

NEW DATA ON QUERCUS GALL MIDGES – *JANETIA CERRIS* (DIPTERA: CECIDOMYIIDAE) IN ORNAMENTAL GREEN LANDSCAPES OF WESTERN ROMANIA

Ana – Maria VÎRTEIU^{1*}, Snejana DAMIANOV¹, L. MOLNAR¹, Ramona ȘTEF¹,
Ioana GROZEA¹

¹Department of Biology and Plant Protection, University of Life Science "King Mihai I" from Timisoara

* Corresponding author: anamariavarteiu@usab-tm.ro; ioana_entomol@yahoo.com

Abstract. The gall midge is the only known dipteran herbivorous insect on oak trees (with the exception of occasional opportunistic pollen feeders). The quercus gall midge is very host specific, it develops on the turkey oak (*Quercus cerris*). In Romania, there are 4 species of gall midges associated with *Quercus* spp., and recently the species *Janetia cerris* has been found in the urban green landscape of Timisoara. The damage caused by this species manifests itself in the appearance of conical galls on the upper side of the leaves, up to 3 mm high and light green in colour. The larvae develop inside these galls. Our investigations were carried out during 2022 – 2023 in 4 observation points in parks and green urban spaces in the city of Timișoara. During our investigation we used the same collecting method at each sample points. We noted in the protocol the geographical characteristics of biotopes and the local abundance of species. The survey indicates a high infestation level with gall midges in all 4 observation points that exceeds 70% of all analyzed samples. The attack can be recognized by the galls that appear on the upper side of the leaf, which have a sharp appearance, are about 2 mm long and lack pubescence; while on the lower side of the leaf, the gall is prominent, up to 5 mm in diameter, with long, yellow-brown hairs. Photos with larvae, galls on leaves, identification keys and brief description for this species are presented in this paper.

Keywords: gall midges, Diptera, Cecidomyiidae, green landscapes, western Romania

INTRODUCTION

Turkey oak (*Quercus cerris*) provides important ecosystem services and is considered to be of high value both as an ornamental tree and as a component of the forest. Due to recent climatic changes, many reports have been published detailing the situation of Turkey Oak in different countries (ROSSNEV, 2006; ŠIMKOVÁ ET AL., 2023;). For this reason, we have carried out a small survey in order to present the most recent pests that are causing significant damage to ornamental trees in the parks and green landscapes of Western Romania.

Numerous galls and leaf deformations were observed on *Quercus cerris* trees in the area of the University of Life Sciences Park in 2020 - 2021. Therefore, in 2022 – 2023 period, a survey was carried out in the city of Timișoara to determine the presence of the *Janetia cerris* gall midge. This is a small insect. It belongs to the order *Diptera*, family *Cecidomyiidae*.

The family *Cecidomyiidae* is one of the most species-rich families of *Diptera* (SKUHRVÁ & SKUHRVÝ, 2010). The family currently comprises 6651 known species and 832 genera (GAGNÉ & JASCHHOF, 2021), with 1800 valid species in 270 genera in Europe (SKUHRVÁ ET AL., 1996, 2006).

BORCEA (1912), in Zoocecidies from Romania, summarised for the first time the data on the occurrence of the family *Cecidomyiidae* in Romania. According to this work, more than 70 species of gall midges have been recorded in the Romanian territory. The Romanian checklist published by BORZA & GHIUȚĂ (1938) includes new species, mostly from woodland areas. From that time to the present day, there have been many reports of new species in our

country's fauna, but only a few have been reported in the green urban landscape. Among these, in the green landscapes of the cities in the western part of Romania, we note for the first time the presence of *Janetia cerris* on *Quercus cerris*.

MATERIAL AND METHODS

Study area

Timisoara is located at the intersection of the parallel of 45° 47' N and the meridian of 21°17' E. In terms of geography, it is almost at the same distance from the Arctic and Antarctic poles, and in terms of time, it is in the Central European Time Zone. Situated in the southern part of the Western Plain, in the area where the Timiș and Bega Rivers meet, the area is characterized by a moderate continental climate, typical of the south-eastern part of the Pannonian Depression, with some sub-Mediterranean influences (Adriatic variant).

The average annual temperature is 10.6°C, the warmest month being July (21.1°C), with an average thermal amplitude of 22.7°C, lower than that of the Romanian plain, which is evidence of the favorable influence of oceanic air masses. From a practical point of view, the number of days with temperatures favorable for the optimal development of the crop plants, i.e. those with an average of more than 15°C, is 143 per year, between the 7th of May and the 26th of September. The active temperature, a total of 2761°C, provides very good conditions for the maturation of crop plants, some of which are of Mediterranean origin.

Being mainly influenced by maritime air masses coming from the North-West, Timisoara receives more rainfall than the cities of the Romanian Plain. The annual average of 592 mm, close to the national average, is achieved mainly as a result of the abundant rainfall in May, June, July (34.4% of the annual total) and those in November and December, when a secondary maximum is recorded, a reflection of the sub-Mediterranean climatic influences.

Timișoara experiences a movement of air masses from the north-west and west that is slightly different from the general air circulation over the western part of Romania, due to its location in the open field, but not too far from the Carpathian Mountains and the main valleys that separate them in this part of the country (Timișoara-Cerna corridor, Mureș Valley, etc.).

Data collection

During the period of 2022 – 2023, we investigated the *Quercus* gall midges *Janetia cerris* in 4 observation points spread throughout the forest, parks and green urban spaces in the city of Timișoara: 1st point - University of Life Science Park (45°782'599" N, 21°215'545" E); 2nd point - Botanical Garden (45°760'653" N, 21°225'645" E); 3rd point – Green Forest (45°783'367" N, 21°263'973" E); 4th point - private garden situated on Martir Silviu Motohon (45°771'569" N, 21°233'208" E).

When we noticed the characteristic galls that appear on the upper side of the leaf, which have a sharp appearance, are about 2 mm long, and are not pubescent, while on the lower side of the leaf the galls are conspicuous, up to 5 mm in diameter, and have long, yellow-brown hairs, we collected them, placed them in jars, and then examined them in the laboratory. During our surveys we used the same collection method at each observation point. This consisted of visually inspecting each observation point by walking through it slowly for at least one to two hours, spaced 10 to 14 days apart, looking for *Quercus* gall midges.. Brief characteristics of the habitats are noted. All findings are recorded, including notes on local abundance (SKUHRVÁ & SKUHRVÝ, 1997, 2009; CHIRECEANU ET AL., 2015; VÎRTEIU ET AL., 2015; OLENCI & DUDUMAN, 2016; ȘTEF ET AL., 2021; VÎRTEIU & GROZEA, 2023).

RESULTS AND DISCUSSIONS

During the research carried out in 2022 - 2023 in Timișoara, Timiș County (Romania), the Quercus gall midge, *Janetia cerris*, was recorded as a pest that causes minor to severe damage to the leaves of *Quercus cerris* trees, especially in the green urban landscape.

Janetia cerris (Kollar, 1850)

Synonyms: *Lasioptera cerris* Kollar = *Arnoldia cerris* Kollar

Material examined: a total of 21 samples were collected, with larvae and galls of Quercus gall midge found in each of the 4 observation points surveyed and in 37 of the total 178 trees analyzed.

Distribution: European, Submediterranean

Main host in European countries: *Quercus cerris*

Description: the following description is mainly based on GIRAUD (1861) and MÖHN (1955, 1966-1971) with the addition of new original photographs: **Larvae** – 2 mm long, glabrous, legless, and reddish-orange in color, sometimes whitish spotted. Short, more or less flattened dorso-ventrally, the sides slightly protruding and slightly nipped, the tip of the head slightly pointed in movement: 13 segments; the first, or cephalic, is very clearly divided into two and carries a black double stain on the dorsal side, at the back, visible through the transparency of the integument. Below and close to the mouth is the oral armour, red in color. It is composed of two very short, straight points, slightly separated at the front, which join at the back, where they are carried by a common, linear and longer than they are stalk. If you look at it on a certain day, the surface of the body has a satiny appearance (figure 1).



Figure 1. *Janetia cerris*: larvae in Turkey oak leaf galls, November 2022, Timisoara (photos by Virteiu)

Galls – produced by this species, are found on the leaves of *Quercus cerris*, sometimes in such abundance that all the leaves of the tree are covered with them. They are often deformed by the curling of their lower edges. It is present on both sides of the leaf, but in a different form on each side (figure 2).



Figure 2. Gall midge *Janetia cerris* attack on Turkey oak, October/ November 2022 Timișoara (photos by Virteiu)

On the lower side of the leaves, it forms a small plate, very slightly convex, about 2-3 millimeters in diameter, and covered with a very dense pubescence, which is whitish at first and then a light reddish grey. On this side of the leaf, the galls are often pressed against each other in such a way that they form a carpet of down that covers a more or less large area (figure 3). At the corresponding point, on the upper surface, we find a small conical nipple, sharp or blunt at the end, almost smooth, pale green or yellowish, of very hard consistency, firmly attached to the leaf from which it never separates spontaneously (figure 4).



Figure 3. *Janetia cerris* galls: lower side of the leaves with whitish to light reddish grey pubescence, May/ November 2022 Timișoara (photos by Virteiu)



Figure 4. *Janetia cerris* galls: upper side of the leaves with pale green to yellowish conical nipple, November 2022 Timișoara (photos by Virteiu)

Removing the pubescent plate of the underside (which can easily be done at the time when the galls are mature), one can see that it is covered, like a cap, by a small pit that appears to have been formed by pushing into the substance of the leaf and housing the larva. This dimple corresponds to the nipple on the upper side of the leaf.

The cover itself is in the form of a small disc, the edges of which are adapted to those of the dimple: it forms the only hairy part of the gall (figure 5 a, b).



Figure 5. *Janetia cerris*: a – upper pubescent plate of mature galls; b - lower small disc of mature galls, November 2022 Timișoara (photos by Virteiu)

Importance of the pest in ornamental green landscapes of Western Romania

Of the 8 observation points we had originally chosen to study, 4 proved to contain *Janetia cerris* gall midge. *Janetia cerris* was found both in artificial urban landscapes (parks and private gardens) and in self-seeded trees in the Green Forest. At each observation point, the infestation rate varied between 13.04 and 100%, with an average of 23.82% of the *Quercus cerris* trees examined (table 1).

The galls were usually found on large mature trees, but sometimes on young trees, in clusters of 20-50. The pest infests from one to five trees standing nearby, while other trees of Turkey oaks in the same park or private gardens show no signs or symptoms of infestation. Groups of infested trees with a total of 916 galls on 50 leaves and an infestation level of 3.99% are scattered at observation points in the city of Timișoara. The species was never found on

Quercus robur trees in the urban landscape. More than 50 *Quercus robur* trees were inspected at different locations. No infestation was found, even in the presence of *Quercus cerris* trees infested with *Janetia cerris* gall midge in the same group.

Table 1.

Number of *Quercus cerris* trees infested by *Janetia cerris* and number of the galls on leaves in different observation points in Timișoara (Timiș County, Romania), 2022 – 2023 period

Observation points	Sampling date	No of trees	No of Infested trees	Infestation levels %	No of galls on 50 leaves	Infestation levels %
ULSP	22.05.2022	3	0	-	-	-
BG	05.06.2022	8	0	-	-	-
GF	22.06.2022	23	3	13.04	17	2.98
PG	06.07.2022	1	0	-	-	-
ULSP	19.07.2022	3	1	33.33	65	15.34
BG	03.08.2022	8	0	-	-	-
GF	18.08.2022	23	3	13.04	49	11.54
PG	31.08.2022	1	0	-	-	-
ULSP	12.09.2022	3	2	66.67	128	25.5
BG	28.09.2022	8	1	12.5	9	2.66
GF	10.10.2022	23	4	17.4	74	16.42
PG	26.10.2022	1	0	-	-	-
ULSP	06.11.2022	3	3	100	288	69.36
BG	14.11.2022	8	3	37.5	35	8.62
GF	21.11.2022	23	9	47.36	111	20.94
PG	28.11.2022	1	1	100	8	2.68
ULSP	02.06.2023	3	0	-	-	-
BG	23.06.2023	8	0	-	-	-
GF	05.07.2023	23	6	26.09	53	6.92
PG	12.07.2023	1	0	-	-	-
ULSP	18.07.2023	3	1	33.33	79	16.36
		178	37	23.82	916	3.99

* ULSP - University of Life Science Park, BG - Botanical Garden, GF - Green Forest, PG - private garden situated on Martir Silviu Motohon

The monitoring of *J. cerris* in Timișoara has shown that all the trees that were found to be infested in the year 2022 were still infested by the pest in the year 2023. In addition, new infestations were observed in 2023 in the vicinity of areas already declared infested in the previous year. This indicates that the species is already well established in the urban green spaces of the city and that the population is spreading at a rather fast rate.

The economic impact of the pest in the city seems to be insignificant, explained by the reduced number of *Quercus cerris* trees in the green urban areas of Timisoara.

CONCLUSIONS

Of the total number of trees studied, an extremely small number lost their ornamental value due to the galls present on the leaves, but there were no cases of *Q. cerris* trees drying up due to the attack of the studied pest, especially since the period studied was extremely short.

It is necessary to continue the monitoring of the species in order to be able to evaluate its negative impact on the trees, but also on their value in the landscape.

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