

RESEARCH ON EVOLUTION OF THE MAIN PESTS OF PLATANE IN ROMANIA

CERCETĂRI PRIVIND EVOLUȚIA PRINCIPALILOR DĂUNĂTORI AI PLATANULUI ÎN ROMÂNIA

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Abstract. In recent years, in Bucharest and in other urban centres in our country began to be placed *Platanus* spp. trees. In the area of Bucharest, in the year 2014 and 2015 was an extension of two dangerous *Platanus*' pests [*Thesycamore* lace bug (*Corythucha ciliata* Say, 1832 - Hemiptera: Tingidae) and leaf-mining moth (*Phyllonorycter platani* Staudinger, 1870 - Lepidoptera: Gracilariidae)]. Research has followed the evolution of these pests in the nursery from Bolintin Deal and identify other potential pests that have the potential to attack the *Platanus* spp.. In order to carry out effective and well timed control methods, bio monitoring studies of the pests are necessary. The biology, ecology and the vulnerable life periods of the pests were studied. It was noted intensity and frequency of infested leaves, calculating the degree of attack, these indicators are variable, depending on the pest life cycle or the period studied. For *Corythucha ciliata* recorded population was between the 2 and 8 exemplars/leaf attacked, while for *Phyllonorycter platani* attack was between 441 and 549 leaves attacked, regarding the number of mine / leaf between 1 and 10 and ranges of attacked leaf surface is between 1.4 and 5.5/attacked leaf. Are presented other pests identified in the nursery.

Key words: evolution of *Platanus* pests in nursery.

Rezumat. În ultimii ani, în București și în alte centre urbane din țara noastră au început să fie plantați copaci de *Platanus* spp. În zona din București, în anul 2014 și în 2015 a fost o extensie a doi dăunători periculoși ai platanului "[Ploșnița dantelată a platanului (*Corythucha ciliata* Say, 1832 - Hemiptera: Tingidae) și molia minieră a frunzelor (*Phyllonorycter platani* Staudinger, 1870 - Lepidoptera: Gracilariidae)]. Cercetarea a urmărit evoluția acestor dăunători în pepiniera de la Bolintin Deal și identificarea altor dăunători potențiali care au capacitatea de a ataca *Platanus* spp. În scopul de a pune la punct metode eficiente și oportune de control, sunt necesare studii de monitorizare a biologiei dăunătorilor. Biologia, ecologia și perioadele de viață vulnerabile ale dăunătorilor au fost studiate. S-a evaluat intensitatea și frecvența frunzelor infestate, s-a calculat gradul de atac, acești indicatori sunt variabili, depinzând de ciclul de viață a dăunătorilor sau perioada studiată. Pentru *Corythucha ciliata* s-a înregistrat populația care a fost între 2 și 8 exemplare / frunză atacată, în timp ce pentru *Phyllonorycter platani* atacul a fost între 441 și 549 de frunze atacate, în ceea ce privește numărul de mine pe frunze acesta a fost

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între 1 și 10 și intervale de suprafață frunze atacate este între 1,4 și 5.5. Sunt prezentate și alți dăunători identificați în pepinieră.

Cuvinte cheie: evoluția dăunătorilor platanului în pepinieră

INTRODUCTION

The Sycamore lace bug, *Corythucha ciliata* (Say, 1832), is a nearctic tingid that feeds on the underside of the leaves of *Platanus spp.* (called sycamore trees in North America and platanos in the Old World). In North America, the area of occurrence of the Sycamore lace bug extends throughout eastern USA and eastern Canada (Halbert and Meeker, 1998), and the species was introduced and is successfully established in Europe and Asia. *Corythucha ciliata* species has been reported in Europe in 1964, in Padova, Italy, and Romania of Kis, in 1990. The greatest danger of this pest is the association brought two fungi *Ceratocystis fimbriata* Ellis and Halsti. form platanu J. M. Walter and *Apiognomonina (Gnomonia) veneta* Sacc. and Speg. that through synergy with pests can cause decline and death of trees. The two pests have, in addition to their herbivorous character, a negative impact on the visitors of the parks or streets both from the point of view of aesthetics and hygiene and much more sycamore lace bug can be an agent of insect-caused dermatosis considered subjects who visit or live near wooded areas or trees which are infested.

Phyllonorycter platani was originally described from northern Italy by Staudinger in 1870 (Šefrov, 2001). Deschka (1984, 1995) believes that its autochthonous (origin) area includes the Balkans and western Asia in accord with the distributional area of the primary host plant (*Platanus orientalis* L.). This distributional area reaches, however, far to the east crossing Middle East up to Central Asia. Deschka (1995) believes that the sudden spread of *Phyllonorycter platani* was started around 1970. But this invasion began obviously decades sooner. It was followed by several distributional waves with the rise of numerous locally limited populations representing the secondary distributional centres. *Phyllonorycter platani* Stdgr., has been recorded in Romania for the first time at Bucharest in 1970 (Drăghia, 1970; Rakosy *et al.*, 2003) or in 1996 by Sandru after Ureche Camelia (Ureche, 2006) Larvae of pest, develop mines large and very distinctive, with several mines often on one leaf in leaves.

MATERIAL AND METHOD

Identification of the pests was done in nursery "Bolintin Deal" at the north of Giurgiu district, 18 km away from Bucharest, near Bucharest- Pitesti highway, in a small company in the field of ornamental plants nursery, its geographical coordinates are 44° 27' 33" North, 25° 49' 16" East.

The climate is continental, with very hot summers, and not very important quantities of precipitation which fall as showers, and cold winters with strong blizzards and frequent worm periods. The average rainfall is 650-700 mm / in most rainy month from the year is June (maximum of 24 hours was 103.2 mm at 21.VII.1978).

There are years when rainfall was doubled, and years when rainfall decreases, appearing drought and rainfall is 250-300 mm, annual average temperature for this

area was 10.2°C average temperature of January was -2.3oC, and the average temperature in July was 23.7°C, (thermal amplitude was 21.4oC). In 2007 the business was started by importing plants from Italy, Holland and France.

Experience has taught them that imported plants that have started their life cycle in a certain climate, have lower rooting rates and the plants develop slower. Thus, in 2009 the owners decided to produce their own plants in Romania. The first author started the business by cultivating her first 2000 sq. m. with plants in the field. Now company is growing and at present the production covers over 2 ha plants, (1 ha of container fields) and it's financial data shows that in 2014 sales were 93,500 Ron and in 2015 sales (till 01 October) were 55,000 Ron.

Structure and volume of number of tree sold is increasing from 2014 to 2015 (Tab. 1).

Table 1

Structure and volume of number of tree sold is increasing from 2014 to 2015

Names of species	No.trees/2014	No. trees/2015
<i>Platanus acerifolia</i>	3000	7500
<i>Rosa spp.</i>	3000	1000
<i>Prunus nigra</i>	1000	300
<i>Betula alba</i>	200	100
<i>Magnolia spp.</i>	500	50
<i>Thuja orientalis</i>	600	600
<i>Thuja occidentalis</i> "Smaragd"	300	300
<i>Tilia tomentosa</i>	1000	150
<i>Acer saccharinum</i>	500	1000



Fig. 1 - Images of Platanus trees batch from nursery

The extremely vast assortment of plants, about 50 species are grown, ranges from deciduous tree to conifers, climbers, roses, topiary, coming in various sizes from small and medium up to unique specimens (*Platanus acerifolia*, *Thuja occidentalis* "Smaragd", *Picea pungens* "Glauca globossa", *Acer platanoides*, roses, *Prunus cerasifera* "Nigra", *Juniperus spp.* etc.). Financial data shows that nursery Bolintin is viably because there are, in 2014 sales of 93,500 Ron and in 2015 sales (till 01 October) 55,000 Ron.

Harmful insect species were noted according to usual methods. Because we done our observation in nursery, number of leaves of *Platanus* trees was considered as average 45. It was taken into consideration 4 batch (Fig. 1) of *Platanus* trees (761 trees). Samples were collected in the field, and more detailed processing was carried out in laboratory conditions. Species of insect pests were determined in the laboratory. Microscopic techniques were used to determine of some species.

Finally, the found species were classified systematically, but in this paper will be presented only four species *Corythucha ciliata* Say, 1832 (Sycamorelace bug); *Phyllonorycter platani* (Sycamore leaf-miner pest); *Metcalfa pruinosa* (citrus flatid planthopper) and *Lymantria dispar* (Gypsy Moth) are moths in the order *Lepidoptera*, family *Erebidae*.

In order to avoid damages noted in 2014, in 2015 it was applied an expensive scheme of treatments, 5 applications (Tab. 2).

Table 2

Scheme of treatments applied in nursery during year 2015

No. of treatment	Data of treatment	Comercial product (active ingredients)	Dose/10 l water
1	6.05	Confidor 200 SL (imidacloprid 200 gr/litru) Dursban 50 W (chlorpyrifos 50%)	5 ml 10 ml
2	25.05	Mimic 2 LV (tebufenozide 24%) Topsin 70 WDG (tiofanat metil 41-60%) Dithane M 454 (mancozeb 80%) Atonik SL (nitroguaiacolat de sodiu 1 gr/kg; orto-nitrofenolat de sodiu 2 gr/kg; paranitrofenolat de sodiu 3 gr/kg) Lannate 20 SL (metomil: 200 g/l) Nissorun 10 WP (hexitiazox 10%)	5 ml 10 g 20 g 10 ml 20 ml 5 g
3	20.06	Confidor 200 SL (imidacloprid 200 gr/litru) Topsin 70 WDG(tiofanat metil 41-60%) Dithane M 454 (mancozeb 80%) Atonik (nitroguaiacolat de sodiu 1 gr/kg; orto-nitrofenolat de sodiu; 2 gr/kg; paranitrofenolat de sodiu 3 gr/kg) Lannate 20 SL (metomil 200 g/l) Nissorun 10 WP (hexitiazox 10%)	5 ml 10 g 20 g 10 ml 20 ml 5g
4	29.07	CONFIDOR 200 SL 200 SL (imidacloprid 200 gr/litru)	5 ml
5	29.10	Confidor Energy (deltametrin 21-40%) Decis Mega 50 EW (deltametrin 50 g/l) Novadim Progress (dimetoat 400 g/l) Kumulus DF (sulphur 80%)	5 ml 10 ml 20 ml 30 g

RESULTS AND DISCUSSIONS

The *Platanus* species have few specialized phytophagous pests. During our observations, in 2014, it were registered on *Platanus acerifolia* the following pests: *Corythucha ciliata* Say, 1832 (Sycamorelace bug), order *Hemiptera*, family *Tingidae*; *Phyllonorycter platani* (Sycamore leaf-miner pest) Staudinger, 1870, order *Lepidoptera* family *Gracilariidae*; *Acalyptis platani* Muller- Rutz, 1934, order *Lepidoptera*, family *Nepticulidae*; possible *Epirrita autumnata* Borkhausen, 1794 (autumnal moth) order *Lepidoptera*, family *Geometridae*; probably *Acleris forsskaleana* Linnaeus 1758 (Maple Leaf-tier Moth) *Lepidoptera*, *Tortricidae*; *Fagocyba cruenta* Herrich-Schaffer, 1838, order *Homoptera*, family *Cicadellidae* and *Drepanosiphum platanoidis* (= *platanoides*) (Common Sycamore Aphid) order *Homoptera*, family *Drepanosiphidae*. During our observations, in 2014 and 2015, it wereregistered on *Platanus acerifolia* the following main pests: *Corythucha ciliata* Say, 1832 (Sycamorelace bug), order *Hemiptera*, family *Tingidae*; *Phyllonorycter platani* (Sycamore leaf-miner pest) Staudinger, 1870, order *Lepidoptera* family *Gracilariidae*, in 2015 was observed attack of *Metcalfa pruinosa* Say, 1830 (citrus flatid planthopper) order *Hemiptera*, suborder *Auchenorrhyncha*, superfamily *Fulgoroidea*, family *Flatidae* and *Lymantria dispar* L. 1758, (Gypsy Moth), order *Lepidoptera*, family *Erebidae*.

Corythucha ciliata Say, 1832 (Fig. 2), it was observed from August, but it's attack was no heavy. In 2014 from 761 trees, in 18 August, only 5 (1.31%) were attacked with 6 leaves with pest colonies, in 29 August, 9 (1.18%) with 19 leaves with pest colonies, in 18 September, 48 (6.31%) with 122 leaves with pest and in 16 October, 47 (6.18%) with 144 leaves with pest colonies. Maximum number of adults and nymphs/leaf was 45. In 2015 due to treatments applied in all 5 variants from table 2 only few exemplars, without importance, were observed. The sycamore lace bug is the only lace bug listed as feeding on *P. occidentalis* according to the world hostlist for lace bugs (Drake and Ruhoff, 1965).

Phyllonorycter platani Staudinger, 1870 (Fig. 3) it was identified from large mines, often having several larvae in one leaf, generally underside between veins (Fig. 4). The upper side becomes mottled. On upper side can be over veins (British leaf miners). The mine begins as an epidermal corridor, sometimes several cm in length. This widens into a shallow, greyish green, irregularly lobed blotch. The fully developed mine is an orange brown tentiform mine with a number of length folds. Almost all mines are lower-surface. The upper side of the mine then is a mottled oval, because the larva here and there has eaten holes in the roof of the mine, i.e., the palisade parenchyma. Pupation inside a white cocoon. It was observed, in 2014, on 30 August as initial attack with small larvae in leaves mines, which become large and very distinctive, with several mines often appearing on one leaf in October (Fig. 5).

The moths fly in late April to May and in August. Wingspan (distance from one wingtip to the other wingtip) is 8-10 mm. The pupae overwinter in mines in fallen leaves and there are 2-3 adult flights/year first is starting in late April to May and the second in August. In 2014 Pest attack was no heavy. In 18 August and 16 October

from 761 trees 222 (29.17%) were attacked by pest, from these 41.38% had only 1 leaf attacked with onemine, 6.9% with two mines, 17.24% with threemines and 34.48% with five mines.



Fig. 2 - Sycamore lace bug (*Corythucha ciliata*), adults, larvae and frass

In 2015 main points of biology of *Phyllonorycter platani* are: May 5, adults flight; June 18, appearing of larvae; July 3, existence of larva+pupa+adult; August 13, existence of larva+adut; September 1 and October 19, larve's presence. The moths's larvae (Fig. 5) is colourless and transparanthave a head capsule and chewing mouthpartswith opposable mandibles, six thoracic legs andabdominal legs. In leaf mine, larvae made twotypes of frass: small, light brown granulescattered throughout the mine, and larger blackish brown grains in an elongate clump. The light spots are windows the larva has eatenin the palissade parenchyma, the roof of themine.



Fig. 3 - Sycamore leaf-miner



Fig. 4 - Sycamore leaf-miner pest attack

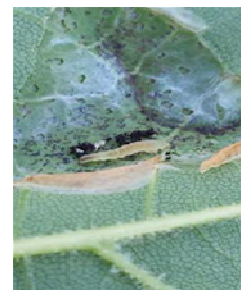


Fig. 5 - Sycamore pest, adultas mines on underside leaf surface leaf-miner larvae

Metcalfa pruinosa (Fig. 6) is a polyphagous planthopper, recently introduced from North America, which can cause serious damage on grapevine. *Metcalfa pruinosa* feeds on a wide variety of trees and shrubs. Distribution: North America, Cuba, Central and South America; adventive in Europe. European hosts for *Metcalfa*

pruinosa include through many others *Acer campestre* L., *Acer platanoides* L., *Clematis vitalba* L. and others.

Regarding of economic importance, of considerable concern in orchards and vineyards in its introduced range, particularly in southern Europe. *Metcalfa pruinosa*, overwinters as eggs inserted in woody tissue or under bark. First nymphs are found on the leaves and stems in May, while adults are present from July to October. Adults are 5–8 mm long, with large moth-like wings, bluish in colour, covered with waxy powder. Dense populations of nymphs cause stunting of the shoots, while those of adults produce large quantities of honeydew on which sooty mould develops. *Metcalfa pruinosa* attack in 2015 was almost insignificant, adults were observed for the first time on June 07 and from 100 analysed trees, when 160 adults were observed.



Fig. 6 -Metcalfa pruinosa adult



Fig. 7 – Atack of Lymantria dispar larvae

Lymantria dispar L. 1758 is native to temperate forests in western Europe. This moth is an important defoliator on broad-leaf and conifer trees. Male moths are dark buff and fly readily during the day. Females are white with black, wavy markings, they have robust abdomens and do not fly, and their wingspan can reach 5 cm. The larval stage (caterpillar) is hairy, and a mature larva is 50-65 mm long with a yellow and black head. The pupal stage is dark reddish-brown and is held in place to some object by small strands of silk. Egg masses deposited by females during July overwinter on trees, eggs hatch from late April through early May. Small first instar larvae do not feed right after they hatch and can be dispersed by wind. Young larvae feed on foliage (fig. 7) and remain on host plants night and day. Pupation takes place during late June and early July. Adults start emerging in late June with peak emergence in mid-July. This pest produces one generation a year in Romania.

In nursery it was registered a weak attack, few larvae nests and of course a light defoliation (defined as 0 to 30% loss of foliage) and has little effect on the health of trees, defoliation being barely detectable.

From all five variants presented in Table 2, variant 5 consisting of Confidor Energy (deltametrin 21-40%) 5 ml; Decis Mega 50 EW (deltametrin 50 g/l) 10 ml; Novadim Progress (dimetoat 400 g/l) 20 ml; Kumulus DF (sulphur 80%) 30 g. in 10 l water has the greatest efficiency 98% after 3-4 days from treatments.

CONCLUSIONS

During our observations, regarding *Corythucha ciliata* in 2014 from 761 trees, in 18 August, only 1.31% were attacked with 6 leaves with pest colonies, in 29 August, 1.18% with 19 leaves with pest colonies, in 18 September, 6.31% with 122 leaves with pest and in 16 October, 6.18% with 144 leaves with pest colonies. Maximum number of adults and nymphs/leaf was 45. In 2015 due to treatments applied only few exemplars, without importance, were observed.

In 2014 Phyllonorycter platani attack was no heavy. In 18 August and 16 October from 761 trees 29.17% were attacked by pest, from these 41.38% had only 1 leaf attacked with one mine, 6.9% with two mines, 17.24% with three mines and 34.48% with five mines, in 2015 main points of biology of *Phyllonorycter platani* are: May 5, adults flight; June 18, appearing of larvae; July 3, existence of larva+pupa+adut; August 13, existence of larva+adut; September 1 and October 19, larve's presence.

Metcalfa pruinosa attack in 2015 was almost insignificant (adults were observed for the first time on June 07 and from 100 analysed trees, when 160 adults were observed, in nursery it was registered a *Lymantria dispar* weak attack, few larvae nests and of course a light defoliation.

There are variants of chemical treatments for controlling of main pests.

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