

CURRENT SITUATION OF INSECTS SPECIES WHICH ARE AFFECTING THE PLANTS IN THE BOTANICAL PARK OF TIMISOARA

Ana-Covilca MUNTEAN¹, Ioana GROZEA¹

e-mail: ioana_entomol@yahoo.com

Abstract

The green spaces represent places of relaxation and release from the daily stress for many of the inhabitants of Timisoara but also from the other villages of the Timis county. The botanical park or botanical garden is one of the most visited green places, being located near the central historical area and also constituting an important didactic and scientific support. The plants that enter its composition are both herbaceous and arboreous. In the last 10 years since its rearrangement, a number of plants have been affected by insects, either indigenous or invasive. A current overview of the analyzed landscape shows that it has lost its aesthetic and scientific qualities, so that areas with healthy plants alternate with areas with affected plants (natural color change, appearance of sticky secretions and inadequate odors due to the attack of Hemiptera, premature maturation, etc.). For an efficient management of the monitoring activities, the park was divided into 5 sectors, in which, 10 observation points were established. Monthly, during May-September, 2019, readings were made at each observation point (identified with the help of GPS mobile). From our observations it was found that the following species of insects were present, at a medium and high population level: *Metcalfa pruinosa*, *Nezara viridula*, *Cydalima perspectalis*, *Cameraria ohridella*, *Tetranychus urticae*, *Eriophyes tiliae*, *Trialeurodes vaporariorum*, *Aphis gossypii* and *Eriosoma lanigerum*. Also other species were observed, but at a lower level. We focused mainly on invasive species, which unfortunately were the most aggressive, in many cases their attack manifesting until the plant is compromised. This is the case of the species *Metcalfa pruinosa* (from Hemiptera) and *Cydalyma perspectalis* (from Lepidoptera) which have proved to be the most dangerous insect species for the plants in the botanical park.

Key words: monitoring, insect pests, invasive, botanical garden

The Botanical Park in Timisoara, better known as the Botanical Garden, was established in 1986.

Its location in the central area of Timisoara makes it extremely attractive and frequented. It extends an area of over 8 ha and is divided into several sectors with floristic and vegetation specificity (Lajos K., 2015).

The main purpose, recreational, is added to the scientific one, mainly didactic.

In accordance with the information provided by the Environmental Directorate of Timisoara Municipality (<http://www.dmmmt.ro>), the sectors are mainly focused on the native flora and vegetation (from Romania and especially from the Banat region), on the ornamental flora of roses; on the flora of America and Asia and to a lesser extent on the medicinal and tropical flora.

Initially, many more specimens of plants were present (about 1000), now there are just over 200 species. All these because in recent years deforestation and correction work have been carried out, removing plants debris or eliminating

the plants attacked by pathogens and pests (Ciupa V. *et al*, 2015).

The role that biotic factors (harmful insects and pathogens) play in endangering the health of existing plants in the park is extremely important and requires great attention in the future.

It is known that botanical gardens all over the world are facing problems to protect biodiversity, due to various biological threats that can create imbalances in the proper functioning of plants. These are the result caused by anthropic factor and the globalization of trade which creates conditions conducive to the occurrence of pests and diseases (Marek B. *et al*, 2016).

Although the management of invasive species in urban landscapes has been in the forefront in recent years, it remains a challenge today (Gaertner M. *et al*, 2016).

Of the newly emerged and lately present species in green spaces and parks in public places (from the western part of Romania), it is worth mentioning *Metcalfa pruinosa*, *Nezara viridula*,

¹ Banat University of Agricultural Sciences and Veterinary Medicine, Timisoara

Cydalima perspectalis and *Leptoglossus occidentalis* (Grozea *et al.*, 2019).

In the present paper we set out to evaluate the current situation of the Botanic Park in Timisoara in terms of monitoring activities of harmful insects that cause damage, both of native and foreign species.

MATERIAL AND METHOD

The observations that are the subject of this paper are made in the municipal area of Timisoara (Timis County), more precisely in the botanical park known and as a botanical garden. The park was divided into 5 sectors (observation areas) (*figure 1*) identified with the following geographical coordinates: zone 1: Lat. 45.7592, long. 21.2254; zone 2: Lat. 45.7608, long. 21.2259; zone 3 Lat.

45.7613 long. 21.2267; zone 4 Lat. 45.7606, long. 21.2250 and zone 5: Lat. 45,7614 long. 21.2286.

In each area (sector) were established 10 observation points, maintained at each monthly reading (direct observations). The observation period was made between the vegetation months May-September 2019, on the principle that all the analyzed plants were attractive for most phytophagous insects (*figure 2*).

Table 1 presents the basic elements of each sector, such as type of analyzed plants (layers with flowers, herbaceous plant, woody plants and meadow) or condition of analyzed spaces (clean, without weeds or wild with weeds present).

Samples of insects but also of affected plants were taken and transported in order to identify accuracy at the university laboratory (Laboratory of Diagnosis and phytosanitary expertise).



Figure 1 The sectors (areas) in which the monitoring observations were made; 1-5 areas (satellite image taken from the public space where modifications have been made)

Table 1

Basic elements of research area (Botanical Park Timisoara)

No.	Zone/Sectors Identification code	Type of the plants analyzed	State of analyzed spaces
1	BPZ01 (S1)	layers with flowers meadow herbaceous plant woody plants	clean, without weeds
2	BPZ02 (S2)	herbaceous plant layers with flowers woody plants meadow	clean, without weeds
3	BPZ03 (S3)	herbaceous plant woody plants meadow	bushes with weeds present
4	BPZ04 (S4)	herbaceous plant woody plants meadow layers with flowers	bushes with weeds present
5	BPZ05 (S5)	herbaceous plant woody plants meadow	bushes with weeds present

BP- Botanical Park; ZO- zone; (S)- sector;



Figure 2 Moments of observations made in the Timisoara Botanical Park during May-September, 2019

RESULTS AND DISCUSSIONS

Following the observations made in the Timisoara Botanical Park, numerous insects belonging to 17 harmful species were quantified and examined. These belonged more to the group of hemiptera and lepidopterans, but also to beetles and mites (table 2).

Phytophagous insects were found in all 5 sectors subject to monitoring. Most, however, were registered in S5 which is the most isolated sector, where there are present areas of meadows, grasses but also woody plants. It should be added that in this area/sector bushes and weeds are more

common than in other sectors, perhaps because of this the insects have found an optimal environment for development. The lack of layers of flowers that are usually better maintained and cleaned of weeds can also be a cause.

Of the 17 species of insects, the best represented numerically were those of the genus *Trialeurodes* (code P7 in table 3) with an average of 98.60 ind., followed by *Aphis rosae* (P11) with the average values of 95.00 ind. after by those of *Corynthucha ciliata* (P17) with an average of 83.80 ind. then P1 (*Metcalfa pruinosa*), P9 (*Eriosoma lanigerum*) and P8 (*Aphis gossypii*) with the values $x = 82.20 \text{ ind./P1}$, $x = 70.40 \text{ ind./P9}$ if $x = 69.80 \text{ ind./P8}$.

Table 2

Situation of population level of the species identified in Timisoara Botanical Park, during the period May-September, 2019

No crt (P)**	Species	Major insect group	Presence (+) /sectors (S)	Total number of individuals*				
				May	June	July	August	Sept.
1	<i>Metcalfa pruinosa</i>	Hemiptera	S1-S5 (+)	19	46	147	88	111
2	<i>Nezara viridula</i>	Hemiptera	S3-S5 (+)	23	41	58	24	67
3	<i>Cydalima perspectalis</i>	Lepidoptera	S2 (+)	25	38	12	7	45
4	<i>Cameraria ohridella</i>	Lepidoptera	S4-S5 (+)	12	46	31	58	11
5	<i>Tetranychus urticae</i>	Acarina	S2, S5 (+)	26	55	48	61	26
6	<i>Eriophyes tiliae</i>	Acarina	S3-S5 (+)	0	36	34	56	22
7	<i>Trialeurodes vaporariorum</i>	Hemiptera	S1-S5 (+)	41	100	231	121	0
8	<i>Aphis gossypii</i>	Hemiptera	S1-S5 (+)	10	74	190	43	32
9	<i>Eriosoma lanigerum</i>	Hemiptera	S4-S5 (+)	36	176	65	19	56
10	<i>Leptoglossus occidentalis</i>	Lepidoptera	S3-S5 (+)	6	0	0	0	3
11	<i>Aphis rosae</i>	Hemiptera	S1, S3 (+)	81	166	51	20	53
12	<i>Halyomorpha halis</i>	Hemiptera	S3, S4 (+)	0	15	43	90	87
13	<i>Phylotreta sp</i>	Coleoptera	S1-S5 (+)	10	39	0	0	21
14	<i>Cossus cossus</i>	Lepidoptera	S5 (+)	0	0	1	3	0
15	<i>Cerambyx cerdo</i>	Coleoptera	S4-S5 (+)	3	8	0	0	0
16	<i>Lymantria dispar</i>	Lepidoptera	S5 (+)	5	0	3	3	0
17	<i>Corynthucha ciliata</i>	Hemiptera	S4 (+)	32	10	68	120	189

*only the active stages (larva, nymph or adults) were identified; (+)-the presence of species in the analyzed

Sector; (P)- code pest

Tabel 3

Statistical values of each insect species (identified with code P1-P17)									
	P1	P2	P3	P4	P5	P6	P7	P8	P9
X	82.20	42.60	25.40	31.60	43.20	29.60	98.60	69.80	70.40
s	50.91	19.78	16.29	20.70	16.36	20.56	88.14	71.04	61.67
Sx	22.77	8.85	7.28	9.26	7.32	9.20	39.42	31.77	27.58
CV	61.93	46.43	64.13	65.49	37.87	69.47	89.39	101.78	87.60
Sx%	27.70	20.77	28.68	29.29	16.94	31.07	39.98	45.52	39.18

Continuation of table 3								
	P10	P11	P12	P13	P14	P15	P16	P17
X	1.80	95.00	15.80	14.00	0.80	2.20	2.20	83.80
s	2.68	42.61	17.80	16.45	1.30	3.49	2.17	72.04
Sx	1.20	19.06	7.96	7.36	0.58	1.56	0.97	32.22
CV	149.07	44.85	112.63	117.48	162.98	158.77	98.54	85.96
Sx%	66.67	20.06	50.37	52.54	72.89	71.00	44.07	38.44

High values also were recorded for *Tetranychus urticae* species (with $x=43.20$ ind./P5), *Nezara viridula* (where $x=42.60$ ind./P2), at *Cameraria ohridella* (with $x=31.60$ ind./P4) and *Cydalima perspectalis* (where $x=25.40$ ind./P3) (table 2 and table 2a).

It deserves attention and the species *Eryophyes tiliae* (P6), *Halyomorpha halis* (P12) and *Phyllotreta sp* (P13) due to registered values ($x=29.60$ ind., $x=15.80$ ind. and respectively $x=14.00$ ind.).

A classification in the 4 levels of population assessment (low level-IV, medium level-III, high level-II and extremely high level-I) shows that in the category of insects (IV) that is not currently constitute a problem among the following species:

Lymantria dispar, *Cerambyx cerdo*, *Cossus cossus*, *Phyllotreta sp* and *Leptoglossus occidentalis* (figure 3). In the middle level category (III) the species include: *Halyomorpha halis*, *Eriophyes tiliae*, *Tetranychus urticae*, *Cameraria ohridella*, *Cydalima perspectalis* and *Nezara viridula*.

Species that are considered dangerous and fall into category II of high level are: *Eriosoma lanigerum*, *Aphis rosae* and *Aphis gossypii*.

Extremely dangerous by the very high level present on the plants (over 400 individuals being registered in the observation points) are *Metcalfa pruinosa*, *Trialeurodes vaporariorum* and *Corynthucha ciliate* (figure 3).

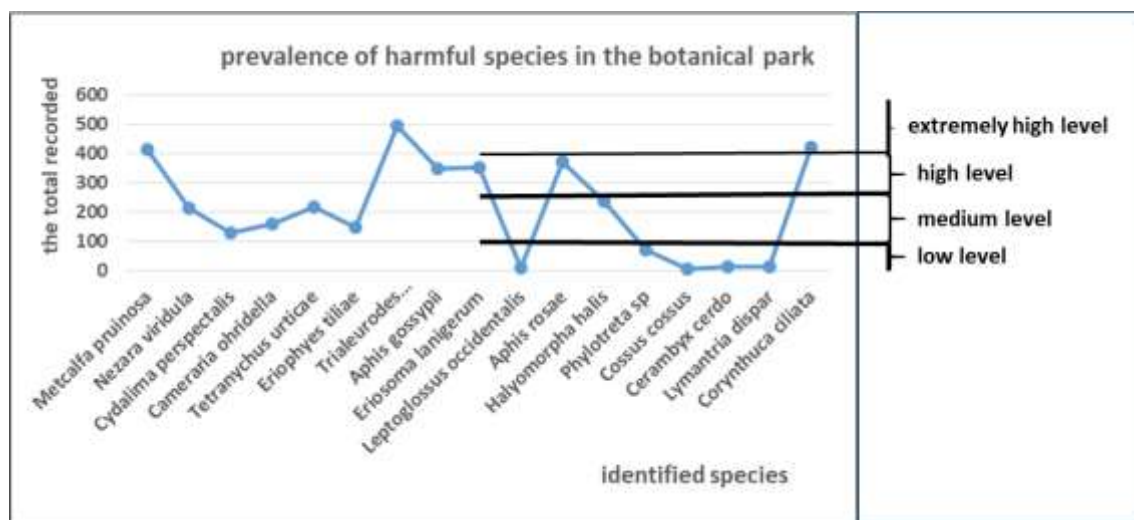


Figure 3 The predominance of the species in the observation points in the botanical park by the prism of the population registered in 2019

Regarding the monthly dynamics of the complete set of active insect pests, during the period May-September, it can be seen in figure 4 that it registered a sudden increase in the period May-June, then a slight increase in July. In July, the maximum value was registered (with 1403

individuals/S1-S5). In August, the presence of insects decreased considerably, then in the first days of September their frequency increased. After September 15, with the fall of the temperatures, their presence diminished.

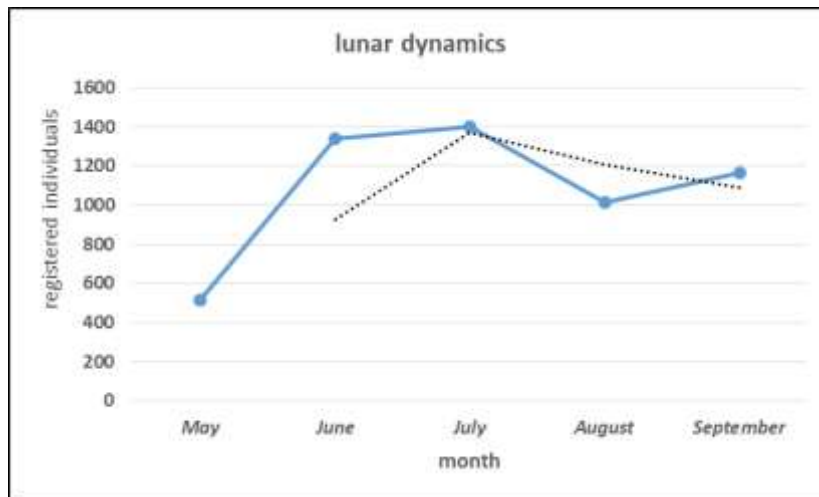


Figure 4 Monthly dynamics of the species of insects observed/ present in the botanical park, during the period May-September

Out of the total species of active insects present in the 5 sectors of the Timisoara Botanical Park, 5 invasive species have been identified that have recently entered Romania. These are *Metcalfa pruinosa*, *Nezara viridula*,

Leptoglossus occidentalis, *Cydalima perspectalis* and *Corynthucha ciliata* (figure 5). These are represented by a considerable number of individuals, so that the percentage reaches 18.34% of the total registered insects.



Figure 5 Invasive insect species identified during monitoring, in the Timisoara Botanical Park during May-September, 2019; a- *Metcalfa pruinosa*, b- *Nezara viridula*, c- *Leptoglossus occidentalis*, d- *Cydalima perspectalis*

CONCLUSION

The presence of invasive species in the Timisoara Botanical Park is a danger to the set of plants that make up the living plant collection. It is known that these species have no natural enemies and there is no strategy to combat them.

Also, the increase of the population level in some native species, at an extremely high level, supplements the stress on the plants.

Therefore, control strategies are required in the future to ensure permanent protection of plants during the vegetation period.

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