

## RESEARCH ON PEST EVOLUTION TO *PLATANUS* SPP. FROM NURSERIES

Irina NEACSU, Ioan ROSCA

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd,  
District 1, 011464, Bucharest, Romania

Corresponding author email: ioanrosca\_usamv@yahoo.com

### 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 was an extension of two dangerous *Platanus*' pests [The sycamore 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 identifies other potential pests that have the potential to attack the *Platanus* spp. *Phyllonorycter platani* species has been reported in Europe in 1964, in Padova, Italy, and Romania by Kis, in 1990. The greatest danger of this pest is the association brought two fungi *Ceratocystis fimbriata* Ellis and Halst. form *platani* J. M. Walter and *Apiognomonium* (*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. 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. It is discussed also the possibility that other important quarantine of *Platanus* spp. pests to appear in Romania.

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

### INTRODUCTION

Today many researches were done in European countries on the spread of the main pests of plane (*Platanus* spp.) and on their influence on the decline of this genus. Of the primary pests which have been detected, has spread throughout almost all Mediterranean countries; so also has the insect *Corythucha ciliata*, which causes yellowing of the foliage. On trees declining under the interaction of these pests, secondary pests, agents of bark necrosis and, above all, of wood decay, are often detected (Anselmi et al., 1994). *Corythucha ciliata* (Say), the sycamore lace bug, is originally from North American and feeds on different species of sycamore trees. The bugs generally lives on the undersides of the leaves, stiking and sucking, causing a chlorotic foliage and trees may be defoliated in late summer. Several consecutive years of severe lace bug damage,

combined with other stress factors, may kill the trees (Barnard and Dixon, 1983). Heavy infestations are more common in urban areas than in natural settings. Damage is' more severe during dry weather (Filer et al., 1977). The sycamore lace bug was discovered, for the first time, in Europe in 1964 in Padova, Italy. The sycamore lace bug is associated as vectors with two fungi, *Ceratocystis fimbriata* Ellis and Halst. forma *platani* J.M. Walter and *Apiognomonium* (= *Gnomonia*) *veneta* Sacc. and Speg., which, in combination with the lace bug, cause decline and death of the trees (Maceljski, 1986). During the past century an outbreak of the leaf mining moth *Phyllonorycter platani* (Såudinger, 1870) was observed in Europe. This species is a leaf mining conductor of various species of *Platanus* trees, in Europe, which is frequently planted in town alleys, cities, castle parks etc. The first indications of the spread of this

species were observed at the beginning of the century, but its massive course has been started approximately in the middle of it (Šefrová, 2001). *Phyllonorycter platani* Stdgr., has been recorded in Romania for the first time at Bucharest in 1970 (Drăghia, 1970; Rákosy 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.

## MATERIALS AND METHODS

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 -2.3°C, and the average temperature in July was 23.7°C, (thermal amplitude was 21.4°C). 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). 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.). 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 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.

## RESULTS AND DISCUSSIONS

Continuing our researches (Balanescu and Rosca, 2014), we surveyed the evolution of main pest of *Platanus* spp.. 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 (Sycamore lace bug), order Hemiptera, family Tingidae; *Phyllonorycter platani* (Sycamore leaf-miner pest) Staudinger, 1870, order Lepidoptera family Gracilariidae; *Acalyptis platani* Müller-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-Schäffer, 1838, order Homoptera, family Cicadellidae and *Drepanosiphum platanoidis* (= *platanoides*) (Common Sycamore Aphid) order Homoptera, family Drepanosiphidae.

*Corythucha ciliata* Say, 1832 (Sycamore lace bug) (Figure 1), it was observed from August, but it's attack was no heavy. 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. The sycamore lace bug is the only lace bug listed as feeding on *P. occidentalis* according to the world host

list for lace bugs (Drake and Ruhoff, 1965). Adults are whitish in color (body is brown to black in color) and about 3 mm in length. For practical purposes, the association with the host plant should be diagnostic for this species (<http://entnemdept.ufl.edu/>). The sycamore lace bug feeds on the undersides of leaves, causing desiccation of tissue, first near the veins, and subsequently affecting the entire leaf, which may drop prematurely. The most detailed life history information on sycamore lace bug can be found in Wade (Wade, 1917). According to Wade's observations in Oklahoma, mating pairs of sycamore lace bugs initiate colonies by laying eggs along leaf veins, especially near the forks. One to several pairs occupy a newly colonized leaf. Sycamore lace bugs overwinter as adults, either under loose bark of the trees, or in nearby cracks and crevices. They are extremely cold tolerant, withstanding temperatures as low as  $-23.3^{\circ}\text{C}$ . According to Wade (1917), the flying wings of adults are very delicate, and thus, these insects rarely fly very far, however, Maceljski (1986) writes that adults "are very mobile and are good fliers. Supported by wind they can fly over many kilometers", both authors surmise that the majority of long distance distribution occurs as a result of human activity. First generation adults appear in June and second generation appears around July/August (<http://fera.co.uk/plantClinic/>). Adults survive the winter under peeling bark of the sycamore tree.



Figure 1. Sycamore lace bug (*Corythucha ciliata*), adults, larvae and frass

Adults become active in the spring when sycamore leaves begin to develop. The nymphs are wingless, smaller and darker than the adults, their body has spines. Adults and nymphs feed on the undersides of leaves,

around the feeding sites, the leaf tissue turns yellow (Figure 2).



Figure 2. Feeding sites, early indicators of Sycamore lace bug activity

Damage to trees is typically not serious, but heavy infestations can reduce growth. In Romania the pest was first recorded in 1990 when Kis collected it at Craiova, after that it has recorded in 2010, at Sibiu (Tatu and Tăușan, 2011).

*Phyllonorycter platani* Staudinger, 1870 (Sycamore leaf-miner pest), (Figure 3), it was observed on 30 August as initial attack with small larvae in leaves mines (Figure 4), which become large and very distinctive, with several mines often appearing on one leaf in October (Figure 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 3 adult flights a year in Netherland (Frankenhuyzen, 1983) or two generations in late April to May and in August, in London (<http://ukmoths.org.uk/>). 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 one mine, 6.9% with two mines, 17.24% with three mines and 34.48% with five mines. The pest larvae of moths is colourless and transparent have a head capsule and chewing mouthparts with opposable mandibles, six thoracic legs and abdominal legs. In leaf mine, larvae made two types of frass: small, light brown granules scattered throughout the mine, and larger blackish brown grains in an elongate clump. The light spots are windows the larva has eaten in the palissade parenchyma, the roof of the mine. The pupa is found inside a white cocoon (Pitkin et al., 2011).



Figure 3. Sycamore leaf-miner pest (*Phyllonorycter platani*), adult



Figure 4. Sycamore leaf-miner pest initial attack on upper leaf surface



Figure 5. Sycamore leaf-miner pest attack as large mines on underside leaf surface



Figure 6. Sycamore leaf-miner pest attack as large mines on underside leaf surface

*Acalyptis platani* (Müller-Rutz, 1934), Lepidoptera, Nepticulidae observed in France, Greece, Italy, Switzerland, Slovenia, Croatia

and Bulgaria, it seems to be present, for the first time recorded in Romania (this is the conclusion only after larvae attack (Figure 7), but its presence has to be confirmed in the future, taking into consideration that the species was registered in Romania (Laštůvka and Laštůvka, 1997). The second specialized lepidopteran leaf miner in Europe is *Acalyptis platani* (Müller-Rutz, 1934). This species reaches the limits of central Europe only in Switzerland, it is known also from southwestern Croatia, northern Italy and southern France (Pitkin et al., 2011).



Figure 7. *Acalyptis platani* leaf attack

Defoliators (Figure 8), during 2014, in nursery, there were registered a heavy attack of two species of defoliators. From 761 trees, from 16 August till 16 October, only 24.7% of trees were attacked by defoliators. It was impossible to rear larvae till adults or to identify species or larvae. One of them is a geometrid the other one is tortricid probably *Acleris forsskalleana* Linnaeus 1758 (Maple Leaf-tier Moth) Lepidoptera, Tortricidae.

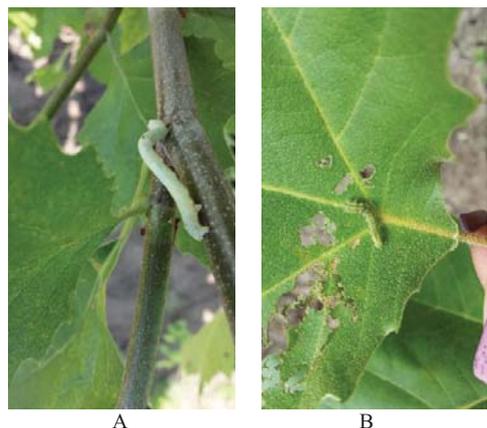


Figure 8. Defoliators' larvae.  
A - Geometridae; B - Tortricidae

*Fagocyba cruenta* Herrich-Schäffer, 1838, Homoptera, Cicadellidae, adult 3.5-4 mm length (Figure 9), appear from June to October in the nursery, till now, in Romania pest was noted on *Acer pseudoplatanus* (<http://www.faunaeur.org/>; <http://www.commanster.eu/>). Extremely variable in colour, with the head and pronotum varying from pale to grey-brown or chestnut brown. This is one of the typical colourations, with the clavus and apices of the forewings suffused greyish. The species can be abundant on some trees, but most notably beech, which hosts few other leafhoppers. There is a similar species, *F. carri*, which occurs locally on oak, and can only be reliably distinguished by microscopic examination.



Figure 9. *Fagocyba cruenta*, adult

*Drepanosiphum platanoidis* (= *platanoides*) Schrank, 1801 (Common Sycamore Aphid) was present on *Platanus* trees (Figure 10). Alate aphids have yellow-brown head and thorax with darker brown markings, and a pale green abdomen. Those that develop early or late in the year have cross-bars present (see first picture below), but these are never restricted to abdominal tergites 4-5. Alates that develop in mid-summer are much paler and have no cross bars (second picture below). The antennae are brown and the siphunculi are pale with a brown tip. The forewing has no black spot at the tip nor one at the outer end of the pterostigma; the pterostigma is defined by two longitudinal brown stripes. The body length is 3.2-4.3 mm. The aphid lives on the undersides of leaves of sycamore (*Acer pseudoplatanus*). It is also recorded from many other *Acer* spp., as well as a wide variety of other trees which are apparently only visited on a casual basis.

Sexual forms occur in September-November. It is a cosmopolitan species which is common on sycamores wherever they are grown (<http://influentialpoints.com/>).



Figure 10. *Drepanosiphum platanoidis* Schrank, 1801 larvae

## CONCLUSIONS

- The *Platanus* species have few specialized phytophagous pests.
- During our observations, in 2014, it were registered on *Platanus acerifolia* the following pests: *Corythucha ciliata*; *Phyllonorycter platani*; *Acalyptis platani*; possible *Epirrita autumnata*; probably *Acleris forsskalean*; *Fagocyba cruenta* and *Drepanosiphum platanoidis*.
- *Corythucha ciliata*, it was observed from August, but it's attack was no heavy, 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.
- *Phyllonorycter platani* 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 one mine, 6.9% with two mines, 17.24% with three mines and 34.48% with five mines.

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