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NEW DATA ABOUT THE CONTROL OF THE PLANTHOPPER *METCALFA PRUINOSA* (SAY 1830) (*HEMIPTERA*: *FLATIDAE*) IN THE TOWN OF PITEŞTI (ARGEŞ COUNTY)

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ABSTRACT

Metcalfa pruinosa (Say 1830), an invasive species mentioned in Romania in 2009, was observed first time in Piteşti in 2014, a city located in the central-southern part of Romania. In the favourable climatic conditions of the summer of 2015, high density of the development stages of the pest were seen on many host plants, both woody and herbaceous, in the green areas of the city. The insecticide treatments show the highest effectiveness for the mixture of imidacloprid 75 g/l, deltamethrin 10 g/l, lambda cyhalothrin 50 g/l, associated with pirimiphos methyl 500 g/l, within an interval of 3-5 days. It is important that treatments be applied in combination with 0.1% Silwet to facilitate the action of the active substance. Monitoring and chemical control are required in order to limit the spread of pests in places bordering the city, where there are important vineyards and orchards.

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INTRODUCTION

Global warming and the increasing trade in plants of economic importance in recent decades have favoured the spread of many species of insects, so that the world is now faced with an increase in the number of invasive species. Such an invasive species, which worries European experts, is *Metcalfa pruinosa* (Say 1830). This species originated in eastern North America (Mead, 2014) and came in Europe accidentally: it was first mentioned in Italy in 1979 (Zangheri & Donadini 1980). Subsequently, the species spread gradually, being observed in various European countries. Also, the species is observed in 2003 in Turkey (Karsavuran et Guclu 2004).

The expansion of the species continued, and so Gnezdilov & Sunyaev (2009) observed it in the summer of 2009 in Russia, where it probably arrived by sea from Turkey or Bulgaria. Yeyeun et al. (2011) report it on the Asian continent, in the Korean capital, also in 2009.

In Romania, the species was first observed in 2009 in the eastern regions (Preda & Skolca 2009) and a year later the species passed through the western gate into Timişoara (Gogan et al. 2010). In 2011, the pest is observed in Bucharest, located at cca 100 km by Piteşti (Chireceanu et Gutue, 2011). The economic importance of the species is reduced in the area of origin. Thus, Mead (2014) considers that it slightly harms plant species, and in terms of transmission of viruses, *M. pruinosa* is a nonvector of tristeza, peach yellows, and blueberry stunt.

However, in invaded areas of Europe and Asia, the species is reported as a pest. Accordingly, chemical and biological methods have been used to control its populations. Biological control consisted in introducing the species *Neodryinus typhlocybae* (Ashmead) (Hymenoptera: Dryinidae) into Europe, a species that is present in the area of origin of the pest. This Hymenoptera is a common parasitoid of the pest's larvae in America, so that chemical treatments are not necessary (Mead, 2014). The first release of the parasitoid Hymenoptera occurred in Italy, and later it was used in other European countries, as well: southern France, Switzerland, Croatia, and Slovenia. Unfortunately, the pest has spread

faster than the parasite (Strauss 2010). Also, pesticides tested were tested for an effective control of populations of *M. pruinosa* (Yeyeun et al. 2011; Balakhnina et al., 2014).

Our study presents data about the biology of the species, in the special conditions in Pitești, and about the effectiveness of several pesticides in controlling populations of *M. pruinosa* on some species of ornamental plants in the public green areas in the town of Pitești.

MATERIAL AND METHOD

The observations in this study were conducted from May to October 2015 in several sites of the city of Pitești. Pitești is located in the central-southern part of Romania, between the Southern Carpathians (or the Transylvanian Alps) and the Danube, in the northwest of Wallachia; the altitude varies between 250 m and 356 m. It should be noted that the months of May to August 2015 were characterized by unusually high temperatures and by a very reduced rainfall regime. *M. pruinosa* individuals were observed on woody and herbaceous ornamental plant species in the green spaces of Pitești. Specimens were collected and transported to the research laboratory of Entomology to be identified and subjected to observations. Also, the host plants were identified on which *M. pruinosa* individuals were found.

As a result of damage incurred specific treatments have been carried out to control this pest by testing several pesticides (Table 1).

Table 1

The insecticides used in our observations

Active substance	The concentration (%)	Time of application
Imidacloprid 75 g/l + deltametrin 10 g/l + lambda cihalotrin 50 g//	0.20+ 0.03	6 August – 2 September
pirimifos metil 500 g/l	0.15	
acetamiprid 20%	0.04	
alfacipermetrin 100 g/l	0.02	
thiametoxam 25%	0.02	
clorpirifos 250 g/l	0.15	

The treatments were conducted in the green areas of the various regions of the city where the pest was noted: Craiovei District - 6 August and 10 August, Prundu and Tudor Vladimirescu District - 7 August and 11 August, City Center - 12 August and 17 August, Bucharest Calea District - 13 August and 18 August, Popa Şapcă District - 13 August and 18 August, Maior Şonţu street, Republicii Avenue - 14 August and 19 August, Expo Parc - 20 August and 24 August, Nord District - 20 August and 24 August, Negru Vodă Avenue and Nicolae Bălcescu Avenue - 21 August and 25 August, Gavana II District - 26 August and 31 August, Gavana III District - 27 August and 1 September, Trivale District - 28 August and 2 September (Fig. 1). Unfortunately, an area near the city center, Exercițiu District, was not considered for treatments, where the pest is also present.

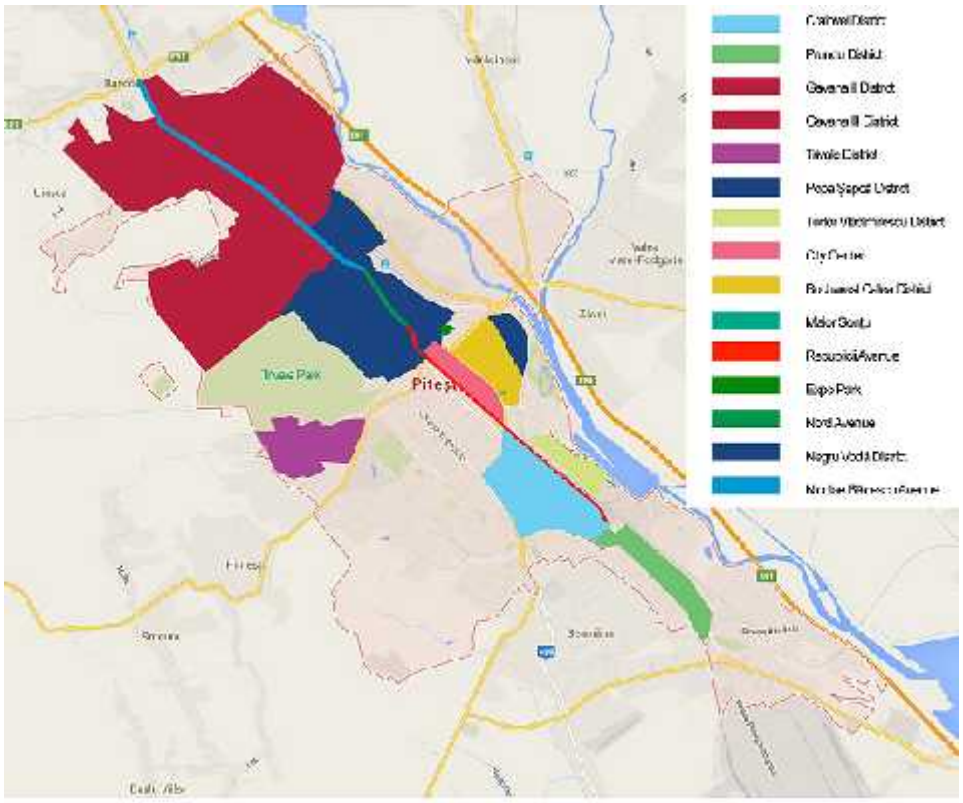

Figure 1. Metcalfa pruinosa localization in Piteşti

RESULTS AND DISCUSSIONS

Life cycle

Both in the area of origin, and in the areas invaded in Europe and Asia, the species has only one annual generation spends winter in the egg stage under the bark of twigs (Lauterer, 2002; Yeyeun et al., 2011; Mead, 2014). *M. pruinosa* has five larval instars. In the original area, characterized by a warm climate, such as the state of Texas, egg hatching takes place at the beginning of March, and the first adults appear after 69 days, in June, the species being observed until October (Dean and Bailay, 1961 – in Mead, 2014). On the European continent, characterized by a temperate climate, the activity of the species takes place between the end of May and September (Strauss, 2010).

On 14 June 2014, the species is first observed on apple trees in a private garden in the center of Pitești. The rainy weather and low temperatures in the course of the year 2014 make the presence of the species discrete. The climatic conditions of 2015, which was a favourable year for the activity of the species, in the city of Pitești the larvae occur in the second ten-day period of May, and the first adults were observed in the last half of July due to high summer temperatures.

Adult life is several weeks, and during the summer months there is a noticeable overlap of the stages of development of the species, i.e. the larvae, nymphs and adults are present in the colonies in the attacked plants.

The unusually low temperatures and rainfall in the first half of September affected the adults of this thermophilous species, so they are no longer observed in the second half of September. The remarkable polyphagous of the species is evidenced by the large number of host plants on which the species was observed in the green areas of the city of Pitești, in the summer of 2015; some are spontaneous species (Table 2).

Table 2

Host plants and damage of *Metcalfa pruinosa* in Pitesti

Host plants			Degree of density observed	
No.	Family name	Scientific name	Immature stages	Adult
1	*Aceraceae*	*Acer sp.*	++	+++
2	*Anacardiaceae*	*Rhus typhina*	++	++
3	*Asteraceae*	*Artemisia sp.*	++	+
4	*Asteraceae*	*Cosmos bipinnatus*	++	+++
5	*Betulaceae*	*Alnus glutinosa*	++	+++
6	*Betulaceae*	*Betula pendula*	++	+++
7	*Cannabaceae*	*Humulus lupulus*	++	+++
8	*Caprifoliaceae*	*Weigela florida*	++	++
9	*Celastraceae*	*Euonymus sp.*	++	++
10	*Chenopodiaceae*	*Chenopodium sp.*	++	+++
11	*Cornaceae*	*Cornus sp.*	++	+++
12	*Elaeagnaceae*	*Elaeagnus angustifolium*	++	+++
13	*Ericaceae*	*Rhododendron indicum*	++	+
14	*Fabaceae*	*Glycine soja*	++	+
15	*Fabaceae*	*Robinia pseudacacia*	++	+++
16	*Fagaceae*	*Quercus sp*	+++	+++
17	*Magnoliaceae*	*Magnolia sp.*	++	+++
18	*Malvaceae*	*Hibiscus syriacus*	++	+++
19	*Hostaceae*	*Hosta plantaginea*	++	++
20	*Rosaceae*	*Mallus pumila*	++	+++
21	*Rosaceae*	*Prunus arnmeniaca*	+++	+++
22	*Rosaceae*	*Prunus padus*	+++	+++
23	*Rosaceae*	*Pyrus pyraster*	+++	+++
24	*Rosaceae*	*Rosa multiflora*	+++	+++
25	*Rosaceae*	*Sorbus sp.*	++	+++
26	*Rosaceae*	*Spiraea sp.*	++	+++
27	*Salicaceae*	*Salix sp.*	++	+++
28	*Simaroubaceae*	*Ailanthus altissima*	+++	+++
29	*Solanaceae*	*Solanum sp.*	++	++
30	*Urticaceae*	*Urtica sp.*	+++	++

(+) less than 10 individuals on plant sample; (++) more than 10 individuals on plant sample; (+++) more than 50 individuals or entire host plant with wax exudate.

Chemical control

The species damages plants both directly, in the process of feeding, and indirectly, as a result of secretion of honey dew, which favours the installation of fungi and the depreciation of the vegetative organs, especially of fruit, leading to considerable economic damage (Karsavuran & Güçlü, 2004; Souliotis et al., 2008; Strauss, 2010). On the other hand, in the trees and ornamental shrubs in parks and gardens, as well as in ornamental plants with commercial value, the damage is also aesthetic, an aspect mentioned by Lauterer (2002).

Chemical control is often ineffective due to the excessive mobility of the adults, the remarkable polyphagy species and its presence in natural habitats (Strauss, 2010).

The successful use of 0.1% Sumithion in fighting individuals of *M. pruinosa* is mentioned (Yeyeun et al. 2011), and Balakhnina et al. (2014) found the lack of response of the individuals to yellow sticky traps, while preparations like Actara and Fitoverm are toxic to the immature stages of this pest.

In our case, one can note in Fig. 1 that the pest is present, in the year 2015, in all areas of greenery in Pitești.

In our studies, phytosanitary treatment involved the use of active substances in combination with a booster for 3-5 days. Only in this way could we speak of the effectiveness of treatments against this pest. In a first phase, in July, due to the large

number of colonies with larvae and nymphs of pest on host plants in the green areas of the city, pesticide treatments were applied that were based on the use of a single active substance (acetamiprid 20%, alphacypermethrin 100 g/l, chlorpyrifos 250 g/l). A very small efficiency of these substances on the pest could be noted (Fig. 2).

Therefore it was recommended to use a number of complex phytosanitary treatments, which consisted in the use of several active substances, namely: imidacloprid 75 g/l, deltamethrin 10 g/l, lambda cyhalothrin 50 g/l (the latter can be replaced with thiametoxam 25%). After three to five days, pirimiphos methyl 500 g/l was applied. It should be noted that sometimes the period of application of the phytosanitary treatments is difficult to observe because of unfavourable weather conditions. It appears that the highest effectiveness is that of the mixture of imidacloprid 75 g/l, deltamethrin 10 g/l, lambda cyhalothrin 50 g/l, while alphacypermethrin 100 g/l had very little impact on the pest (Fig. 2). It is important to note that treatments should be applied in combination with 0.1% Silwet to facilitate the action of the active substance.

The phytosanitary treatments are recommended when the first pest colonies are noticed on host plants.

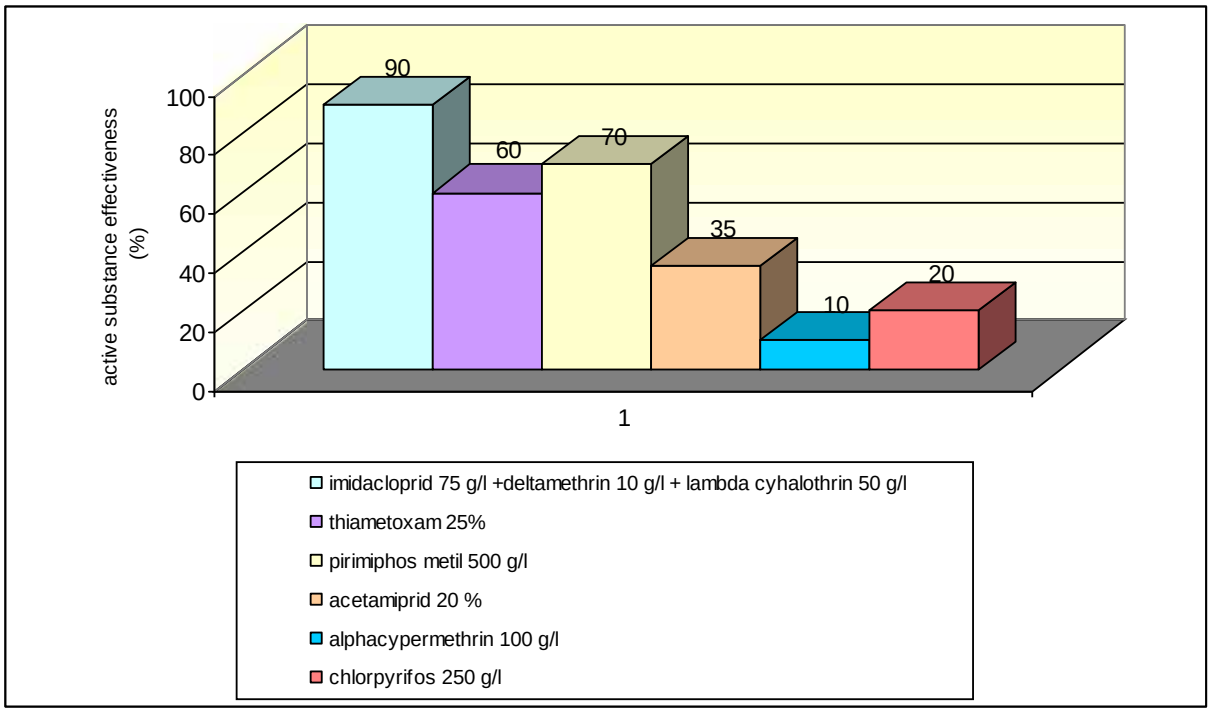

Figure 2. The efficacy of insecticides against Metcalfa pruinosa

CONCLUSIONS

Metcalfa pruinosa (Say 1830), an invasive species first mentioned in Romania in 2009, was observed in Pitești in 2014, a city located in the central-southern part of Romania.

In the favourable climatic conditions of the summer of 2015, the species invaded the whole city, and high densities of the development stages of the pest are noted on species of host plants in the city's green spaces.

Insecticide treatments show that the most effective was the mixture of imidacloprid 75 g/l, deltamethrin 10 g/l, lambda cyhalothrin 50 g/l, followed by 3-5 days of treatment with pirimiphos methyl 500 g/l.

Although the species has not yet been observed in neighbouring localities of the city, the fact there are several ways of spreading it make the chemical control of the pest in Pitești extremely important. It should be borne in mind that in the vicinity of the city there

are important vineyards, fruit tree orchards and ornamental plant plots, which are preferred by this species – especially the famous Ștefănești vineyard and the orchards in Mărăcineni.

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