

METCALFA PRUINOSA (SAY) (HEMIPTERA: FLATIDAE) IDENTIFIED IN A NEW SOUTH EASTERN AREA OF ROMANIA (BUCHAREST AREA)*Constantina CHIRECEANU*¹, *Cătălin GUTUE*²¹Research and Development Institute for Plant Protection Bucharest, Romania²Faculty of Agriculture, University of Agronomic Sciences and Veterinary Medicine Bucharest, Romania¹* correspondence address:

Research-Development Institute for Plant Protection
Bd. Ion Ionescu de la Brad nr. 8, CP 013813, S 1,
Bucharest, ROMANIA
Tel.: 004-021-2693234
Fax.: 004-021-2693239
e-mail: cchireceanu@yahoo.com

ABSTRACT During August-October of 2011, the presence of *Metcalfa pruinosa* (Say), a nearctic invasive flatid plant-hopper introduced from North America to Europe in 1979, was detected on fruit trees, grapevines and different ornamental and shrubs plant species in private gardens, public institutions courts in Bucharest city and adjacent areas. Adults were directly observed or captured on the yellow sticky traps set up in orchards and grapevine plots with or without protective management to detect the specific phytoplasma insect vectors. The large white waxy filaments amount and the honeydew production caused unaesthetic damages to garden, terraces and ornamental plants. First detection of the pest in Romania was on plants in urban green areas and public parks in 2009. Taking into consideration that the *M. pruinosa* continues to spread with growing populations in new areas of country and also the way of feeding in the plants phloem, it could be suspected to play a role in the epidemiology of important diseases with spreading through the insects, such as viruses and phytoplasmas. The Japanese maple leafhopper, *Japananus hyalinus* (Osborn) was detected in *M. pruinosa* colonies on maple trees.

Key words: *Metcalfa pruinosa*, fruit trees, grapevines, urban gardens areas.

INTRODUCTION

Metcalfa pruinosa (Say 1830) (Insecta: Hemiptera: Flatidae), known as citrus flatid plant-hopper (Lauterer 2002) is a nearctic invasive species which was introduced from North America into Europe (Italy) in 1979 (Zangheri & Donadini 1980, Duso 1984, Arzone et al. 1987) from where this rapidly has expanded (spread, dispersed) to countries in Europe and Asia (Girolami et al. 2002, Strauss 2009, Gnezdilov & Sugonyaev 2009, Yeyeun et al. 2011) mainly by the worldwide trade with fruit trees, vine cuttings and ornamental plants which can carry especially eggs of pest. In America, *M. pruinosa* occurs in two subspecies, the typical form widespread in areas from Florida, Texas, New Mexico, Arizona, California and Mexico, Ontario and the subspecies *M. pruinosa cubana* (Metcalf & Bruner 1948) in Cuba (Lauterer 2002). Adult insects are often transported by the road vehicles stationed near infected host plants (Pantaleoni 1989). Local invasion is relatively slow and it is facilitated by the ability of adults to fly actively (Zezlina & Girolami 1999). The nymphs can develop large populations from the eggs introduced in new areas in absence of its specific natural parasites (Strauss 2009, Mifsud et al. 2010). The insect has one generation per year (Della Giustina & Navarro 1993) and is very polyphagous, it has been reported on more than 300 plants, including a wide range of trees and bushes or cultivated plants (vines, apple, pear, plum and peach), forests and weeds (García et al. 2002, Matošević & Pernek 2010). The economic damages of *M. pruinosa* are directly by feeding of nymphs and adults on the sap of plants and indirectly by the massive productions of waxy secretions and honeydew produced especially by fifth instars nymphs and adults during daylight hours (Wilson & Lucchi 2007). The honeydew deposited on plants is an adequate substrate which enables the development of the black sooty moulds (Della Giustina & Navarro 1993). The flowers and fruits are

qualitatively depreciated they becoming unmarketable. *M. pruinosa* is also regarded as a special threat for grapevine and fruit orchards, the adults are supposed to be involved in epidemiology of economically important diseases such as virus and phytoplasmas diseases (Danielli et al. 1996, Guadagnini et al. 2000, Landi et al. 2007). The vineyards into forest areas are more frequently colonized by the *M. pruinosa* (Duso et al. 2010). From the other perspective, *M. pruinosa* is positive considered, the bees collect the honeydew producing a honey named the "Metcalfa honey" well known on the market in Italy and France for its quality (Wilson & Lucchi 2007).

In Romania, *M. pruinosa* was reported as recently introduced invasive alien species in two regions of country: the south-eastern part (Constanta County) (Preda & Skolka 2009, 2011) and the western part (Timiș County) (Gogan et al. 2010) on the ornamental plants in parks and urban areas.

The purpose of this work was to improve the existing knowledge about the *M. pruinosa* in Romania by reporting its occurrence in new areas and on new host plants, contributing to the configuration of movement route as well as the range of host plants of its inside area of country.

MATERIAL AND METHODS

From August to October 2011, during the monitoring program on the insect vectors of phytoplasma diseases spreading in fruit trees, hawthorn and vine plots in and near Bucharest city areas, adults of *Metcalfa pruinosa* were detected visually and on the yellow sticky traps set up in these crops (fig. 1). About at the same time, following the request of some garden owners in residential areas in/and adjacent areas of Bucharest, we detected the invasion of this insect on garden plants, terraces and ornamental plants and also on house walls. Based on these first signals, our observations were extended to the courtyard of two public institutions, Research Development Institute for Plant Protection and University of Agronomic Sciences and Veterinary Medicine from Bucharest to detect the another plant species affected by the attack of *M. pruinosa* and identify the new host plants. Periodically, we made visual observations directly on herbaceous and woody plants until October. The plant species that showed adults, nymphs, waxy filaments or honeydew secretions occurrence have been noted as host plants for *M. pruinosa* for our zone. The yellow sticky traps in fruit trees orchards, vine and hawthorn plots were checked weekly and adults were collected until October.

RESULTS AND DISCUSSION

Results of our investigation carried out in the zones affected by the flatid planthopper *M. pruinosa* in and near Bucharest city are presented in Table 1.

Based on data collected with this survey, a range of 33 plant species from 18 botanical families have been recorded as host for adults and larvae of the invasive species *M. pruinosa* in Bucharest areas. Of these, 22 host species belonged to ornamental and shrubs plant species and 11 host species belonged to fruit crop species and grapevine. The first signals which attested the presence of *M. pruinosa* on plant species in Bucharest area were represented by the adults captured simultaneously on the first two days of August 2011 on yellow sticky traps (Figure 1) installed in the vine plots, apple orchards and hawthorn bushes. The identification of adults as belonging to the new invasive *M. pruinosa* species was easy to do due to their distinctive aspects extensively described in literature. The adults, about 5–9 mm long, have large moth-like wings covered with a dense white waxy powder giving them a bluish nuance with two characteristic dark spots located on the basal half of each forewing. The larvae (Figure 1) also covered by white wax and the waxy filaments are particularly long on the apex of the abdomen (Lauterer, 2002). Our investigation was facilitated by the visible presence of the adults or nymph associated with the typical signs represented by the white waxy secretions (Figure 2) and honeydew production as result of their feeding activity. The mass invasions of insects with various stages of development rapidly colonized the fruit trees, garden plants, terraces and ornamental plants in citizen private properties. *M. pruinosa* seemed to be attracted to light, a large number of specimens were also found on the wells of houses creating a discomfort for people. Pest density was low to moderate level, but the population density is expected to increase within the next years, and also to extend the range of host plant species in the context that it continues to spread rapidly.

Regarding the *M. pruinosa* in Romania, the current situation indicated the species was detected for the first time in the South-Eastern part (Constanta county) in 2009 and then in the Western part (Timis county) in 2010, two opposite geographical points located at two extreme borders of the country. To these are added our results reported in Bucharest area in 2011 (Figure 3). It is notable that the Bucharest area, investigated by us, is located at about 250 km from Constanta city, the first point of *M. pruinosa* penetration, on the Southern border of the country. Based on our observations performed this year, we have come to the conclusion that this new invasion of species produced from Constanta direction. During a time of two years, the species advanced the distance of 250 km between the two areas; this means that it is an aggressive invasive species with a high rate of spreading. This fact revealed that *M. pruinosa* extended continuously occupying new territory as well as new host plants, showing a great ability to spread and adapt to the conditions inside the territory of Romania. The progress of the pest toward other new areas appears to be favored by its capability to produce many offspring and enabled by the alternative presence of various wild and cultivated host plants on which the pest colonized without any discrimination.

From the practical and research perspective, it requires an understanding of the biology, ecology and effective control measures of this pest as well as its agronomical impact in the event that this has a high rate of spread and becomes steady in fruit and grape growing regions in Romania. Taking into account that *M. pruinosa* is suspected to play a role in epidemiology of phytoplasma agents which cause some of the most devastating diseases of orchards and grapevines worldwide, our further research will be directed towards approaching this aspect.

It is worth mentioning that the presence of the japanese maple leafhopper, *Japananus hyalinus* (Osborn 1900) (Figure 4), was reported in *M. pruinosa* colonies on maple trees in courtyard of Research Development Institute for Plant Protection Bucharest. *J. hyalinus* (Cicadellidae, Deltocephalinae) is also an invasive non-European species, native to the Eastern Asia (Japan) (Arzone 1987) or Eurosiberia (Nickel & Remane 2002), from where it spread with the worldwide trade of maple trees. It was recorded for the first time in Europe (Austria) in 1961 (Arzone 1987). The distribution of this species is related to its host plants, *Acer spp.*, in Austria, Bulgaria, Switzerland, Czech Republic, Germany, Spain, France, Hungary, Italy, Montenegro, Romania, Serbia, Slovenia, Slovakia, Russia, Poland (Arzone 1987, Gnezdilov 2000, Emeljanov et al. 2002, Seljak 2002, Šefrová & Laštůvka 2005, Mifsud et al. 2010, Swierczewski & Walczak 2011). In Romania, *J. hyalinus* was reported for the first time by Dlabola in 1961 (Arzone 1987).

Table 1

The plant species on which *Metcalfa pruinosa* has been recorded in zones of Bucharest city, in 2011

Ornamental and shrubs plant species		Fruit crop species and grapevine	
Species/Genus	Family	Species/Genus	Family
<i>Thuja occidentalis</i>	Cupressaceae	Malus domestica	Rosaceae
<i>Pinus sp.</i>	Pinaceae	<i>Pyrus communis</i>	Rosaceae
<i>Ulmus sp.</i>	Ulmaceae	<i>Prunus americana</i>	Rosaceae
<i>Acer negundo</i>	Sapindaceae	<i>Prunus domestica</i>	Rosaceae
<i>Acer platanoides</i>	Sapindaceae	<i>Prunus persica</i>	Rosaceae
<i>Platanus sp.</i>	Patanaceae	Prunus avium	Rosaceae
<i>Aesculus hippocastanum</i>	Hippocastanaceae	<i>Prunus cerasifera</i>	Rosaceae
<i>Crataegus monogyna</i>	Rosaceae	<i>Vitis vinifera</i>	Vitaceae
<i>Rosa sp.</i> (various cultivars)	Rosaceae	<i>Rubus idaeus</i>	Rosaceae
<i>Rosa canina</i>	Rosaceae	<i>Lycium sp.</i>	Solanaceae
<i>Spiraea vanhouttei</i>	Rosaceae	<i>Juglans regia</i>	Juglandaceae
<i>Celtis occidentalis</i>	Cannabaceae		
<i>Ligustrum vulgare</i>	Oleaceae		
<i>Jasminum sp.</i>	Oleaceae		
<i>Hibiscus syriacus</i>	Malvaceae		
<i>Parthenocissus quinquefolia</i>	Vitaceae		
<i>Clematis vitalba</i>	Ranunculaceae		
<i>Evonymus sp.</i>	Aquifoliaceae		
<i>Hedera helix</i>	Araliaceae		
<i>Yucca sp.</i>	Agavaceae		
<i>Robinia pseudoacacia</i>	Fabaceae		
<i>Tilia spp.</i>	Malvaceae		



Fig. 1. *Metcalfa pruinosa*: adult on yellow sticky trap in grapevine; adult on apricot; adult and larvae on pear leaf (original)



Fig. 2. *Metcalfa pruinosa*: exuviae and waxy filaments on plants leave (original)



Fig. 3. *Japananus hyalinus* adult on maple leaf (original)

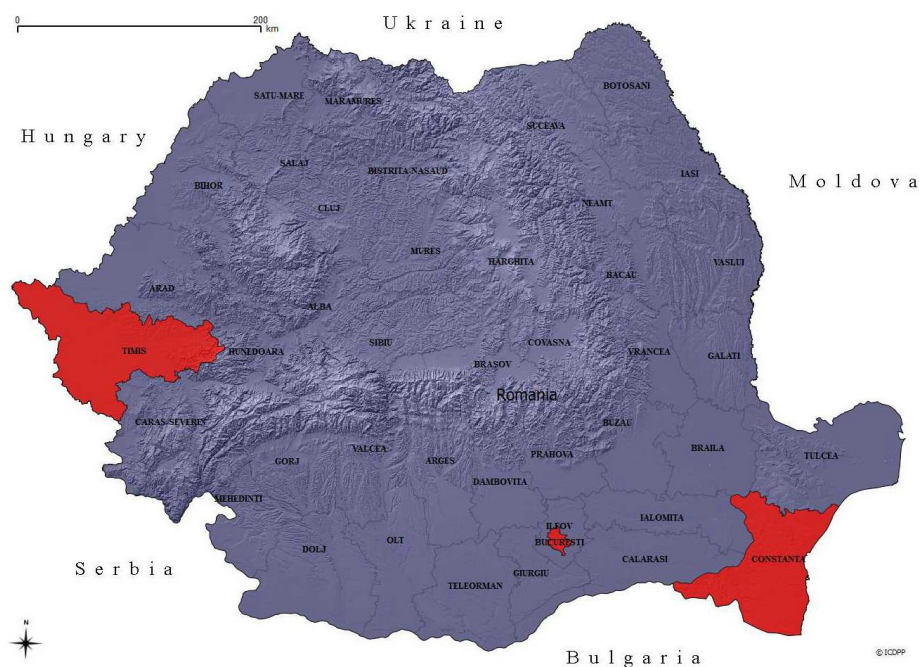


Fig. 4. The presence of the citrus flatid plant-hopper (*M. pruinosa*) in Romania (Constanta County - cited by Preda & Skolka 2009; Timis County – cited by Gogan et al. 2010; Bucharest – this report 2011)

CONCLUSIONS

The invasive species (*Metcalfa pruinosa* Say) was recorded on fruit species (apple, pear, apricot, peach, cherry and plum and grapevine as well as on ornamental trees and shrubs in various botanical families in Bucharest city and adjacent areas (South-Eastern part of Romania) in 2011. The mass invasion of insects was detected in citizen private properties on the fruit trees, garden plants, terraces and ornamental plants and also on houses walls.

The new *M. pruinosa* invasion in Bucharest areas produced from Constanta county direction.

The Japanese maple leafhopper, *Japananus hyalinus* (Osborn) was detected in *M. pruinosa* colonies on maple trees.

Acknowledgements

We thank Gudrun Strauss (Austrian Agency for Health and Food Safety, Austria) and Gabrijel Seljak (Department of Plant Protection, Chamber from Agriculture and Forestry of Slovenia) who kindly provided literature. This research was integrated within framework of the project PN II no 52-130/2008-2011 financed by the Ministry of Research, Education and Innovation from Romania.

REFERENCES

- ARZONE, A., VIDANO, C., ALMA, A. (1987). Auchenorrhyncha introduced into Europe from the Nearctic region: and phytopathological problems. *Proc. 2nd Int. Workshop on Leafhoppers and Planthoppers of Economic importance*. Provo, Utah USA, 28th July-1st Aug. Eds. M.R. Wilson & L.R. Nault, CIE, London, 1986, pp. 3-17.
- DANIELLI, A., BERTACCINI, A., VIBIO, M., MORI, N., MURARI, E., POSENATO, G., GIROLAMI, V. (1996) Detection and molecular characterization of phytoplasmas in the planthopper *Metcalfa pruinosa* (Say) (Homoptera: Flatidae). *Phytopath. Medit.* 35(1):62–65.
- DELLA GIUSTINA, W., NAVARRO, E. (1993). *Metcalfa pruinosa*, un nouvel envahisseur? *Phytoma* 451:30–32.
- DUSO, C. 1984. Infestations by *Metcalfa pruinosa* in the Venice district. *Informatore Fitopatologico*, 34(5):11-14.
- DUSO, C., MORI, M., POZZEBON, A., MARCHESINI, E., GIROLAMI, V. (2010). Problemi, tendenze e innovazioni nel contenimento degli artropodi dannosi alla vite Tignole e cicaline. *Approfondimenti*, 15-25. http://paduaresearch.cab.unipd.it/4169/2/Duso_et_al_protezione_delle_colture_2010a.pdf.
- EMELJANOV, A.F., GNEZDILOV, V.M., GJONOV, I.V. (2001). New records of the Cicadina from Bulgaria based on material collected in 2000, with comments of the list of Bulgarian Cicadina. Pp. 15 In: 2nd European Hemiptera Congress, Slovenia, Fiesa, 20–24 June 2001. Program and book of abstracts.

- GOGAN, A., GROZEA, I., VIRTEIU, A. M. (2010). *Metcalfa pruinosa* Say (Insecta:Homoptera: Flatidae) - First occurrence in western part of Romania. *Research Journal of Agricultural Science*, 42(4): 63-67.
- GARCÍA, S., FERNÁNDEZ, X.P., LUMBIERRES, B. (2002). Presencia de *Metcalfa pruinosa* (Say) (Homoptera:flatidae) sobre plantas ornamentales en Cataluña. *Phytoma España: La revista profesional de sanidad vegetal*, 136, 34-38.
- GIROLAMI, V., MAZZON, L., ALMA, A. (2002). Il flatidae *Metcalfa pruinosa* (Say) in Europa vent'anni dopo. *Informatore Fitopatol.*, 7-8:10-13.
- GUADAGNINI, M., MORI, N., ALBERGHINO, S., CARTURAN, E., GIROLAMI, V. AND BERTACCINI, A. (2000) Molecular evidence of phytoplasma transmission to grapevine by *Metcalfa pruinosa* (Say) in Italy. In *Extended abstracts of XIIIth Meeting of the International Council for the Study of viruses and virus-like diseases of the grapevine (ICVG), Adelaide,(Australia), 12-17 March, pp. 99-100.*
- GNEZDILOV, V.M. (2000). The fauna of Cicadina (Homoptera) of the main plant formations of North-West Caucasus // *Trudy Zool. Inst. Ross. Akad. Nauk.* 286: 45-48
- GNEZDILOV, V.M., SUGONYAEV, E.S. (2009). First record of *Metcalfa pruinosa* (Homoptera: Fulgoroidea: Flatidae) from Russia. *Zoosystematica Rossica*, 18(2), 260-261.
- LANDI F., PRANDINI A., PALTRINIERI, S., MORI N., BERTACCINI A. (2007). Detection of different types of phytoplasmas in stone fruit orchards in northern Italy. *Bulletin of Insectology*, 60 (2):163-164.
- LAUTERER, P. (2002). Citrus Flatid Planthopper-*Metcalfa pruinosa* (Hemiptera: Flatidae), a new pest of ornamental horticulture in the Czech Republic. *Plant Protection Science*, 38(4):145-148.
- PANTALEONI, A.R. (1989). Modalità d'invasione di un nuovo areale in *Metcalfa pruinosa* (Say, 1830) (Auchenorrhynca: Flatidae). *Bollettino dell'Istituto di Entomologia "Guido Grandi" della Università degli Studi di Bologna*, 43:1-7.
- PREDA, C., SKOLKA, M. (2009). First record of a new alien invasive species in Constanta - *Metcalfa pruinosa* (Homoptera: Fulgoroidea). In: Păltineanu C. (Ed.) *Lucrările Simpozionului Mediul și agricultura în regiunile aride*; Prima editie. Bucuresti. Estfalia, pp. 141-146.
- WILSON, S.W., LUCCHI, A. (2007). Feeding activity of the Flatid planthopper *Metcalfa pruinosa* (Hemiptera:Fulgoroidea). *Journal of the Kansas Entomological Society*, 80(2), 175-178.
- YEYEUN, K., MINYOUNG, K., KI-JEONG, H., SEUNGHWAN, L. (2011). Outbreak of an exotic flatid, *Metcalfa pruinosa* (Say) (Hemiptera: Flatidae) in the capital region of Korea. *Journal of Asia-Pacific Entomology*, 14(4):473-478.
- MATOŠEVIĆ, D., PERNEK, M. (2011). Alien and invasive insects in Croatian forest Ecosystems and estimate of their damage. *Šumarski list – Posebni broj*, 264-271.
- MIFSUD, D., COCQUEMPOT, C., MÜHLETHALER, R., WILSON, M., STREITO, J-C., (2010). Other Hemiptera Sternorrhyncha (Aleyrodidae, Phylloxeroidea, and Psylloidea) and Hemiptera Auchenorrhyncha. Chapter 9.4. *BioRisk* 4(1): 511-552, Special issue: Alien terrestrial arthropods of Europe. doi: 10.3897/biorisk.4.63.
- NICKEL, H., REMANE, R. (2002) Check list of the planthoppers and leafhoppers of Germany with notes on food plants, diet width, life cycles, geographic range and conservation status (Hemiptera, Fulgoromorpha and Cicadomorpha). *Beitr zur Zikade* 5:27-64 (English translation of original, *Artenliste der Zikaden Deutschlands, mit Angabe von Nahrungspflanzen, Nahrungsbreite, Lebenszyklus, Areal und Gefährdung* (Hemiptera, Fulgoromorpha et Cicadomorpha)) only available as pdf (http://www.gwdg.de/*hnickel).
- SELJAK, G. (2002) Non-european Auchenorrhyncha (Hemiptera) and their Geographical distribution in Slovenia. *Acta Entomologica Slovenica* 10: 97-101.
- STRAUSS, G. (2009). Host range testing of the nearctic beneficial parasitoid *Neodryinus typhlocybae*. *Biocontrol*, 54:163-171.
- STRAUSS, G. (2010). Pest risk analysis of *Metcalfa pruinosa* in Austria. *Journal of Pest Science*, 83:381-390.
- SWIERCZEWSKI D., WALCZAK M. (2011). New and rare Auchenorrhyncha species in the Polish fauna. *DGaaE-Nachrichten*. 25(1):32-34.
- ZANGHERI, S. DONADINI, P. (1980). Appearance in the Venice district of a Nearctic bug: *Metcalfa pruinosa* Say (Homoptera, Flatidae). *Redia*, 63:301-305.
- ZEZLINA, I., GIROLAMI, V. (1999). Spreading of *Metcalfa pruinosa* Say in Slovenia and Italy and seasonal dynamics of its developmental stages. *Zbornik predavanj in referatov 4. Slovenskega Posvetovanja o Varstvu Rastlin v Portorožu*. 3(4): 453-458.