresponds to the *Longibrachiatum* section. These isolates exhibited a morphological variability which made species identification very difficult. While the second group (8 isolates) consisted of isolates with inflated phialides disposed in pairs or in verticils such as *Pachybasum* section. The second group isolates presented globular conidia, and based on conidia sizes, this group was subdivided in two subgroups. The first one included the isolates: T6, T12, T15, T16, and T18, while the second one included the isolates: T3, T7, and T13. The first subgroup isolates have conidiophore with short branches, such as *Pachybasum* section, while the second ones show long branches. Phylogenetic analysis based on ITS clustered the eighteen *Trichoderma* strains on two branches and three groups. The first group includes the ten *Longibrachiatum* section isolates which clustered with reference strains of *T. longibrachiatum* species. The second contains the 5 isolates T6, T12, T15, T16 and T18 with reference strains of *T. harzianum* and its teleomorph *H. lixii*. The third one grouped isolates T3, T7 and T13, reference strains of *T. atroviride* and its teleomorph *Hypocrea atroviridis*. Species determination based on classical approaches has shown that morphological criteria are not enough to determine species identity. [Houda Bouregghda and Zouaoui Bouznad (Algeria), *Algerian Annals of Agronomy (ex. Annales de l'Institut National Agronomique El-Harrach)*, Département de botanique - Ecole Nationale Supérieure Agronomique, ENSA, Algiers –Algeria, 32 (1 & 2): 11-21, 2020].

Characterization of *Xanthomonas campestris* pv. *campestris* in Algeria. *Xanthomonas campestris* pv. *campestris* (Xcc) causes the black rot of cruciferous plants. This seed-borne bacterium is considered the most destructive disease to cruciferous crops. Although sources of contamination are various, seeds are the main source of transmission. Typical symptoms of black rot were first observed in 2011 on cabbage and cauliflower fields in the main production areas of Algeria. Leaf samples displaying typical symptoms were collected from 2011 to 2014, and 170 strains were isolated from 45 commercial fields. Xcc isolates were very homogeneous in morphological, physiological and biochemical characteristics similar to reference strains and gave positive pathogenicity and molecular test results (multiplex PCR with specific primers). This is the first record of Xcc in Algeria. Genetic diversity within the isolates was assessed in comparison with strains isolated elsewhere. A multilocus sequence analysis based on two housekeeping genes (*gyrB* and *rpoD*) was carried out on 77 strains representative isolates. The isolates were grouped into 20 haplotypes defined with 68 polymorphic sites. The phylogenetic tree obtained showed that Xcc is in two groups, and all Algerian strains clustered in group 1 in three subgroups. No relationships were detected between haplotypes and the origins of the seed lots, the varieties of host cabbage, the years of isolation and agroclimatic regions. [S. Laala¹, S. Cesbron², M. Kerkoud³, F. Valentini⁴, Z. Bouznad¹, M.-A. Jacques², C.Manceau⁵ (Algeria), ¹Ecole Nationale Supérieure d'Agronomie, ¹Avenue Pasteur, Hassan Badi - 16000 El Harrach - Alger, Algeria. ²INRA, UMR1345 Institut de Recherche en Horticulture et Semences, Beaucozé, Rue Georges Morel 42, 49071 Beaucozé, France ³Diag-Gene, 8 rue Lenôtre, 49066, Angers, France. ⁴CIHEAM - Instituto Agronomico Mediterraneo di Bari, Via Ceglie, 9, I-70010, Valenzano (BA), Italy, ⁵ANSES, Agence Nationale de Sécurité Sanitaire de l'alimentation, de l'environnement et du travail. Laboratoire de la santé des végétaux, 7 rue Dixmèras, 49044 Angers, France. *Phytopathologia Mediterranea*, 60(1): 51-62, 2021]. [doi: 10.36253/phyto-11726](https://doi.org/10.36253/phyto-11726)

EGYPT

Carbon Dioxide-Enriched Atmosphere to Control *Oryzaephilus surinamensis* L. on Stored Fruits of Saqie Date Variety. Control of the stored date insects by an eco-friendly method is essential to maintain the fruit for prolonged periods, especially when the dates are consumed fresh. The search for a safe method, as an alternative to commonly used chemical pesticides, is needed. The objective is to investigate CO₂ enriched atmosphere on the Mortality Percentage (MP) of the Saw-toothed grain beetle, *O. surinamensis*, life stages with special emphasis on reducing damage to stored dates. **Materials and Methods:** The effect of high levels of CO₂ as an alternative control method against the Saw-toothed grain beetle, *Oryzaephilus surinamensis* L., at different life stages was studied on infested 'Saqie' dates. Four CO₂ pressures (25, 50, 75 and 90 kPa, balance is nitrogen) were tested for 6, 12, 18, 24, 48, 72 and 96 hrs intervals. The response of different life stages of *O. surinamensis* to the different treatments varied according to CO₂ level, developmental stage and exposure period. **Results:** Mortality (%) was higher during the larval stage, followed by adults, pupae and eggs, in descending order. The larvae and adult stages were more sensitive to CO₂ treatment than the pupal and egg. Exposure time was more effective on eggs, larval and adult MP than the CO₂ atmosphere level. Mortality% at 96 hrs exposure time was almost 100% with CO₂ atmospheres of 50, 75 and 90 kPa. Mathematical equations were developed to model the relationship between mortality% and CO₂ treatments using multiple regression analyses for each life stage. **Conclusion:** The results confirmed that CO₂ could be applied to final food products during packaging to control the residual occurrence of insect pests after storage and before the packaging process to prevent further infestation in the last packages. [Nagdy F. Abdel-Baky, Daa A. Elrayes, Mohammad A. Aldeghairi, Mohamed I. Ghonimy, Ahmed M. Alzoheiry, Nader D. Al-Otaibi and Moustafa M.S. Bakry (Egypt), *Pakistan Journal of Biological Sciences*, 24 (6): 688-698, 2021]. DOI: [10.3923/pjbs.2021.688.698](https://doi.org/10.3923/pjbs.2021.688.698)

Impact of Silver Nanoparticles and Two Biological Treatments to Control Soft Rot Disease in Sugar Beet (*Beta vulgaris* L). **Background:** Soft rot disease caused by *Pectobacterium carotovorum* was observed in various crops which leads to yield shortages and economic losses. **Results:** Both *in vitro* and *in vivo* experiments, aimed to assess the effect of nanoparticles and biological treatments to control soft rot disease in sugar beet plant. The treatments comprised three silver nanoparticles (Ag NPs) concentrations (50, 75, and 100 ppm), three *Spirulina platensis* extract concentrations (50, 75, and 100%), and *Bacillus subtilis* (1 × 10⁹ CFU ml) 100%. Under *in vitro* conditions, results of the antibacterial activity showed that the zones of inhibition recorded 4.33 cm for 100 ppm Ag NPs, 0.43 cm for 100% algal extract, and 0.2 cm for bacterial treatments. Also, disease incidence % of bacterial soft rot was significantly decreased in all treatments in pot and field experiments. For resistant enzymes activity, *B. subtilis* 100% showed the most effect (84 mg min⁻¹), followed by *S. platensis* extract 75%, (57 mg min⁻¹), and

Ag NPs 75 ppm (44 mg min⁻¹), for poly phenol oxidase (PPO) at 81 days after sowing (DAS), but at 102 DAS revealed opposite results. On the contrary, peroxidase (PO) at 81 DAS showed different effects where treatment with *S. platensis* extract 100% increased it significantly (0.546 mg min⁻¹) compared to control (0.535 mg min⁻¹). The same trend was observed at 102 DAS. These results were reflected on sugar quality where Ag NPs 100 ppm treatment recorded the highest significant value (20.5%), followed by *S. platensis* 75% (19 %); however, the differences among them were not statistically significant. **Conclusion:** This study indicated the potential benefits of using silver nanoparticles and two biological treatments to control soft rot disease in sugar beet (*Beta vulgaris* L.). [Nasr A. Ghazy, Omnia A. Abd El-Hafez, A. M. El-Bakery and Dalia I. H. El-Geddawy (Egypt), *Egyptian Journal of Biological Pest Control*, 31:3, 2021].

Intraguild Predation in Three Generalist Predatory Mites of the Family Phytoseiidae (Acari: Phytoseiidae).

Background: The predatory mites, *Neoseiulus californicus* (McGregor), *N. barkeri* (Hughes), and *Amblyseius swirskii* Athias-Henriot, are important predators attacking many insect and mite pests. They can coexist in the same habitat and engage in intraguild predation (IGP). **Results:** IGP was assessed among the exotic one *N. californicus* and the native species *N. barkeri* and *A. swirskii* as Intraguild predator (IG-predator)/intraguild prey (IG-prey) in either absence or presence of extra-guild prey *Tetranychus urticae* Koch (EG-prey). In the laboratory, the physiological parameters, longevity, fecundity, and predation rate of these predatory mites' females, fed on EG-prey, were evaluated, where phytoseiid larvae are considered as (IG-prey) or combined IG-prey with EG-prey. All predatory species consumed larval stages of each other's, but in case of *N. californicus*, females failed to sustain oviposition on *N. barkeri* larvae. Also, it was noticed that *N. californicus* females killed 3 times more *A. swirskii* larvae than *N. barkeri* larvae, whereas *A. swirskii* consumed more *N. californicus* than *N. barkeri* larvae, respectively. *Neoseiulus californicus* lived longer on *T. urticae* and *A. swirskii* larvae than on *N. barkeri*, while the latter survived longer on *T. urticae* only than on the other prey or with combinations with *T. urticae*. *Amblyseius swirskii* lived shorter when fed exclusively on *T. urticae* or IG-prey than on EG-prey combined with IG-prey. In choice experiments, *N. californicus* showed a higher preference to consume more *T. urticae* than any of phytoseiid larvae. The comparison between *T. urticae* and IG-prey diets definite the higher influence of *T. urticae* on the fecundity in *N. californicus* and *N. barkeri* than on IG-prey, whereas in *A. swirskii* fecundity was as equal on *T. urticae* as on IG-prey *N. californicus* larvae. **Conclusion:** *A. swirskii* seemed to be the strongest IG-predator. [Faten M. Momen and Amira Abdel-Khalek (Egypt), *Egyptian Journal of Biological Pest Control*, 31:8, 2021].

Enhancement of *Apis mellifera* Hypopharyngeal Gland using *Hyphaene thebaica* Ethanolic Extract as Supplement.

Background and Objective: Hypopharyngeal gland (HPG) of *Apis mellifera* L. honey bee workers secrete the main proteinaceous substances. This royal jelly plays a vital role in brood care by young workers and thus colony growth. Many factors may affect the development and function of hypopharyngeal gland and consequently their role within the beehive. **Material and Methods:** *Hyphaene thebaica* fruit powder (500g) was soaked in one liter of 70% ethanol for three days at room temperature, then filtered and concentrated to dryness with a rotary evaporator. Bioactive compounds and biological activity of doum ethanolic extract were characterized to measuring the extent of safety. Samples of workers bee feeding with the extract concentrations (0.5 and 1%) at 6, 10 and 14 days were examined for head weight, body weight, soluble protein content, DNA fragmentation and hypopharyngeal glands histology; the data were analyzed using analysis of variance (ANOVA), Tukey's least significant difference. **Results:** Ethanolic doum extract contains flavonoids (45.62 mg g⁻¹) and phenolic (27.24 mg g⁻¹) compounds, also possess antioxidant (147 µg ml⁻¹), anti-inflammatory (119.8 µg ml⁻¹) and antimicrobial activities. There was an elevation in soluble protein content and no DNA damage in the honey bee worker's genome after fourteen days of feeding. The histological studies exhibited no deformation in the structure of gland acini, and an increase in gland size was detected. **Conclusion:** Ethanolic doum extract in the bee diet has a role in HPG enhancement. Studies on its safety profile and biological activities make it a good choice to attenuate honey bee diseases inside bee colonies. [Rasha S. Sakla, Hend M. Sabry and Rehab M. El-Gendy (Egypt), *Pakistan Journal of Biological Sciences*, 24(2): 282-291, 2021]. [DOI:10.3923/pjbs.2021.282.291](https://doi.org/10.3923/pjbs.2021.282.291)

Toxicological, Histological and Biochemical Effects of *Lepidium sativum* Seeds Extract on *Galleria mellonella* L. (Lepidoptera: Pyralidae) Larvae.

The greater wax moth *Galleria mellonella* L. is a serious destructive pest of honeybee colonies in the beekeeping industry all over the world. The larvae feed on almost all of the honeybee products and have the ability to completely destroy the bee colony, especially the weakened ones. The toxicity and biochemical effect of garden cress *Lepidium sativum* defatted seeds methanolic extract as a natural product against greater wax moth was evaluated under laboratory conditions. The defatted seeds (250g) of garden

cross were refluxed in 500 ml methanol, filtered and then dried using a rotary evaporator. Results revealed that the toxic effect of the garden cress extract against 5th instar larvae of *G. mellonella* was 1.15%, (LC₅₀) after 24h which induced more histopathological alterations on cuticle layers, fat bodies and muscle as sever deformation in integument; rupture and nucleus disappear of epithelial cells, deformation of fat bodies separation of muscles. A significant reduction in protein content, as well as high significant inhibition in α , β esterase and phenol oxidase activities were also recorded. On the other hand, the extract induced an elevation in total lipid content and acid phosphatase activity. Furthermore, apoptotic DNA fragmentation related to damage DNA was occurred at concentrations of 3, 2 and 1%. GC-MS analysis illustrated the toxic effect of methanol extract of *L. sativum* seeds is related to 10 major compounds content as 2,3,4-Tri- methoxycinnamic acid (20.44%), Benzyl nitrile (15.29%), 5-Hydroxy-methylfurfural (11.03%) and trace number of fatty acids as 11-Octadecenoic methyl ester (5.48%) and Hexadecanoic acid methyl ester (2.22%). From the previous, it can be concluded that the methanolic extract of *L. sativum* seed can be a good choice as an economical biocide in the control of greater wax larvae.



[Rehab, M. El-Gendy (Egypt), **Pest Physiology Department, Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt, The International. Journal of Environmental Sciences, Vol. 23(1):1-10, 2021**] [DOI: 10.21608/CAT.2021.65612.1074](https://doi.org/10.21608/CAT.2021.65612.1074)

IRAQ

A Study on Watermelon Wilt Caused by *Fusarium oxysporum* f. sp. *melonis* and *Macrophomina phaseolina* and its Control. Results obtained from this study showed the compatibility between the pathogens *Fusarium oxysporum* f. sp. *melonis* and *Macrophomina phaseolina* and melon plants cv. Galia F1 causing severe disease. Both fungi were isolated from infected plants collected from the fields in the Dujail and Ishaqi areas of Salah al-Din Governorate. Disease incidence and severity of infection with both pathogens when inoculation was done through seed and seedling treatments were 100.00%, 0.66 and 86.66%, 0.54, respectively. When different control treatments such as the biological product Trichosone (*T. harzianum*), salicylic acid (SA), humic acid (H) and agricultural sulfur (S) were applied, by using seed treatment or watering the seedlings, an increase in the concentration of peroxidase, chitinase and polyphenol oxidase enzymes was obtained. Results obtained also showed a significant superiority for the triple interference treatment, the biological preparation Trichosone for the fungus *T. harzianum*, salicylic acid, and humic, and by the method of the seedling treatment, and it achieved the highest enzyme activity of 68.50, 79.22, and 3.84 units/ml, respectively, which reflected positively in reducing the incidence and severity of infection as they reached 23.33% and 0.08%, respectively, compared to the control contaminated with the pathogen, which reached 100.00% and 0.66, respectively. [Al-Khazraji, N.K.A. and S.M. Ismaeel. (Iraq), **Arab Journal of Plant Protection, 39(2): 85-95, 2021**].

Evaluation of Some Molecular Resistance Markers of the Wheat Cultivars for Control of Head Blight Disease Caused by *Fusarium graminearum* in Salah Aldin Province, Iraq. Twelve fungal isolates of the genus *Fusarium* were isolated from bread wheat grains infected with Fusarium head blight; 4 isolates of *F. culmorum*, 3 isolates of *F. graminearum*, 2 isolates of *F. equiseti* and *F. moniliforme*, and one isolate of *F. avenaceum*. The results obtained showed that all of these isolates caused head blight disease in wheat (Tamoze 2 cultivar). The isolates *F. graminearum* 2, *F. graminearum* 3 and *F. culmorum* 3 showed the highest Fusarium infection index (FII), which was 51.45, 50.37, and 50.03, respectively. In contrast, the lowest values were 24.61 and 32.04 for the isolates of *F. culmorum* and *F.avenaceum*, respectively. The identification of the most pathogenic isolates of *F. graminearum* 2 was confirmed by molecular diagnosis based on the matching of the nucleotide sequence of the 5.8S rRNA gene of this fungus with the nucleotide sequences of the fungal strains contained in the World Genbank database (listed on the NCBI website), and this isolate was recorded in Global Genbank under the accession number MT998864.1. The results obtained also showed 12 of the studied wheat cultivars (Sham 6, Abu Ghraib, Babil, Milan, Sally, Hadbaa, Rabia, Bohoth 206, Sham 4, Iba 99, Dor 29 and Al Ezz) had the lowest infection levels compared to other cultivars. The FII values obtained suggested a significant superiority of the cultivars Sham 6, Abu Ghraib, Milan and Babel (which did not differ significantly among each other) with the lowest values of 16.84, 16.86, 17.44 and 17.84, respectively. The effect of infection with FHB was reflected in the percentage of Fusarium damaged kernels (FDK), with the lowest values of 38.43, 39.23, 41.58, 41.82 and 42.03% for the cultivars Sham 6, Abu Ghraib, Milan, Babel and Hadba, respectively. The electrophoresis of PCR products of *Xgwm389*, *6B NOR* and *Xgwm 126* markers associated with the resistance genes *Fhb1*, *Fhb2* and *Fhb3*, respectively, carried out on twenty-eight wheat cultivars showed that four cultivars (Sham 6, Abu Ghraib, Babel

and Milan) produced bands of 140 bp in size for the marker of Fhb1 gene (*Xgwm389*), which is considered one of the indicators for resistance to FHB disease of wheat. The test also showed the presence of a single band of 220 bp in the wheat cultivar Sally for the gene marker Fhb2 (*6B NOR*), which indicates resistance to FHB disease. Whereas, the electrophoresis product for the gene marker Fhb2 (*Xgwm 126*) produced a band of 2100 bp in size, reflecting the resistance characteristic in this cultivar. The results of this study indicated the presence of a relationship between the decrease in the infection parameters with the presence of resistance genetic markers in the cultivars Sham 6, Abu Ghraib, Babel, Milan, Sally and Hadbaa, whereas the cultivars Rabia, Bohoth 206, Sham 4, Iba 99, Dor 29 and Al Ezz showed a decrease in infection parameters to a lesser degree than the remaining cultivars, but without the presence of the genetic markers investigated. [Al-Qaissi, A.R.M., A.A. Hassan, W.M. Saleh and F.H. Yehya (Iraq), *Arab Journal of Plant Protection*, 39(2): 96-108, 2021].

Effectiveness of Thiamethoxam and Acetamiprid against Cabbage Aphid *Brevicoryne brassicae* and the Residue of Acetamiprid in Leaves and Soil using HPLC. The objective of this experiment is to evaluate the effectiveness of two neonicotinoids, Thiamethoxam 25% WDG and Acetamiprid 20% SL, against nymphs and adults of *Brevicoryne brassicae* during the 2019-2020 season in the field of Faculty of Agriculture, Kerbala University. The results showed that Thiamethoxam 25% WDG and Acetamiprid 20% SL achieving significant mortality on aphid adults. The higher mortality was 99.91% and 99.34% after five and three days of treatment by Acetamiprid. However, the percentage of nymph's mortality reached 99.94% after five days, respectively, of treatment by Acetamiprid compared with 45.78% after one day of treatment. The study of Acetamiprid residue showed that the percentage of pesticide in Cabbage leaves was 88.93 mg/kg after one hour of application, which reduces to 3.70 mg/kg after ten days of treatment and then the HPLC did not recode any recommended concentration. Also, the result of Acetamiprid residue in soil showed that the concentration of pesticide was low by 17.43% mg/kg for recommended concentration after one day of treatment and then reduced to 6.23 mg/kg after seven days of treatment which is continued till the HPLC did not record the pesticide. [Ahmed B. Abu-Duka and Mushtak T. Mohammadali (Iraq), *Plant Cell Biotechnology and Molecular Biology*, 22(19&20):123-129; 2021]. ahmed.b@s.uokerbala.edu.iq

PAKISTAN

Biological Parameters of the Bark Beetle, *Xylosandrus crassiusculus* (Motschulsky) Under Controlled Laboratory Conditions. Biological parameters of the bark beetle, *Xylosandrus crassiusculus* (Motschulsky) (Coleoptera: Curculionidae: Scolytinae) was investigated under different temperature regimes (27, 29, 31 and 35°C). The females reared at 29°C, lived 30.93±2.36 days for oviposition. The female laid a maximum of 6.71±1.89 eggs per day and a maximum of 6.99±1.33 batches per female. Each batch had an average of 13.78±2.01 eggs. The mean total fecundity recorded was 67.8±4.25 eggs, with the shortest egg incubation period. At 29°C, the duration of the larval stage was 20.17±2.89 days, the pupal stage 5.03±1.11 days, and the life span of the adult insect was 29.44±3.19 days. Significant differences (P<0.05) were noted when the duration of the different life stages under 29 and 35°C were compared, with longer duration at 29°C. Insects reared at 35°C had narrower bodies and smaller sizes. Furthermore, the developmental stages period, including the ovipositional period (days), were negatively correlated with temperature. [Khalid Hussain Qureshi, Abdul Waheed Solangi, Abdul Ghani Lanjar, Jan Muhammad Marri, Sajjad Ali Khuhro and Aslam Bukero (Pakistan), *Arab Journal of Plant Protection*, 39(2): 146-151, 2021].

Detection of Citrus Bent Leaf Viroid in Citrus Orchards of Sargodha, Pakistan. A study was conducted to monitor the Citrus bent leaf viroid (CBLVd) in citrus-growing areas of district Sargodha, Pakistan, during 2017-2018. Collected samples were tested by RT-PCR using specific primers. PCR positive samples were used to confirm the CBLVd incidence and severity on different citrus varieties grown at different regions of Sargodha. Maximum disease incidence was recorded in Kot Momin with the mean value of 24%, with severe symptoms of bark cracking, backward leaf bent and stunting. Minimum disease incidence was recorded in Sillanwali region with a mean value of 3.33%. The symptoms in Sillanwali were only yellowing and slight leaf bent. Maximum severity was observed in Kot momin (0.60%). Molecular detection of CBLVd by RT-PCR confirmed the diagnosis of the viroid. This survey was carried out for the first time in Sargodha district to monitor the occurrence of citrus bent leaf viroid following the first report of its detection in Pakistan in 2009. Since many declining citrus trees were found negative to CBLVd testing, other causal agents can be involved, and extensive surveys are still required in the near future. [Faeema Bakhtawar, Yasir Iftikhar, Muhammad Ahmed Zeshan and Muhammad Imran Hamid (Pakistan), *Arab Journal of Plant Protection*, 39(2): 159-163, 2021].

Activity and Monitoring of Olive Fruit Fly, *Bactrocera oleae* (Rossi) Males, and Effect of Temperature and Relative Humidity, at Al Quneitra Governorate, Southern Syria. This study was carried out in Al Quneitra governorate, Syria during 2017 and 2018 seasons with the aim of monitoring the activity of olive fruit fly *Bactrocera oleae* (Rossi) (Diptera: Tephritidae) males, in three locations of similar altitude (945-989 m above sea level), in addition to evaluating the effect of temperature and relative humidity on males activity using pheromone traps. The results obtained showed that olive fruit fly male adults activity began in the last week of May 2017 season and in the 3rd week of May 2018 season. Male adult's population reached a peak in the 4th week of September, with an average of 126.43±33.70 males/trap in the 2017 season, whereas their peak in the 2018 season was reached in mid-September with an average of 205.2±15.51 males/trap. The number of activity periods for males differed according to the season of study, and the number of activity periods was 3 in 2017 and 4 in 2018. The duration of the activity period ranged from 4 to 11 weeks. The results obtained also showed a weak correlation effect of temperature and relative humidity on males activity during the two seasons, and its value was +0.16, +0.048, respectively. The monthly abundance of males differed during one season. Statistical analysis showed that the highest monthly abundance in 2017 season was in October, with an average of 192.07±14.94 males/trap with a significant difference in relation to the rest of the months, whereas in the 2018 season, it reached the highest monthly abundance in September, with an average of 420.33±15.18 males. [Diab, N., E. Al-Jouri, M. Dawoud and A. Jalloud (Syria), *Arab Journal of Plant Protection*, 39(2): 116-125, 2021].

Laboratory Study of the Effect of Some Factors on the Parasitoid, *Psytalia concolor* (Szépligeti), of the Olive Fruit Fly. The main objective of this study was to study the effect of some influencing factors on *Psytalia concolor* (Szépligeti) (Hymenoptera: Braconidae) parasitism, which is one of the most important insect parasitoids used in biological control of the olive fruit fly. The study was carried out at the Biological Control Studies and Research Center, Faculty of Agriculture, Damascus University. Results obtained indicated that the parasitoid prefers the third larval instar, followed by the fully-grown larvae. The effect of olive (*Olea europaea* L.) fruit size on parasitism rate was quantified within one olive cultivar (Kaisi) and across four different olive cultivars (Mawi, Istanbuli, Sorani and Kaisi, in increasing order of fruit size). Parasitism was examined under two different host distributions: variable distribution in which insect host density increased with decrease in olive fruit size; and uniform distribution in which insect host density was more or less similar across olive fruit sizes. The results obtained showed that the parasitism rate decreased as the size of the olive fruit increased. In addition, parasitism rate was influenced by the olive variety, olive fruit size and the age of the insect host larvae. Furthermore, the parasitoid preferred the third larval stage. Thus it is recommended to release the parasitoid in commercial olive orchards at the time when the third larval stage of the olive fruit fly is prevalent, and such date could vary from one region to another. [Zraiki, M., A.N. Bashir and Gh. Ibrahim (Syria), *Arab Journal of Plant Protection*, 39(2): 109-115, 2021].

Evaluation of Activity of Tannases Produced by Isolated from Syrian Woody Soils *Trichoderma citrinoviride* and *T. brevicompactum* on Tannins Degradation. This study was conducted during the period 2019–2020 to identify *Trichoderma* spp. isolated from woody soils and assessing their efficacy for biodegradation of tannins through tannase enzyme activity produced. Results obtained confirmed the presence of two species; *Trichoderma citrinoviride*, which was isolated from Maysalon area near Damascus, and characterized by a yellowish green colony with a dense growth of spores at the center of the colony, and *Trichoderma brevicompactum* isolated from the Balluran area near Lattakia characterized by yellow colonies with concentric rings. *Trichoderma citrinoviride* had higher biodegradation activity, measured by degrading different tannins concentrations (2, 4, 6%) collected from *Queircus coccifera* from Bmelka area in Tartous in a liquid medium and led to 85, 87 and 90% degradation for the three concentrations, respectively, following 12 days incubation. The activity of the produced tannase was measured to be 37.9 units/mg. Whereas, the decomposition rate of the three tannin concentrations by *Trichoderma brevicompactum* reached 67, 80, 89%, respectively, again after 12 days of incubation, with enzyme activity measured to be 35.2 units/mg. [Al-Nhlaoui, M., A.A. Nizam and M. Daghestani (Syria), *Arab Journal of Plant Protection*, 39(2): 126-134, 2021].

Effect of Constant Temperatures on Biological Parameters of *Tuta absoluta* (Meyrick, 1917) on Tomato Plants in Case of Asexual Reproduction (Parthenogenesis). Tomato leafminer *Tuta absoluta* (Meyrick, 1917) (Lepidoptera: Gelechiidae) is a critical devastating pest worldwide, it can develop on a wide range of Solanaceous

plants, but tomato (*Solanum lycopersicum* L.) is considered to be its preferred host. This study was carried out at the Agricultural Scientific Research Centre in Latakia in 2019 to estimate the biological parameters of *T. absoluta* and evaluate the effect of temperature in its development, longevity, reproduction, in parthenogenesis. The experiments were carried out at constant temperatures (10, 20, 30° C), 60-65% RH, and photoperiod (16L: 8D). Biological parameters were analyzed according to the theory of age-stage two-sex life table using the computer program TWO-SEX MSchart. The highest value of the intrinsic rate of increase (r), the final increase rate (λ), and net reproductive rate (R_o) were 0.0439 ± 0.0028 females/female/day, 1.0449 ± 0.0029 , and 7.01 ± 0.8705 females/female/generation, respectively, at 20°C. The lowest value of net reproductive rate (R_o) was 0.92 ± 0.1250 females/female/generation at 30°C. Generation time (T) was the longest (44.3 ± 0.203 days) at 20°C and decreased to 26.38 ± 1.156 days at 30°C. *T. absoluta* completed its development at all these temperatures. The results obtained showed that the effect of temperature on the insect development from egg to adult decreased with increased temperature. The shortest development period on egg, larva and pupa development was 3.95 ± 0.149 , 11.975 ± 0.075 and 4.95 ± 0.086 days, respectively, at 30°C. This means that the development time from egg to adult was shorter (20.8 ± 1.151 days) at 30°C as compared to 34.51 ± 0.127 days at 20°C, and longest at 10°C (125.4 ± 1.211 days). The female longevity was longer (61.35 ± 0.25 days) at 20°C. The highest fecundity rate was 12.98 ± 1.072 eggs/unmated female, and the lowest was 2.19 ± 0.152 eggs/unmated female at 30°C. Moreover, the unmated females kept at 10°C did not lay eggs, and unfertilized eggs (asexually produced eggs) laid by unmated females at 20 or 30°C did not hatch. The adult pre-oviposition period (APOP) of unmated females was 2.57 ± 0.1368 days at 20°C and 4.31 ± 0.2629 days at 30°C, whereas the total APOP of females was 36.86 ± 0.1844 days at 20°C and 24.21 ± 0.3039 days at 30°C. [Abo Kaf, N., R. Youssef and R. Aboud (Syria), *Arab Journal of Plant Protection*, **39(2): 135-145, 2021**].

Detection of *Erysiphe necator*, the Causal Agent of Powdery Mildew on Grapevine, and Determination of their Mating Types in Southern Syria Using Some Molecular Markers. Powdery mildew caused by *Erysiphe necator*, is one of the most economically damaging grapevine diseases throughout the world. This study aimed to identify the mating types of this pathogen in Syria using molecular markers. Three DNA extraction methods: Promega Kit, phenol chloroform isoamyl alcohol (PCI) and SDS were compared. The amount and quality of DNAs obtained by the SDS method were suitable for PCR amplification and other molecular assays. PCR amplification using specific primers (Uncin 144 and Uncin 511) was performed, and the expected amplicon of 300-400 bp was obtained from 29 isolates of *E. necator* collected from different geographical locations and different grapevine cultivars. Results obtained showed that *E. necator* might cause atypical symptoms similar to those of downy mildew in some grapevine cultivars according to the environmental conditions and training system used. Isolates of *E. necator* were classified into four groups according to geographical locations and grapevine cultivar, based on the observed variation in banding pattern with E07 primer and the constructed phenogram using UPGMA. RAPD analysis of 39 *E. necator* isolates using the primer E07 showed two mating types and the frequency of each varied depending on the geographical location, with a predominance of the mating-type which did not produce a 1000 bp band using the PCR primer E07. [Nujoud Alimad, Walid Naffaa and Salam Lawand (Syria), *Arab Journal of Plant Protection*, **39(2): 152-158, 2021**].

SAUDIA ARABIA

Isolation and Identification of *Bacillus thuringiensis* Strains Native of the Eastern Province of Saudi Arabia.

Background: *Bacillus thuringiensis* (*Bt*) produces a group of δ -endotoxin proteins designated as cry toxins. No doubt that *Bt* isolates are excellent potential candidates for biological control strategies. **Results:** The present study showed that 12 *Bt* strains were isolated and characterized at morphological, biochemical, and molecular levels. All the tested 12 *Bt* strains were gram-positive, endospore-forming, and possessing typical *Bt* crystal structures under the scanning electron microscopy (SEM). Universal primers direct and reverse of 5 pairs were used to detect 6 Cry-type genes (Cry1, Cry2, Cry3, Cry4, Cry7, and Cry8) by the PCR sizes produced from the studied *Bt* strains. The 16S rRNA PCR technique, 16S gene primer, DNA template, dNTPs, and Taq polymerase produced unique and distinguishable restriction patterns used for the molecular characterization of the studied *Bt* strains. Based on the PCR products, the frequency of Cry-gene distribution among the tested strains was Cry1 100%, Cry4 85%, and Cry3 62%, and Cry2 and Cry7 frequency was 54%. Based on the activity of insecticidal of the tested *Bt* strains, Bt1, Bt9, Bt10, and Bt11 were extremely pathogenic; their pathogenicity ranged from 93 to 100% against dipteran and lepidopteran larvae, compared to the other *Bt* isolates. The nucleotide sequences of amplified 1500 bp conserved region of 16S rRNA genes of 4 strains blasted using NCBI database compared to NCBI database sequences, and they were reported as native strains of *Bt* showing high homology with the known *Bt* strains (99–

100%). The nucleotide sequences of Bt1, Bt9, Bt10, and Bt11 were placed in the GenBank database under accession numbers MN860017, MN843958, MN843959, and MN843960, respectively. **Conclusion:** The strategies of enhancing the sustainability of crops and vegetables that are targeted by a large number of pathogenic insects require a great effort of exploring novel species and strains of *Bt*. Herein, native strains of *Bt* were documented from the eastern province of Saudi Arabia that displayed bio-insecticidal action on larvae of Diptera and Lepidoptera. [Amina A. Hassan, Mohamed A. Youssef, M. M. A. Elashtokhy, I. M. Ismail, Munirah Aldayell and Eman Afkar (Saudi Arabia), (Egyptian Journal of Biological Pest Control, 31:6, 2021)].

TUNISIA

***Pistacia vera* L. Hosts Pistachio Ampelovirus A in Tunisia.** Pistachio (*Pistacia vera* L.) is an important crop in Tunisia. With a 30.000 ha of cultivated area, Tunisia is the 7th largest pistachio producer in the world. The country has long been engaged in selecting local cultivars and ecotypes for establishing a national germplasm collection. Little is known on the sanitary status of this species, in particular on the presence of viruses. Given the growing interest in pistachio cultivation, a study was carried out to ascertain the virus status of this crop in Tunisia. The attention was paid to the detection of pistachio *ampelovirus* A (PAVA) of the family Closteroviridae that was recently reported in pistachio in the USA (Al Rwahnih *et al.* 2018). The survey was conducted in the Tunisian germplasm collection plot, which is under rainfed conditions at the Northeastern part of the country and represents the main national source of pistachio plant propagation material for nurseries. Leaf samples from 130 accessions (males and females) were collected. Total nucleic acids were extracted following the CTAB buffer method of Murray and Thompson (1980). All samples were tested by RT-PCR for the presence of PAVA using a specific primer pair designed in the heat shock protein 70 homolog coding region (Al Rwahnih *et al.* 2018) to amplify a genomic fragment of 516 bp in size. Fifteen samples (11.5%) were found infected with PAVA. The presence of PAVA in pistachio was confirmed by sequencing RT-PCR amplicons of three infected accessions, whose nucleotides sequences were deposited in GenBank under accession numbers MZ357211-MZ357213 showed 99.1% of identity with isolate W10 (MF198462) from the USA. This is the first report of PAVA in pistachio in Tunisia. [Ghada Chouk, Manel Elair, Azza Chelli Chaabouni, Toufic Elbeaino, Michele Digiaro and Naima Mahfoudhi (Tunisia), Laboratoire de Protection Des Végétaux, Université de Carthage, Institut National de La Recherche Agronomique de Tunisie, Tunis, Tunisia. Laboratoire D'Horticulture, Université de Carthage, Institut National de La Recherche Agronomique de Tunisie, Tunis, Tunisia. Istituto Agronomico Mediterraneo Di Bari, Via Ceglie 9, 70100, Valenzano, Bari, Italy. Journal of Plant Pathology, 9.7.2021]. <https://doi.org/10.1007/s42161-021-00905-2>

Natural Repellents based on Three Botanical Species Essential Oils as an Eco-friendly Approach against Aphids. The aim of this work is to analyze the chemical composition of *Cymbopogon citratus*, *Salvia officinalis* and *Origanum majorana* essential oils (EO) and evaluate their repellent effects on economically significant aphid species. The hydrodistillation yields of the plant's aerial parts were 0.45%, 0.32% and 0.25% for *O. majorana*, *S. officinalis* and *C. citratus* respectively. Chemical analysis by GC-MS identified 87.6%, 100% and 97% of *C. citratus*, *S. officinalis* and *O. majorana* chemical composition respectively. *S. officinalis* EO was mainly composed of α -thujone (25.7%) and camphor (18.4%), while *C. citratus* EO major compounds were neral (26.4%) and geranial (30.6%). Finally, *O. majorana* EO was principally constituted of 4-terpineol (38.7%). Then, the repellency potential of these EO was assessed in vitro on *Myzus persicae*, *Aphis gossypii*, *Aphis spiraecola* and *Aphis fabae*. In vitro bioassays showed that 2 μ L of the three EO were insufficiently repellent on all aphid species during the surveyed period. However, at 120 min, 5 μ L EO repellencies were variable from repellent to very repellent depending on the EO and aphid species. Interestingly, 5 μ L of *O. majorana* EO were very repellent for *M. persicae* and *A. fabae* after 120 min. Furthermore, in vivo repellency bioassays of 5 μ L *O. majorana* EO were carried out for *M. persicae* and *A. fabae*. After 120 min, results showed a statistically higher repellency on *M. persicae* (repellent) compared to *A. fabae* (moderately repellent). The in vivo RT50 and RT90 of 5 μ L *O. majorana* EO for *M. persicae* were 54.68 min and 131.26 min respectively, while *A. fabae* recorded RT50 of 107.93 min and RT90 of 287.24 min. Both in vitro and in vivo bioassays demonstrated that the tested EO repellencies never decreased over the investigated periods. These results suggest that the studied EO can be used as botanical repellents against these aphid species. [Wafa Khaled-Gasmi, Amel Ben Hamoud, Ikbal Chaieb, Rabha Souissi, Roberta Ascrizzi, Guido Flamini and Sonia Boukhris-Bouhachem, (Tunisia), South African Journal of Botany, Volume 141, Pages 133-141, September 2021].

❖ Graduate Students Thesis (Master and Doctorate)

Selection of Microorganisms to Develop New Tools for the Management of *Drosophila suzukii*.

Drosophila suzukii Matsumura is an alien invasive pest of soft fruits. It has spread across the Americas and Europe since the late 2000s with adverse economic effects on berries. This pest received special attention because it is one of the most successful invasive species of the genus *Drosophila*, utilizing different food resources and showing ecological adaptation to variable climatic conditions. Monitoring, as a component of pest management, is the key to control this pest. Hence, it is vital to use the best lure and trap available to obtain reliable monitoring. At present, current fermentation products and synthetic lures are not adequately selective and effective for monitoring. Moreover, no efficient monitoring tools have been developed yet. There is a need to improve the attractiveness of commercially available lures that are currently used to monitor this pest and creating a new trapping system for efficient pest management. The present work aims to develop the prototype of a highly attractive lure for developing a new trapping system intended for pest monitoring. Therefore, olfactory and trapping studies, which included a series of behavioral bioassays were conducted under laboratory and semi-field conditions. Two-choice olfactometer was used to evaluate the behavioral response of female flies towards crop and non-crop host fruits and lactic acid bacteria strains associated with fruits surface and *D. suzukii* gut microbiota. Subsequently, cage assays were used to evaluate the behavioral response of flies towards synthetic volatile compounds, associated with host fruits and microbial fermentation that elicit a behavioral response in adult flies. Lastly, a synthetic blend was evaluated for fly's attraction and used in the design of the prototype of a highly attractive lure for developing a new trapping system intended for pest monitoring. Our results showed that flies were significantly more attracted to crop and non-crop host fruits more than control in olfactometer bioassay. Blackberry fruits were the most attractive fruits. Moreover, flies exhibited a positive response to volatiles emitted by lactic acid bacteria strains inoculated into Droskidrink food bait. The most attractive strains, *Lactobacillus kunkeei* 84 and *Oenococcus oeni* LS, showed a significant attraction to females when combined and inoculated into food bait. In cage assays, the attractiveness of a commercial lure, Dros' Attract, was improved using a blend of plant-based volatiles (geraniol) and microbial fermentation volatiles (dimethyl sulfide). Therefore, a prototype of a more attractive lure was developed comprising the commercial lure and both compounds. Ultimately, a new trapping system was designed consisting of Dros' Attract lure combined with volatile compounds and specialized Droso-Trap. The obtained data provide knowledge on the importance of combining host fruit volatiles with microbes' volatiles to increase the attractiveness of existing attractive lures. Also, it increases our understanding of *D. suzukii* olfactory responses to synthetic volatile compounds as sources of attractants which may help in the development and adoption of behaviourally based tools for pest monitoring and eco-friendly management strategies. [Amani Mahmoud Alawamleh (Jordan), Department of Agricultural, Environmental and Food Sciences, University of Molise, Campobasso, Italy, (Doctorate, 2021)].



Multitrophic Interactions in Apple Orchards to Enhance Sustainable Management of Pests

In the last few decades, concerns about the intensification of agriculture and the use of agrochemicals on the environment and human welfare have been rapidly increasing. Understanding food webs between different organisms in the agroecosystems hold the potential in finding new pest control tools that have a less negative impact on the environment. In this light, this doctoral dissertation aimed to investigate chemo-ecological interactions between apple *Malus domestica* (Borkh) and two of its main aphid species, *Dysaphis plantaginea* (Passerini) and *Aphis pomi* (de Geer). Also, this dissertation aimed to study myrmecophily of aphids to enhance its sustainable management strategies. Experiments were conducted to characterize the volatiles by using CLSA-GC-MS complemented by PTR-ToF-MS. Some volatile compounds (VOCs) were found to be released upon the infestation of both aphid species, such as acetic acid (AA) and 2-phenylethanol (PET), nonanal, decanal, methyl salicylate, geranyl acetone and (*E*)- β -caryophyllene. Whereas benzaldehyde and (*E*)- β -farnesene were exclusively identified upon the infestation of *A. pomi*, and linalool, (*E*)-4,8-dimethyl-1,3,7-nonatriene (DMNT) upon the infestation with *D. plantaginea*. The



volatiles were tested in a wind-tunnel to assess the attraction of the aphid predator, *Chrysoperla carnea* (Stephens). The predator showed good attraction to a blend of AA and PET and did not respond to several aphid-induced VOCs when they were tested alone. A three-year field study showed that traps baited with the same lure combinations were highly attractive to leafroller, *Archips xylosteana* (L.) but not natural enemies. These results taken together proved that HIPVs released by apple trees after aphid infestations could have a role not only in tritrophic interactions but in multitrophic interactions. On another front, the myrmecophily of both aphid species *D. plantaginea* and *A. pomi* was studied to enhance biocontrol. Artificial honeydew was used to divert ants from aphid colonies to open a gap for natural enemies. *D. plantaginea* and *A. pomi* colonies were mapped from emergence to the end of the season; in addition, the numbers of the ant *Lasius niger* and three taxa of natural enemies, Coccinellidae, Syrphidae and *Chrysoperla* spp. were mapped. The results showed how myrmecophily blocks biological control. With ants diverted by artificial honeydew, the dynamics within the aphid colonies shifted, and responses of natural enemies could be observed. Taken together, findings from these various studies in the context of multitrophic interactions, represents an important contribution towards finding new sustainable pest management strategies. [Zaid Badra (Jordan-Italy), Supervisor is Professor Sergio Angeli Free University of Bolzano (Doctorate, 2021)].

Identification, Determination of the Chemotype and Study of the Pathogenicity of the Main Fungal Species Associated With Fusarium Head Blight and Root Rot of Wheat in Algeria.

Fusarium head blight (FHB) and crown rot (CR) of wheat are among the most important diseases of cereals in the world. Both diseases are responsible for quantitative and qualitative yield losses through the secretion of mycotoxins dangerous for human and animal health. FHB and CR are caused by species belonging to two genera *Fusarium* and *Microdochium*. The composition of the species complex that causes Fusarium diseases on wheat differs according to the region and also to the climatic conditions which characterize the year. The identification of species belonging to this complex is essential before considering control methods. The objective of this work is to assess the distribution of these two diseases in the main cereal growing areas of the country, and this also involves the identification of the main responsible species, their distribution, their chemotypes as well as their aggressiveness towards the various organs attacked, namely the seed, the collar and the ear. The morphological and molecular identification of the isolates obtained from the crowns showed the occurrence of six fungal species: *Fusarium culmorum* (68%), *F. pseudograminearum* (10%), *F. verticillioides* (3%), *F. avenaceum* (2%), *Microdochium majus* (13%) and *M. nivale* (4%). Only two species were obtained from the ears: *F. culmorum* (94.1%) and *F. pseudograminearum* (5.9%). In this study, we note that *F. culmorum* is the main species associated to Fusarium diseases on wheat, and also the absence of the species *F. graminearum* in all the surveyed regions of Algeria. The identification of the chemotypes showed the existence of the two chemotypes DON and NIV in Algerian wheat. The dominant chemotype of the *F. culmorum* isolates obtained from the crowns was 3-ADON (n = 49) and only 4 isolates belong to the NIV chemotype. All (n = 14) isolates of *F. culmorum* obtained from the ears are of 3-ADON chemotype. All four isolates of *F. pseudograminearum* were of the 3-ADON chemotype. Assessment of the aggressiveness of the main isolated species showed that *F. culmorum* was the most aggressive species on seeds and in the ear after inoculation, while the species *F. pseudograminearum* was more aggressive on the crown. Isolates belonging to *Microdochium* are the least aggressive on all aggressiveness tests performed. Finally, in the present study, we noted the absence of isolates specificity towards the organs of the wheat plants. In fact, the isolates obtained from the crowns induced high disease indices on the ears and the isolates obtained from the ears induced high disease indices on the crowns. Strong, very highly significant correlations are noted between the *in vitro* pathogenicity test and the ear inoculation test for the two groups of *F. culmorum*. The results of this study provide us with preliminary information on the crown rot and *Fusarium* head blight situation in our wheat crops. [Nora Abdallah, (Department of Botany, the National Higher School of Agronomy, Algiers, Algeria) under the supervision of Dr. Houda Boureghda. (Doctorate, 2021)].

Phenotypic and Genetic Detection and Identification of Xanthomonas Associated with Cereals in Algeria.

Cereals are monocotyledons belonging to the order *Poales* and the family *Poaceae* or *Gramineae*. Among the cereal species, wheat is the most important resource for human feeding. Wheat cultivation in Algeria uses both traditional local genotypes and introduced genotypes. The local varieties are known to have a rather limited production potential due to intense selective pressures, mainly exerted by environmental factors. Cereals are indeed prone to several diseases, including bacterial diseases, which are transmitted by several pathways. Among the source of

bacterial inoculum is the seed. The seed is considered to be the main source of pathogens, which can attach to the seed coats and can be easily transmitted to the plant and also to the rhizosphere during germination. The diseases most known for their economic impact on cereals, in general, are those associated with the genus *Xanthomonas* commonly limited to the different pathovars of the species *X. translucens*, responsible for bacterial streak and Black chaff. This work is therefore focused on the investigation of bacterial diseases caused by *Xanthomonas translucens* with its different pathovars (*cerealis*, *translucens*, *graminis*, *undulosa*...). The impact of these bacteria on the yield is quite important, especially when the climatic conditions are favourable. Moreover, the conservation of these bacteria at several levels (seed, rhizosphere, plant debris and spontaneous plants, etc.) constitutes an important reservoir for the regeneration of the inoculum. It should be noted that the highly controversial nomenclature and classification of the members of this group are regularly updated. These continuous revisions are often linked to the evolution of new characterization techniques. This work is initiated by surveys of several wheat plots in the Algiers region, Algiers, Tipaza, Bouira, Boumerdes and also in Tiaret in the west of the country. The wheat fields surveyed include experimental stations, pilot farms and private fields. The study starts with a collection and analysis of plants showing typical symptoms of the disease. This is complemented by a search for the presence of the pathogen and its storage in the soil and also in the crop residues in areas showing symptoms similar to the bacterial attacks. Another part of this work is related to the verification of the sanitary state of seed lots produced and multiplied in Algeria, the isolation of the bacteria in the different cases is carried out based on specific techniques. The characterisation of the isolates is based on biochemical and molecular identification and for their pathogenicity. The molecular characterisation of the strains is based on the identification of the strains by gene amplification by PCR (Polymerase Chain Reaction) of a conserved sequence for the *Xanthomonas* species, completed by the sequencing of certain genes forming part of the MLST scheme recommended by several authors. The results of this study highlighted the unexpected presence of previously undescribed *Xanthomonas* species on wheat and revealed the ability of these *Xanthomonas* species to adapt to new host species, suspecting transmission by neighbouring crops or by regrowth of contaminated grains from the previous crop, or accompanying crop seeds. The unexpected detection of the *raphani*-wheat association prompts changes in the way of managing the development of diseases that used to be identified mainly on the basis of the classical description of symptoms. Furthermore, the presence of several *Xanthomonas* species related to *Xanthomonas translucens* species of Clade I and *X. campestris* species of Clade II, on the same host, wheat, makes this crop very vulnerable and could suggest its capacity to harbour as many pathogens as the spontaneous plants that accompany it and those associated with its rotation system. These results especially highlight the first signalling of atypical strains usually identified in Algeria, based on phenotypic characterization as *Xanthomonas translucens*. [Bahria Djebari (Département de Botanique-Ecole Nationale Supérieure Agronomique –ENSA- Algiers- Algeria) under the supervision of Professor Claude Bragard from the Catholic University of Louvain- Belgium and Professor Zouaoui Bouznad from the Ecole Nationale Supérieure Agronomique -ENSA- Algiers- Algeria. (Doctorate, 2021)].

Isolation and Identification of Root-Knot Nematodes *Meloidogyne incognita* and their Interaction with Other Pathogens and Their Possible Biological Control

The study aims to isolate and diagnose some biological control agents isolated from tomato plant roots and to evaluate their efficiency in controlling soil fungi that cause wilting, rotting and root galling caused by the root-knot nematode *Meloidogyne incognita*. Isolated fungi including *Fusarium equiseti*, *Colletotrichum dematium*, *Fusarium chlamydosporum*, and *Alternaria tenuissima* were partially diagnosed using the polymerase chain reaction (PCR) technique. The research included isolating and diagnosing four types of bacterial isolates, two of which are *Bacillus* and two types of *Enterobacter*, using the Vitek-2 device. The results showed that the first and the second isolates were *Bacillus firmus* and *Bacillus megaterium* with a probability of 91%, the third isolate was *Enterobacter cloacae* ssp *cloaca* with a probability of 94%, and the fourth isolate was *Enterobacter cloacae* complex with a probability of 99%. Root-knot nematodes *Meloidogyne incognita* accompanying tomato roots were also isolated and diagnosed. It was found that *F. equiseti* recorded the highest percentage in reducing the growth indicators under study, including the weight of healthy seedlings, length of healthy seedlings, number of healthy ones, number of damped off seedlings and number of seeds germinated in plates ten days after planting. The fungi *F. equiseti* and *F. chlamydosporum* recorded the highest rate of infection severity, as well as reduced indicators of tomato fungi at 30 days of cultivation. The interaction treatment of nematode *M. incognita* and the fungus *F. equiseti* resulted in the highest reduction in tomato growth indicators compared to the control and nematode treatment 60 days after planting. In contrast, the interaction treatment between *M. incognita* and *F. chlamydosporum* recorded the highest percentage of infection severity. *B. firmus* and *E. cloacae* ssp *cloacae* were significantly highest than the rest of the

treatments in terms of increasing tomato growth indicators after 30 days. It was found that there was a clear effect of root knot nematodes in reducing plant growth indicators. The interaction treatment of *M. incognita*, *B. firmus* and *B. megaterium*, increased plant growth indicators and decreased infection severity compared to the control and nematode treatments. There was an apparent effect of the interaction treatment of *M. incognita*, *E. cloacae* and *B. megaterium* in reducing the number of nematode second stage juvenile J2 in 100 g soil and a significant reduction in the number of eggs per root. The interaction treatment, *M. incognita*, *B. firmus* and *B. megaterium* had the highest effect in reducing the number of root galls after 60 days of planting. The interaction treatment of root-knot nematode *M. incognit* and *B.megaterium* showed a reduction in nematode's developmental characteristics, including number of egg masses, number of females, number of eggs and number of J2 in 100 g soil, which were 170, 133.33, 0.66, 0.33 respectively. The other treatments also varied in their effects on nematode's development. Whereas the interaction treatments *E. cloacae ssp + M. incognita + C. dematium* did not show a significant effect in reducing the root galling index compared to the nematode treatment 45 days after planting. While the other combinations resulted in gall index reduction. [Hind Imad Kayet Al-Kurdi (Iraq), Plant Protection, Faculty of Agriculture, University of Kufa-Baghdad-Iraq, Supervised by Prof. Dr. Fadhel Abdul-Hussein Al- Fadhel (Master, 2021)].

Evaluation of *Trichoderma* in Biological Control of *Rhizoctonia solani*, the Causal Agent of Damping-off and Root Rot Diseases of Cucumber.

Cucumber (*Cucumis sativus* L) is one of the most important vegetable crops grown in greenhouses. Cucumber plants are attacked by many fungal, bacterial and viral pathogens that affect fruit yield. Root rot and damping-off are the most spread diseases attacking cucumber plants where most commercial cultivars are susceptible. *Rhizoctonia solani* (*R. solani*) is the main cause of seedling death and root rot on cucumbers. In order to minimize the use of pesticides, which have hazardous effects on both human health and the environment, biological control strategies are applied. In this respect, *Trichoderma* species are widely used due to their ability of mycoparasitism on fungal pathogens. *Rhizoctonia* was isolated from numerous plant samples, which are cucumber, zucchini, tomato, and potato to identify the pathogenic anastomosis groups of cucumber. The pathogenicity revealed that the isolates belonging to the multinucleated AG4 anastomosis group were the only pathogenic isolates to cucumber plants. Cultivation of cucumber seeds with the fungus in the inoculated soil culminated in disease severity exceeding 97.5%. Through analyzing the genetic differences between the various groups of cucumber-isolated *Rhizoctonia* and other AGs, it was noticed some of isolates were polynucleated and included the anastomosis groups AG4, AG3, AG2-1, while the binucleated isolates were included in the anastomosis groups AG-A and AG F-It was also found that the two AG4 isolates were pathogenic to cucumber. Several biological control agents have been identified including *T. hamatum*, *T. harzianum*, *T. asperellum*, *T. longibrachiatum*. *In vitro* test of *Trichoderma* isolate revealed the efficacy of isolates to inhibit *Rhizoctonia* and the rate of growth inhibition of ranged from 38.67% to 79.33%. Under greenhouse conditions, they reported effectiveness varying from 2.56 to 61.54%. The large variation of *Trichoderma* isolates in their biological activity against wilt disease and cucumber root rot induced by the *Rhizoctonia* fungus. The study therefore suggests the need for the production of biological control strategies and a continuous quest for the most powerful biological control agents to minimize disease transmission and mitigate losses in a healthy and environmentally sustainable way. [Maitham Alqatan (Saudi Arabia) College of Agriculture and Food Sciences, King Faisal University. Supervisors. Prof. Khalid Alhudaib and Sherif Elganainy (Master, 2021)].

Determination of Genetic Variation between *Potato Virus Y* strains in Saudi Arabia

Potatoes can be infected by many fungal, bacterial and viral pathogens, which cause dramatically yield and quality losses. Potato viral diseases are the most critical reason responsible for these losses. *Potato virus Y* (PVY) is one of the most economically important potato pathogens. PVY can be characterized based on symptoms into two major groups, the first one, which causes mosaic or vein clearing in tobacco, is called the familiar or ordinary strain PVY^O, while the second strain causes systemic vein necrosis in tobacco is called PVY^N. The PVY genome has a high degree of genetic variability and is also subject to recombination between different strains resulting in some new strains which are more aggressive in potato crops. From this respect, this study aims to monitor these strains and determine the genetic variability of PVY in the growing areas of potatoes in Saudi Arabia. The potato virus was studied in a number of 184 samples collected from five different regions of the Kingdom, Haradh, Qassim, Al-Ahsa, Hail, and Wadi Al-Dawasir, PVY isolates were found in all regions of the Kingdom with a rate ranging from 36.36% in Hail region to 94.47% in the Qassim region. In all regions of the Kingdom, a total rate of 55.98%, while PVYN in all regions of the Kingdom was 10.32%. Specific primers were used to detect these different strains. By

studying the genetic variation, 22 samples were found out of a selection of 24 samples very close to each other and similar to the isolate previously in Wadi Al-Dawasir, namely SYR-II. The full-length genome of two isolates was sequenced, which revealed that two strains are the same PVY^N; the length of the genome was about 9700 bases. This was the first time that the complete genome of the Potato Y virus was identified in Eastern Province in Saudi Arabia. [Mohamad Alyami (Saudi Arabia), College of Agriculture and Food Sciences, King Faisal University, Supervisors. Prof. Khalid Alhudaib and Sherif Elganainy (Master, 2021)].

Biological Study of *Bemisia tabaci* (Gennadius) and The Parasitoids *Eretmocerus mundus* (Marcet) On Tomato in Greenhouses.

Biology of *Bemisia tabaci* (Gennadius, 1889) and *Eretmocerus mundus* (Marcet) studied in the laboratory under conditions of 25±1 °C, 70±2 % RH and photoperiod (14L: 10D) hours (light: darkness). Where the white fly *Bemisia tabaci* (Gennadius, 1889) reared on tomato plants grown in pots, and the parasitoid *Eretmocerus mundus* (Marcet) was reared on the nymphs of the second and third age of the white fly *Bemisia tabaci* (Gennadius, 1889) on tomato plants grown in pots in the laboratory room, and used the TwoSex-MSChart program to calculate indicators whose values were: Biology of *Bemisia tabaci* (Gennadius, 1889): Net reproductive rate $R_0 = 31.89 \pm 4.32$ Female/female/generation, the intrinsic rate of increase (r)= 0.1266±00052 Female/female/day, mean generation time (GT)= 27.343±0.23 days, double time (DT)= 5.473 days, gross reproductive rate (GRR)= 46.58±6.58 individuals/offspring, Survival rate (lx)= 0.9988, fecundity (F)= 66.78±3.055 eggs/female, total developmental times of immature mean= 22.75±0.084 days, Adult pre-oviposition period of female adult (APOP)= 0.22±0.0868, Mean length Adult female age= 33.22±0.36 days, The Mean age of the adult male is 32.04±0.37 days. Biology of *Eretmocerus mundus* (Marcet): Net reproductive rate (R0) = 122.94 female/female/generation, the intrinsic rate of increase (r)= 0.21±0.005 female/female/day, mean generation time (GT)= 22.31±0.2 days, double time (DT)= 3.21 days, gross reproductive rate (GRR)= 165.5 individuals/offspring, fecundity (F)= 220.67 eggs/female, total developmental times of immature mean= 18.31±0.146 days, The Mean age of the adult female longevity= 27.02±0.5 days, The Mean age of the adult male 26.96±0.5 days. The study also showed the possibility of raising the parasite in vitro on a sugar solution (honey 10%). It showed the parasite's ability to control the white-fly population on two levels at the first rate of the release of a couple/plant/week as well as at a rate of 4 pairs/plant/week for three weeks and keep the fly population without Threshold of damage This study is useful for us to understand the change in numbers of white fly and parasitoid, both laboratory and field. It shows the effectiveness of the parasitoid in controlling the white fly population over tomatoes in the greenhouse. [Yasser Ali Habeb (Syria), Department of Plant Protection, College of Agricultural Engineering / Tishreen University, Syrian Arab Republic, Supervisors: Prof. Dr. Nabil Abo Kaf (Master, 2021)]

Isolation and Molecular Identification of the Whitefly *Bemisia tabaci* (Genn) in Karbala Province, Iraq.

The cotton fly or the white sweet potato (*Bemisia tabaci* (Genn.)) is one of the complex species and important pests that affects several vegetable crops such as tomato, cucumber and eggplant in Iraq and worldwide causing significant economic losses. Therefore, one of study aims was the molecular identification of the biological species of this whitefly *B. tabaci* distributed in Karbala Province, Iraq. Insect samples were collected from three different places (fields of the College of Agriculture - Al-Atishi, Al-Husayniyyah district of the eggplant plant), and the area (Al-Ibrahimi- Al-Hafiz - the Imam Husseinia nurseries from the tomato plant) and from (the Imam Hussein farms from the eggplant plant). Genomic DNA was then extracted and the nucleotide sequences for the mtCOI gene was determined. The results showed the presence of three genetically different types or biological types in Karbala Province, which are B and B2 types belonging to the Middle East-Asia Minor1 gene group and a third type belonging to the Middle East-Asia Minor2 gene group (MEAM2). Furthermore, it was observed that there were differences in the genetic sequences among the three isolates and the other isolates registered in the Global Genebank, which confirmed the diagnosis of this genetic species of *B. tabaci*. [Durgham Abdul Aziz Abd Al-Khazai, Ali A. Kareem, and Adnan A. Lahuf (Iraq) Plant Protection Department, Agriculture College, University of Karbala, Karbala Province – Iraq, (Master, 2021)]. <https://uokerbala.edu.iq/en/>

❖ Some Plant Protection Activities of FAO and Other Organizations

ACTIVITIES OF THE REGIONAL OFFICE OF FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS – NEAR EAST AND NORTH AFRICA

Plant Health is Key to the Establishment of One Health: Plant Health Experts Met to Protect Plants from Harmful Pests in the Near East and North Africa

August 3, 2021 - Every year, pests and plant diseases cause damage that reduces global agricultural production by between 20 and 40 percent, according to **Dr Abdulkhkim Al-Waer**, Assistant Director-General of the Food and Agriculture Organization of the United Nations (FAO). For example, the recent outbreak of Fall Armyworm has caused an estimated \$4.6 billion in losses in Africa alone.

To address this problem, international experts and representatives of the countries of the Near East and North Africa are joining forces through a virtual workshop that will be held from 3 to 10 August 2021. The workshop is organized in cooperation between the Secretariat of the International Plant Protection Convention (IPPC), the FAO Regional Office for the Near East and North Africa, the Near East Plant Protection Organization, and the Iraqi Ministry of Agriculture.



Experts will discuss ways to stop transboundary plant pests and diseases from entering and spreading in the region. This is particularly important given the scale of international trade in agricultural products. Experts will also discuss how to build plant health capacities, prepare regional opinions on the proposed International Standards for Phytosanitary Measures (ISPMs), and share best plant health practices. A special session will be held on the most important transboundary diseases that threaten food security in the region and ways to confront them through early detection and good management practices.

This workshop is one of seven annual regional workshops the IPPC holds worldwide in 2021 under the title "Plant Health and Environmental Protection".

His Excellency Iraqi Minister of Agriculture **Muhammad Karim Jassim Saleh Al-Khafaji** commented: "The Covid-19 pandemic taught us to break barriers and use modern technologies to facilitate the exchange of ideas and implement the international standards on the protection of plant health."

For his part, Dr. Thaer Yaseen, FAO Regional Plant Protection Officer, said the workshop serves as an essential annual forum enabling regional representatives of state parties to the IPPC to exchange views on the new ISPMs, which seek to impose coordinated and agreed measures globally to facilitate international trade while preserving national plant resources. These measures also aim to enhance regional efforts to monitor and respond to emerging threats to plant health, he added. <http://www.fao.org/neareast/news/view/en/c/1418739/>



A Dialogue with the Private Sector to Transform Agri-food Systems in the Near East and North Africa: CEOs and Chairmen from Global and Regional Stakeholders Seeking to Build a shared Vision about Challenges Facing the Region

12 July 2021, Cairo - The Food and Agriculture Organization of the United Nations (FAO) initiated a dialogue with the private sector in the NENA region to identify opportunities for private sector engagement and action around the Sustainable Development Goals (SDGs) and SDG #2 in particular, virtually today.

FAO Director-General Qu Dongyu opened the dialogue, highlighting that “political commitment remains essential, establishing major alliances and engagement with key stakeholders are key to help build consensus towards the SDGs.”

Introducing the event, FAO Assistant Director-General and the Regional Representative for the Near East and North Africa, Abdulhakim Elwaer, emphasized that “a broad array of private sector actors, from farmers, including smallholders and family farmers to micro, small and medium-sized enterprises (MSMEs) and large companies as well as financial institutions will be instrumental in driving our efforts.”

A statement followed by Khaled El Hanafy, the Secretary-General of the Union of Arab Chambers of Commerce, stressed “the need to promote technology use by empowering smallholders and agri-food accelerators that can drive the efforts forward.”



A pursuit through business practices

The need for synergy and a shared cause between stakeholders is probably nowhere more evident for the Near East and North Africa (NENA) region than in the agri-food systems, where the private sector plays such an essential role along the whole food chain. Today, the region’s food and agriculture sectors are poised to meet some of the world’s biggest challenges in our common pursuit of SDG 2; from providing a growing population with affordable, accessible, and nutritious food to reducing hunger and malnutrition, combating growing obesity, dealing with the already stark impacts of climate change, addressing water scarcity and other environmental concerns, and tackling emerging threats from pests and diseases.

“Together, we can deal with the challenges of the region, empower the most vulnerable communities, including smallholder producers, the youth, and women, through inclusive pro-poor interventions in rural areas,” Qu Dongyu added.

The dialogue aimed at developing a conversation with three main categories of private sector operators:

- Micro-, small and medium-sized agri-food enterprises (MSMEs), including start-ups, who can play a critical role in achieving food security and eradicating rural poverty, with special emphasis on digital agriculture and youth- and women-led businesses;
- Large firms, including large national and multinational companies and State-owned enterprises operating in the agri-food sector, including production, processing, distribution, and retail;
- Financial institutions, including commercial banks and private investors, impact investors and other private investment institutions who have the potential to play a critical role in mobilizing private investment to achieve the SDGs.

The dialogue was divided into two-panel discussions. The first was on “**How can public-private engagements provide large-scale solutions for addressing regional priorities and achieving the SDGs in the Near East and North Africa Region**”, moderated by Beth Bechdol, Deputy Director-General FAO. The panel was consisted of:

- Sheikh Majid Sultan Al Qassimi - Partner, Soma Mater
- Alzbeta Klein - CEO/Director-General, International Fertilizer Association (IFA)
- Ayman Amin Sejiny - CEO/General Manager-Islamic Corporation for the development of the Private Sector - Islamic Development Bank (IsDB)
- Moez El-Shohdi - President of the Food Banking Regional Network

The second session was on “**Green and inclusive technologies and investments in Agriculture – what is the potential**” moderated by Ismahane El Ouafi, Chief Scientist, FAO, and had:

- Soud Ba'alawy - Executive Chairman Enspire (DIFC) Ltd.

- Ouïam Lahlou - Professor at “Institut Agronomique et Vétérinaire Hassan II” at Rabat, Morocco
- Yousef Hamidaddin - CEO, Agri-Tech Accelerator
- Reginald Lee - Director, Programs, Grow Asia
- Chandra Singh - Director Business Development, Elite Agro

Both sessions allowed Q&As and interventions during both of the panels with the panelists and the FAO leadership.

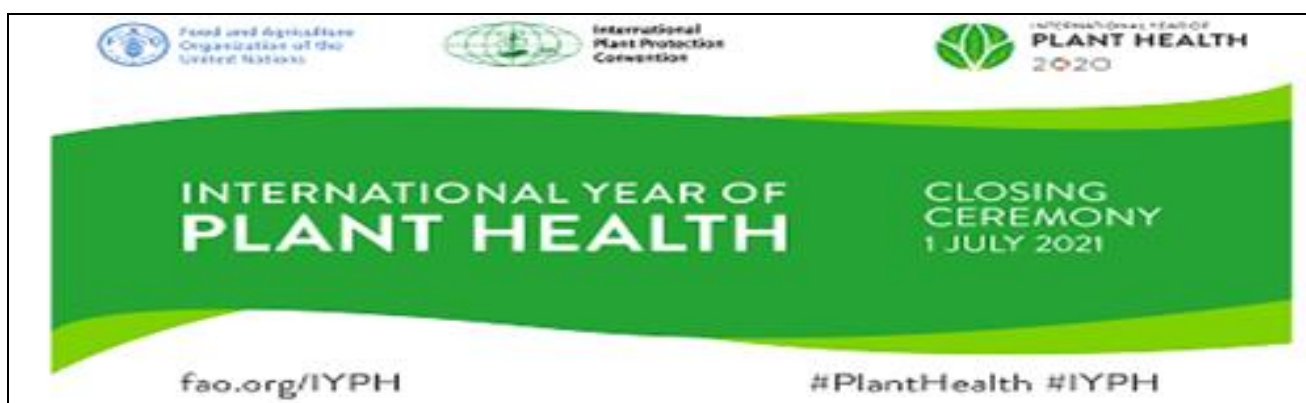
Hand in Hand for a better life

Transforming the world’s agri-food systems, the way we produce, process, distribute and consume food has been identified as one of the key avenues to achieving many targets of the 2030 Agenda. This means better production, better nutrition, and a better environment for a better life.

The evidence-based and country-led *Hand in Hand Initiative* launched by FAO can provide a tangible framework that would allow us to demonstrate the impact of working together.

This initiative focuses on the poorest rural communities left behind and have not had the opportunity to contribute to their country’s development. Through match-making partnerships, including donor countries, development banks, the private sector, and others, FAO wants to lift these communities out of poverty. And by facilitating their access to investments, markets, and more effective production tools, the goal is to render them active actors in developing their countries and territories. <http://www.fao.org/neareast/news/view/en/c/1415670/>

International Year of Plant Health Closing Ceremony 1 July, 2021



Closing Ceremony of International Year of Plant Health Rome (virtual), Italy, 01/07/2021

At its eighth meeting, the IYPH ISC recommended that the IYPH 2020 Closing Ceremony be held on **1 July 2021** in conjunction with the closure of the first International Plant Health Conference (IPHC) in Helsinki, hosted by the Government of Finland. This was partially revised by the IYPH ISC at its fourteenth meeting, which further postponed the IPHC to 12 May 2022, while requiring that the IYPH Closing Ceremony still be held on 1 July 2021.

The main objectives of the IYPH Closing Ceremony are to:

- present the outcomes of key IYPH initiatives undertaken in 2020 and the first half of 2021;
- highlight the IYPH achievements and trigger further reflections on the status of plant health around the world; and
- Stress the importance of plant health to achieve the United Nations 2030 Agenda for Sustainable Development.

Tentative Agenda of the IYPH Closing Ceremony

Time	Presenter
13:00 – 13:05	Introduction by moderator and projection of IYPH video
13:05 – 13:10	Welcome remarks by QU Dongyu Director-General, FAO
13:10 – 13:15	Message from His Excellency Jari Leppä Minister of Agriculture and Forestry of the Republic of Finland
13:15 – 13:20	Message from Her Excellency Pippa Hackett Minister for Agriculture, Food and the Marine of the Republic of Ireland
13:20 – 13:25	Message from Songowayo Zyambo Permanent Secretary, Ministry of Agriculture of Zambia
13:25 – 13:30	Message from Stella Kyriakides EU Commissioner for Health and Food Safety
13:30 – 13:35	Message from Monty Don IYPH Advocate for Europe (UK)
13:35 – 13:40	Message from Diarmuid Gavin IYPH Advocate for Europe (Ireland)
13:40 – 13:45	Message from Rodrigo Pacheco IYPH Advocate for Latin America and Caribbean (Ecuador)
13:45 – 14:00	Distribution of awards for winners of photograph, drawing and video competitions
14:00 – 15:00	Panel discussion – moderated by Jingyuan Xia Director, FAO Plant Production and Protection Division
14:00 – 14:05	Opening remarks by Jingyuan Xia Director, FAO Plant Production and Protection Division
14:05 – 14:15	Presentation by Ralf Lopian Chairperson, IYPH International Steering Committee
14:15 – 14:25	Presentation by Kyu-ock Yim Vice-Chairperson, IYPH International Steering Committee
14:25 – 14:35	Presentation by Michael Keller Secretary-General, International Seed Federation
14:35 – 14:45	Presentation by Ibrahim Al-Jboory President of the Arab Society for Plant Protection
14:45 – 15:55	Presentation by Victoria Valenzi Youth representative – presenting IYPH Youth Declaration
14:55 – 15:00	Conclusion remarks by Beth Bechdol Deputy Director-General, FAO
The event was moderated by Yasmina Bouziane, Deputy-Director of the FAO Office of Communications.	

Emergency Preparedness and Response to Strengthen Capacities of NENA Countries to Mitigate the Risk of Fall Armyworm (FAW) in the Region”, TCP/RAB/380

Lebanon

Under the framework of the regional project “Emergency preparedness and response to strengthen capacities of NENA countries to mitigate the risk of Fall Armyworm (FAW) in the region”, TCP/RAB/380, The Food and Agriculture Organization in Lebanon (FAO), in collaboration with the Ministry of Agriculture (MoA) conducts the implementation of the project as part of the regional action that involves four countries: Jordan, Syria, Palestine and Lebanon. The project was launched in January 2021 for 12 months and aims to detect the presence of FAW in Lebanon, provide a platform for a national action plan in FAW monitoring, improve the early warning system, increase capacity building among agricultural extension workers, raise awareness among farmers and develop sustainable FAW management to reduce FAW damage and decrease its impact on food security.

Despite FAW is not yet reported in Lebanon, the pest poses a significant threat to the agricultural sector and food security due to: 1- The registration of the pest in the neighbouring countries. 2- its biological characteristics such as the high migratory potential and reproductive capacity and ability to cause significant damage to essential crops, 3- Possibility of accidental introduction by infected seeds, 4- availability of cultivated host plants in the country. Farmers, especially smallholders with limited capacity, are unprepared for this new pest and need significant support, guidance, and education to sustainably manage the FAW in their crop system.

Phases implemented in collaboration with FAO-RNE, FAO office in Lebanon and MOA are as follow

- Establish a working group from the MoA to carry out the national survey and the field scouting in the threatened districts.
- Development of a national action plan
- Preparation of training and education materials
- Preparation of guidelines on FAW and its management
- Purchase and distribute traps and pheromones to the national working group for FAW monitoring in all the governorates. The priority given to the governorates of Baalbak-Hermel, Bekaa, Akkar, Nabatieh and South of Lebanon based on the risk assessment of FAW in Lebanon.
- Establish five FFS to train farmers, strengthen their skills, transfer knowledge and guide them to implement best practices to manage FAW.
- Providing national ToTs on FAW biology, monitoring and control under the output 2 “*Capacities and technical skills of government personnel and institutions are improved in the monitoring and management of the FAW*”, to be prepared for the introduction of the FAW and to conduct the national monitoring by using the app FAMEWS, identify different methods of FAW management according to available tools and make the appropriate decision that fit the situation with giving priority to biological control and conservation of biodiversity

Jordan

Since the fall armyworm invaded the African continent in 2016, the Food and Agriculture Organization of the United Nations started an extensive campaign to raise the pest warning and awareness on the danger of FAW worldwide. Due to the danger of FAW as an invasive pest causing substantial crop losses on more than 100 hosts and the possibility of widening its main crop maize to other crops such as tomato and pepper. The Jordanian Ministry of Agriculture staff started early 2018 a survey in all cornfields by installing pheromone traps and personal scouting, raising awareness to the farmers and engineers. Training and workshops were conducted focusing on pest identification, damage and control. In September 2020, the insect was recorded for the first time in the northwest of Jordan in the governorate of Irbid, Northern Shounha, and during the year 2021, the pest was reported in the east of the Zarqa and other areas. Due to some biological features of FAW such as high ability to fly reaching around 100 km per night, high fecundity of female 1000-1500 eggs laid in baches of 50-200 eggs on the plant in addition to the suitable climatic conditions in the Jordan Valley. Ministry of Agriculture is accomplishing in collaboration with FAO the **TCP/ RAB/3803** project “Emergency preparedness and response to strengthen capacities of NENA countries to mitigate the risk of Fall Armyworm (FAW) in the region” to establish a national and regional plan to combat the invasion of fall armyworm by raising the awareness through applying FFS, workshops, field visits, local training and designing four different experimental fields to use the biorational insecticides. One of the main parameters of the project is to increase the building capacity for FFS facilitators, agriculture engineers and farmers through applying the FAMWES application of FAO. Survey and establish a start-up small mass rearing unit for the most familiar parasitoids or predators are also a project's target. Local and international experts are following the project segments scheduled to finish end of 2021.



Palestine

The main objective of this project is to increase the resilience of livelihoods to threats and crises in the targeted countries and regions by providing regular information and early warning against potential damage caused by the

insect pest. Setting up or improve an existing mechanism for insect identification, monitoring, and assessing potential risks. Capacity building of the involved sector staff to mitigate resilience measures to the Country Programming Frameworks of all FAO-NENA member states.

In West Bank and Gaza Strip (WBGs), several activities have been performed, started with:

- Regular field visits to several governorates to detect infection of FAM in corn fields. Thus determine the infection rate in exiting fields, and it ranged from low to intermediate.
- Two local radio episodes were carried out to raise general awareness about FAW among farmers, the public communities and other stakeholders.
- Routine zoom virtual meeting with the national project team discussed the project action plans, training schedules, supplies and project timeline etc.
- Four workshops have been carried out in WBGs to enhance the general understanding of FAM, to increase the awareness of FAW among farmers, communities and other stakeholders; and to discuss the national action plan to manage the insect Fall Armyworm in WBGs within the emergency response project to strengthen national and regional capacities to reduce the insect risks.
- Three-day training of FFS by the international consultants, which included TOT Training to establish and perform FFS, improved agricultural engineers' capacities on IPM of FAM on corn crops. Improving the quality of the agricultural product and producing a safe product. Sustaining the natural resources and biodiversity and field of agricultural ecosystem analysis.
- TOT workshop on FAW monitoring using the FAMEWS app and global platform took place by the international consultants.
- Several separate meetings occurred to build the technical capacities and improve the required skills for FAW identification, monitoring, and management of the targeted group.
- More than 250 targeted group members have received training or attended workshops so far throughout this project. More training, workshop and field visits are scheduled for the upcoming of this project.

Syria

After the Food and Agriculture Organization of the United Nations FAO announced the spread of the fall armyworm FAW *Spodoptera frugiperda* (Lepidoptera) in different African countries within a short span between 2016 and 2017 and raised the awareness about the economic impact that cause this pest on the main agricultural crop, the University of Latakia in Syria has organized a workshop on the 7th and 8th of January 2020 in collaboration with the Arab Society for Plant Protection under the title "Detection, spread and management of the invasive or newly emerging pests in Syria and neighboring countries". The workshop aimed to disseminate the knowledge and increase awareness on the fall armyworm and highlighted the significant damage caused by this invasive pest and the strategies of control. Later, and after the pest was registered in the neighboring countries (Egypt - Jordan - Palestine) during 2020, the Ministry of Agriculture in Syria has conducted a survey in the governorates of Homs, Hama, Al-Ghab, Quneitra and Reif Damascus without reporting any catch in the distributed traps. Later, in November 2020, damages by FAW in corn field were recorded for the first time in Daraa Governorate and therefore, FAW is officially reported in Syria.

Since January 2021 and under the supervision of FAO, the Ministry of Agriculture is implementing for a period of 12 months the Regional 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, which includes Syria, Lebanon, Palestine and Jordan. Under the framework of the project, the Ministry has developed a national action plan including FAW monitoring, enhance capacity building on the early warning system (FAMEWS) and the integrated pest management (IPM) in order to raise awareness among stakeholders, especially the smallholder farmers and guide them on how to manage FAW and prevent the new spread of the pest to new areas, and reduce its impact on crops and food security.

The ministry carried out ToTs on the biology of FAW, monitoring and control and has conducted during the month of July field visits in the Governorates of Daraa, Homs and Hama to inaugurate farm field schools in order to train farmers and raise their awareness on FAW. The first field school was done in the infected area (Dael - Al-Khman road in Daraa) where on spot observations were applied to teach the farmers how to recognize the pest and their damage and to develop an approach to control FAW based on IPM tools.

In addition, and during the tour in Homs, a second new infection was reported in a corn field in the West of the city. The infected area was immediately treated with the available pesticides chlorpyrifos and alpha-cypermethrin. Later, the technicians of the FFS in Damascus reported the third infection in the Duma area - Al-Rayhan village in Reif Damascus, and farmers were training on the management of Fall Armyworm.

FAO Red Palm Weevil Eradication Programme in the NENA Region

August, 2021

A Letter of agreement has been signed with the Arab Organization for Agricultural Development (AOAD). Signing of cooperation agreements with the other partner institutions to implement the activities of the Red Palm Weevil (RPW) Management Programme is underway. Farmer Field Schools have been launched in southern Egypt. The baseline data on the RPW is being assembled from member countries. As part of the virtual meetings with the RPW national focal points from member countries and the Technical Working Groups, the sixth virtual meeting and the fifth training programme on integrated management of the RPW was held on June 24. In the meeting, Dr Maged Elkahky of FAO presented a lecture on RPW monitoring using the “Susa Hamra” system/App.



Dr Mohamed Kamal Abbas, Director of the Plant Protection Research Institute, Arab Republic of Egypt, presented an insight about “Farmers Field Schools for combating the RPW. In addition, Eng. Mohammed Ahmed Hamdan Al Dhanhani, Head of Agricultural Development and Health, Ministry of Climate Change and Environment, presented a lecture on the management of RPW in the United Arab Emirates. The seventh regional meeting of the programme will be held on 4th August, in which the integrated management strategy and the executive plan for the management of the RPW in the Kingdom of Saudi Arabia will be presented by Dr Suleiman Al-Khatib, General Manager, Plant Resources, Ministry of Environment, Water and Agriculture and other lecturers from the Kingdom.

FAO Experts, Sudanese Date Palm Farmers' Associations Join Hands to develop Date Palm Products and by-Product Value Chains

Under FAO Support and Sponsorship: Training Course for Date Palm Producers in Northern State Gets Held

Khartoum, 8 August 2021 - An advanced training course was opened on Sunday, today, targeting date palm producers in the Northern state. The course is part of the “Development of Date Palm Products and By-products Value Chains in Sudan” project sponsored by the World Food and Agriculture Organization (FAO) in partnership with the Federal Ministry of Agriculture and the Sudanese Date Palm Farmers Association.



The opening ceremony of the course, held in the Research Hall in Dongola, the capital of the Northern State, was attended by **Dr. Muhammad Daldoom**, representative of FAO, and **Mr. Muhammad El-Hassan Abdeen**, representing the Northern State government, as well as a wide range of farmers from the four localities of the state. At the beginning of the opening session, Dr. Badr El-Din El-Sheikh, Secretary-General of the Sudanese Palm Farmers Association, thanked FAO for its interest and support for the "Development of Date Palm Products and By-products Value Chains in Sudan" project, pointing to the great efforts made by the association to develop palm cultivation and train producers. He also stressed the need to expedite the formation of associations of date producers in order to facilitate the provision of production and cultivation machinery.

For his part, **Dr. Mahdi Abdel Rahman**, Agricultural Research Authority and representative of FAO experts, emphasized the importance of training to help improve production, stressing that FAO is committed to providing all production equipment to date producer associations.

Dr. Muhammad Daldoom, FAO country representative, indicated that the UN organization's focus on the date palm sector came late, thanking the Sudanese Palm Farmers Association for cooperating with the organization to hold these courses. He called for an increased focus on date palm and its production, noting that the FAO project

to develop the dates sector takes care of all stages of the value chain, including cultivation through post-harvest operations, marketing and agricultural operations.

Daldom explained that the cooperation between FAO and the associations of date producers aims to meet the demands of the local market in the first place. At the end of the opening session, Mr. Muhammad El-Hassan Abdeen, representative of the Northern State government, welcomed the FAO, the Sudanese Palm Farmers Association, and the participants in the course, stressing the state's readiness to support the project and stand by it until it achieves the desired goal. After that, the session started with a lecture on the current situation of date palms in Sudan, presented by Dr. Mahdi Abdel Rahman. Dr. Mariam Ibn Auf also gave a lecture on the varieties of dates and agricultural processes related to palm cultivation. Dr. Badr El-Din El-Sheikh also gave a lecture on the FAO project and its role in the development of date palms in Sudan. This course will continue through next Tuesday.8/8/2021. <http://www.fao.org/neareast/news/view/en/c/1419752/>

Food and Agriculture Organization of the United Nations, in Collaboration with the Government of Canada, Launches USD 2.3 Million Project

3 August 2021-- A high level delegation from Food and Agriculture Organization of the United Nations (FAO) headed by FAO Representative Babagana Ahmadu and the Canadian Ambassador to Sudan Adrian Norfolk visited the Blue Nile and Sinnar States to launch the new FAO project under the theme ‘‘Building resilience and restoring agriculture and livestock based livelihoods for improved food and nutrition security of smallholder women and men farmers and agro-pastoralists affected by floods and COVID-19’’, which is funded by the Canadian government. Upon the delegation’s arrival to the Blue Nile State, Damazine, a courtesy visit was the State Government General Secretariat, where several issues of concern to the people of the state such as developing livelihoods and supporting those affected by floods were discussed,



Amb Adrian expressed Canada’s readiness to continue providing support to Sudan, such as the support for the Thamarat project, which alleviates the economic burden on citizens and helping low-income families. The delegation was also at Azaza village in Damazine, to meet the affected floods victims and IDPs that benefitted from previous assistance from FAO in provision agricultural inputs, cash, extension services and capacity development. The high level delegation then visited Sinnar State, to launch the partnership program to build resilience and gender’s empowerment for food and nutrition security funded by the Government of Canada. The project was inaugurated in Wad Al-Jak village in Singa city, Sinnar state. The residents of the village organized a warm reception for FAO delegation and the Ambassador of Canada, in the presence and of the Governor of Sinnar State Al Mahi Suleiman, the Minister of Agriculture Asmaa Othman, Forests National Corporation (FNC) officials, state police staff and a group of specialists and media professionals. In his address to the people at the gathering, the FAOR Babagana Ahmadu expressed his gratitude for the warm welcome and reiterated the commitment of FAO to support the vulnerable and the flood victims until they recover from the devastating impact of the disaster, ‘‘Sinnar is particularly chosen for this project in order to address the issue of agro-forestry and pastoralism, rehabilitate the canals that allow water to go to the forest areas, these canals are the key problem, it makes the community vulnerable to floods unless they are properly rehabilitated’’, said Babagana.

The Government of Canada funded FAO project, by \$2.3 million, that aims to increase production and productivity in areas affected by the covid-19 and floods, focusing on families supported by women as well as youth and children, through four axes; providing agricultural inputs for autumn and winter, providing veterinary services, financial support to poor families and capacity-building & training.

‘‘This state has huge resources, and it is fully qualified to promote agriculture, but it is facing some challenges and difficulties. We are determined to help you overcome those difficulties. We as the Canadian government are working through FAO to achieve prosperity’’, Adrian said. The project targets 20 000 families across six states, namely; South and East Darfur states, North and South Kordofan states, White Nile and Sinnar states. Through this support, the targeted beneficiaries will also be able to diversify their food basket and improve their nutrition and income. Overall, the project will target 20,000 vulnerable flood affected women, men and youth (100 000

people including 30 600 women, 20 000 girls (18 years old or under), 29 400 men and 20 000 boys (18 years old or under).

“I think that Sudan is very rich in its natural resources and also in its incredible resources in its people. I also hope that these children, of Wad Al Jak village, will grow up and find themselves not in need of the support from Canada or anyone else and be self-sufficient”, said Adrian. The State Minister of Agriculture, Asmaa Othman, expressed her great gratitude to the government of Canadian for the support through FAO. “We thank the Canadian and FAO support for its contribution to the agricultural development to the affected communities, that play a major role in agriculture, especially women and youth, who we rely heavily on in economic transformation because agriculture is one of Sudan’s most important resources, and Sudan will become a contributing country in the field of food security”, Asmaa said In his address, the project coordinator Mr Abdul Hafiz confirmed that Sinnar state will, support; i- preserving forests and rehabilitation of the inlet and the outlet of forest irrigation canal, ii-receive the reconstruction of about 5,000 hectares of improved forest seeds in order to compensate for the impact and damage of pastures in AL-Dali and AL-Mazmoom localities in cooperation with the FNC, iii-pastures and communities. The Governor of Sinnar state addressed the audience, thanking the villagers of Wad Al-Jak for hosting the event and the good reception, and thanked the Government of Canada and its Ambassador Adrian for his presence despite of the difficulties of the roads and bad weather conditions that faced the delegation to reach Sinnar state. Al Mahi expressed his government's full readiness to work towards achieving the objectives of the project, as well as his thanks to FAOR Babagana, for FAO’s great interest in the state and its people, describing him as a friend to Sinnar state. “Sinnar state is rich with agricultural and productive land, and 95% of its population work in agriculture and animal production”, said Al Mahi.

“We need to preserve and nurture forests to protect the environment for sustainable development”, Al Mahi concluded. **03/08/2021**. <http://www.fao.org/neareast/news/view/en/c/1419478/>

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: **THREAT**

General Situation of the Desert Locust during July 2021 and Forecast until mid-September 2021 provided by the FAO Emergency Centre for Desert Locust (ECLO).

General Situation

summer breeding imminent in Northeast Ethiopia & elsewhere

Spring breeding has ended in eastern Ethiopia and northwest Somalia where control operations continue to decline as they reduce the number and size of the spring- bred immature swarms. As anticipated, at least several swarms migrated to northeast Ethiopia where above- average rains since mid-July allowed them to mature and probably lay eggs in the Afar Region and southern Djibouti. Although this could not be confirmed and very few swarms have been seen recently due to difficulties in accessing the breeding areas, hatching and hopper band formation should be expected from early August onwards that could give rise to new swarms after late September. A few swarms may have also continued to the highlands in northern Ethiopia where they could reappear in adjacent areas of Sudan and Eritrea for breeding. In Yemen, a few swarms moved through the highlands and at least one swarm reached the interior where good rains that fell during July will allow at least one generation of summer breeding and the formation of small hopper bands. So far, local breeding is already in progress. Widespread, good rains also fell throughout the summer breeding areas in the northern Sahel between Mauritania and western Eritrea as well as along the Indo-Pakistan border. As few locust infestations are present in these areas, breeding will be on a small scale and locust numbers will only increase slightly.

Western Region: **CALM**

SITUATION. Scattered adults in Morocco (30 ha treated); isolated adults in central Algeria and Niger. **FORECAST.** Small-scale breeding in the northern Sahel of Mauritania, Mali, Niger, and Chad.

Central Region: THREAT

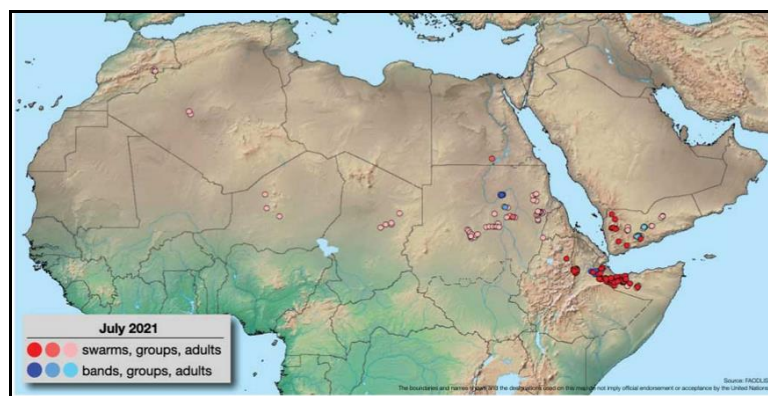
SITUATION. Control declines against last remaining hopper bands and immature swarms in northwest Somalia (27 162 ha treated), eastern Ethiopia (3 788 ha) and southeast Djibouti (55 ha); limited movement of swarms to northeast Ethiopia where rains allowed maturation, but few swarms seen. A few immature swarms in Yemen highlands move to interior where small-scale breeding is in progress. Bands and adult groups form from local breeding in northern Nile Valley of Sudan (525 ha). Immature adult group in southern Egypt (50 ha).

FORECAST. Laying, hatching, and band formation expected in northeast Ethiopia and southern Djibouti. A few immature swarms likely to persist in northwest Somalia. Scattered small-scale breeding in Sudan and western Eritrea. Breeding expected to increase in Yemen interior with possibility of small bands forming

Easter Region: CALM

SITUATION. No locusts present.

FORECAST. Small-scale breeding along both sides of the Indo-Pakistan border



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

Field Test and Training in Drones Operation Use.

As part of FAO Desert Locust Commissions in the Western and Central Region response to locust threat in Western Africa and the Middle East, 21 drones have been purchased to strengthen the early warning capacities and ensure early warning and rapid response locust activities in the traditional locust breeding areas. Therefore, the field trial was organized in Mauritanian from 14-29 June to validate the prototype developed jointly between FAO and HEMAV foundation and train the drone's focal points on its operational use.

14 participants were certified to perform drone flights and ensure the basic maintenance and data analysis of drones. The field evaluation of the drones confirmed that the current prototype meets the locust surveillance needs. The Drones has simplified the implementation and operation procedures as much as possible. With its "Mono Spectral" on-board camera, the drones allow good detection of vegetation in locust habitats. The "visual" camera allows the survey officer to visually confirm the analysis obtained through the onboard data processing generated by the on-embed computer. Simplified flight programming allows deployment in a very short time. Its good autonomy makes it possible to cover a considerable distance quickly (can perform up to 80 km flight)



Congratulations

Dr. Abdelhakim Rajab Al-Waer/ ADG and FAO representative for the Near East and North Africa Region FAO, Cairo, Egypt

On behalf of the Executive Committee of the Arab Society for Plant Protection (ASPP), I extend to you my sincere congratulations for your appointment as Assistant Director General & Regional Representative of the Regional Office for the Near East and North Africa – FAO. Since its establishment in 1981, the Arab Society for Plant Protection has cooperated with the FAO Regional Office in implementing many activities in the field of organizing workshops, translating plant protection terms, organizing scientific sessions in all previous conferences (the number of society conferences so far is 12 and the thirteenth will be in Tunisia in 2022)), to name a few. The society is also engaged with FAO-RNE through a collaboration agreement to issue a newsletter for plant protection in the Arab and Near East countries. We sincerely hope that this cooperation with the FAO Regional Office in the Near East and North Africa will continue and be strengthened under your leadership to reach higher levels. I wish you great success in your new mission.



Ibrahim Jboory, ASPP President

The Arab Society for Plant Protection Congratulates the President of the Publishing Committee of the Egyptian Journal of Biological Pest Control, Prof. Dr Ahmed El-Henedy

The Arab Society for Plant Protection congratulates the president of the publishing committee of the Egyptian Journal of Biological Pest Control Prof. **Dr. Ahmed El-Henedy**, and his assistant team, for the outstanding achievement this year by up ranking the international impact factor of the journal to 1.99 from 0.74 (almost three times). The journal ranking reached 37th out of 104 journals specialized in entomology after it was 72nd in 2019. The Egyptian Society issued the journal for Biological Pest Control in 1991 and 2017, in cooperation with the international publishing house Springer-Nature. Our best wishes for continued success for the journal and all colleagues behind it.

Dr Youssef Khamis selected as an editor from Taylor & Francis

The board of the Arab Society for Plant Protection sincerely congratulates **Dr. Youssef Khamis** for being selected as an outstanding editor from Taylor & Francis for 2020. Dr Youssef Khamis is an Associate Professor of Plant Pathology, Plant Pathology Research Institute, Agricultural Research Center (ARC), Egypt. He obtained his B.Sc. in 2002, Agriculture Sciences, Plant Pathology at Faculty of Agriculture, Assiut University, Egypt. In 2007, he received his M.Sc. in Integrated Pest Management of Mediterranean Fruit Tree Crops at CIHEAM-MAIB, Italy. In 2011, he got his PhD in Plant Protection Curriculum: Integrated Crop Protection from Bari University Aldo Moro, Italy. Also, he had a Postdoc position at the Department of Agronomy, Londrina State University in Brazil. He published many research articles in peer reviewed in highly impactful scientific journals in the field of phytopathology. He has membership and contributes to several professional societies and editorial board member for several international journals such as Journal of Plant Diseases and Protection (JPDP), Journal of Plant Pathology (JPP) and Folia Horticulturae (FH). [Youssef Khamis (Egypt-Brazil), 2021].



Additional Email Address for ASPP

Because the ASPP office is facing difficulties with its email address aspp@terra.net.lb, an additional email address was established. All colleagues communicating with the ASPP Office, especially those submitting articles for publication in the Arab Journal of Plant Protection, are encouraged to use both the old address and the new email address: asplantprotection@gmail.com.

The 13th Arab Congress of Plant Protection 2022

Due to the continuation of the Covid-19 pandemic and unstable health situation in Tunisia, the Congress Organizing Committee decided to postpone the congress to October 2022. The Society Executive Committee endorsed the new date and ensured getting the same hotel prices offered earlier.

1-The new congress date is October 16-21, 2022.

2-Registration deadline: September 1, 2022.

3-Abstract's submission deadline (confirmation of earlier submitted abstracts or presenting new ones): April 30, 2022.

4-Acceptance of abstracts: 30 June, 2022.

5-Deadline for submitting proposals for invited concurrent oral research papers sessions: March 31, 2022

6-Second congress announcement: May 31, 2022.

7-Third and final congress announcement: July 1, 2022.

8-Deadline for hotel booking: July 31, 2022.

9. The email address and the website of the congress will continue to be: info@acpp-aspp.com and www.acpp-aspp.com

We apologize for any inconvenience caused by this postponement imposed on us by conditions beyond our control, and we appreciate your kind understanding. We are looking forward to meeting you all in the fall of 2022 in Tunisia.

The Arab Society for Plant Protection

The Organizing Committee of the 13th Arab Congress of Plant Protection in Tunisia

Atlas of Agricultural Pests in the Arab Region.

Dear Colleagues and fellow researchers in the field of plant protection in the Arab world

After the successful publication of the book "Plant Protection Challenges in the Arab Region: Vision 2050", the Arab Society for Plant Protection is delighted to announce the project of developing a book entitled:

"Atlas of Agricultural Pests in the Arab Region".

The idea of this important publication comes from the fact that workers in the field of plant protection in the Arab world have taken, during their career, multiple pictures of agricultural pests, however, many of these pictures remained unused, and did not find their way to publication or to benefit researchers and other workers in the agricultural sector in the Arab world and abroad. Therefore, the proposal to produce such an atlas will add to the Arab agricultural library a book of scientific and practical value. In order to implement this project, the Arab Society for Plant Protection recently formed a working group consisting of researchers from different Arab countries whose responsibilities are defined as follows:

- Lead editor (task force coordinator): Dr. Nadjia Zermane: nadjiazermane@gmail.com

-Editor in charge of insects and mites: Dr. Nizar Al-Mallah: naz953aralmlaah@gmail.com

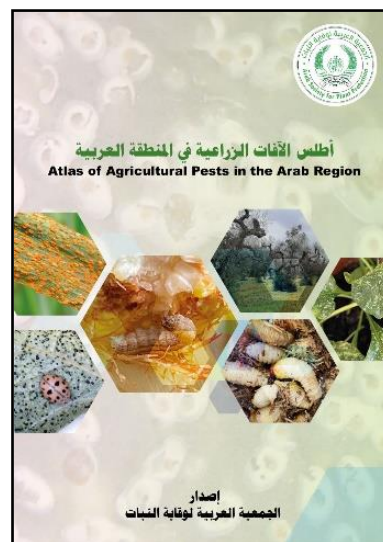
-Editor in charge of fungal and bacterial diseases: Dr. Abdel Hamid Ramadani: ramdani.abdelhamid@gmail.com

-Editor in charge of viral and phytoplasmic Diseases: Dr. Raied Aboukubaa: raied.aboukubaa@ipsn.cnr.it

-Editor in charge of nematodes: Dr. Mahfouz Mohamed Mustafa Abdel Gawad: mahfouzian2000@yahoo.com

-Editor in charge of weeds (including parasitic weeds): Dr. Nadjia Zermane

The Arab Society for Plant Protection is convinced that such a project cannot succeed without your active participation, hence the society encourages all colleagues to participate in this work and send their high-quality pictures to the appropriate editor, as listed above, no later than the end of December, 2021.



Pictures characteristics and requested information :

- Pictures must be of high quality (high resolution ≥ 300 dpi) and in JPG or PNG format
- Pictures must be owned by participants, i.e. taken directly by them and not from other researchers's works to avoid copyright-related problems.
- Pictures should concern the field apparent symptoms and damage caused by the pest (general or close-up pictures), the appearance of the pest (or the pathogen), especially the economic damage causing phase, and if possible, pictures of the most important natural enemy of the pest.
- For each picture the following information should be provided: the name of the photographer, the date the picture taken (year, and month if possible), the location where the picture was taken (country, city or region), the name of the pest (scientific and common names), the host plant or the affected crop (shown in the picture).

Furthermore, the Arab Society for Plant Protection assures all the participants that the source of each picture published in the Atlas will be acknowledged, and all pictures will be protected by copyright, and cannot be used for commercial or non-commercial purposes (ie in any educational, scientific or non-profit project) unless a written permission is provided by the source and the publisher (the Arab Society for Plant Protection).

Respectfully yours, **Ibrahim Jboory, ASPP President**

Contributions of the Arab Society for Plant Protection in promoting the International Year of Plant Health

Contributions of the Arab Society for Plant Protection in promoting the International Year of Plant Health 1/7/2021

"The Arab Society for Plant Protection helped enhance knowledge and widen interest on [#PlantHealth](#) issues within the Arab and Near East countries and beyond". Ibrahim Al-Jboory, President of the Arab Society for Plant Protection.

The Arab Society for Plant Protection participated in a lecture on the society contribution to promoting the International Year of Plant Health, where the president explained the society achievements, contributions and cooperation with the Food and Agriculture Organization of the United Nations in spreading news and awareness of invasive pests that FAO contributes to working on. The president also presented the society contributions in the report titled "Scientific review of the impact of climate change on plant pests" published by FAO, 2021. Finally, the most important achievement presented by the society is the book "The Challenges of Plant Protection in the Arab Region: Vision 2050" on the occasion of the International Year of Plant Health, which was issued at the end of 2020.



Khalifa International Award for Date Palm and Agricultural Innovation

Khalifa International Award for Date Palm and Agricultural Innovation General Secretariat organized a scientific virtual lecture on the "The Arab Society for Plant Protection and its role in spreading the awareness on Date Palm Pest Management", presented by Dr Ibrahim Al Jboory, President of the Arab Society for Plant Protection, on Monday 12th of July, 2021, with the attendance of 50 experts and specialists in the Date Palm cultivation sector representing 12 Arab countries. Dr Abdelouahhab Zaid, Award's Secretary-General, noted that this virtual lecture comes under the directives of H.E. Sheikh Nahayan Mabarak Al Nahayan, Minister of Tolerance and Coexistence, Chairman of the Award's Board of Trustees, and within the Award's framework and commitment to spreading the scientific knowledge and awareness specialized in date palm cultivation production.



Dr Ibrahim Al Jboory, from his side, highlighted the role of the Arab Society for Plant Protection, which has more than 1,000 members from 17 Arab countries, in addition to members from Iran, Pakistan, India, Turkey, France, Germany, Italy, Greece, England, and the USA. Dr Ibrahim then presented the Society's achievements since its founding in 1981, where it had a significant role in spreading knowledge, technical awareness, and identifying pests and their management through conferences held every three years and scientific books and publications that cover all activities related to plant protection. Dr Ibrahim also stressed the fact that the Arab Society for Plant Protection is a professional, non-profit cultural organization, consisting of scientists belonging to academic institutes, as well as both public and private scientific and industrial organizations, where it represents a diverse group of scientists specialized in the fields of plant protection internationally and in the Arab world. The association works to promote research, education, and extension activities related to pests, by providing scientifically-based information to the public and private sectors and enhance awareness on pests and their effects on agronomic systems and the environment. The society is an associate member of the International Society of Plant Protection (IAPPS), the Plant Pathology Union of the Mediterranean Basin Countries (MPU), and the International Society of Plant Diseases (ISPP).

Dr Ibrahim Al Jboory then concluded the lecture by highlighting the significant role played by the Khalifa International Award for Date Palm and Agricultural Innovation in supporting and developing the date palm cultivation sector and the date production worldwide through the organizing of the Jordan International Date Palm Festival, Sudan International Date Palm Festival, and Egypt International Date Palm Festival and the accompanying activities and events. Which actively contributed to the increase of the reputation of the Arab dates and the volume of exports, in addition to the series of international conferences organized by the Award's General Secretary

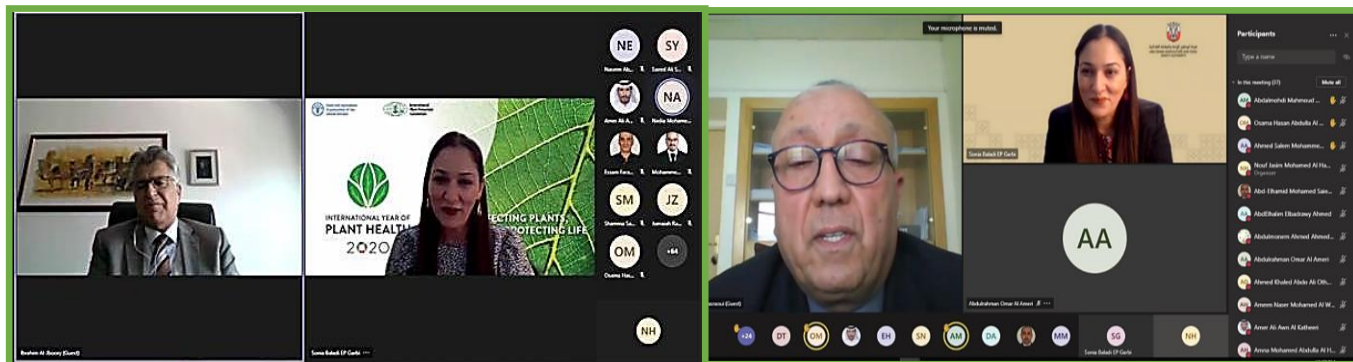


Transboundary Pests, Fall Armyworm as a Case Study, 21/June/2021- UAE

The Arab Society for Plant Protection Participation in the Virtual Scientific Forum of ADFCA

During the year 2021, the initiative of the Virtual Scientific Forum to assess plant health risks was launched by the Risk Assessment Department of the Policy and Risk Assessment Directorate of Abu Dhabi Agriculture and Food Safety Authority. Engineer Sonia Al Kafi is promoting this initiative. The forum consists of a series of virtual workshops covering various topics in plant protection and assessing the risks of agricultural pests. This initiative target intends to continue the exchange of experiences and transfer knowledge through virtual meetings and lectures, despite the Covid-19 pandemic that limited direct meetings between various actors in the field of phytosanitary. On the 1st of March, Dr Bouzid Nasraoui delivered a lecture on the recent control measures of red palm weevil implemented in Saudi Arabia and on 21 of June, Dr Ibrahim Al-Jboory, president of the Arab Society for plant protection, participated in the forum by delivering a lecture on Transboundary Pests, Fall Armyworm and

Red Palm Weevil, damage, biological and ecological aspects and IPM tools. Engineer Sonia introduced the lecturer and submitted a lecture on Pest Risk Assessment criteria as of IPPC-FAO. An invitation is open to the interested scientists to participate in this forum; contact Engineer Sonia on the email sonia.garbi@adafsa.gov.ae

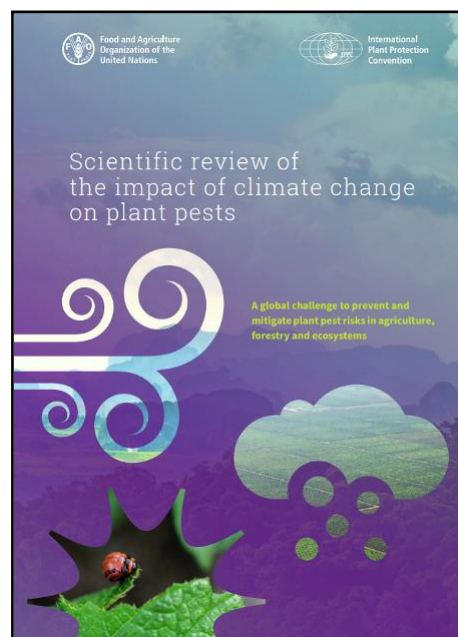


Effect of Transboundary Pests on Food Security 20/June/2021- Basra University

The President of the Arab Society for Plant Protection delivered a lecture on the impact of transboundary pests on food security, that attended by graduate students and the staffs of the Plant Protection Department. The lecture focused on the 10 invasive pest priorities of FAO and the 20 quarantine pests raised by EFSA. The global losses by pests particularly fall armyworm and red palm weevil and many other pests were discussed. An open discussion with the attendees has been maintained on different topics and the society activities.

IPPC-FAO Celebrates Releasing the Review Report “Climate Change and Plant Pests”

On June 1, 2021 the International Plant Protection Convention (IPPC) of FAO released through a webinar a “Scientific review of the impact of climate change on plant pests: a global challenge to prevent and mitigate plant pest risks in agriculture, forestry and ecosystems”. To strengthen the review’s scientific foundation, IPPC convened a panel of reputable scientists from around the world to write the review, and established a rigorous peer review system to validate its findings. This report details the outcome of the review and has been prepared by a group of ten authors representing all FAO regions and with expertise in plant pathology, entomology, herbology, climatology and data analytics, namely: **Maria Lodovica Gullino (lead author, Italy), Ramon Albajes (Spain), Ibrahim Al-Jboory (Iraq), Francislene Angelotti (Brazil), Subrata Chakraborty (Australia), Karen A. Garrett (United States of America), Brett Phillip Hurley (South Africa), Peter Juroszek (Germany), Khaled Makkouk (Lebanon), Xubin Pan (China) and Tannecia Stephenson (Jamaica).** The Arab and Near East region was represented by two ASPP members, **Ibrahim Al-Jboory and Khaled Makkouk.** Individuals interested in reading the English full report can reach it through the following link: <https://doi.org/10.4060/cb4769en>. An Arabic version of the report is also available through the following link: <https://doi.org/10.4060/cb4777ar>.



First Molecular Detection of APIS Mellifera Filamentous Virus (AMFV) in *Apis mellifera* in Southern Italy.

The global and continuous increasing decline of honey bees over the last decade has driven several research programs to tackle biotic and abiotic causes threatening this important insect species. Among the biotic factors, several positive-sense RNA viruses have been recently associated with colony decline, and a widespread occurrence of the DNA virus "Apis mellifera filamentous virus (AmFV)" has also been reported. However, the pathogenicity of this virus on the infected colonies is still questioned, being rarely associated with acute infections or colony losses. In this work, we investigated the occurrence of AmFV in the apiaries in the Apulia region (southern Italy) using conventional PCR and high-throughput sequencing (HTS). More than 35 apiaries were visited between 2017 and 2018, and about 380 honey bee specimens consisting of adults, pupae, larvae of the worker bees and in some cases, queen pupae were collected and tested by PCR as groups using two diagnostic primers that amplify two partial regions of the Thymidylate synthase gene (TS) and the BRO-N gene (Cornman *et al.*, 2010 and Laurent Gauthier *et al.*, 2015); respectively. From two apiaries where trembling and weak bees were found, specimens were collected and extracted total RNA subjected to HTS. PCR results showed the occurrence of AmFV in all sampled colonies with only two negative samples: (i) one sample consisting of 20 adult bees collected in Copertino (LE) and (ii) one sample consisting of two dead pupae collected from queen cell in an apiary located in Lecce. The overall AmFV-infection rate in the Apulian colonies was approximately 91%. The nucleotide sequence determined for a selected representative AmFV positive sample showed that based on the phylogenetic analysis of the thymidylate synthase gene and Bro gene sequences, the Apulian isolate shared more than 98% of nucleotide identity with isolates previously characterized in Belgium, Switzerland and China. The presence of this virus in the diseased-colonies was also confirmed by HTS: two large contigs (3604bp and 2112bp) were assembled from the sequence dataset and shared up to 99% similarity- at nucleotide level- with sequences of AmFV previously reported from Switzerland. This is the first detection of AmFV infections on *A. mellifera* populations in Italy by HTS and PCR. HTS technology proved to be a rapid tool for identifying viruses in honeybees. Analyses are still ongoing on the recovered sequence dataset to identify other putative viral agents. Although limited information is available on the potential impact of AmFV, the wide distribution of this virus in the Apulian colonies should be of concern for the health status of a honey bee in the region. **[Raied Abou Kubaa, Annalisa Gianpetruzzi, Maria Saponari, Rocco Addante. CNR, Istituto per la Protezione Sostenibile delle Piante (IPSP), Bari, Italia; DiSSPA, Università degli Studi di Bari Aldo Moro, Bari, Italia, XXVI Italian National Congress of Entomology 7 - 11 June 2021].**

Only Females Oviposit: Chemical Discrimination of Adult Stink Bug Sex by the Egg Parasitoid *Trissolcus japonicus*.

Egg parasitoids foraging for suitable hosts scattered in the environment rely mainly on chemical cues. Elucidating the chemical ecology of natural enemies is important in the development of effective and successful strategies for conservation biological control. In this context, the host cuticular hydrocarbons, which are exploited by several species of egg parasitoids as contact kairomones, could be used to retain them by providing information about the presence and the sex of adults of the target species: sex is important because only females of the host species lay the eggs that can be subsequently utilized for parasitoid reproduction. However, the chemical basis of host sex discrimination in egg parasitoids is not well understood. We carried out behavioral and chemical bioassays to investigate the role played by contact chemical cues left by adults of the brown marmorated stink bug, *Halyomorpha halys* Stål, in host egg searching behavior and adult host sex discrimination by the egg parasitoid *Trissolcus japonicus* (Ashmead). The first set of bioassays showed that parasitoids spent more time exploring patches contaminated with chemicals associated with adult *H. halys* females compared with adult males. Similar responses were displayed by *T. japonicus* when hexane extracts of *H. halys* were tested, suggesting that non-polar chemical compounds are involved in host sex discrimination. GC-MS analysis of hexane extracts revealed quantitative differences in the cuticular combinations of the two sexes, with 1-hexadecene (more abundant in males) being the most important component in determining these differences. Hexane extracts of *H. halys* females blended with synthetic 1-hexadecene significantly reduced the wasps' arrestment responses compared to crude extracts. **[Mokhtar Abdulsattar Arif^{1,2}, (Iraq-Italy), Tugcan Alınç¹, Salvatore Guarino³, Stefano Colazza¹, Antonino Cusumano¹ and Ezio Peri¹, ¹Department of Agricultural, Food and Forest Sciences (SAAF),**

University of Palermo, Palermo, Italy, ² Plant Protection Directorate, Ministry of Agriculture, Baghdad, Iraq, ³Institute of Biosciences and Bioresources (IBBR), National Research Council of Italy (CNR), Palermo, Italy, Front. Ecol. Evol., 13 April 2021]. <https://doi.org/10.3389/fevo.2021.652561>

Citrus Varieties with Different Tolerance Grades to Tristeza Virus Show Dissimilar Volatile Terpene Profiles.

Plants produce considerable amounts of volatile organic compounds (VOCs) with several biological functions, including protection against biotic agents such as viruses and their vectors. In citrus species, these metabolites can be related to their different susceptibility/tolerance toward the Tristeza virus (CTV), one of the main biotic constraints for the citrus industry. The objective of this study was to compare the VOCs pattern from the leaves of a CTV-susceptible citrus variety such as *Citrus aurantium* and from three CTV-tolerant varieties: *Citrus volkameriana*, Carrizo citrange, and Forner-Alcaide no. 5. The VOCs emitted were analyzed via the headspace SPME method, while plant metabolites sequestered in the leaves were analyzed by heptane extraction followed by GC-MS. The results indicated that the majority of the VOCs emitted and sequestered in the leaves of the varieties tolerant and susceptible to CTV are constituted mainly by volatile terpenes (VTs) that exhibit strong qualitative/quantitative differences among the profiles of the four citrus species. In detail, the VOC emission indicated different patterns between *C. aurantium* and *C. volkameriana* and from both of them in comparison with Forner-Alcaide no. 5 and Carrizo citrange that exhibited more similarities, with the last two characterized by a higher presence of sesquiterpenes. The data obtained from the analysis of the VOCs sequestered in leaf tissues of the CTV-tolerant varieties indicated a higher presence of monoterpenes such as limonene, α -pinene, and p-cymene, known to be the main components of several plant extracts showing deterrent properties toward viruses and insect vectors. As VOC evaluation is a fast and noninvasive measure of phenotypic dynamics, allowing the association of plant phenotypes in accordance to plant disease resistance and/or stress tolerance, the possible implications of such differences in terms of tolerance grade to CTV and/or its related vectors are discussed. [Salvatore Guarino, Loredana Abbate, Francesco Mercati, Sergio Fatta Del Bosco, Antonio Motisi, Mokhtar Abdulsattar Arif (Iraq-Italy), Gabriele Cencetti, Eleonora Palagano and Marco Michelozzi, *Agronomy*, 11(6), 1120, 2021]. <https://doi.org/10.3390/agronomy11061120>

Pathological and molecular characterization of phytopathogenic fungi in broad beans (*Vicia faba* L.) and search for effective biocontrol agents.

Climate changes contribute to the creation of different stress conditions that threaten all types of living organisms, where they evolve themselves to survive and resist. The combined effects of multiple conditions have affected the activities of microorganisms on their host environment with aggressive infection of plants by plant pathogenic fungi, as well as the interaction with beneficial bacteria. At the beginning of this study, a collection of 120 fungal isolates associated with *Vicia faba* plants showed different effects on faba plants after the Koch's postulates test where 18 fungi showed high damage to the plants. These fungi belong to *F. equiseti*, *F. brachygibbosum*, *F. redolens*, *F. polyphialidicum*, *F. acuminatum*, *F. graminearum*, *Alternaria* sp., *Rhizopus oryzae*, *Boeremia exigua*, *Rutstroemia* sp. and *Clonostachys rosea*. On the other hand, these fungi show different behaviors under salt and drought stress *in vitro* and *in vivo*. Best linear unbiased predictors (BLUPs) of *F. equiseti* VFF16, *F. graminearum* VFF6 and *Rutstroemia* sp. VFF7 were significantly increased under salt and drought stress compared to controls after *in planta* test. While BLUPs of *F. equiseti* VFF12, *F. brachygibbosum* VFF9 and *B. exigua* VFF4 were not significant, maintaining a similar pathogenic effect. However, the BLUPs of *Alternaria* sp. VFF5 and *R. oryzae* VFF1 were significantly reduced. Afterwards, 24 *Bacillus* isolates were selected from 455 bacteria associated with *Vicia faba* plants according to their high antifungal activity. These *Bacillus* strains were defined as *B. subtilis*, *B. cereus*, *B. velezensis*, *B. mojavensis* and *B. amyloliquefaciens*. These bacteria showed high antifungal activity against 10 plant pathogenic fungi, where later their activities were significantly related to the presence of most of the biosynthetic genes of cyclolipopeptides (cLPs), enzyme genes encoding plant-induced resistance factors, production of lipopeptides (iturins, fengycins and surfactins), as well as plant growth stimulating metabolites (AIA, HCN, siderophores and phosphate solubilization) and extracellular enzymes (pectinase, amylase, cellulase and protease). Our result showed that the *B. amyloliquefaciens* VFS2 strain is one of the most promising for effective biological control also promotes plant growth by controlling *F. equiseti* infection in *Vicia faba* plants. Subsequently, the VFS2 strain showed a significant correlation ($p < 0.01$) of its antifungal activity with the production of cLPs, which allowed us to optimize its performance using specific sources of carbon and nitrogen by four culture media (LB, LA, GA and PM). Optimization by the response surface

methodology (RSM) methodology of the fermentation conditions showed that the optimal antifungal activity (95%) was recorded in the PM and LB media. Thus, Heatmap analyses visualized the effect of cultures media on the production of each isoform of cLPs. On the other hand, Person's correlation indicated that certain iturins, fengycins and surfactins isoforms were related to the antifungal activity of VFS2 strains depending on the fermentation medium. Finally, the stability of antifungal activity and metabolites production involved in the inhibitory activity of *B. amyloliquefaciens* VFS2 was evaluated in the context of climate change under salt and drought stress. In which the VFS2 strain showed antifungal activity against eight phytopathogenic fungi under salt and drought stress with growth inhibition percentages more than 97% under different concentrations of NaCl and PEG6000. This was in parallel with the increase in the production of certain cLPs isoforms under the conditions of two stresses. In addition, the amount of AIA produced by VFS2 strain was elevated from 0.1 µg/ml to 0.7 µg/ml under water stress and 0.9 µg/ml under saline stress. Similarly, an increase in siderophore production was detected from 1.5 mm in unstressed conditions to more than 3 mm in a stressed condition. The VFS2 strain reduced root rot of *Vicia faba* plants cultured in different systems (in non-stressed soil, saline soil and under drought stress), which showed comparable efficacy to the synthetic fungicide Benomyl to protect the plant against fungal infection. [Imen Haddoudi (Tunisia), Faculty of Sciences Tunis, Doctorate, 2021].

Imen Haddoudi successfully defended her PhD thesis entitled “Pathological and molecular characterization of phytopathogenic fungi in broad beans (*Vicia faba* L.) and search for effective biocontrol agents” at the Faculty of Sciences Tunis El Manar (FST, Tunisia) and Center of Biotechnology of Borj Cédria (CBBC, Tunisia), and a collaboration with CIDS AV Laboratory, University of Girona (Girona, Spain). Currently she occupies a postdoc position at the Department of Ecosystem Biology in the Faculty of Science-University of South Bohemia, Czech Republic. During her PhD, her work focused on obtaining efficacy biocontrol *Bacillus* agents against phytopathogenic fungi infecting *V. faba* plants under climate change. The overall findings of her work suggest *B. amyloliquefaciens* VFS2 as effective biocontrol agent *in vitro* and *in vitro* by suppression the fungal infection in *Vicia faba* plants caused by *Fusarium equiseti* under salt and drought stress. The high antifungal activity of *B. amyloliquefaciens* VFS2 under stress conditions was related to their production of cyclolipopeptides (iturins, fengycins and surfactins), phytohormones IAA and siderophores.



Species-Specific Induction of Plant Volatiles by Two Aphid Species in Apple: Real Time Measurement of Plant Emission and Attraction of Lacewings in the Wind Tunnel.

Upon damage by herbivores, plants release herbivory-induced plant volatiles (HIPVs). To find their prey, the pest's natural enemies need to be fine-tuned to the composition of this volatiles. Whereas standard methods can be used in the identification and quantitation of HIPVs, more recently introduced techniques such as PTR-ToF-MS provide temporal patterns of the volatile release and detect additional compounds. In this study, we compared the volatile profile of apple trees infested with two aphid species, the green apple aphid *Aphis pomi*, and the rosy apple aphid *Dysaphis plantaginea*, by CLSA-GC-MS complemented by PTR-ToF-MS. Compounds commonly released in conjunction with both species include nonanal, decanal, methyl salicylate, geranyl acetone, (Z)-3-hexenyl acetate, (Z)-3-hexenyl butanoate, (Z)-3-hexenyl 2-methyl-butanoate, (E)-β-caryophyllene, β-bourbonene and (Z)-3-hexenyl benzoate. In addition, benzaldehyde and (E)-β-farnesene were exclusively associated with *A. pomi*, whereas linalool, (E)-4,8-dimethyl-1,3,7-nonatriene were exclusively associated with *D. plantaginea*. PTR-ToF-MS additionally detected acetic acid (AA) and 2-phenylethanol (PET) in the blends of both trees attacked by aphid species. In the wind tunnel, the aphid predator, *Chrysoperla carnea* (Stephens), responded strongly to a blend of AA and PET, much stronger than to AA or PET alone. The addition of common and species-specific HIPVs did not increase the response to the binary blend of AA and PET. In our setup, two host-associated volatiles AA+PET appeared sufficient in the attraction of *C. carnea*. Our results also show the importance of combining complementary methods to decipher the odor profile associated with plants under pest attack and identify behaviourally active components for predators. [Zaid Badra(Jordan-Italy), Sebastian Larsson Herrera ,Luca Cappellin, Franco Biasoli, Teun Dekker, Sergio Angeli, Marco Tasin, Journal of Chemical Ecology, 2021]. <https://doi.org/10.1007/s10886-021-01288-5>

Morphological Ontogeny and Molecular analyses of Geographic Strains of Two Closely Related *Neoseiulus* species (Acari: Phytoseiidae).

The predatory mites, *Neoseiulus longispinosus* (Evans) and *N. womersleyi* (Schicha) (Phytoseiidae) are two morphologically close species. Although they can be mainly separated by the length of the dorsal seta S5, misidentifications may occur. The present study investigated various strains of the two closely related species collected from Japan, Taiwan and/or Thailand using a combination of morphological and molecular data. We

described and illustrated the adults and immature stages. We also sequenced the 28S region of nuclear ribosomal DNA to determine whether these strains represent different species. The two species could be clearly separated based on the length of seta S5 and the ratio of setae Z5/S5. In a 28S tree, the examined strains also formed separate clades with 100% bootstrap values. We conclude that a combination of different methods is often necessary to precisely distinguish these closely related taxa. [Mohamed W. Negm (Egypt- Japan), Ibaraki University, Japan; Assiut University, Egypt, Tomoko Matsuda, Kanagawa, Japan. Takumi Kayukaw, Tsukuba, Ibaraki, Japan. Chyi-Chen Ho, Taichung, Taiwan. Yu-Tzu Hsu, Taitung, Taiwan. Manita Kongchuensin, Bangkok, Thailand, Ploychompoo Konvipasruang, Bangkok, Thailand. Tetsuo Gotoh, Ryutsu Keizai University, Japan. *Acarologia*, 61(2): 432-452, 2021].

Ontogenetic Description of *Proctolaelaps bickleyi* (Bram) (Acari: Melicharidae), newly Recorded from Lepidopteran Insect Cultures in Japan.

Proctolaelaps bickleyi (Bram) (Acari: Melicharidae) is an edaphic predatory mite commonly associated with insects. Although *P. bickleyi* has been reported from many countries worldwide, it is reported herein for the first time in Japan from laboratory cultures of *Chilo suppressalis* (Walker) and *Cossus insularis* (Staudinger) (Lepidoptera: Crambidae, Cossidae). *Proctolaelaps bickleyi* is redescribed and illustrated from females, males, deutonymphs, protonymphs and larvae. The morphological ontogeny of idiosomal and leg chaetotaxy is discussed and a key to the Japanese species of *Proctolaelaps* is provided. [Mohamed W. Negm (Egypt-Japan), Ibaraki University, Japan; Assiut University, Egypt. Tetsuo Gotoh, Ryutsu Keizai University, Japan. *Systematic & Applied Acarology*, vol. 26, 2021].

Biological Control of Sheep Nematode *Haemonchus contortus* using Edible Mushrooms.

This study evaluated in vitro the morphology of ten strains of edible mushroom: *Pleurotus ostreatus* (strains 1123 and 0152), *P. eryngii* (strains 1290 and 1291), *P. cornucopiae* (strains 1328 and 1330), *Coprinus comatus* (strain 1103), *Panus* sp. (strain 801), *Lentinula edodes* (strain 401) and *L. boryanus* (strain 402) on different growing media. In addition, the in vitro anthelmintic activity (AH) of the mycelium of the fungi against *Haemonchus contortus* infective larvae was evaluated in Petri dishes. Finally, organic extracts of six of the fungi were synthesized and evaluated against *H. contortus* larvae. The highest mycelial growth rate was achieved by *P. ostreatus* (0152), *Panus* sp. (801), and *P. ostreatus* (1123) in wheat flour with agar (HIT). The highest biomass (1.43 g/Petri dish) was produced by *Panus* sp. 801 in the HIT medium. The highest percentages of mycelial AH mortality were caused by *P. ostreatus* 0152, *P. cornucopiae* 1328, *P. ostreatus* 1123, *P. eryngii* 1292 and *L. edodes* 401, at 88, 88.5, 91, 93 and 93.93% respectively. The biological activity of the fungi could be due to toxins, which inhibit the movement of nematodes and subsequently degrade them. The extracts that caused the highest mortality rates were: *P. ostreatus* 0152 (81.6%) and *P. eryngii* 1292 (90.8%) at 72 h following exposure to 200 mg/mL of extract. The results of the present study show that these fungi are candidates for future in vivo tests against *H. contortus*. [Ricardo José Comans-Pérez, José E Sánchez, Laith Khalil Tawfeeq Al-Anic (Iraq- Malaysia), Manases González-Cortázar, Gloria Sarahi Castañeda-Ramírez, Pedro Mendoza-de Givesa, Alma Delia Sánchez-García, Jair Millán-Orozco, Liliana Aguilar-Marcelino, Centro Nacional de Investigación Disciplinaria en Salud Animal e Inocuidad, INIFAP, Morelos, Mexico; El Colegio de la Frontera Sur, Tapachula, Chiapas, Mexico; Department of Plant Protection, College of Agriculture, University of Baghdad, Baghdad, Iraq; School of Biology Science, Universiti Sains Malaysia, Pulau Pinang, Malaysia; Centro de Investigaciones Biomédicas del Sur, Instituto Mexicano del Seguro Social, Morelos, Mexico; Universidad Politécnica del Estado de Morelos, Morelos, Mexico; Universidad Autónoma Agraria Antonio Narro, Torreón, Coahuila, Mexico. *Biological control*; 152, January 2021]. <https://doi.org/10.1016/j.biocontrol.2020.104420>

SO₂-generating pads reduce gray mold in clamshell-packaged 'Rubi' table grapes grown under a two-cropping per year system.

The aim of this work was to evaluate different SO₂-generating pads and liners to control gray mold in ventilated clamshell-packaged 'Rubi' table grapes grown under a two-cropping per year system. The treatments consisted of SO₂-generating pads (slow release or dual release) and plastic liners with different perforations (microperforated; 2.0; 4.0 or 5.0 mm in diameter) and a control, only with the standard microperforated plastic liner. The packaged grapes were stored in a cold chamber at 1.0 ± 1.0 °C and 95% relative humidity. After 45 days, the grapes were removed from cold storage and placed, without liners and SO₂-generating pads, for three days at room temperature (22.0 ± 1.0 °C). The evaluations occurred at 30 and 45 days after the beginning of cold storage, and the following

variables were assessed: incidence of gray mold, mass loss, stem browning and shattered berries. At three days of shelf-life, the same variables were assessed, except mass loss. The completely randomized design was used as a statistical model with four replications, and each plot consisted of five bunches individually stored in ventilated clamshell-packaged. The dual release SO₂-generating pads are efficient in controlling the gray mold in 'Rubi' table grapes regardless of the type of perforation of the plastic liners, with low mass loss and shattered berries, with good conservation of the freshness of the rachis. The disease was efficiently controlled in both annual crops. The slow-release SO₂-generating pads, regardless of the type of perforation of the plastic liners, resulted in intermediate efficiency of grey mould control, with the good physical quality of the bunches. Thus, the use of dual release SO₂-generating pads is recommended to control gray mold in ventilated clamshell-packaged 'Rubi' table grapes. [Mühlbeier D.T., Ribeiro L.T., Higuchi M.T., Youssef K.(Egypt), Chaves Junior O.J., Koyama R., Roberto S.R., Semina: Ciências Agrárias, 42(3), 1069-1086, Plant Pathology Research Institute, ARC, Egypt and Londrina State University, Brazil].

XYLELLA FASTIDIOSA NEWS

The 3rd European Conference on *Xylella fastidiosa* and XF-ACTORS final meeting.

About 900 people from more than 60 countries registered for the 3rd European Conference on *Xylella fastidiosa* and the final meeting of the XF-ACTORS project. The event was held online from 26 April to 30 April 2021 and was organized by EFSA and XF-ACTORS with the active contribution of the major EU and transnational research initiatives tackling *X. fastidiosa*: BIOVEXO, CURE-XF, ERC MultiX, EUPHRESCO, EUROXANTH, and Life Resilience. The overall objective of the conference was to take stock of the results from research that has taken place since *X. fastidiosa* was first detected in Europe in 2013. The conference sessions gave an opportunity to present and discuss the latest findings, data and knowledge on *X. fastidiosa*, including: Pathogen biology, ecology and genetics; Epidemiology and modelling of *X. fastidiosa* diseases; Host plant interactions and the search for resistant/tolerant germplasm; Surveillance and early detection tools; Vector biology and control; Endophytic microbial resources and their potential applications for *X. fastidiosa* control; Sustainable management strategies for prevention and reduction of the impact of *X. fastidiosa* diseases.

Members of Arab society of plant protection from Syria, Palestine, Jordan and Tunisia contributed in several researches that were presented during the conference, those included:

Yaseen T. *Xylella fastidiosa*: Imminent Risk to Food Security in Near East and North Africa Region.

Al-Karablieh N, AbuObeid I, Haddadin J, Al Omari R, Al-Jabaree A, Mazahreh S, Al-Elaumi L, Mutak I. *Xylella fastidiosa* is not detected yet in Jordan: survey results.

Hanani A, Valentini F, Davino SW. Antagonism capacity of endophytes isolated from olive cvs in Apulia region.

Mourou M, Valentini F, Cavallo G, D' Onghia AM, Balestra GM. Screening of a novel biological control agent targeting the phytopathogen *Xylella fastidiosa*.

Abou Kubaa R, Altamura G, D'Attoma G, Morelli M, Roseti V, Saldarelli P, Boscia D, Saponari M. Estimating prevalence and population size of *Xylella fastidiosa* in olive cultivars with differential phenotypic responses to the bacterial infection.

Boscia D, Altamura G, **Abou Kubaa R,** Leon L, De La Rosa R, Belaj A, Serrano A, Specchia F, Montilon V, Zicca S, Palmisano F, Loconsole G., Dreo T, Saldarelli P, Saponari M. Searching for olives displaying resistance traits to *Xylella fastidiosa* subsp. pauca ST53: experimental evidence and challenges.

Giampetruzzi A, Altamura A, **Abou Kubaa R,** Nicoloso V, Landa BB, Ester Marco-Noales, Saldarelli P, Saponari M. *Xylella fastidiosa* subsp. pauca and multiplex elicit differential responses in a susceptible olive cultivar.

Formisano G, Iodice L, Cascone P, Sacco A, Quarto R, Cavalieri V, **Abou Kubaa R,** Bosco D, Guerrieri E, Giorgini M. Genetic diversity and Wolbachia infection of Italian populations of *Philaenus spumarius*, the main vector of *Xylella fastidiosa* in southern Europe.

Morelli M, Giampetruzzi A, Baptista P, Sisto A, **Abou Kubaa R,** Altamura G, Boscia B, Cameirão C, Costa D, D'Attoma G, De Bellis P, Lino Neto T, Masiello M, Pereira JA, Saponari M, Zicca S, Saldarelli P. Exploring endophytic microbial communities to identify potential biocontrol agents against *Xylella fastidiosa* strain 'De Donno'.

Giampetruzzi A, D'Attoma G, De Stradis A, Altamura G, **Abou Kubaa R**, Nicoloso V, Saponari M, Saldarelli P. *Xylella fastidiosa* and olive interactions: the key role of the plant cell wall.

To read the book of abstracts, please visit: <https://www.efsa.europa.eu/sites/default/files/event/210426-xylella-conf-book-abstracts.pdf>

General News

Twelve Master Of Science Candidates Graduated from IAMB-Italy

IAM-BARI NEW STUDENT GROUP ACADEMIC YEAR 2021-2022

A group of 12 students from the Mediterranean and other countries finished the first year of their program with a Diploma degree in July 2021. The candidate students enrolled in the institute during the COVID-19 pandemic; however, the institute administration facilitated all the comfortable atmosphere for the student to finalize their courses properly. On behalf of the Arab Society for Plant Protection, I express my profound congratulations to the graduated students and the institute director, tutors and administration department for achieving the goal despite all difficulties. I would recommend accepting all students for a different degree because the plant protection sector faces many pests that need to be investigated by such young researchers. The student names are: **Orges Cara (Albania)**, **Dounya BouAicha (Algeria)**, **Zaidat Sabri Ala-Eddine (Algeria)**, **Melkamu Birhanie Mekonnen (Ethiopia)**, **Charlie Abi Saad (Lebanon)**, **Zeinab Sweidan (Lebanon)**, **Reem Yazbeck (Lebanon)**, **Hassan Achetbi (Morocco)**, **Hamza Mghari (Morocco)**, **Wesam Atawneh (Palestine)**, **Manel Ibrahim (Tunisia)**, **Rym Khefacha (Tunisia)**.



The Gypsy moth *Lymantria dispar* (Linnaeus) rise in Lebanon.

Oak forests (Fagaceae) occupy the largest areas of forest in Lebanon covering approximately 40,000 ha. They are found at altitudes between 500 and 1800 meters mainly in the western slopes of the Mount Lebanon chain and extend discontinuously on the eastern slopes at Jabal Barouk-Niha and between Yammouneh and Hermel. Few oak stands persist at Baalbeck, Rachaya and Hasbaya districts and South Lebanon at Jabal Amel. The most common species are *Quercus calliprinos*, *Q. infectoria*, *Q. cerris* var. *pseudo cerris* and *Q. brantii*. Other native minor species are *Q. libani*, *Q. cedrorum*, *Q. ithaburensis ungeri*, *Q. pubescens* and *Q. kotschyana*. Today Lebanon is facing for the first time an outbreak of the gypsy moth, *Lymantria dispar* (Linnaeus), covering all his territories. Eggs deposited in the late summer hatched in spring with caterpillars voraciously eating leaves and causing complete defoliation of broadleaved trees during the last week of May. The pest is not new to Lebanon, it has been recorded since 1950 and later, in 1998, two outbreaks have been reported at Jabal Moussa and Tourza defoliating more than 200 ha. However, during the past 3 years, an outbreak occurred in Ammiq and Ain Zhalta in summer 2019, followed by another one at Deir Ahmar in 2020 causing a complete defoliation of oak trees and other suitable host present in the ecosystems. Pests and associated host plants are very influenced by the climate. During the past decade, Lebanon faces milder winter, hotter and drier summers and reduction in precipitation for a long period from 2013 till 2017 affecting the ground water discharge and inducing water stress to trees. These changes in the climatic condition interfere with the life cycle of the insect causing an exponential growth of the population and increasing consumption. However, the prolonged drought was followed by abundant precipitation at the end of 2018 and through the year 2019 that induced a high vegetative growth rate providing available food to the new hatched larvae of Gypsy Moth in the spring. In addition, oak forests in Lebanon suffer over the last century from fragmentation, fire and human practices such quarries, charcoal, fuel wood production and

overgrazing putting forests under pressure. The detection of the infestation occurs suddenly after a complete defoliation and when larvae of Gypsy Moth became mature and close to the pupation. Treatment with *Bacillus thuringiensis* became inefficient at this stage. With the support of FAO, MoA put intensive pheromone traps at Ain Zhalta, and Amiq in 2019 and at Deir Ahmar in 2020 for capturing the big number of adults after emergence which contributed in decrease mating and laying eggs. However, the population of *L. dispar* have rose in 2021 requiring an aerial spraying of BT based on the assessment of the hatching eggs in the next spring. Three natural enemies on *L. dispar* were identified by the Laboratory of Entomology at LARI from larvae collected in the infested area at Ammiq in 2019: Chalcididae, *Exorista larvarum* (Trachinidae) and the *Brachymeria intermedia* (Chalcididae). However, in 2021, a big number of dead larvae was found hanging the head down or in upside down V shape from branches and trunks in a forest at Batroun indicating presence of pathogen agent such fungus and virus. Larvae were collected and send to the Laboratory of Pathology at LARI for the identification. Birds were reported by the residents flying above infested areas in many regions. These natural enemies are important in contributing to control gypsy moth outbreaks and keeping the population low. [Zinette Moussa (Lebanon), 2021].



Presentation at Misan University

A scientific webinar on phytoplasmas was organized at Misan University on July 7, 2021 and presented by Dr. Abdelkarim Kasem El-Mawla, who focused on this group of pathogens which for some time thought to be caused by viruses because of similarities in mode of transmission (insects) and the symptoms caused on the host plants. Doi *et al.* (1967) was the first to elucidate that these pathogens are pleomorphic prokaryotes with no cell wall and restricted to the phloem tissue, and accordingly they gave them the name mycoplasma-like organisms (MLOs), because of their morphological resemblance with mycoplasmas. With the advances in molecular characterization of these organisms they were given the name "phytoplasmas" in 1994 (IRPCM, 2004). The presentation focused on the main features of phytoplasmas, including symptoms caused by them, their pathogenicity and virulence, transmission characteristics and the major diseases they cause on field and vegetable crops, fruit trees and ornamental plants, as well as their economic importance and means of control. Participants in this webinar were plant protection scientists, including Dr Ibrahim Jboory, ASPP President and Dr. Mohamed Amer Fayad from Basra University, as well as many other colleagues from other universities in Iraq and beyond.

Brief on "Strategy of Integrated Management of Date Palm Orchards" Project

The Strategy of Integrated Management of Date Palm Orchards" project was financially supported by "the Academy of Scientific Research and Technology" in the Arab Republic of Egypt. The project was carried out between 2017-2020 in Siwa, Dakhla and Kharga, and Baharia Oasis of Matrouhm New Valley and Giza Governorates, respectively. **Prof. Dr Salwa Sayed Mohammed Abdel- Samad**, Professor of Biological Control, Plant Protection Research Institute, the Agricultural Research Center, was the Head Investigator of the project. The three Governorates are well known for their agriculture and intensive date palm plantation, with several high-quality cultivars. Date palm is a significant part of the grower's activities. The date fruits are subjected to seven types of pests that cause a substantial production loss and hence deteriorate the quality and quantity of produced dates until storage. The pests controlled are the greater date moth, *Arenipses sabella*, *Batrachedra amydraula*, *Virachola livia* pomegranate flour, *Ectomyelois ceratoniae*, oases mussel worm *Ephestia calidella*, and *Ephestia* sp. Palm trees are infested with the red palm weevil *Rhynchophorus ferrugineus*. Moreover, genetic differences

and changing growth conditions for date palms show vast differences in their final appearance and quality. The most important quality standards for the consumer are colour, size, format, texture, flavour, and nutritional value. One of the objectives of this project is to reach a clean, safe product free from pests through clean and environment-friendly methods along with the exploitation of the bio-fertilization and farmers' training on using sensible consumption of pesticides and preserve of natural enemies. The project reached its goals where parasites such as *Trichogramma*, *Bracon*, *Goniozus* and predators such as Chrysopidae, Coccinellidae and Orius were reared and released to control pests. Two farms in Dakhla and Siwa Oases received the Khalifa International Award for Date Palm and Agricultural Innovation for the two years of 2017 and 2018.

Tomato brown rugose fruit virus (ToBRFV)

1. Introduction: Tomato brown rugose fruit virus (ToBRFV) genus *Tobamovirus* was first observed in 2014 and 2015 on tomatoes in Palestine and Jordan, and outbreaks have recently occurred in several countries round the world and the Middle East. The virus is a major concern for growers of tomato and pepper as it reduces the vigour of the plant, causes yield losses and virus symptoms make the fruits unmarketable. However, the virus may also be present in asymptomatic foliage and fruit.

2. Taxonomic position: Virus, Riboviria, *Virgaviridae*, *Tobamovirus*.

3. Host plants: Tomato (*Solanum lycopersicum*) and capsicum (*Capsicum* sp.) are the main hosts. Inoculation experiments showed that *Nicotiana benthamiana*, *N. glutinosa*, *N. sylvestris*, *N. tabacum* (tobacco) develop symptoms and that weeds such as *Chenopodium murale* and *Solanum nigrum* may act as reservoirs for ToBRFV. Eggplant (*Solanum melongena*) and potato (*S. tuberosum*) did not show symptoms after inoculation of the virus and ToBRFV was not found when the plants were subsequently tested by ELISA.



4. Disease symptoms: ToBRFV causes a wide range of symptoms. Symptoms may range from very severe to mild, or plants can be infected asymptotically. Leaf symptoms often first appear in the young shoots at the top of the plant.

4.1. Symptoms on tomato: The following virus symptoms may be observed on tomato (*Solanum lycopersicum*) infected with ToBRFV.

4.1.1. Leaves or plants: (1) Chlorosis, mosaic patterns (chlorotic/pale patches) and mottling often observed on young leaves at the top of the plant and on side-shoots; (2) Crumpling, puckering or deformation of young leaves; (3) Narrowing of leaves (needle-like symptoms); (4) Blistering of the leaf surface; (5) Wilting of leaves, followed by yellowing and plant death.

4.1.2. Pedicles (stems), calyx (sepals), and petioles: Brown necrotic lesions.

4.1.3. Fruits: (1) Yellow (chlorotic) spots and marbling of fruits; (2) Dark-coloured (necrotic) spots on green fruits; (3) Deformation and uneven ripening of young fruits (e.g. individual fruits can be in red color in some parts and showing green stripes, blotches or patches in other parts); (4) Orange fruits not turning red; (5) Brown rugose (wrinkled) patches (rarely observed); (6) Reduced number of fruits per branch.

4.2 Symptoms on pepper: Only pepper plants that do not harbour the *L3* and *L4* resistance gene/alleles² can be infected and therefore show symptoms; plants harbouring those gene/alleles react with a local hypersensitive response and are therefore not systemically infected.

5. Transmission: ToBRFV is transmitted by seed, contact (contaminated tools, hands, clothing, direct plant-to-plant contact), and propagation material (grafts, cuttings). Tobamoviruses can remain infective in seeds, plant remains and contaminated soil for months. They are found in the seed coat and the endosperm, which could explain why conventional seed disinfection treatments are not fully effective to control them. Even if transmission

from seed to seedling is low, further dissemination by contact (e.g. during transplantation of seedlings or regular handling of the crop) allows a rapid spread within a glasshouse.

6. Possible risks: Tomato and capsicum are important crops, thus symptoms of the disease make the fruit unmarketable. Once the virus is introduced in an area, control measures are very limited and mainly rely on elimination of infected plants and strict hygiene measures. Testing methods (ELISA, RT-PCR) are available to detect the virus in the seed. It therefore seems desirable to avoid its further introduction and spread within the region.

7. Sources:

- EPP0 Bulletin 2021, Volume 51, Issue 1 p. 178-197.
- EPP0 Reporting Service no. 01 – 2019.
- Dombrovsky A, Smith E (2017) Seed transmission of tobamoviruses: aspects of global disease distribution, pp 234-260.
- JKI (2018). Express – PRA zum *Tomato brown rugose fruit virus*.

Scientific Books

Khalifa International Award for Date Palm and Agricultural Innovation, Releasing the First 10 Scientific Publications out of the “50 Booklets Series in the 50th Year” Initiative

Under the directives of H.E. Sheikh Nahayan Mabarak Al Nahayan, Minister of Tolerance and Coexistence, Chairman of the Board of Trustees of the Khalifa International Award for Date Palm and Agricultural Innovation, the Award’s General Secretary launches the first batch of the “50 Booklets series” initiative, which was launched by the award to celebrate the “Year of the Fiftieth”. Where the initiative aims to spread specialized scientific knowledge in compliance with the Award’s objectives and transfer knowledge to farmers and interested people working in the date palm cultivation, date production, and agricultural innovation sectors, at the national, and international levels.

Dr. Abdelouahhab Zaid, Award’s Secretary General, also highlighted the fact that the first batch of booklets were launched in celebration of the fiftieth anniversary of the UAE’s Founding, and coinciding with “Year of the Fiftieth”, which will attract a large group of specialized academic expertise from inside and outside the UAE, covering scientific, technical material as well as innovative success stories. The booklets will also cover the use of artificial intelligence and the prospect of the agricultural future, in a way that contributes to supporting the scientific knowledge infrastructure related to the date palm cultivation, date production, and agricultural innovation sectors. The series of booklets and other publications are all available to the public readers through the Award’s Electronic Library, via the following link (www.ekiaai.com), also added Dr. Zaid.

The first batch of 10 booklets from the 50 Booklets series included the following:



1. The UAE is a green paradise, thanks to Zayed's vision.

The study prepared by Dr. Helal Humaid Saed Al Kaabi, Secretary General of the Abu Dhabi Council for Quality and Conformity, highlighted the insightful vision of the late Sheikh Zayed bin Sultan Al Nahyan, and His Highness interest in agriculture and increasing the green area, during the period His Highness was the ruler's representative in the eastern region, of the Emirate of Abu Dhabi (1946), where this continued after appointing H.H. Sheikh Zayed Bbin Sultan, as the Ruler of Abu Dhabi (1966). His Highness spared no effort in researching and employing the specialists' expertise, from around the world, while His Highness' agricultural vision expanded, to reach what the UAE has become today, a green paradise.

2. Achievements of the Arab Organization for Agricultural Development (AOAD), in developing the field of date palm cultivation and the production.

The study prepared by Professor Ibrahim Adam Ahmed Al-Dukhairi, Organization's Director General, referred to the efforts of the AOAD since its establishment in Khartoum, in developing the date palm cultivation and production sector in the Arab countries, by increasing the cultivated areas and combating pests and diseases that affect date palm trees of various kinds, which include mechanical, agricultural, biological, and chemical damage. In addition to the legislation for the application of strict agricultural quarantine procedures to protect this wealth.

3. Developing the Dates' value chain, and maximizing their added value.

The study prepared by Dr. Amjad Ahmed Mohamed El-Qadi, Director of the Food Industries and Agricultural Processing Technology Center (FAITC), affiliated to the Industry Council for Technology and Innovation in the Ministry of Trade and Industry in the Arab Republic of Egypt, indicated a set of challenges facing the Arab dates, including high losses due to the lack of full implementation of practices. Good agricultural and manufacturing activities that will maximize the value of dates throughout the value chain, especially the post-harvest transactions, processing and packaging.

4. Date Palm borers and Nematodes.

The study presented by Dr. Muhammad Zidan Khalaf, and Dr. Samia Khalil Mahmoud, from the Republic of Iraq, indicated that date palm trees and their fruits are attacked by many insect pests such as palm borers, which are one of the insect pests that cause severe damage to date palm trees. Nematodes (nematodes) pathogenic to insects are also considered one of the effective biological agents that are used to control a wide range of insect hosts, as it is one of the safe methods that do not affect non-target organisms.

5. Date palm in archaeological finds in the Arabian Peninsula.

The study prepared by Dr. Vivian Hanna Al-Shweiri, Professor of Archeology, Civilizations and Ancient Languages, at the Lebanese University, indicated that the date palm tree extends its roots in the Arab lands', since the founding of the land of the Arabs, depicted as a divine source, where its trunk is a firm support, its head is a shelter to people under in its shadows, people who loved it and radiated the authenticity of existence. As the date palm tree is one of the oldest cultivated plants, archaeological evidence indicates that the date palm tree is considered an ancient tree, as its history goes back to thousands of years ago in the land of the Arab world.

6. Agro-tourism, a cultural and recreational agricultural innovation.

The study presented by Dr. Sayed Ashour Ahmed, Professor at the Faculty of Agriculture, Assiut University, Arab Republic of Egypt, indicated the importance of agricultural tourism, as a new type of eco-tourism, which appeared in its current form in the eighties, and developed as a result of social, economic and cultural factors, until it became one of the the most important types of tourism in the world, and one of the most developed, especially in the Middle East, which has distinctive environmental factors, and presenting the most important elements of agricultural tourism in the Arab region.

7. Sustainable oases initiative.

The study presented by Eng. Mohamed Bachri, Director of Strategy and Cooperation, at the National Agency for the Development of Oasis and Argan Regions, in the Kingdom of Morocco, indicated the importance of establishing an international alliance on the "Sustainable Oases" initiative, between the countries concerned with the problems facing the date palm oases, across the desert region, and extended

from The Arabian Gulf to the Atlantic Ocean, under the auspices of the United Nations to develop the necessary tools and resources to protect and ensure the sustainability of these oases.

8. **The Jordanian experience in date palm cultivation and production.**

The study presented by Eng. Anwar Helal Abdullah Haddad, President of the Jordan Dates Association, highlighted the main factors that contributed to the quality of Jordanian dates, despite the short lifespan of the experiment, which does not exceed 20 years. Date Palm cultivation in the Hashemite Kingdom of Jordan, was based on a scientific study, using textile seedlings from reliable global sources, with the development of a specific standard for Jordanian dates, in addition to preparing a national strategy, and a study on the positioning of the Jordanian dates in the international market.

9. **Dates Nutritional benefits.**

The study presented by Eng. Nada Zuhair Ahmed Al-Adeeb, Director of Community Nutrition Department, Tawam Hospital, Abu Dhabi Health Company, Secretary-General of the Emirates Nutrition Association, indicated that dates played an important role in the cultural heritage of the UAE, and many Middle Eastern countries. Given its diverse nutritional value, it contains more calories than most fresh fruits. Eng. Nada also emphasized that including dates in one's diet, is an important way to increase fiber intake, which will benefit the health of the digestive system and improve the body's vitality.

10. **Scientific guide to the prevention and control of the Red Palm Weevil.**

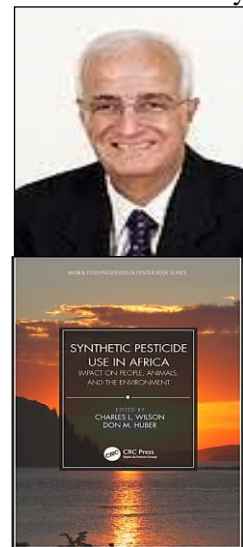
The study presented by Eng. Khaled bin Al-Waleed Mahmoud, and Eng. Islam Mahmoud Abdel Alim, from the Arab Republic of Egypt, answered a number of important questions, most notably about the Red Palm Weevil, a pest that cannot be eradicated? Are the findings of science and technology up to the present time not sufficient to prevent date palm trees from such pests? Is the Red Palm Weevil different from any other pest, and does it have a special nature, different from other known pests?

Synthetic Pesticide use in Africa: Impact on People, Animals, and the Environment

Mohammed Besri, MBTOC member wrote a chapter in the new book that should be out in July entitled: "*Synthetic Pesticide Use in Africa: Impact on People, Animals, and the Environment*". The book edited by Charles L. Wilson and Don M. Huber from Purdue University, Idaho, USA. The chapter (Chapter 12) is entitled "*The Montreal Protocol and the Methyl Bromide Phase-out in the Soil Sector: Key Success Factors and Lessons Learned to Eliminate Synthetic Pesticide Use in Africa*"

SUMMARY OF THE CHAPTER "The Montreal Protocol and the Methyl Bromide Phaseout in the Soil Sector: Key Success Factors and Lessons Learned To Eliminate Synthetic Pesticides Use in Africa"

The Montreal Protocol (MP) on Substances That Deplete the Ozone Layer is an international treaty designed to protect the ozone layer by phasing out the production and consumption of numerous substances that are responsible for ozone depletion including methyl bromide (MB). As a result of the MP, MB use in the soil sector has been completely phased out in 2005 and 2015 (except for the critical use exemptions), respectively, in developed and developing countries except for critical exemptions uses. The ozone hole is slowly recovering, and it is expected that the ozone layer will return to 1980 levels between 2050 and 2070. Technical innovation, industries and farmers' involvement, market transformation, technology acceptance, transfer, implementation and strict phase-out schedules were critical to the success of the MP. MB has been completely been phased out in Africa for soil uses. Unfortunately, many toxic synthetic pesticides to humans and to their environment are still used. About 70 synthetic highly hazardous pesticides have already been banned in the EU but, unfortunately, continue to be used in our continent. Many lessons can be learned from the MP treaty and could be applied to phase out these dangerous synthetic pesticides in Africa. [Mohammed Besri, 2021]. **For more information visit :** www.routledge.com



The Arachnological Bulletin of the Middle East and North Africa

In August 1987, *SERKET* was launched in Egypt, taking its name from the ancient Egyptian language for a scorpion. Seventeen volumes were published until now (each of 3-4 parts). Volume 18 (2021-2022) is in preparation now. *SERKET* welcomes manuscript submission from researchers. Short communications are also welcomed. Correspondence concerning subscription, back issues, publication, etc. should be addressed to the editor:

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ISSN: 1110-502X, Volumes 1-17(4) (1987-2021), 33 years, 17 volumes, 65 parts, 3062 pages, 332 papers. The journal accepts all publications with no fees needed.

246 authors from 29 countries [1 from: Austria, Azerbaijan, Canada, Czech Republic, Denmark, Germany, Israel, Italy, Japan, Jordan, Kazakhstan, Russia, Syria; 2 from: Bangladesh, Bulgaria, Saudi Arabia; 3 from: Belgium, South Africa; 4 from: Cyprus, France, Morocco, U.S.A.; 5 from: Iraq; 6 from: U.K.; 10 from Iran; 16 from: Algeria; 48 from: India; 53 from Egypt; and 66 from Turkey]. New names: 1 genus + 14 species of spiders, 21 species + 1 subspecies of scorpions, and 1 species of solifugae. Thanks to Biodiversity Heritage Library, the back issues of *Serket* can be downloaded from: <http://www.biodiversitylibrary.org/bibliography/103155#summary> and from <https://archive.org/>

Volume v.1-2 (1987-1992) <https://archive.org/details/serket1219elh>

Volume v.3-4 (1992-1996) <https://archive.org/details/serket3419elhe>

Volume v.5-6 (1996-2000) <https://archive.org/details/serket5619elhe>

Volume v.7-8 (2000-2003) <https://archive.org/details/serket7820elhe>

Volume v.9-10 (2004-2006) <https://archive.org/details/serket9102elhe>

Volume v.11-12 (2008-2011) <https://archive.org/details/serket1112elhe>, <http://serket1987.blogspot.com>

SELECTED RESEARCH PAPERS

- **Mating Disruption of *Pseudococcus calceolariae* (Maskell) (Hemiptera, Pseudococcidae) in Fruit Crops.** Carolina Ballesteros, Alda Romero, María Colomba Castro, Sofía Miranda, Jan Bergmann and Tania Zaviezo, *Insects*, 12(4), 343, 2021. <https://doi.org/10.3390/insects12040343>
- **The Insect Pest Control Laboratory of the Joint FAO/IAEA Programme: Ten Years (2010–2020) of Research and Development, Achievements and Challenges in Support of the Sterile Insect Technique.** Marc J. B. Vreysen, Adly M. M. Abd-Alla, Kostas Bourtzis, Jeremy Bouyer, Carlos Caceres, Chantel de Beer, Danilo Oliveira Carvalho, Hamidou Maiga, Wadaka Mamai, Katerina Nikolouli, Hanano Yamada and Rui Pereira. *Insects*, 12(4), 346, 2021. <https://doi.org/10.3390/insects12040346>
- **Biological Strategies of Invasive Bark Beetles and Borers Species.** Denis A. Demidko, Natalia N. Demidko, Pavel V. Mikhaylov and Svetlana M. Sultson, *Insects*, 12(4), 367, 2021. <https://doi.org/10.3390/insects12040367>
- **Biological Control and Insect Pathology.** Eustachio Tarasco and Francesca De Luca, *Insects*, 12(4), 291, 2021. <https://doi.org/10.3390/insects12040291>
- **Virus-Infected Melon Plants Emit Volatiles that Induce Gene Deregulation in Neighboring Healthy Plants.** Carmen López-Berenguer, Livia Donaire, Daniel González-Ibeas, Cristina Gómez Aix, Verónica Truniger, Giuliano S. Pechar, and Miguel A. Aranda, 15 April, 2021. <https://doi.org/10.1094/PHYTO-07-20-0301-R>
- **Assessment of the Effect of Thermotherapy on ‘*Candidatus Liberibacter asiaticus*’ Viability in Woody Tissue of Citrus via Graft-Based Assays and RNA Assays.** Naweena Thapa, Michelle D. Danyluk, Kayla M. Gerberich, Evan G. Johnson, and Megan M. Dewdney, 19 April, 2021. <https://doi.org/10.1094/PHYTO-04-20-0152-R>
- **Influence of Pre-Harvest Bagging on the Incidence of *Aulacaspis tubercularis* Newstead (Hemiptera: Diaspididae) and Fruit Quality in Mango.** Modesto del Pino, Claudia Bienvenido, María Eva Wong, María del Carmen Rodríguez, Juan Ramón Boyero and José Miguel Vela, *Insects*, 12(6), 500, 2021. <https://doi.org/10.3390/insects12060500>

EVENTS OF INTEREST 2021-2022

29/8 – 1/9,/2021	III. Balkan Agricultural Congress, Edirne, Turkey. https://www.agribalkan.net/
7-10 /10/2021	XII International Agriculture Symposium “AGROSYM 2021” Jahorina, Bosnia and Herzegovina. http://agrosym.ues.rs.ba/
10 –13/11/2021	8th International Conference of Radiation Science & Application, at Makadi bay, Hurgada – Egypt. http://esrsaeg.net/conference.html
11-15/7/2022	IX EURAAC Symposium of the European Association of Acarologists in Bari- Italy, https://euraac2022.com/
18-23/7/2022	The 26th International Congress of Entomology, Helsinki, Finland, July 2022. https://ice2020helsinki.fi/

Cotton mealybug, *Phenacoccus solenopsis* Tinsley 1898 (Hemiptera: Pseudococcidae)

Mohammed Zaidan Khalaf (Iraq), 2021

Cotton mealybug, *Phenacoccus solenopsis* becomes a serious pest on ornamental and another crops in Iraq and surrounded countries. The photo is from Hollyhock, *Alcea* spp.



Greenhouse leafhopper, *Hauptidia maroccana*

New record of the greenhouse leafhopper, *Hauptidia maroccana* as a pest of tomato, pepper, basil, peppermint, selery, and parsley in Jordan. It is a severe pest on the above mentioned hosts, hard to control with conventional insecticides in the house gardens.



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

Khalid Alhudaib (Saudi Arabia), Fadhel Abdul-Hussein Al- Fadhel (Iraq), Houda Kawas (Syria), Abdunabi Basheer (Syria), Rawa Muhsen Youssef (Syria), Nadia-AL- Khateeb(Syria), Zinette Moussa (Lebanon), Emad Al-Maarooof(Iraq), Feyroz Ramadan Hassan (Duhok -Iraq), Yasser Ali Habeb (Syria), Mokhtar Abdulsattar Arif (Iraq-Italy), Mohammed Besri (Morocco), Moustafa M.S. Bakry(Egypt), Mohammed Zaidan Khalaf (Iraq), Imen Haddoudi (Tunisia), Amani Mahmoud Alawamleh (Jordan), Zaid Badra (Jordan-Italy), Ahmed Abdelfattah (Egypt), Mohamed W. Negm (Egypt-Japan), Naima Mahfoudhi (Tunisia), Durgham Abdul Aziz Abd Al-Khazai(Iraq), Adnan A. Lahuf (Iraq), Rehab M. El-Gendy (Egypt), Mahran Zeity(Syria), Ahmed B. Abu-Duka(Iraq), Salwa Sayed Mohammed Abdel- Samad(Egypt), Laith Khalil Tawfeeq Al-Anic(Iraq- Malaysia), Sonia Boukhris-Bouhachem, (Tunisia), Wafa Khaled-Gasmi(Tunisia), Nadjia Zermane(Algeria), Abdelouahhab Zaid , Emad Saad (UAE), Elia Choueiri(Lebanon), Anne-Sophie Roy (EPPO, France), Orges Cara (Albania-Bari), Dounya BouAicha (Algeria-Bari), Zaidat Sabri Ala-Eddine (Algeria-Bari), Melkamu Birhanie Mekonnen (Ethiopia-Bari), Charlie Abi Saad (Lebanon-Bari), Zeinab Sweidan (Lebanon-Bari), Reem Yazbeck (Lebanon-Bari), Hassan Achetbi (Morocco-Bari), Hamza Mghari (Morocco-Bari), Wesam Atawneh (Palestine-Bari), Manel Ibrahim (Tunisia-Bari), Rym Khefacha (Tunisia-Bari). Mamoon Alalawi (FAORNE) Lidia AbdelShahid, (FAORNE), Heba Tokali (FAORNE), Ahmed Elsayed (FAORNE), Mohamed Ali Bob (FAORNE), Mahdi Abdel Rahman Ahmed (Sudan). Sonia Al Kafi (Tunisia-UAE)

A special thanks to Dr. Houda Boureghda for her outstanding activity in collecting the scientific archives and activities of the researchers and university staff in Algeria and neighboring countries to enrich the newsletter contents.

News and announcements from all, on any aspect of plant protection in the Arab world, are invited for the Newsletter. Contributions from the Executive Committee of the Arab Society for Plant Protection and from the four Subject Matter Committees, as well as from national societies in the Arab region dealing with any aspect of plant protection, are kindly requested and highly appreciated.

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