

THE AGGRESSIVE BEHAVIOUR OF *THE CORYTHUCHA CILIATA* AT THE ENVIRONMENTAL CHANGES OF THE LAST YEARS

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Abstract. In the last two years, in the peri-urban and urban areas of the city of Timisoara (Romania) numerous small insects have been observed. These have been identified as species of the Tingidae family, the order Hemiptera, more specifically species of *Corythucha ciliata* (sycamore lace bugs). In the western part of the country, the species has had a less evolution and without entering the attention, until 2017. In the last two years it gradually experienced an increasing evolution, so that in summer and autumn of 2019, the population level of them became so great that they changed their behaviour. Known as a pest of the plane tree (*Platanus sp.*), it has developed adaptive abilities to other species and is often observed on birch trees (*Betula sp.*). During the month of August when the temperature was high the insect became aggressive, so that in the 2 locations where the observations were made (private gardens with houses) behavioural deviations were recorded. In detail, individuals had a chaotic flight and an attraction to human skin (people in the locations under observation were stung manifesting mild allergy symptoms). Also frequent in September and October (during the pre-wintering period) they were observed on other plants (conifers) in association with the predatory spiders, caught in their canvas. The cause of their presence on conifers is not known, but most likely they have withdrawn to house buildings and in plants with foliage more often in search of heat, in order to wintering. Some of them were seen on terraces and houses. It is obvious that with the changes in temperature in recent years produced changes in the biology and behaviour of this species. As such, it is important to constantly monitor insect populations and to find solutions for their management, especially invasive ones, as well as the target species of this work.

Keywords: *Corythucha ciliata*, sycamore lace bugs, behaviour, climate change.

INTRODUCTION

Corythucha ciliata known as sycamore lace bug is part of the order Hemiptera, the family Tingidae is native to America (1832) but has gradually spread to Europe, Asia and Africa (MC PHERSON AND WEBER 1981).

In Europe it was found in 1964 (Padua, Italy), then in 1975 in France (SERVADEI, 1996; D'AGUILAR ET AL., 1977). Then it spread rapidly in all directions so that today it is present everywhere, to the West (Spain, Portugal, Germany, Austria, Switzerland, Belgium, UK) (KMENT, 2007) and to the East (Poland, Slovenia, Slovakia, Croatia, Serbia, Czech Republic, Romania, Bulgaria, Greece (PROTIC, 1998; LIS, 2009; TAUSAN, 2011).

The insect is known to be a pest of woody species of the genus *Platanus*. According to HALBERT AND MEEKER (1988) it has been observed on other woody plants in urban and suburban green spaces, such as Juglandaceae and Oleaceae, but not in large populations such as Platanaceae (OZI ET AL., 2005).

Its diet has long been focused on plant tissue and is considered an oligophagous species. It is frequently found in forests or urban green spaces, where the plane tree predominates (HALBERT AND MEEKER, 1988).

The insect has an incomplete development passing through the adult stage egg and larvae (nymphs). Nymphs go through 5 ages. The adult form is about 3 mm long, with whitish

areas with dark spots, flattened dorso-ventral, and the wing coverings and pronotum are dilated laterally forming an enlarged lace-shaped cover of the body (CABI, 2020).

It develops 2 generations per year in temperate conditions, one in spring-summer and another in autumn. Large populations occur when the temperature rises and if they are present on their favourite plants. They are also found in parks and gardens near houses (MALUMPHY ET AL. 2006).

The feeding of adults and nymphs is done on the leaves, on the lower part, where it extracts the cytoplasm. The economic impact of the attack on the plant tissue is to affect the whole plant due to its lack of necessary nutrients (MACELJSKI, 1986; JU ET AL., 2009).

When their big number on foliage is present, especially in the first summer months the yellowing of foliage is started, usually near large nervures, where individuals of the bug are concentrated, and then their activity is extended on the whole leaf. So, in the midsummer as a result of severe damage leaves of the plane tree discolours to brown, then falls (SUPATASHVLI ET AL., 2016).

There are references in the literature related to adaptation of the insect to human blood and the production of allergies, but at a restrictive and limited level (DUTTO AND BERTERO, 2013; IZRIEY AL., 2015).

MATERIAL AND METHODS

This paper is a short study on a species of Tingidae (initially unknown) that was observed in a private garden in Timis County. After identifying the species we tried to see if it is present in other places, and it is not just a random outbreak, so we chose another garden with the house to make comparative observations.

Thus, in the first location where the species was observed (lat: 45.78293092, long: 21.24208252), direct observations were made, individuals from each plant present (absent or present) were quantified and then they went to the laboratory of Phytosanitary Diagnosis and Expertise laboratory of the university, for scientific determination.

After identifying the species, we proceeded to the observation and analysis of the two gardens (lat: 45.78287198, long: 21.24235627) where the plants were also analyzed.

The observations were made during 2 months (August and September) in both locations, consisting of 8 readings. The observations were made during 2 months (August and September) in both locations, consisting of 8 readings. In total, 10 species of woody and herbaceous plants were present for observation, present in the analyzed garden.

The objectives of the study were to identify and systematically classify the species, describe the forms found and the hosts that provide their food.

Identify and systematically classify the species. The species identified at the first laboratory analysis was included in the Arthropoda phylum, Insecta class, Hemiptera order and Tingidae family (MC PHERSON AND WEBER 1981). The Latin scientific name of the species is *Corythucha ciliata* and the recognition as a popular name is "sycamore lace bug", so it can be identified as *Corythucha ciliata* (Say, 1832), sycamore lace bug.

Method for describe the forms found. The forms encountered between August 15 and September 25 were those of an adult. As such, the description is made only at this stage. In order to describe the specimens found, they were collected in sealed plastic containers, then transported to the laboratory where they were analyzed in detail under a binocular magnifying glass. A total of 100 specimens were observed, 50 from location 1 and 50 from location 2.

Method for identify the hosts. The plants present in those two locations were: plane tree (*Platanus acerifolia*), silver birch (*Betula pendula*), ash (*Fraxinus sp.*), lilac, rose, walnut, thuja,

black chery ornamental plum (*Prunus cerasifera Nigra*), apple tree and ornamental pine. All plants were studied for the presence or absence of *Corythuca c.*

RESULTS AND DISCUSSION

The data from the study show that the species *Corythuca ciliata* is present in the 2 private gardens and their behavior was feeding on plants but a deviation to human blood tissue was observed.

The description of the forms found. The identified form is that of an adult, explainable because in August and September the adults of the second generation appear (the autumn generation). The 100 specimens studied with a binocular magnifier had characteristics similar to those described in the literature.

From our observation, the 100 adult individuals showed length values of 2.6-3.0 mm (figure 1). As the insect shape is flattened dorso-ventral, the body is dark in color. In the thoracic area it has some extensions like whitish transparent wings with ribs that close numerous circular areas; also the wings are extended outside the abdominal surface, having the same consistency and color as the extensions from the pronotum (figure 2).

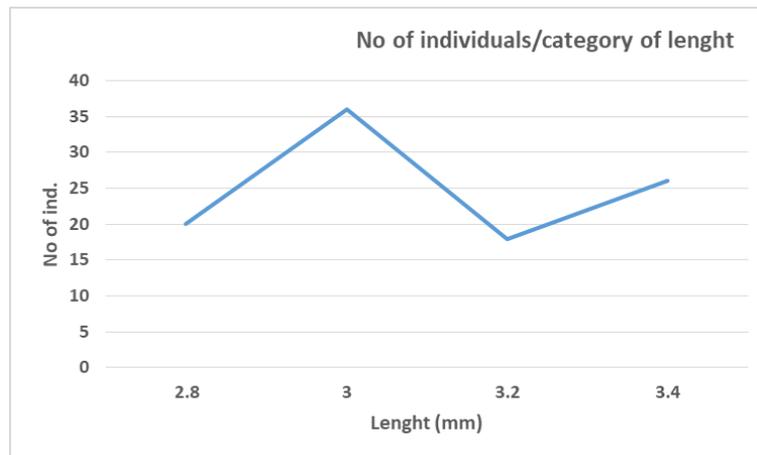


Figure 1. The length of the adults of *Corythuca c.* among the specimens collected from the 2 private gardens



Figure 2. Adults of *Corythuca c.* collected in August from plants (left and middle); length measurement (right and middle) (photos taken by Grozea during the period August and September, 2019)

Feeding behavior and identified hosts.

Vegetable hosts identified that provide their food. At the time of reading, among the analyzed plants, the insect was present on the species of *Platanus acerifolia*, *Betula pendula* and *Pinus sp.* (table 1).

Table 1

Presence or absence of <i>Corythuca ciliata</i> species on the analyzed plants from private gardens		
Family	Plant species	Presence/ absence of insect
<i>Platanaceae</i>	<i>Platanus acerifolia</i>	+
<i>Oleaceae</i>	<i>Fraxinus sp</i>	-
	<i>Syringa vulgaris</i>	-
<i>Rosaceae</i>	<i>Prunus cerasifera Nigra</i>	-
	<i>Rosa sp</i>	-
	<i>Malus sp</i>	-
<i>Betulaceae</i>	<i>Betula pendula</i>	+
<i>Yuglandaceae</i>	<i>Juglans regia</i>	-
<i>Cupresaceae</i>	<i>Tuja sp.</i>	-
<i>Pinaceae</i>	<i>Pinus sp.</i>	+

"+" means that insect *Corythuca c.* was present on the plant

"-" means that the insect was not present on the plant at the time of observation

In August they were present on *Platanus* and *Betula* species (figure 2), but in September only in location/ garden 1 were observed numerous specimens (25 adults/plant) on *Pinus sp.* The specimens from August were observed feeding on the leaf nervures. But those observed in September (at the last 2 readings) no longer fed but were trapped in a canvas of a predatory spider (figure 2). The analyzed pine is located near the house and terrace and probably in search of sheltered and warmer places, the insects migrated towards them and were caught in the canvas of the predatory spider from *Aranea*. Anyway, they were not observed consuming this type of plant.



Figure 2. Adult insects of *Corythuca ciliata* on *Betula sp.* (left); adult caught in the canva of the spider from (right) *Aranea* (photos taken by Grozea during the period September, 2019)

Making a few observations in October, it was noticed that the number of insects caught in the canvas increased compared to September, which leads to the idea that they were preparing for winter.

Other hosts identified that provide their food.

The analysis of the behavior of this species occurred when, in August, many insects were observed flying without a specific target and their stagnation for a longer time, especially near the space where a human was present (at one time, walking, sitting on a bench in the garden, on the terrace).

In detail, individuals had a chaotic flight and an attraction to human skin. After discussions with 6 people who lived in locations under study, it was concluded that insects had the same manifestations of behavior in the presence of humans. So, adults got on the skin and started pinching at first, annoyingly.



Figure 2 Adult *Corythuca c.* at the time of the sting (right); adults collected after stinging human skin (left) (photos taken by Grozea during the period August, 2019)

Subsequent, 4 of people started to scratch and at 3 there were swellings of the tissue around the sting. Of these, 3 people have manifested mild allergy symptoms and one has resorted to antihistamine medication.

Specimens collected from human skin were analyzed immediately and it was observed that they were darker in color, no longer had the same mobility and died shortly after.

CONCLUSIONS

With the changes in temperature in recent years, there have been changes in the biology and behavior of this species. The combination of the two types of food (vegetable juice, human blood) will probably lead to the adaptation to a single type of food. However, from what was observed, after being fed with human blood, the individuals died shortly after. However, attention remains on the future, the increase of the population level and the disturbance of the human habitat. Basically, we have proven that they become extremely aggressive in behavior and can cause even severe allergies in sensitive people.

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