**Corythucha ciliata (Say, 1832) – Pest of Plane Trees (Platanus spp.)**

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**RESEARCH ARTICLE**

**Abstract**

The research aimed the study of an invasive species that has recently appeared in our country, *Corythucha ciliata* Say (plane tiger or lacy plane bedbug) (Hemiptera, Tingidae). Knowing this pest is very important in order to control it, in order to keep the appearance of the parks pleasant and clean. The insect is an aggressive pest of plane trees (*Platanus* spp.), which harms their leaves, leading to premature defoliation. The aims of this research were: identifying and monitoring of *Corythucha ciliata* Say populations; observations on the host plants in the analyzed space; tracking the biological cycle of the species *Corythucha ciliata* Say and the extent of pest. Following research conducted in 2020-2021, the invasive species *Corythucha ciliata* Say, was identified in 4 locations in Transylvania, on two species of plane trees, *Platanus occidentalis* Linné and *Platanus x acerifolia* Willdenow. In the ecological conditions of Cluj-Napoca (Cluj County), the numerical density of the pest on the plane leaves was of maximum 30 adults/leaf and 63 larvae/leaf. Concerning the biological cycle, it was found that, in the temperate-continental climate of Cluj-Napoca, the species has 2 generations per year.

**Keywords:** sycamore lace bug; identifying; locations; numerical density; biological cycle

**INTRODUCTION**

The plane tiger or the sycamore lace bug, *Corythucha ciliata* Say, 1832, is an invasive insect species native to the eastern and central regions of North America (Halbert Susan and Meeker, 1998). It was first described by the American entomologist Thomas Say in 1832 as *Tingis ciliata* Say, 1832. The pest belongs to the family Tingidae of the order Hemiptera. The family includes the so-called lace bugs, small and very small insects, 2-10 mm, about 2000 species worldwide (Resh and Cardé, 2003). In Europe, *Corythucha ciliata* Say was first observed in the Italian city of Padua in 1964, from where it spread across the continent (Halbert and Meeker, 1998; Rabitsch, 2008). The expansion took place gradually to the western part of Europe in Yugoslavia (1970) and France (1974), then in most European countries (Hungary, Spain, Portugal, Austria, Germany, Belgium, Luxembourg, Great Britain, Czech Republic, Slovakia, Croatia, Slovenia, Greece, Turkey, Poland, Bulgaria, Moldova) (Maceljski and Balarin, 1972; d’Aguilar et al., 1977; Tzanakakis, 1988; Iosifov, 1990; Ószi Brigitta et al., 2005; Malumphy and Reid, 2006; Derjanschi, 2007; Grosso-Silva and Aguiar, 2007; Mutun, 2009). In 2001, the insect was reported in Russia (Voigt, 2001). The plane tiger has also spread on the Asian continent, in Korea (Chung et al., 1996), Japan (Tokihiro et al., 2003), China (Li et al., 2007). In 1990 it was reported in Chile (South America) (Prado, 1990) and in 2006 in Australia (Gillespie, 2007; Dominiak et al., 2008). In February 2014, large colonies of the plane tiger were observed, with insects being collected from the underside of London plane leaves (*Platanus × acerifolia* Willdenow) in the Newlands suburb of Cape Town, South Africa (Picker and
Griffiths, 2015). According to EPPO data (2021), the insect is spread in 32 countries on 4 continents (North America, South America, Asia, Europe and Australia).

In Romania, it was first reported in Craiova (Dolj County) in 1990 and the second time in Sibiu in 2010 (Tatu and Tăuşan, 2011). Subsequently, *Corythucha ciliata* Say spread in the country, being identified in Bucharest (Neacşu Irina and Roşca, 2015), Macea (Arad County) (Don et al., 2016), Timişoara (Timiş County) (Grozea et al., 2020).

According to data from the literature, the adult is small, 3-6 mm long, and the body is flattened dorso-ventral, almost black. The head is whitish to light gray, the eyes are well developed and the antennae are filiform, short. The chest has attached three pairs of legs provided terminally with strong and sharp claws. The hemielytres are almost transparent, with a lacy appearance. The abdomen is black-gray (Figure 1). The larvae are black, oval, with the body covered with numerous spines. They are five larval ages and the wings appear in the end of the last larval age. The egg has an elliptical shape, being sharpened at the base, with a length of 0.5 mm, black (d’Aguilar et al., 1977; Halbert Susan and Meeker, 1998; Malumphy et al., 2007).

*Corythucha ciliata* Say grows on trees of the Platanaceae family. The main host of this insect is the American plane tree, *Platanus occidentalis* Linné (Halbert Susan and Meeker, 1998). Other species of the genus *Platanus* that have been reported are: *Platanus orientalis* Linné (eastern plane tree), *Platanus x acerifolia* Willdenow (London or hybrid plane tree), *Platanus racemosa* Nuttall (Californian or western plane tree) and *Platanus wrightii* S.Watson (Arizona plane tree) (Malumphy et al., 2007). Other host plants are mentioned in the literature, such as: *Broussonetia papyrifera* Ventenat, *Carya ovata* K. Koch, *Chamaedaphne* spp., *Fraxinus* spp., *Morus* spp., *Quercus laurifolia* Michaux and *Liquidambar styraciflua* Linné (Halbert Susan and Meeker, 1998; Malumphy et al., 2007).

*Corythucha ciliata* Say causes damage to trees (plane trees) by feeding on foliar material, thus reducing photosynthesis and promoting degradation. Once established, it can form fairly stable, high-density populations. In cases of severe infestations, trees can be defoliated in late summer. Several consecutive years of severe damage caused by the plane tree tiger, combined with other stressors, can kill trees. Massive infestations are more common in urban areas than in natural conditions. The damage is more severe during dry periods. In addition to damaging trees, the insect has become a major problem in Europe, as the plane tree is a very popular shade tree in the parks in Southern Europe. Sycamore lace bugs are particularly annoying in open-air bars and cafes, which are shaded by plane trees. They can also invade homes in large numbers (Halbert Susan and Meeker, 1998).

According to reports from various countries (Italy, France, Romania), it has been found that the plane tiger, *Corythucha ciliata* Say, occasionally stings and causes painful inflammation on human skin (Dutto and Bertero, 2013; Izri et al., 2015; Ciceoi Roxana and Adriana Radulovici, 2018; Grozea Ioana et al., 2020).

**MATERIALS AND METHODS**

The aims of the research made between 2020-2021 were the following: identification and monitoring of *Corythucha ciliata* Say populations; observations on the host plants in the analyzed space; tracking the biological...
cycle of the species Corythucha ciliata Say and the extent of pest. In order to identify and monitor the plane tiger, direct observations were made by visual control of the trees (Platanus spp.), samples were collected from 5 trees in the form of biological materials (leaves, adult insects, larvae), which were brought to laboratory, analyzed under a microscope and photographed. To track the biological cycle, colored sticky trap-type panels were used to capture adults.

RESULTS AND DISCUSSIONS

The first identification of the species Corythucha ciliata Say was made in Chereușa locality (Satu-Mare County) on 18.08.2020, at a temperature of 26°C. At the same time, in Tășnad (Satu-Mare County), we managed to collect 12 specimens of Corythucha ciliata Say. We continued the research in the city of Cluj-Napoca (Cluj County) and we located the species in the Sports Park "Iuliu Hațieganu" (coordinates 46°45'55" N 23°33'33" E) on 27.08.2020. The plane tiger was observed and identified on several plane trees (Platanus occidentalis Linné and Platanus x acerifolia Willdenow). Another location of the species was in the city of Sibiu (Sibiu County), on 23.05.2021, on a solitary plane tree in the center of the city.

The observations were made for a period of 3 months (August, September, October) in Cluj-Napoca (Cluj County) in 2020 and in 2021 the observations began in June.

Table 1. Numerical density of Corythucha ciliata Say individuals on American plane leaves, Platanus occidentalis Linné (Cluj-Napoca, 2020)

<table>
<thead>
<tr>
<th>F (Leaf)</th>
<th>Tree 1</th>
<th>Tree 2</th>
<th>Tree 3</th>
<th>Tree 4</th>
<th>Tree 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>20A, 15L</td>
<td>0A, 5L</td>
<td>2A, 3L</td>
<td>11A, 53L</td>
<td>7A, 2L</td>
</tr>
<tr>
<td>F2</td>
<td>1A, 0L</td>
<td>3A, 8L</td>
<td>3A, 4L</td>
<td>0A, 14L</td>
<td>3A, 1L</td>
</tr>
<tr>
<td>F3</td>
<td>6A, 16L</td>
<td>4A, 6L</td>
<td>3A, 5L</td>
<td>14A, 29L</td>
<td>19A, 6L</td>
</tr>
<tr>
<td>F4</td>
<td>7A, 24L</td>
<td>4A, 7L</td>
<td>1A, 20L</td>
<td>5A, 9L</td>
<td>7A, 0L</td>
</tr>
<tr>
<td>F5</td>
<td>1A, 0L</td>
<td>8A, 10L</td>
<td>2A, 17L</td>
<td>4A, 13L</td>
<td>4A, 15L</td>
</tr>
<tr>
<td>F6</td>
<td>4A, 1L</td>
<td>30A, 3L</td>
<td>3A, 15L</td>
<td>8A, 7L</td>
<td>3A, 63L</td>
</tr>
<tr>
<td>F7</td>
<td>5A, 10L</td>
<td>5A, 5L</td>
<td>3A, 44L</td>
<td>7A, 3L</td>
<td>0A, 84L</td>
</tr>
<tr>
<td>F8</td>
<td>18A, 0L</td>
<td>13A, 4L</td>
<td>6A, 3L</td>
<td>6A, 0L</td>
<td>0A, 0L</td>
</tr>
<tr>
<td>F9</td>
<td>7A, 3L</td>
<td>4A, 3L</td>
<td>12A, 19L</td>
<td>2A, 23L</td>
<td>1A, 0L</td>
</tr>
<tr>
<td>F10</td>
<td>3A, 2L</td>
<td>8A, 4L</td>
<td>13A, 12L</td>
<td>0A, 2L</td>
<td>0A, 0L</td>
</tr>
<tr>
<td>F11</td>
<td>13A, 5L</td>
<td>0A, 50L</td>
<td>14A, 15L</td>
<td>2A, 17L</td>
<td>1A, 0L</td>
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<tr>
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<td>6A, 6L</td>
<td>4A, 0L</td>
</tr>
<tr>
<td>F13</td>
<td>10A, 0L</td>
<td>14A, 4L</td>
<td>5A, 2L</td>
<td>0A, 0L</td>
<td>0A, 0L</td>
</tr>
<tr>
<td>F14</td>
<td>9A, 0L</td>
<td>2A, 15L</td>
<td>3A, 0L</td>
<td>0A, 0L</td>
<td>0A, 8L</td>
</tr>
<tr>
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<td>8A, 22L</td>
<td>1A, 1L</td>
</tr>
<tr>
<td>F16</td>
<td>1A, 0L</td>
<td>6A, 7L</td>
<td>2A, 4L</td>
<td>0A, 0L</td>
<td>3A, 19L</td>
</tr>
<tr>
<td>F17</td>
<td>0A, 2L</td>
<td>3A, 2L</td>
<td>1A, 2L</td>
<td>7A, 0L</td>
<td>0A, 0L</td>
</tr>
<tr>
<td>F18</td>
<td>7A, 11L</td>
<td>5A, 6L</td>
<td>2A, 4L</td>
<td>0A, 0L</td>
<td>4A, 0L</td>
</tr>
<tr>
<td>F19</td>
<td>11A, 0L</td>
<td>4A, 3L</td>
<td>1A, 0L</td>
<td>0A, 0L</td>
<td>7A, 8L</td>
</tr>
<tr>
<td>F20</td>
<td>10A, 0L</td>
<td>0A, 3L</td>
<td>2A, 15L</td>
<td>0A, 23L</td>
<td>15A, 3L</td>
</tr>
<tr>
<td>F21</td>
<td>7A, 0L</td>
<td>2A, 3L</td>
<td>1A, 0L</td>
<td>0A, 0L</td>
<td>0A, 8L</td>
</tr>
<tr>
<td>F22</td>
<td>11A, 0L</td>
<td>4A, 5L</td>
<td>4A, 4L</td>
<td>3A, 12L</td>
<td>3A, 0L</td>
</tr>
<tr>
<td>F23</td>
<td>3A, 4L</td>
<td>5A, 6L</td>
<td>2A, 2L</td>
<td>9A, 0L</td>
<td>5A, 16L</td>
</tr>
<tr>
<td>F24</td>
<td>13A, 4L</td>
<td>4A, 2L</td>
<td>2A, 2L</td>
<td>1A, 4L</td>
<td>0A, 0L</td>
</tr>
<tr>
<td>F25</td>
<td>2A, 1L</td>
<td>0A, 16L</td>
<td>1A, 2L</td>
<td>4A, 3L</td>
<td>0A, 7L</td>
</tr>
</tbody>
</table>

Note: A = adults; L = larvae

On 23.08.2021, in the ecological conditions of Cluj-Napoca (Cluj County) - “Iuliu Hațieganu” Sports Park (coordinates 46°45'55" N 23°33'33" E), around 3 pm, at a temperature of 24°C, 5 American plane trees, Platanus occidentalis Linné, were analyzed to monitor the attack, the data being presented in the table (Table 1). 25 leaves were collected from each tree, and the adult insects and larvae of the plane tiger, Corythucha ciliata Say, were observed and counted. After analyzing the 5 trees, the numerical density of the pest on the plane leaves was a maximum of 30 adults/leaf and 84 larvae/leaf.

Research has shown that adults have a preference for light and heat, preferring trees exposed to the sun, while the larvae were more numerous in shady places, away from sunlight. It was also observed that Corythucha ciliata Say would have chromatic orientations, having preference over certain colors, this can be observed sitting on white and light pink clothes. Following these findings, on June 16, 2021, on the same trees, ecological traps, without
pheromones, of various colors (white, yellow, blue) were installed to test the hypothesis. On June 23, 2021, the traps were checked, but only 3 adults were observed on the yellow panel. In addition to the attack on plane trees, it seems that the plane tiger, *Corythucha ciliata* Say, also attacks humans. Following the research, it was observed that the insect stings at high temperatures above 28°C. The sting looks like a local inflammation in the skin, subsequently appearing slight irritations of the sting (Figure 2).

![Figure 2. The sting produced by *Corythucha ciliata* Say (original)](image)

Concerning the biological cycle, following the research carried out in the “Iuliu Hațieganu” Sports Park, through direct observations (visual control) and the use of colored adhesive traps, it was found that in the temperate-continental climate of Cluj-Napoca, *Corythucha ciliata* Say has 2 generations per year (Figure 3). The first generation appears in May, with increasing temperature, and the second generation was observed in September (Figure 4).

![Figure 3. Monitoring of plane tiger, *Corythucha ciliata* Say using colored sticky traps (“Iuliu Hațieganu” Sports Park Cluj-Napoca, 2021) (original)](image)

**CONCLUSIONS**

Following the research carried out in 2020-2021, the invasive species *Corythucha ciliata* Say, was identified in 4 locations in Transylvania: Chereușa (Satu-Mare County), Tâșnad (Satu-Mare County), Cluj-Napoca (Cluj County) in 2020 and Sibiu (Sibiu County) in 2021. The plane tiger was observed on two species of plane trees, *Platanus*...
occidentalis Linné and Platanus x acerifolia Willdenow. In the ecological conditions of Cluj-Napoca (Cluj County), the numerical density of the pest on the plane leaves was of maximum 30 adults/leaf and 84 larvae/leaf. Concerning the biological cycle, it was found that, in the temperate-continental climate of Cluj-Napoca, the species has 2 generations per year.

Figure 4. Damage of American plane leaves, Platanus occidentalis Linné produced by plane tiger, Corythucha ciliata Say ("Iuliu Hațieganu" Sports Park Cluj-Napoca, 2021) (original)

Author Contributions: T.F. Conceived and designed the analysis; T.F. and D.P. Collected the data, make photos and performed the analysis; H.B. Make photos, conceived and wrote the paper.

Conflicts of Interest
The authors declare that they do not have any conflict of interest.

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