ASSESSING THE POPULATIONS OF APHIDS ON THE ROSE AND OTHER INSECT ASSOCIATED WITH THEM DURING THE AUTUMN PERIOD

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Abstract: *During the autumn, the aphids of roses appear in adult sexual forms (females and males) or sexupara forms (un-winged), sometimes in extremely high populations. The cause may be the weather neither too hot nor too cold. And the warmth days alternating with rainy and cold days, somehow determine a balance and climate conducive to population development and intensive feeding activity. Through this paper we set out to evaluate the populations of aphids that damage the rose plants during the autumn. Being a decorative plant, the rose also needs attention during periods other than those of spring and summer. The observations were made in a private garden in Timisoara in Lipovei area (Timis county) during 2 months (IX, X) of 2019. Four varieties of rose were analyzed, on which 4 readings were made (bi-weekly). In addition to aphids we have also followed other species associated with them such as ants or ladybugs. We found that on all the plants analyzed, aphids were present, sometimes even in excess populations (with overlapping individuals). Ants were also noted among the aphids. These were attracted by the liquid excrements of aphids which are known as honey dew. Where the number of aphids was high and the number of ants visiting the plants near the aphid-concentrated areas was increased. The population level of the 2 species involved (aphids and ants) varied depending on the variety of roses but also on the time of reading (periodic verification and the time interval of the day). High levels of aphids have been observed especially in red flowered varieties and thicker, softer petals, well caught by the bud. Compared to varieties with petals that fall slightly the population level was lower. In conclusion, aphids can create serious impairment of the decorative quality of roses in all flowering seasons, therefore it is necessary to check them periodically and to intervene to stop their propagation.*

Keywords: ***aphids, ants, population, assessing, autumn, rose plant.***

INTRODUCTION

Around 18,000 rose varieties are cultivated worldwide. This is because the rose is known as the "king of flowers" and the growers get huge profits (QURATALAIN et al., 2015). Numerous species of native or non-native aphids have expanded their range throughout Europe. Some species are considered serious pests, capable of transmitting viruses (WIECZOREK et al., 2019). The list of aphids presents on rose plants in all the world is comprehensive. Among the most important aphids of rose plants are *Macrosiphum rosae* (L.), which has a worldwide distribution (GOLIZADEH et al., 2017). Aphids are present especially on fast-growing organs, such as buds and shoots. A large number of aphids can distort or compromise the buds or reduce the size of the flowers (KARLIK and TJOSVOLD, 2003; GROZEA, 2006). When populations become crowded, both aphids develop without wings, but they can also develop with (seasonal) wings so that when the amount of food is insufficient, insects can travel to other plants, breed and start a new colony (BISHT et al., 2001).

The aphids are easily recognized, these are small, soft-bodied insects that suck from the plant tissues and are present on plants (BLACKMAN, 2010; CANNON et al., 2017; JALALIZANDA et al., 2012).

Often, besides aphids, predatory species such as dipteras, coccinelids, spiders and others (SIMOVA and VUKOVIC, 1980; LEBANOVSKY and SOIKA, 2010) are present.

The aphids and ants can live in a symbiotic relationship in which both species benefit (STARY, 1966; STADLER and DIXON, 2005). The ants protect the aphids from natural enemies and the aphids secrete the honey dew with which the ants feed (WATANABE et al., 2018).

In most areas of the world, aphids are considered a major problem; in some only in spring and early summer they are considered harmful before the high summer temperatures cause their number to decrease (FLINT, 2013).

MATERIAL AND METHODS

The observations related to the evaluation of the aphid's populations on the roses, as well as other associated insect species, were made in the autumn of 2019, during the months of September and October. The place where the readings were made is located in the north part of the city of Timisoara, in a private garden in Calea Lipovei (figure 1). Our observations were made on 4 varieties of roses: Emeraude D'or (yellow-pink), Ingrid Bergman (bright red, velvety), Chrysler Imperial (normal red) and Glorious (yellow).

The plant checks were carried out bi-weekly by direct readings on shoots, buds and flowers (figure 1).

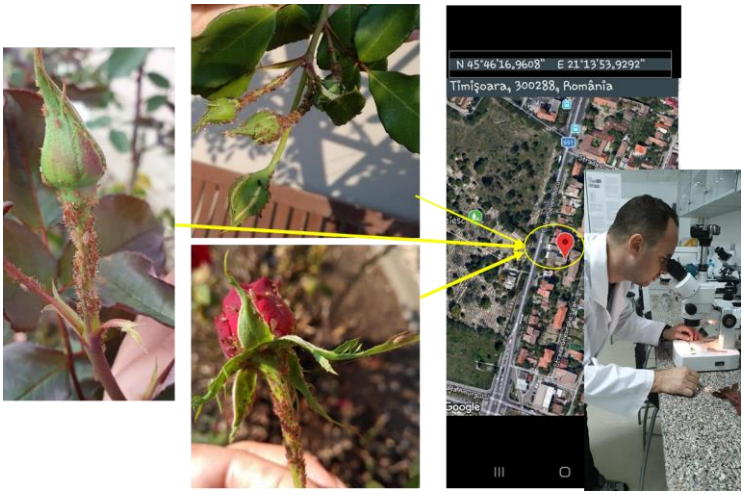

Figure 1. Moments of observations on rose plants, in a private garden in Timisoara (Timis county)

There were also taken samples of plants with aphids for transport to the laboratory of Diagnosis and Phytosanitary Expertise (DPE) within the USAMVBT King Mihai of Romania. Following the detailed studies in the binocular magnifying glass, the existing species, the forms (stages) of the aphids and the population level were determined (figure 1). To evaluate the number of ants that visited the plants, direct observations were made on the plants.

RESULTS AND DISCUSSIONS

From the observations we can see that the aphids were present on all varieties of rose. The species found in the monitored garden was *Macrosiphum rosae* (rose aphid). Their numerical population level was different from 11 aphids/reading to 148 aphids. In the majority, the aphids were observed in the feeding activity, in the position with the head oriented downwards and the buccal apparatus introduced into the plant tissue of the plant.

Aphid populations were made up of sexual forms (in September and October) and sexupara forms (only in October) (Table 1) (figure 1). These comprised sexupara forms (in both, September and October) and sexual forms (only in October) (Table 1). It seems that the sexupara (non-winged) forms were predominant, perhaps due to the fact that the temperatures were quite high for this period, but also due to the flight capacity (they were only observed at one time in moment of reading on the plants).

At the September readings (R1-R3) the numerical values registered in the population were lower than those of October (R4-R7). They were located in 11-210 individuals (ind.)/2 plants analyzed. Most aphids were quantified in the Ingrid Bergman and Chrysler Imperial varieties. In October, the total values were at the same but much higher on varieties (between 72-440 ind./plants) (table 1). As a rule, in October, populations decrease numerically due to unpopular weather (colder, colder rain), but this autumn was more atypical due to excessive heat, which led to the development of very large populations.

Table 1

Population level of aphids on the plants analyzed by the roses (on all four varieties), in autumn 2019

No.	Variety	Number of aphids on analyzed plants (2 plants/variety)						
		September			October			
		R1	R2	R3	R4	R5	R6	R7
1	Emeraude D'or	44	40	126	102	228*	240*	428*
2	Ingrid Bergman	100	170	210	250*	323*	456*	740*
3	Chrysler Imperial	86	114	160	232*	244	282*	516
4	Glorious	11	20	58	72	100*	88*	121*
X		60.25	86.00	138.50	164.00	223.75	266.50	451.25
s		40.55	69.07	63.80	90.05	92.36	151.34	256.37
Sx		20.27	34.54	31.90	45.03	46.18	75.67	128.18
CV		67.30	80.31	46.06	54.91	41.28	56.79	56.81
Sx%		33.65	40.16	23.03	27.45	20.64	28.39	28.41

R1-Reading 1:10.09.2019; R2-Reading 2: 17.09.2019; R3-Reading 3:24.09.2019; R4-Reading 4: 1.10.2019; R5-Reading 5:8.10.2019; R6-Reading 6:15.10.2019; R7-Reding 7:22.10.2019;

**Winged aphids present*

The number of aphid colonies did not vary much between varieties and between periodic readings. The average values recorded during the whole period were between 2.75 and 4.50 ind. (table 2). However, the size of each colony differed greatly from one reading to another and from one variety to another.

Table 2

Frequency of aphid colonies present on plants in the four rose varieties, in autumn 2019

No.	Variety	Number of aphids colonies /2 plants/variety						
		September			October			
		R1	R2	R3	R4	R5	R6	R7
1	Emeraude D'or	3	2	4	3	4	4	3
2	Ingrid Bergman	4	6	5	5	5	6	5
3	Chrysler Imperial	3	3	4	4	4	5	4
4	Glorious	1	2	2	2	3	3	2
X		2.75	3.25	3.75	3.50	4.00	4.50	3.50
s		1.26	1.89	1.26	1.29	0.82	1.29	1.29
Sx		0.63	0.95	0.63	0.65	0.41	0.65	0.65
CV		45.76	58.25	33.55	36.89	20.41	28.69	36.89
Sx%		22.88	29.12	16.78	18.44	10.21	14.34	18.44

R1-Reading 1:10.09.2019; R2-Reading 2: 17.09.2019; R3-Reading 3:24.09.2019; R4-Reading 4: 1.10.2019; R5-Reading 5:8.10.2019; R6-Reading 6:15.10.2019; R7-Reding 7:22.10.2019

In almost all organs of the plant, aphids were present, such as the rosette of leaves, young shoots before the formation of the floral bud and shaped flower buds (figure 2). Also, on the underside of the leaves, were observed. On some plants, the aphids overlapped one another, especially on the shoots and at the base of the flower buds (figure 2). Their presence in very large numbers was extremely harmful to the plants, because they were fed continuously (probably only during the light period) by extracting sap. As an immediate effect, the leaf tissue became discolored, then faded; the flower buds did not open and changed their color and the young shoots dried and did not produce flowers. And all these have depreciated the decorative value of the whole plant.

Figure 2. Population of aphids caught on rose plants during periodic readings, on different organs of the plant found in various phenophases; a, rosette of leaves; b, young shoots before the formation of the floral bud; c, and d, shaped flower buds (different varieties)

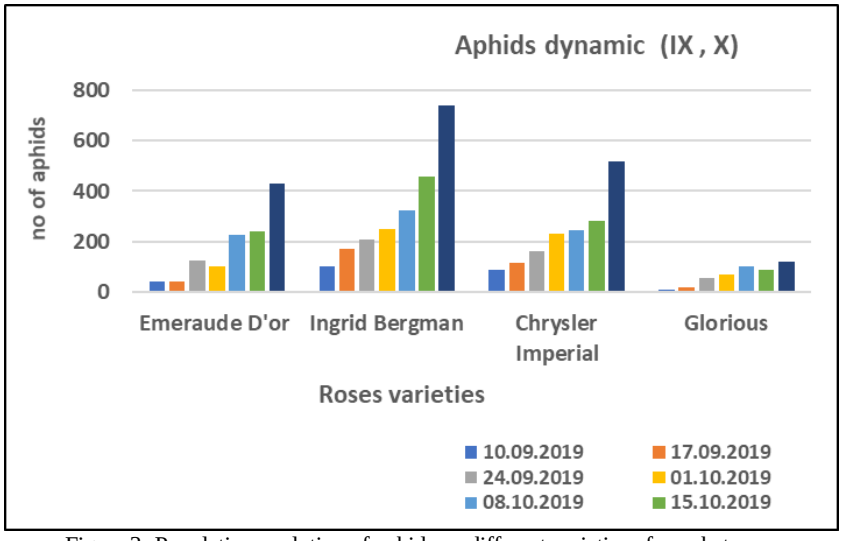

Figure 3. Population evolution of aphids on different varieties of rose between 10 September and 22 October (2019)

The most affected rose plants were those with flowers (flower buds) of red color (Ingrid Bergman and Chrysler Imperial varieties). Probably because of the sweeter sap and the larger petal

thickness. The most attractive variety was Ingrid Bergman, who has a flower with thick, well connected to the substrate, soft and denser petals.

The numerical evolution of the populations during the 2 months, was increasing, from one reading to another, so that a maximum in all varieties was registered in October at the last 2 readings (15 and 22 October) (figure 3).

Besides aphids, white exuviae (shells) of pre-adult forms were observed on plants, sometimes in large numbers. And also, at several readings, the ants were observed visiting the aphid populations. The larger the aphid's population was, the more ants increased. In September, the number of ants that visited the plants (at one point) was low (x =2.00-4.25 ind./reading) while in October this gradually increased (x=5.75-15.0 ind./reading) (table 3).

Table 3

The presence of ants on plants when checking plants, in autumn 2019

No.	Variety of roses	Number of ants observed on analyzed plants (2 plants/variety)						
		September			October			
		10.09	17.09	24.09	1.10	8.10	15.10	22.10
1	Emeraude D'or	1	4	3	6	7	10	9
2	Ingrid Bergman	5	11	8	10	14	8	20
3	Chrysler Imperial	2	3	6	5	11	10	15
4	Glorious	0	0	0	2	4	2	16
X		2.00	4.50	4.25	5.75	9.00	7.50	15.00
s		2.16	4.65	3.50	3.30	4.40	3.79	4.55
Sx		1.08	2.33	1.75	1.65	2.20	1.89	2.27
CV		108.01	103.44	82.35	57.46	48.86	50.48	30.31
Sx%		54.01	51.72	41.18	28.73	24.43	25.24	15.15

The connection between ants and aphids can be explained by mutual exchange, in the sense that ants feed on the liquid secretions of aphids that are sweet (figure 5). That is why, often, where the plant aphids are present, ants are encountered. The ratio of ants to aphids was at 1:20 (30). In all the varieties of rose, the values of the report have remained the same (figure 4).

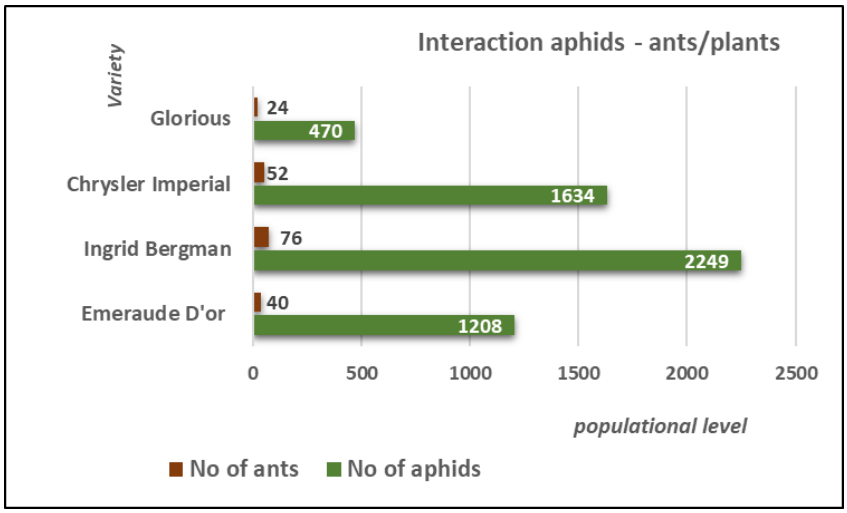

Figure 4. The aphid-insect interaction on rose varieties expressed through the population level of both

(autumn period) (2019)

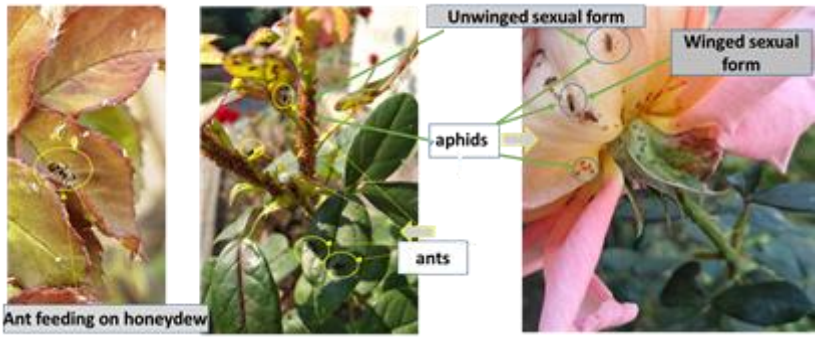

Figure 5. Presence of aphids and ants on diverse variety of rose, and their useful relation

The aphids produce direct damage by extracting the sap, also indirectly by leaving the exuviae on the plants but also the sweet liquid. Indirect damages amplify the aesthetic aspect given by the presence of aphids on plants and by their discoloration.

The ants do not harm the plants, these against them clean the leaves and other organs of sticky substance known as honey dew. The sticky substance block respiration and photosynthesis of plants. In large populations of aphids, the amount of honey dew can reach the entire surface of the plant, so the ants are very helpful.

CONCLUSIONS

Both aphids and ants were present at different levels on the all varieties analyzed. Overall, large aphid populations attract a large number of ants. Varieties of roses with red flower but with thick and soft petals, well connected, slightly sweet, attract more aphids (and indirectly more ants) than varieties with thin, fall petals. The presence of ants can be considered indifferent in terms of plant damage; they can only be aesthetic if we consider the decorative value of the roses.

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