

A New Problem for Western Romania: *Metcalfa pruinosa* emiptera: Flatidae

Ioana GROZEA^{1*}, Alina GOGAN¹, Mihai VLAD¹, Ana Maria VIRTEIU¹, Ramona STEF¹, Alin CARABET¹, Snejana DAMIANOV¹, Teodora FLORIAN²

¹) Faculty of Agriculture, Agricultural Entomology Discipline, Department of Biology and Plant Protection, Banat's University of Agricultural Sciences and Veterinary Medicine "Regele Mihai I al României" from Timisoara, Calea Aradului, 119, Timisoara.

²) Department of Environment and Plant Protection, University of Agricultural Science and Medicine Veterinary, Calea Mănăştur 3-5, Cluj-Napoca, Romania.

*Corresponding author, e-mail: ioana_entomol@yahoo.com

Bulletin UASVM Horticulture 72(1) / 2015

Print ISSN 1843-5254, Electronic ISSN 1843-5394

Doi:10.15835/buasvmcn-hort:10337

ABSTRACT

The cicada considered for this study is *Metcalfa pruinosa* (Say), called flatid plant hopper, a species that has recently caught the attention of experts in Romania. In year 2010, it was seen for the first time in the western part of country and it was identified by some routine observations. Is considered a non-native species knowing that originated in America. Objectives focused primarily exploration the territory in the western part, in order to report the first larval colonies and secondly identification of host plants. Observations were made during three years, 2011 to 2013 and included several points located near the western border. For monitoring of the immature stages (larvae, nymphs) direct observations were made in green spaces, parks, vineyards and orchards. Having in mind that larva is the most important stage, if we refer to damage plants, all our attention was directed to this. Somewhat, the results certify the polyphagism of this species, indicating numerous species of infested plants. Among, frequently infested with larval colonies, in green spaces, were *Acer negundo*, *Acer pseudoplatanus*, *Acer campestre*, *Acer platanoides*, *Tilia cordata*, *Catalpa bignonioides*, *Juglans regia*, *Ligustrum vulgare*, *Hibiscus syriacus*, etc. On the other hand, in the vineyards and orchards, plants affected were *Malus domestica*, *Persica vulgaris*, *Prunus persica*, *Prunus armeniaca*, *Prunus domestica* and *Vitis vinifera*. Currently, in the western part of Romania, over 50 host plants were identified, tree species (shrubs, trees, fruit -trees), culture plants (sunflower, soybean) and a lot of herbaceous species.

Keywords: colonies, invasive, *Metcalfa pruinosa*, polyphagous.

INTRODUCTION

The citrus flatid planthopper (*Metcalfa pruinosa*) is native to the Nearctic region, more specifically in Eastern North America, from Ontario to Florida, Mexico and Cuba (Metcalf and Bruner, 1948). It is a common species on the American continent (Chittenden, 1900; Van Duzee, 1923; Weese, 1924; Willson and McPherson, 1981) and Europe (Grozca *et al.*, 2011; Drosopoulos *et al.*, 2004; Lauterer, 2002; Preda and Skolka, 2011; Sivic, 1991; Trenchev *et al.*, 2006; Zangheri and

Donadini, 1980). In 2 years ago was raised in Asia, too (Kim *et al.*, 2011).

The cicada is a species with a polyphagism emphasized; in places of origin has a great range of host plants (over 100 plant species) and in Europe is recorded over 300 plant species (Alma *et al.*, 2005; Wilson and Lucchi, 2000).

MATERIALS AND METHODS

The research has been carried out in a large territory of west part of Romania. Observations were made during three years, 2011 to 2013 and

included several points located near the western border. These points have been covered in 3 counties (Timis, Caras Severin and Mehedinti) on the southern direction, starting from the reference County, Timis (where was the first outbreak).

In term of monitoring activity. For Timis County were established follow point of observation (OP): Timișoara1 (green space + park); Timișoara2 -Didactic Experimental Resort-BUAVMT (vineyard+orchard); In Caras Severin County have been monitored less points, such as: Reșița (green space + park), Tirol (vineyard) and Caransebeș (green space+park). For Mehedinti County, the locality under observation was Drobeta-Turnu Severin (green space +park) (Fig. 1).

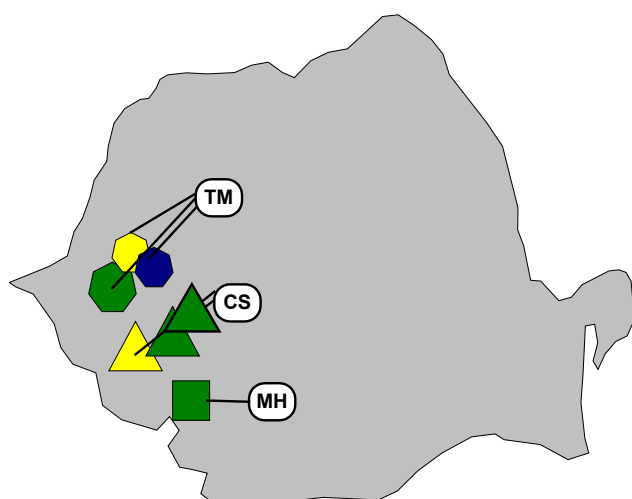


Fig. 1 Map of the points of observation in western counties (TM-Timis county, CS-Caras Severin county, MH-Mehedinti county); green points color represents green spaces and parks, yellow points represents vineyards and blue points show the orchards.

Each point was observation through the prism of larval colonies present on the leaves or young shoots of host plants (mentioned in specialty literature or from the native range of the green spaces, orchards or vineyards under studies).

For monitoring of the immature stages (larvae, nymphs) direct observations were made in green spaces, parks, vineyards and orchards. So, 3 readings were performed per year; a monthly reading (1 reading in July, 1 reading in August and

1 reading in September), usually in the middle of every month. Marking points of study was achieved with the help of GPS.

Regarding the establish of host plants. In this regard have been completed more stages: direct observations in order to establish a first set of host plants/PO; regular observations to identify new host plants; collection of samples (portions of sprouts, whole leaves, grapes) and finally transport and analyze in detail.

For both, monitoring and the range of host plants, there have been two types of observations, direct on plants in the area and their development and indirect, through detailed studies from the laboratory to the magnifying glass vision.

RESULTS AND DISCUSSION

First report of the invasive cicada, called *Metcalfa pruinosa*, in western Romania was recognized in year of 2010 (the place named Young Naturalists Resort Park of Timisoara (pointed with red color in the map) (Fig. 2). This is in fact

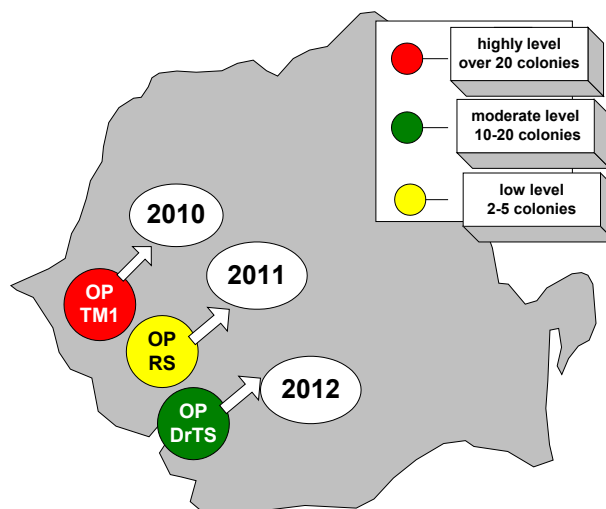


Fig. 2 Map of the first larval colonies, in western counties subject to the observations ((TM-Timis county, CS-Caras Severin county, MH-Mehedinti county)); red point is the first place where the insect was observed for the first time in west part of country.

the reference point of our studies.

The subsequently researches, carried out in the years 2011, 2012 and 2013 revealed also the presence in other localities/points of observation. Next we make a short presentation of status in all points under observation. It is necessary to

mention that in this paper data are presented only in Southern direction, from Timisoara (first point of occurrence) to Danube.

Range of host plants. In OP/Timisoara1, plant species infested with larval colonies of *Metcalfa* were numerous, over 35 with high frequency

follows: *Tilia cordata*, *Ligustrum vulgare*, *Catalpa bignonioides*; *Fraxinus excelsior*, *Ficus carica*, *Hibiscus syriacus*, *Juglans nigra*, *Acer platanoides*, *Acer campestre*, *Acer negundo*, *Rosa sp.*

In the three years of observations, in mixed plantation (vineyard and orchard) from OP/Timisoara2 (DER-BUAVMT they highlighted the

Tab. 1 List of host plants for larvae of *Metcalfa pruinosa* in OP/Timisoara1- green space + park, in 2011-2013 period

N	Family	Plant species	Colonies of larvae present on	
			Leaves	Shoots
1	Tiliaceae	<i>Tilia cordata</i>		x
2		<i>Acer negundo</i>	x	x
3		<i>Acer pseudoplatanus</i>		x
4	Aceraceae	<i>Acer campestre</i>		x
5		<i>Acer platanoides</i>		x
7	Anacardiaceae	<i>Cotinus coggygria</i>		x
8		<i>Rhus typhina</i>		x
9	Rosaceae	<i>Rosa sp</i>	x	x
10	Araliaceae	<i>Hedera helix</i>	x	x
11		<i>Sambucus nigra</i>		x
12	Adoxaceae	<i>Viburnum lantana</i>	x	x
13	Berberidaceae	<i>Berberis thunbergii</i>	x	x
14		<i>Buxus microphylla</i> ,	x	x
15	Buxaceae	<i>Buxus sempervirens</i>	x	x
16		<i>Carpinus betulus</i>		x
17	Betulaceae	<i>Corylus avellana</i>		x
18	Bignoniaceae	<i>Catalpa bignonioides</i>		x
19	Cornaceae	<i>Cornus sp.</i>		x
22	Caprifoliaceae	<i>Heptacodium miconioides</i>		x
23	Cannabaceae	<i>Humulus lupulus</i>		x
24	Fabaceae	<i>Robinia pseudoacacia</i>		x
25	Hydrangeaceae	<i>Philadelphus sp.</i> ,		x
26		<i>Juglans regia</i>		x
27	Juglandaceae	<i>Juglans nigra</i>		x
28	Malvaceae	<i>Hibiscus syriacus</i>		x
29	Moraceae	<i>Ficus carica</i>	x	x
30		<i>Fraxinus excelsior</i>		x
31	Oleaceae	<i>Ligustrum vulgare</i>	x	x
32	Plantaginaceae	<i>Plantago major</i>	x	x
33		<i>Pyrus communis</i>	x	x
34	Rosaceae	<i>Spiraea x vanhouttei</i>		x
35	Sapindaceae	<i>Aesculus hippocastanum</i>		x
36	Ulmaceae	<i>Ulmus minor</i>	x	x
37	Vitaceae	<i>Parthenocissus quinquefolia</i>	x	x
38	Magnoliaceae	<i>Magnolia kobus</i>	x	x

following plants: *Vitis vinifera*, *Persica vulgaris*, *Malus domestica*, *Prunus persica*, *Prunus armeniaca*, *Prunus domestica* (Tab. 2).

Insects was observed on all fruit trees in all the study, less than *Prunus domestica* which has not been observed in 2011.

In point of observation OP/Resita the cicada had a smaller range plants of infested plants only on the leaves and young shoots, belonging to two species, *Acer platanoides* and *Acer negundo* (Tab.3).

Data obtained as a result of observations made in observation point from Drobeta Turnu Severin showed a large variety of infested plants. The

larval colonies were fixed on plants which belong to the following botanical families: *Tiliaceae*, *Rosaceae*, *Aceraceae*, *Betulaceae* and *Oleaceae* (Tab. 4). So that, may be considered host plants, species like *Acer negundo*, *Acer platanoides* and *Acer campestre*.

It is important to note that at this point, the first report of the invasive insect was achieved only in the year 2012. In the first year of observations, 2011, the cicada was not present.

In point of observation OP/Tirol (vineyard) and OP/Caransebes (green space+park) the cicada has been found in no place researched and no plants.

Tab. 2 List of host plants for larvae of *Metcalfa pruinosa* in OP/Timisoara2- vineyard + orchard, in 2011-2013 period

N	Family	Plant species	Colonies of larvae present on	
			Leaves	Shoots/fruit stem
1	Rosaceae	<i>Persica vulgaris</i>	x	x
2		<i>Prunus armeniaca</i>		x
3		<i>Prunus persica</i>		x
4		<i>Prunus domestica</i>	x	x
5	Vitaceae	<i>Malus domestica</i>	x	x
6		<i>Vitis vinifera</i>	x	x

Tab. 3 List of host plants for larvae of *Metcalfa pruinosa* in OP/Resita- green space + park, in 2011-2013 period

N	Family	Plant species	Colonies of larvae present on	
			Leaves	Shoots
1	Aceraceae	<i>Acer negundo</i>	x	x
2		<i>Acer platanoides</i>	x	x

Tab. 4 List of host plants for larvae of *Metcalfa pruinosa* in OP/Dr. Turnu Severin- green space + park, in years of 2012 and 2013

N	Family	Plant species	Colonies of larvae present on	
			Leaves	Shoots
1	Aceraceae	<i>Acer negundo</i>	x	x
2		<i>Acer campestre</i>	x	x
3		<i>Acer platanoides</i>	x	x
4	Tiliaceae	<i>Tilia cordata</i>		x
5	Betulaceae	<i>Carpinus betulus</i>		x
6	Oleaceae	<i>Fraxinus excelsior</i>		x
7	Hydrangeaceae	<i>Philadelphus sp.</i>		x

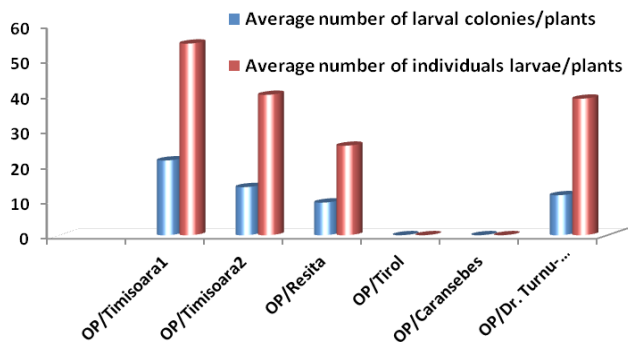


Fig. 3 The level of larval colonies and individuals larvae on plants, in several observation points from western Romania.

Colonies and larvae on plants. In Fig. 3 average values are represented in comparison mod, between populational level of the larvae and colonies present in the observation points. Far as in OP/Timisoara values are higher than in

other places. Explainable, maybe due to the fact that here was the first report of the insect and also, there exist one year advance ahead of other points (2010 is the first appearance of insect in Timisoara).

If you make the comparison between OP with green spaces and parks, we can see in the graph as in OP/Timisoara1 and other points, OP/Resita and OP/Dr.Turnu Severin there are some differences. In OP/Timisoara1, the values show that the colonies and that of larvae is higher, respectively over 20 colonies and 50 larvae on the plants. In OP/Resita and OP/Dr. Turnu Severin the values were lower, but it's not close to the minimum level, over 5 col. and 20 larvae/plants in OP/Resita while in OP/Dr.Turnu Severin these were over 10 col. and 30 larvae/plants. No colony of larvae was not found in OP-Caransebes.

Comparing the points of agricultural material (vineyards and orchards) the result is quite



Fig. 1 Larvae and their waxy secretion on leaves



Fig. 2 Larvae and their waxy secretion on leaves



Fig. 3 Larval waxy secretion the shoot (indirect damage)



Fig. 4 Colonies of larvae on shoots (strongly affected plants)

obvious, in OP/Tirol no colony of larvae was found in the observed period, while in OP/Timisoara2 the values were smooth high (over 15 colonies and over 40 larvae present on the plants).

Damages. There are various hypotheses concerning the effects produced by this invasive species. After some researchers (Lucchi and Santini, 2001; Kahrer et. al., 2009) cicada can cause both direct and indirect damage.

In our studies we found that the symptomatology describes in specialty literature is similiary. So, direct damage can be associated with local characteristic discoloration with is achieved through mouth adapted for stung and sucked.

Indirect damage is caused by the presence of waxy secretion filamentous of color white- snow (Fig. 1, Fig. 2, Fig. 3.). In case of strong infestation, leaves, fruits, bunches of grapes, stems and shoots have been strongly affected (Fig. 4).

Fig. 1,2,3,4 Aspect of indirect and direct damages on several host plants in some places (parks, green spaces, vineyards) from western Romania

CONCLUSION

The invasive insect *Metcalfa pruinosa* is in installation period in our country, which is why we cannot draw a conclusion finals. The sheer volume of work and multiple directions of study we allow only partial conclusions.

Thus we can say that, tha cicada is present both fields, ornamental and agricultural, having a great range of host plants.

Plants with the highest larval infestation are folows: *Tilia cordata*, *Ligustrum vulgare*, *Catalpa bignonioides*; *Fraxinus excelsior*, *Ficus carica*, *Hibiscus syriacus*, *Juglans nigra*, *Acer platanoides*, *Acer campestre*, *Acer negundo*, *Rosa sp*, *Vitis vinifera* and *Persica vulgaris*. These presented both forms, weak and strongly attack.

Regarding populational level of the larvae and colonies present in the observation points, far as the in OP/Timisoara values are higher than in other places (over 20 colonies and 50 larvae on the plants).

Not in all observation places were found larval colonies of *Metcalfa pruinosa*.

Acknowledgments. We want to thank the authorities in charge of parks and green spaces from each location where studies were made. Also,

to the voluntary persons for that we have helped to periodic readings.

REFERENCES

- Alma A, Ferracini C, and Burgio G (2005). Development of sequential plan to evaluate *Neodryinus typhlocybae* (Ashmead) (Hymenoptera: Drynidae) population associated with *Metcalfa pruinosa* (Say) (Homoptera: Flatidae) infestation in Northwester Italy, Biological control-parasitoids and predatoris 34 (4): 819-824.
- Chittenden FH (1900). Notes on two species of "lightning [sic] hoppers." United States Department of Agriculture, Division of Entomology. Bulletin 22:98-99.
- Drosopoulos A, Broumas T, and Kapothanassi V (2004). *Metcalfa pruinosa* (Hemiptera, Auchenorrhyncha: Flatidae) an undesirable new species in the insect fauna of Greece. Annals of the Benaki Phytopathological Institute 20(1): 49-51.
- Grozea I, Gogan A, Vîrteiu AM, Grozea A, Ştef R, Molnar L, Cărbăţ A, Dinnesen S (2011). *Metcalfa pruinosa* Say (insecta: homoptera: flatidae): A new pest in Romania. African Journal of Agricultural Research 6 (27):5870-5877.
- Kahrer A, Strauss G, Stolz M, Moosbeckhofer R (2009). Beobachtungen zu Faunistik und Biologie der vor kurzem nach Österreich eingeschleppten Bläulingszikade (*Metcalfa pruinosa*). Beiträge zur Entomofaunistik 10: 17-30.
- Kim Y, Kim M, Hong KJ, Lee S (2011). Outbreak of an exotic flatid, *Metcalfa pruinosa* (Say) (Hemiptera: Flatidae), in the capital region of Korea. Journal of Asia-Pacific Entomology 14: 473-478.
- Lauterer P (2002). Citrus flatid planthopper - *Metcalfa pruinosa* (Hemiptera: Flatidae), a new pest of ornamental horticulture in the Czech Republic. Plant Protect. Sci. 38: 145-148.
- Lucchi A, Santini L (2001). Aspetti fisiologici e morfofunzionali in *Metcalfa pruinosa* (Homoptera: Fulgoroidea) con riferimento agli effetti prodotti sulle produzioni agricole e sulle alberature ornamentali. Atti dell'Accad. Nazionale Ital. Entomol. Rendiconti 131 - 147.
- Metcalf ZP, Bruner SC (1948). Cuban Flatidae with new species from adjacent regions. Annals of the Entomological Society of America 41: 63-118.*
- Preda C, Skolka M (2011). Range Expansion of *Metcalfa pruinosa* (Homoptera: Fulgoroidea) in Southeastern Europe. Ecologia Balkanica 3:79-87.
- Sivic F (1991). Medeci skrzat ze v Slovenii. Moj Mali Svet 23 (10): 24-25.
- Trenchev G, Ivanova I, Nikolov P, Trencheva K (2006). *Metcalfa pruinosa* (Say 1830) new pest and new species in Bulgaria. 70th Anniversary of Plant Protection Institute and Annual Balkan Week of Plant Health :39.
- Van Duzee EP (1923). Family Fulgoridae. In: Britton WE, ed. Guide to the Insects of Connecticut, Part IV: The Hemiptera or Sucking Insects of Connecticut. State of Connecticut Public Document 47. State Geological and Natural History Survey Bulletin 34:24-55.

14. Weese AO (1924). Animal ecology of an Illinois elm-maple forest. Illinois Biological Monographs 9(4):7-93.
15. Willson SW, McPherson JE (1981). Life histories of *Anormenis septentrionalis*, *Metcalfa pruinosa*, and *Ormenoides venusta* with descriptions of immature stages. Ann. Entomol. Soc. America 74 (3): 299-311.
16. Wilson SW, Lucchi A (2000). Aspetti sistematici, corologici, ecologici. In: A. Lucchi, La Metcalfa negli ecosistemi italiani, Agenzia Regionale per lo Sviluppo e l'Innovazione nel settore Agricolo-forestale: 13-28.
17. Zangheri S, Donadini P (1980). Comparsa nel Veneto di un *Omottero nearctico Metcalfa pruinosa* Say (Homoptera, Flatidae). Redia 63: 301-305.