

## THE CONTRIBUTION OF THE RESEARCH AND DEVELOPMENT INSTITUTE FOR PLANT PROTECTION TO THE FIRST DETECTION OF INVASIVE INSECT PEST SPECIES IN ROMANIA

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**Abstract:** The global phenomenon of biological invasion is a prevailing and important subject of research, with major negative social and economic consequences, representing a real threat for the native biodiversity of invaded countries. The main elements that favour the entering and spreading of invasive insect pest species into new territories are the intensive trade of goods between different regions, tourism and the on-going climate changes which are predicted to become more severe. Early detection and monitoring of the invasive organisms are essential steps of the foundation of an appropriate and efficient management. The problem of alien invasive species, especially those of agricultural importance, has been an on-going concern for the community of researchers at the Research and Development Institute for Plant Protection in Bucharest, Romania, who have made it the subject of numerous studies and research papers published and incorporated in national and international journals and projects.

**Key words:** *Invasive insect species, first record, damage, Bucharest.*

### INTRODUCTION

Invasive alien species (IAS) are non-native organisms which are introduced into new territories where they have the capacity to cause damage. These invaders are an important threat to the native biodiversity, economy, agriculture, infrastructure and even human health. According to the European Commission the invasive organisms cause a yearly damage worth billions of Euros to the European economy. Invasive alien insects (IAI) can affect biodiversity (including agricultural) directly through the feeding on native plants or plants of economic importance, the predation or parasitism of a native prey or host, or the hybrid reproduction with native species. IAIs can also affect the invaded ecosystems in an indirect manner by being carriers of diseases, competing with natives for food and resources, or by having the same natural enemies as the native species (Kenis et al., 2009). The spread of the alien phytophagous insects into new habitats is favoured by the increasing globalization of human activities such as trade, transportation, tourism and also increasingly severe climate changes. In order to effectively address the continuous expansion of IAIs, scientists must be able to detect the organisms as early as possible, try to eradicate them or manage their proliferation (Reaser et al., 2019). Of greatest importance is the early detection. This is particularly difficult to do because initially, the size and density of the population of invasive insects are very low, the individuals may be very small or live in hidden or unknown microhabitats, they may enter complex or remote ecosystems and simply be unknown to researchers (Martinez et al., 2019).

The purpose of this paper is to disseminate documented information regarding the alien invasive insect species of agricultural importance first recorded by the community of

researchers at the Research and Development Institute for Plant Protection (RDIPP) Bucharest on the territory of Romania.

## MATERIALS AND METHODS

The information for this paper was collected and synthesized from the various research papers written by scientists in the RDIPP in the past four decades.

## RESULTS AND DISCUSSIONS

A total of 11 invasive insect species have been recorded for the first time on the territory of Romania, in the past 41 years, out of which 10 in the past few years. They belong to 4 different orders (Table 1), 10 species are phytophagous pests and 1 species is a useful parasitoid.

**Table 1.** Taxonomic classification of invasive insects first reported at RDIPP, Bucharest, Romania and their host plants

Order	Family	Species Scientific/common name	Host plants
Hemiptera	Aphididae	<i>Pterochloroides persicae</i> (Cholodkovsky, 1899) The black peach aphid	<i>Prunus</i> spp., especially <i>P. armeniaca</i> , <i>P. domestica</i> , <i>P. persicae</i> .
	Acanaloniidae	<i>Acanalonia conica</i> (Say, 1830) The green cone-headed planthopper	Fruit trees ( <i>Corylus avellana</i> , <i>Morus</i> spp., <i>Prunus</i> spp.), grapevine ( <i>Vitis vinifera</i> ), ornamental trees ( <i>Ulmus</i> spp., <i>Cornus sanguinea</i> ), herbaceous plants ( <i>Chenopodium</i> spp., <i>Humulus lupulus</i> , <i>Urtica dioica</i> ) etc.
	Cicadellidae	<i>Arboridia kakogawana</i> (Matsumura, 1932) The Japanese grapevine leafhopper	<i>Vitis vinifera</i> , <i>V. amurensis</i> , <i>Parthenocissus quinquefolia</i> .
		<i>Erasmoneura vulnerata</i> (Fitch, 1851) The North American grapevine leafhopper	<i>Cercis canadensis</i> , <i>C. siliquastrum</i> , <i>Ilex decidua</i> , <i>Parthenocissus</i> spp., <i>Vitis vinifera</i> , <i>Vitis</i> spp.
		<i>Orientalis ishidae</i> (Matsumura, 1902) Japanese leafhopper or Mosaic leafhopper	Woody plants <i>Berberis</i> sp., <i>Betula</i> sp., <i>Buxus sempervirens</i> , <i>Corylus avellana</i> , <i>Crataegus</i> sp., <i>Fagus sylvatica</i> , <i>Prunus domestica</i> , <i>Rosa canina</i> , <i>Salix</i> sp. <i>Ulmus</i> sp. etc., and herbaceous <i>Chelidonium majus</i> , <i>Urtica dioica</i> .
		<i>Scaphoideus titanus</i> (Ball, 1932) The American grapevine leafhopper	<i>Vitis</i> spp.
Hymenoptera	Dryinidae	<i>Neodryinus typhlocybae</i> (Ashmead, 1893) The parasitoid wasp of the citrus flatid planthopper <i>Metcalfa pruinosa</i>	Plant hosts of <i>M. pruinosa</i> ( <i>Acer</i> sp., <i>Buxus</i> sp., <i>Citrus</i> sp., <i>Cornus</i> sp., <i>Corylus</i> sp., <i>Fraxinus</i> sp., <i>Lonicera</i> sp., <i>Malus</i> sp., <i>Olea</i> sp., <i>Prunus</i> sp., <i>Quercus</i> sp., <i>Rubus</i> sp., <i>Vitis</i> sp. etc.)
Lepidoptera	Crambidae	<i>Cydalima perspectalis</i> (Walker, 1859) Box tree moth	<i>Buxus</i> spp.
	Heliozelidae	<i>Coptodisca lucifluella</i> (Clemens, 1860) The North American walnut shield-bearer	Woody plants from family Juglandaceae ( <i>Carya</i> spp., <i>Juglans</i> spp., <i>Pterocarya</i> spp.)
Diptera	Drosophilidae	<i>Drosophila suzukii</i> (Matsumura, 1931) The spotted wing Drosophila	Plants with thin-skinned berries ( <i>Cornus</i> sp., <i>Phytolacca americana</i> , <i>Prunus</i> sp., <i>Rubus</i> sp., <i>Sambucus</i> sp., <i>Taxus baccata</i> , <i>Vaccinium</i> sp.).
		<i>Zaprionus tuberculatus</i> (Malloch, 1932) The African vinegar fly or pomace fly	Rotting fruit of <i>Artocarpus</i> sp., <i>Carissa macrocarpa</i> , <i>Citrus sinensis</i> , <i>Litchi sinensis</i> , <i>Rubus caesius</i> etc.

*Pterochloroides persicae* (Cholodkovsky, 1899) (Hemiptera: Aphididae) - the black peach aphid (Figure 1) - is an invasive aphid species from China. It has spread in India, Pakistan, the Middle East and the Mediterranean region (Laamari et al., 2015). In Romania it was first reported in October 1982 on peach and plum trees in a private house garden in Bucharest (Hondru et al., 1986). A noticeable attack of this aphid was found in a peach orchard in Sadova (Dolj County) in 1983. Apterous forms are dark brown or black in colour with white spots and 3.5-4.0 mm length. The alate forms have a similar colour as the apterous adults and dark, big, characteristic spots on their wings. The species overwinters as eggs under the bark of host trees (*Prunus sp.*). The eggs hatch at the beginning of spring and the nymphs start their life cycle feeding on the trunks of host trees. The black peach aphid lives in large colonies on the trunk of fruit trees. The preferred hosts are peach, apricot and plum trees (Hondru et al., 1986). More recent reports were made in 2004 in experimental orchards in northern Bucharest, where *P. persicae* was one among the four aphid species found on peach trees, with predators such as *Chrysoperla carnea* and parasitoids from the order Hymenoptera associated with aphid colonies (Chireceanu et al., 2006). In current practice in social media sites, the presence of the aphid was also reported from S and S-E of the country.



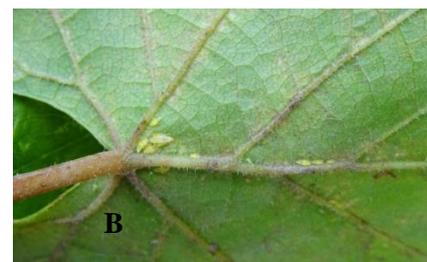
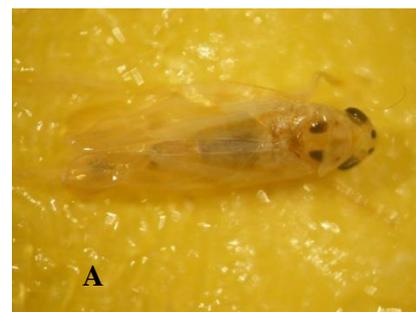
Figure 1. *P. persicae* - colony on a peach tree trunk

*Acanalonia conica* (Say, 1830) (Hemiptera: Acanaloniidae) - the green cone-headed planthopper (Figure 2) - is an invasive species from North America, Guatemala, Cuba and Mexico. It was first reported in Europe in Italy in 2004 (D'Urso & Uliana, 2004). In Romania the species was identified in 2016 in northern Bucharest, caught on yellow sticky traps (Chireceanu et al., 2017). Adults are bright green, have a laterally compressed shape and a length of approximately 10 mm. The nymphs have a hemispherical shape, a light brownish colour and pass through 5 instars. They secrete honeydew and waxy filaments with which they cover the host plants, attracting fungi from the genus *Capnodium*. The planthopper has one generation per year and overwinters as eggs in clefts in the bark of host trees. The species is polyphagous feeding on a wide range of ornamental woody and herbaceous plants, on weeds, fruit shrubs and trees and grapevine. In the years that followed its first report, the planthopper established in the Bucharest area with growing populations (Chireceanu et al., 2019). So far, there are no other reports of this species in other parts of the country.



Figure 2. *A. conica* - nymphs, adults (A) waxy filaments and honeydew (B)

***Arboridia kakogawana*** (Matsumura, 1932) (Hemiptera: Cicadeliidae) - The Japanese grapevine leafhopper (Figure 3) - is native to East Asia. It was first described in Japan in 1932. The first report on European territory was in 1999 in the Krasnodar region in southern Russia. Later it spread to Northern Caucasus (2009), The Crimean Peninsula (2015), Bulgaria (2020), Serbia (2021), Republic of Moldova (2022) (Bragart et al., 2021; Svetlana, 2022). In Romania it was first reported in 2018 on yellow sticky traps in a grapevine plantation in northern Bucharest, being the first report on the European Union territory (Chireceanu et al., 2019). Adults have a body length of 2.6-4.0 mm, light yellow to greenish-yellow. Two black, triangular and characteristic marks can be seen on the vertex and the superior corners of the scutellum. The identification of the species can be made only by describing the genital armature. The main host plants are from the genus *Vitis*. Adults overwinter in sheltered microhabitats of forests in the vicinity of grapevine. The damage is done by adults and nymphs who feed on the leaves of grapevine, piercing and sucking the cellular juice, forming chlorotic spots (Gnezdilov et al., 2008; Bragart et al., 2021). The species can have up to 4 generations in Romania. In the past few years, large adult populations were captured on yellow sticky traps in vineyards in western and eastern Romania alongside other planthopper and leafhopper species, within monitoring programs as part of national projects related to grapevine yellows phytoplasmas and their insect vectors (Chireceanu et al., 2022).



**Figure 3.** *A. kakogawana* adult (A) and nymphs on grapevine (B)

***Erasmoneura vulnerata*** (Fitch, 1851) (Hemiptera: Cicadeliidae) - the North American grapevine leafhopper (Figure 4) - is an invasive species native to North America. It was first reported in Europe in 2004 in Italy. So far it has a limited spread in Europe but became one of the important leafhopper pest species of grapevine in Europe (Duso et al., 2020; Rizzoli et al., 2020). In Romania it was first caught on yellow sticky traps in 2015 in Bucharest and its presence confirmed in 2018 (Chireceanu et al., 2020). Adults are small, 2.7-3.2 mm long and have brownish to orange and reddish color with white spots. They can be easily identified by a white marking on the costal margin of the anterior wing and a transversal red vein in front of the apical cell. The main hosts are *Vitis* sp. and *Parthenocissus* sp. The damage is the consequence of nymphs and adults feeding on leaves by piercing and sucking the cellular juice forming chlorotic spots. Black excrement can be observed on the attacked leaves. *E. vulnerata* overwinters as adults in plant debris or other shelters located near vineyards. It can develop 2-3 generations per year. Similarly to *A. kakogawana*, *E. vulnerata* was captured from vineyards but also in orchards as part of different studies and projects. In vineyards from eastern Romania (Moldova hills) it was an eudominant species (19.18%) alongside *S. titanus* (Chireceanu et al., 2022) and in two abandoned apple and plum orchards it was a dominant species (9.41%)



**Figure 4.** *E. vulnerata* adult (A) and attack on grapevine (B)

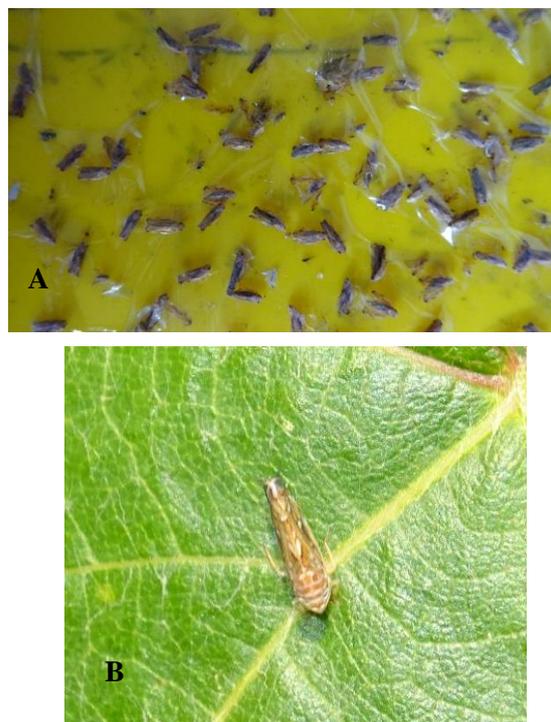
(Teodoru et al., 2021), meaning that the species is well established in these ecosystems, becoming an important pest.

***Orientus ishidae*** (Matsumura, 1902) (Hemiptera: Cicadeliidae) - the Japanese leafhopper or the mosaic leafhopper (Figure 5) - is an invasive insect of East Asian origin. It was first encountered on European territory in Italy in 1998. In Romania it was first discovered in 2016 in Bucharest (Chireceanu et al., 2017). The adults are brown-grey with darker, sometimes orange-reddish markings on head and wings. It is extremely polyphagous preferring mainly woody plants (Parise, 2017). The species has been confirmed as a vector for the grapevine phytoplasma *Flavescence Dorée* (Lessio et al., 2019), apple proliferation phytoplasma (Oppedisano et al., 2017) and peach X-disease phytoplasma (Rosenberger & Jones, 1978). The species was monitored together with *A. conica* in the years following their first report and its populations have been increasing in the areas of northern Bucharest (Chireceanu et al., 2019). *O. ishidae* was the eudominant species with the most captures out of 24 species (Teodoru et al., 2021) in two abandoned orchards in northern Bucharest.



**Figure 5.** *O. ishidae* adults captured on yellow sticky traps.

***Scaphoideus titanus*** (Ball, 1932) (Hemiptera: Cicadeliidae) - The American grapevine leafhopper (Figure 6) - is an invasive insect from North America. The first report in Europe was in the 1950's in France. Since then it has spread all over the continent in all grapevine growing regions. In Romania it was discovered in 2009 in an abandoned vineyard from Bucharest (Chireceanu et al., 2011). Adults are reddish-brown, with white markings. Males are 4.8-5.2 mm long and females 5.5-6.0 mm. Nymphs are milky white-cream and have 5 instars. Eggs are white and laid under the bark of *Vitis* sp., the only plant host on which *S. titanus* can complete its life cycle. It has one generation per year. Nymphs and adults feed by piercing the leaves of grapevine plants and sucking the cellular juice. Its attack is of great importance because it is the main natural vector of the *Flavescence dorée* phytoplasma (Chuche & Thiéry, 2014; Bocca et al., 2020), a quarantine disease in the European Union. In the past 6 years the species has been closely monitored in different vineyards in Eastern and Western Romania as part of different national projects dealing with the vectors of grapevine yellows phytoplasmas. The results have shown



**Figure 6.** *S. titanus* captures on sticky traps (A) and adult on grapevine leaf (B)

the pest's presence in all surveyed locations in large densities with a varying percentage of host plants showing symptoms of phytoplasma infection (Chireceanu et al., 2017, 2019).

*Neodryinus typhlocybae* (Ashmead, 1893) (Hymenoptera: Dryinidae) - is an invasive parasitoid wasp of North American origin (Figure 7) firstly introduced in Europe in 1987 in Italy to be use in a management program against the citrus flatid plant hopper *Metcalfa pruinosa*, another invasive insect with a serious damaging impact for grapevine and other woody and herbaceous plants of economic importance (Alma et al., 2005). The parasitoid wasp is the only natural enemy of *M. pruinosa*. In Romania it was first detected in 2019 in *M. pruinosa* colonies from parks in Bucharest (Chireceanu et al., 2019). The females lay their eggs inside the thorax of *M. pruinosa* nymphs. The parasitoid larvae consume the interior of the pest nymphs and after get out and build oval milky-translucent cocoons in which they pupate (Vétek et al., 2019). There are wasps that hatch from the cocoons the same year (the bivoltine population) and some that hatch the following year in spring (the univoltine population) (Strauss, 2012). The cocoons of the wasp were found on numerous plant species damaged by *M. pruinosa*. After the first detection, *N. typhlocybae* has spread in western Romania (Chireceanu & Dobromir, 2019). More important, the RDIPP team of researchers has found that a significant proportion of parasitoid wasps have their own hymenopteran hyperparasitoids, which limit their populations and certainly the wasps' ability to successfully control the citrus flatid planthopper (unpublished data).



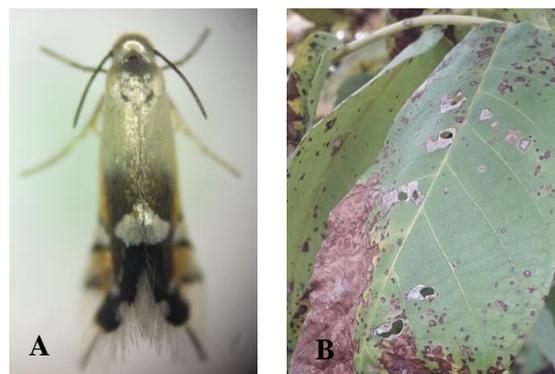
**Figure 7.** *N. typhlocybae* - cocoons in a *M. pruinosa* colony (A); adults: female (B) and male (C)

*Cydalima perspectalis* (Walker, 1859) (Lepidoptera: Crambidae) - the box tree moth (Figure 8) - is an invasive moth species native from Asia (China, Korea, India, Japan, Russian Far East). Its presence on the European continent was signalled in 2006 in Germany. The first report for Romania was in 2010 on buxus plants in a public park from north-western Bucharest under the name of *Diaphania perspectalis* (Walker, 1859) (Iamandei, 2010). Adults have white bodies and brown head. The wings are white with a brown irregular girdle on the anterior and posterior margins of the fore wings and on the outer margin of the hind wings (Korycinska & Eyre, 2011). Damage is caused by larvae which feed on the plant leaves and bark. Plants are left defoliated and covered in the silky filaments left behind by the moving larvae. The attacks are extremely severe both in urban planted areas and natural ecosystems where *Buxus sp.* shrubs are growing naturally (Leuthardt et al., 2013). Plant hosts are from the genus *Buxus*. Since 2010 the pest has spread throughout the country. Hulujan et al. (2021) in a study conducted in western Romania, on the natural enemies, found that pupae of the box tree moth had a parasitism rate between 9.2 and 18.8% and a predation frequency between 12.5 and 19%. The earwig *Forficula auricularia* L. was observed feeding on moth pupae.



**Figure 8.** Adult of *C. perspectalis*.

***Coptodisca lucifluella*** (Clemens, 1860) (Lepidoptera: Heliozelidae) - the walnut shield-bearer (Figure 9) - is an invasive leaf miner moth from North America. Its first detection on the European continent was in 2010 in Italy and in Romania in august 2022 (Chireceanu et al., 2022). Adults are very small with a wing span of approximately 4.1 mm. Their body and head are covered in grey-silvery scales. The lower half of the forewings have a distinct marking made up of 2 white triangles bordered by orange and black scales and hairs. The damage to host plants is done by females who lay their eggs in the leaf mesophyll. After the hatching the larvae feed on the mesophyll forming mines between the two epidermises. Once they reach the final stage of development they stop feeding and build their cocoons from the epidermises of the mine. Once the cocoon is completed they carry it to a favourable pupating or wintering spot (tree trunks, bark crevices, plant debris). The species may have 2-4 generations per year (Bernardo et al., 2015; Takács et al., 2020). Plant hosts of *C. lucifluella* are trees from the family Juglandacea - *Juglans spp.*, *Carya spp.*, *Pterocarya spp.* Ulterior to its first report, further studies concerning the percent damage on common walnut trees and the rate of parasitization by indigenous parasitoids have been made. The mean damage percent per walnut tree reached 81% in October and the mean parasitism rate of moth larvae was 31.8% (unpublished data).



**Figure 9.** *C. lucifluella*: adult (A) and symptoms of attack (B).

***Drosophila suzukii*** (Matsumura, 1931) (Diptera: Drosophilidae) - the spotted wing drosophila (Figure 10) - is an invasive fruit fly coming from South-Eastern Asia. In 2008 it entered both Europe (Italy and Spain) and North America (California). Afterwards it rapidly extended its presence in many countries of Europe, North and South America. In Romania the first specimens were collected in September 2013 on wild blackberry shrubs in northern Bucharest in a Tephri trap used for capturing the Mediterranean fruit fly *Ceratitidis capitata*. The adults of *D. suzukii* are small with an approximate length of 2-4 mm. Sexual dimorphism is evident, the male has a dark spot on the lateral exterior margin of each wing, trait that sets the species apart from other European *Drosophila* sp. The first pair of legs presents two hairy comb-like formations on the first and second tarsal articles. In some circumstances these spots may be absent and the identification of males can be made using the tarsal hairy formations or the genital armature. The females lack the wing spot and can be identified after the characteristic ovipositor which presents 30-36 black teeth on each side. With the help of this strong ovipositor the female breaks the exocarp of host fruits for egg laying. The larva is cylindrical, of white or cream colour, have visible internal organs and completes three instars (Walsh et al., 2011). *D. suzukii* has between 3-9 generations per year and overwinters as an adult in different shelters,



**Figure 10.** *D. suzukii* male (A) and pupa (B)

under the bark of woody plants or under plant debris. The damage is caused by females who prefer to lay their eggs inside healthy mature fruits, by piercing their soft epicarps with their strong ovipositors. The larvae develop inside the fruits by eating the pulp. The impact of this species is all the more important because it targets healthy fruit and not decomposing ones like other species of *Drosophila*. The species has been closely monitored in the past years and the results show that populations have adapted in northern Bucharest and even if they are not captured in large numbers their presence is constant (unpublished data).

**Zaprionus tuberculatus** (Malloch, 1932) (Diptera: Drosophilidae) - the African vinegar fly (Figure 11) - is an invasive fruit fly native in the Afrotropical realm and the islands of the Indian Ocean (Tsacas et al., 1977; Chassagnard & Tsacas, 1993). It was first reported in Europe in 2008 in Greece (Crete) and afterwards in other Mediterranean countries (Raspi et al., 2014; EPPO, 2020).



**Figure 11.** *Z. tuberculatus* captured adults (A) and adult (B).

In Romania the species was initially captured in September - November 2014 in northern Bucharest (Chireceanu et al., 2015) and a second time in October - November 2018 (unpublished data). The adults are brownish-red and have 4 lighter longitudinal stripes across their head and thorax. They can be identified by a hairy tuft on the basal segment of the tarsus (males) and a small tuber like formation with a long seta on the femur of the first pair of legs (both sexes) (Patlar et al., 2012). It is considered a secondary pest because it only attacks decomposing fruit, leaving no visible symptoms, but in association with the Japanese spotted wing drosophila represent an important risk for fruit production.

## CONCLUSIONS

The research papers documenting the first reports of invasive insect pests in Romania have contributed to the knowledge and popularization of information about these organisms which were helpful for farmers and other actors involved in plant protection, urban or rural.

In these studies the importance of early detection is highlighted for its key role in the efficient management of these pests. Similarly, of utmost importance is the reporting and studying of new alien pests that enter the country and are vectors of dangerous plant diseases that have the potential to disrupt agricultural production in important areas.

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## REFERENCES

ALMA, A., FERRACINI, C., BURGIO, G. (2005). Development of a sequential plan to evaluate *Neodryinus typhlocybae* (Ashmead) (Hymenoptera: Dryinidae) population associated with *Metcalfa pruinosa* (Say) (Homoptera: Flatidae) infestation in northwestern Italy. *Environmental Entomology*, 34, 819-824.

- BERNARDO, U., VAN NIEUKERKEN, E.J., SASSO, R., GEBIOLA, M., GUALTIERI, L., VIGGIANI, G. (2015). Characterization, distribution, biology and impact on Italian walnut orchards of the invasive North-American leafminer *Coptodisca lucifluella* (Lepidoptera: Heliozelidae). *Bulletin of Entomological Research*, 105, 210-224.
- BOCCA, F. M., PICCIAU, L., ALMA, A. (2020). New insights on *Scaphoideus titanus* biology and their implications for integrated pest management. *Entomologia Generalis*, 40, 337-349.
- BRAGARD, C., BAPTISTA, P., CHATZIVASSILIOU, DI SERIO, F., GONTHIER, P., JAQUES MIRET, J. A., FEJER JUSTESEN, A., MAGNUSSON, C. S., MILONAS, P., NAVAS-CORTES, J. A., PARNELL, S., POTTING, R., REIGNAULT, P. L., STEFANI, E., THULKE, H.-H., VAN DER WERF, W., CIVERA, A. V., YUEN, J., ZAPPALÀ, L., GREGOIRE, J.-C., MALUMPHY, C., KERTESZ, V., MAIORANO, A., MACLEOD, A. (2021). Pest categorisation of *Arboridia kakogawana*. *EFSA Panel on Plant Health (PLH), EFSA Journal* 2022, 20, 1, 7023.
- CHASSAGNARD, M.-TH., TSACAS, L. (1993). Le sous-genre *Zaprionus* s. str. définition de groupes d'espèces et révision du sous-groupe vittiger (Diptera: Drosophilidae). *Annales de la Société Entomologique de France*, 29, 173-194.
- CHIRECEANU, C., BĂLAN, V., DROSU, S., SIVU, C. (2006). Entomophagous range and structure in the aphid colonies of peach-trees grown in the Bucharest-Băneasa area. *Lucrări științifice UȘAMVB, Seria A*, 69, 229-235.
- CHIRECEANU, C., PLOAIE, P.G., GUTUE, M., NICOLAE, I., STAN, C., COMSA, M. (2011). Detection of the Auchenorrhyncha fauna associated with grapevine displaying yellows symptoms in Romania. *Acta Phytopathologica et Entomologica Hungarica*, 46, 253-260. DOI: 10.1556/APhyt.46.2011.2.9.
- CHIRECEANU, C., TEODORU, A., CHIRILOAIE, A. (2015). The first detection of fruit fly *Zaprionus tuberculatus* Malloch (Diptera: Drosophilidae) in the eastern part of Europe (Romania). *Analele Universității din Craiova-Biologie, Horticultură, Tehnologie Prelucrării Produselor Agricole, Ingineria Mediului*, 20, 377-382.
- CHIRECEANU, C., TEODORU, A., GUTUE, M., DUMITRU, M., ANASTASIU, P. (2017). Two new invasive hemipteran species first recorded in Romania: *Orientus ishidae* (Matsumura 1902) (Cicadellidae) and *Acanalonia conica* (Say 1830) (Acanaloniidae). *Journal of Entomology and Zoology Studies*, 5, 2, 824-830.
- CHIRECEANU, C., TEODORU, A., MIHU, G., BOSOI, M., STOIAN, I. (2017). Presence of the grapevine leafhopper *Scaphoideus titanus* in vineyards in North-Eastern Romania. *Proceedings of the VIII International Agricultural Symposium "Agrosym 2017"*, 1261-1266.
- CHIRECEANU, C., PETCU, D. I., TEODORU, A., CHIRILOAIE-PALADE, A. (2019). Data on the abundance of *Orientus ishidae* (Matsumura, 1902) and *Acanalonia conica* (Say, 1830) in South of Romania, two years after the first detection. *Acta Oecologica Carpatica*, 12, 53-62.
- CHIRECEANU, C., PODRUMAR, T., TEODORU, A., DOBROMIR, D., CARDEI, P. (2019). Distribution and population density of the North American leafhopper *Scaphoideus titanus* in vineyards from western Romania. *AgroLife Scientific Journal*, 8, 24-33.
- CHIRECEANU, C., NEDELCEA, D., SELJAK, G. 2019. First record of the Japanese grape leafhopper *Arboridia kakogawana* (Matsumura 1932) (Hemiptera: Cicadellidae) from Romania. *EPPO Bulletin*, 1-7.
- CHIRECEANU, C., GEICU, A. G., TEODORU, A. (2019). First record of *Neodryinus typhlocybae* (Ashmead) (Hymenoptera: Dryinidae) in Romania, a parasitoid wasp of the citrus flatid planthopper *Metcalfa pruinosa*. *Romanian Journal for Plant Protection*, 12, 109-114.
- CHIRECEANU, C., DOBROMIR, D. (2020). A new record of *Neodryinus typhlocybae* in Romania. *Romanian Journal for Plant Protection*, 13, 52-54.
- CHIRECEANU, C., BOSOI, M., PODRUMAR, T., GHICA, M., TEODORU, A., CHIRILOAIE-PALADE, A., ZAHARIA, R. (2020). Invasive insect species detected on grapevines in Romania during 2016-2019 and first record of *Erasmoneura vulnerata* (Fitch, 1851) (Hemiptera: Cicadellidae). *Acta Zoologica Bulgarica*, 72, 649-659.

- CHIRECEANU, C., TEODORU, A., MIHU, G., PODRUMAR, T., PUȘCALĂU, M., DOBROMIR, D. (2022). Abundance and diversity of Auchenorrhyncha species in vineyards from Romania. *Scientific Papers. Series B, Horticulture*. 66, 268-276.
- CHIRECEANU, C., MUSTĂȚEA, R.-V., TEODORU, A. (2022). The Walnut Shield Bearer *Coptodisca Lucifluella* (Clemens, 1860) (Lepidoptera: Heliozelidae) - The First Record in Romania. *Romanian Journal for Plant Protection*, 15, 15-23.
- CHUCHE, J., THIÉRY, D. (2014). Biology and ecology of the Flavescence dorée vector *Scaphoideus titanus*: a review. *Agronomy for Sustainable Development*, 34.
- D'URSO, V., ULIANA, M. 2004. First record of *Acanalonia conica* (Issidae) in Italy, 26-27. *Abstracts Third European Hemiptera Congress*, St. Petersburg, Russia, 8-11 June.
- DUSO, C., ZANETTIN, G., GHERARDO, P., RANIERO, D., ROSSETTO, F., TIRRELLO, P., POZZEBON, A. (2020). Colonization Patterns, Phenology and Seasonal Abundance of the Nearctic Leafhopper *Erasmoneura vulnerata* (Fitch), a New Pest in European Vineyards. *Insects*, 11, 731.
- GEICU, A.-G., CHIRECEANU, C. (2019). O nouă semnalare a afidului brun de scoarță al piersicului *Pterochloroides persicae* în România. Sesiunea anuală a Institutului de Cercetare Dezvoltare pentru Protecția Plantelor, București, România, *Book of abstracts*, 29-30.
- GNEZDILOV, V. M., SUGONYAEV, E. S., ARTOKHIN, K. S. (2008). *Arboridia kakogawana* (Matsumura) (Hemiptera Cicadellidae Typhlocybinae) – a new pest of grapevine in Southern Russia. *Redia*, 91, 51-54.
- HONDRU, N., MĂRGĂRIT, G., POPA, I. (1986). Afid - un nou dăunător al culturilor pomicole - *Pterochloroides persicae* (Cholodowsky, 1899) (Homoptera - Aphidina - Lachnidae). *Analele Institutului de Cercetări pentru Protecția Plantelor*, 19, 151-154.
- HULUJAN, I. B., FLORIAN, T., FLORIAN, V. C., OLTEAN, I. (2021). Zoophagous entomofauna and entomopathogenic agents reported on *Cydalima perspectalis* (Walker, 1859) in north-western of Romania. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*, 49, 1-14.
- IAMANDEI, M. (2010). *Diaphania perspectalis* (Walker 1859) (Lepidoptera:Crambidae) a new pest of *Buxus spp.* in Romania. *Scientific Papers USAMVB series B*, 54, 787-797.
- KENIS, M., AUGER-ROZENBERG, M.-A., ROQUES, A., TIMMS, L., PÉRÉ, C., COCK, M. J. W., SETTELE, J., AUGUSTIN, S., LOPEZ-VAAMONDE, C. (2009). Ecological effects of invasive alien insects. *Biological Invasions*, 11, 21-45. doi 10.1007/s10530-008-9318-y.
- KORYCINSKA, A., EYRE, D. (2011). Box tree caterpillar *Cydalima perspectalis* – Plant pest Factsheet. *The Food and Environment Research Agency (Fera)*. <https://planthealthportal.defra.gov.uk/assets/factsheets/boxTreeCaterpillar2011.pdf>
- LAAMARI, M., COEUR D'ACIER, A., JOUSSELIN E. (2015). Première observation du puceron brun *Pterochloroides persicae* (Cholodkovsky) (Homoptera, Aphididae, Lachninae) sur pêcher en Algérie. *Bulletin OEPP/EPPO Bulletin*, 45, 106-107.
- LEUTHARDT, F., GLAUSER, G., BAUR, B. (2013). Composition of alkaloids in different box tree varieties and their uptake by the box tree moth *Cydalima perspectalis*. *Chemoecology* 23, 203-212. doi.org/10.1007/s00049-013-0134-1.
- LESSIO, F., BOCCA, F., ALMA, A. (2019). Development, spatial distribution and presence on grapevine of nymphs of *Orientus ishidae* (Hemiptera: Cicadellidae), a new vector of *Flavescence Dorée* phytoplasmas. *Journal of Economic Entomology*, 20, 1-7.
- MARTINEZ, B., REASER, J. K., DEGHAN, A., ZAMFT, B., BAISCH D., MCCORMICK, C., GIORDANO, A. J., AICHER, R., SELBE, S. (2019). Technology innovation: advancing capacities for the early detection of and rapid response to invasive species, *Biological Invasions*, 22, 75-100. doi.org/10.1007/s10530-019-02146-y.
- OPPEDISANO, T., PEDRAZZOLI, F., CAINELLI, C., FRANCHI, R., GUBERT, F., MARINI, L., MAZZONI, V., DE CRISTOFARO, A., IORIATTI, C. (2017). Investigation of the biodiversity and landscape ecology of apple orchards to investigate potential new vectors of apple proliferation. *IOBC/WPRS Bulletin*, 123, 104–105.
- PARISE, G. (2017). Notes on the biology of *Orientus ishidae* (Matsamura, 1902) in Piedmont (Italy) (Hemiptera: Cicadellidae: Deltocephalinae). *Cicadina*, 17, 19-28.

- PATLAR, B., KOC, B., YILMAZ, M., OZSOV, E. D. (2012). First records of *Zaprionus tuberculatus* (Diptera: Drosophilidae) from the Mediterranean Region, Turkey. *Drosophila Information Service*, 95, 94-96.
- RASPI, A., GRASSI, A., BENELLI, G. (2014). *Zaprionus tuberculatus* (Diptera Drosophilidae): first records from the European mainland. *Bulletin of Insectology*, 67, 157-160.
- REASER, J. K., BURGIEL, S. W., KIRKEY, J., BRANTLEY, K. A., VEATCH S. D., BURGOS-RODRÍGUEZ, J. (2020). The early detection of and rapid response (EDRR) to invasive species: a conceptual framework and federal capacities assessment, *Biological Invasions*, 22, 1-19. doi.org/10.1007/s10530-019-02156-w.
- RIZZOLI, A., BATTELLI, R., CONEDERA, M., JERMINI, M. 2020. First record of *Erasmoneura vulnerata* Fotch, 1851 (Hemiptera, Cicadellidae, Typhlocybinæ) in Switzerland. *Alpine Entomology*, 4, 151-156.
- ROSENBERGER, D., JONES, A. (1978). Leafhopper vectors of the peach X-disease pathogen and its seasonal transmission from chokecherry. *Phytopathology*, 68, 782–790.
- STRAUSS, G. (2012). Environmental risk assessment for *Neodryinus typhlocybae*, biological control agent against *Metcalfa pruinosa*, for Austria. *European Journal of Environmental Sciences*, 2, 102-109.
- SVETLANA, G. (2022). Information about the presence of the japanese grape leaf hopper *Arboridia kakogawana* (Matsumura, 1932) (Hemiptera: Cicadellidae) in the Republic of Moldova. *Biology and Sustainable Development*, 24-25.
- SZALÁRDI, T., NAGY, K., NAGY, A. (2019). Distribution of the American grapevine leafhopper (*Scaphoideus titanus* Ball 1932) in west Romania. *Acta Agraria Debreceniensis*, 2, 127-130. doi:10.34101/actaagrar/2/3690.
- TAKÁCS, A., SZABÓKY, C., TÓTH, B., BOZSÓ, M., KUTAS, J., MOLNAR, S., RICHTER, I. (2020). Nearctic walnut leafminers invade Europe: first *Coptodisca lucifluella* (Clemens, 1860) and now *Coptodisca juglandiella* (Chambers, 1874) (Lepidoptera, Heliozelidae). *Nota Lepidopterologica*, 43, 77-93.
- TEODORU, A., FLORESCU, I., GEICU, A. G., CHIRECEANU, C., Auchenorrhyncha fauna associated with abandoned apple and plum orchards in northern Bucharest in 2020. *Scientific Papers. Series B, Horticulture*. 65, 256-265.
- TSACAS, L., DAVID, J., ALLEMAND, R., PASTEUR, G., CHASSAGNARD, M.T., DERRIDJ, S. (1977). Biologie évolutive du genre *Zaprionus*. Recherches sur le complexe spécifique de *Z. tuberculatus* (Dipt. Drosophilidae). *Annales de la Société Entomologique de France*, 13, 391-415.
- VÉTEK, G., KORÁNYI, D., MEZŐFI, L., BODOR, J., PÉNZES B., OLMÍ, M. (2019). *Neodryinus typhlocybae*, a biological control agent of *Metcalfa pruinosa*, spreading in Hungary and reaching Slovakia. *Bulletin of Insectology*, 72, 1-11.
- WALSH, D. B., BOLDA, M. P., GOODHUE R. E., DREVES, A. J., LEE, J., BRUCK, D. J., WALTON, V. M., O'NEAL, S. D., ZALOM, F. G. (2011). *Drosophila suzukii* (Diptera: Drosophilidae): Invasive pest of Ripening Soft Fruit Expanding its Geographic Range and Damage Potential. *Journal of Integrated Pest Management*, 2, 1-7.