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## **THE SPECIES COMPOSITION AND NUMBER OF APHIDS ON THE SHRUBS OF *Pinus mugo* Turra AND *Rosa* sp. IN URBAN CONDITIONS**

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### **ABSTRACT**

The purpose of the studies conducted in Lublin in the years 1999-2001 was to establish the species composition and number of aphids on the shrubs of dwarf mountain pine (*Pinus mugo* Turra) and park rose (*Rosa* sp.). Observations were carried out in the green areas of the city in the street site (A) and the park site (B). Four species of aphids were found on the dwarf mountain pine and eight on the park rose. The shrubs of dwarf mountain pine were inhabited by a greater number of aphids in site A, an exception being two species (*C. pini* and *E. rileyi*), which occurred in greater numbers in site B. In site A all species of aphids were observed on the shrubs of park rose and their populations were more numerous, while in site B only six aphid species occurred and their number was smaller. The greatest number of all aphids was noticed in 2000, while the smallest in 1999.

**Key words:** aphids, *Pinus mugo* Turra, *Rosa* sp., urban conditions.

## INTRODUCTION

Ornamental shrubs, both deciduous and coniferous ones, constitute a valuable decorative element. In the city areas of parks, gardens, squares and housing estates the shrubs – due to their colour accents – introduce a lot of beauty and harmony to the surrounding landscape, also in winter. These plants, composed into a whole by designers, and looked after by professionals, are characterised by special values that result from the richness of forms, sizes, colours and shapes [9]. A significant role among those shrubs is played by the park rose (*Rosa* sp.) and dwarf mountain pine (*Pinus mugo* Turra). These are very decorative shrubs showing high resistance to urban and industrial pollution as well as droughts.

The decorative character of shrubs is significantly lowered by phytophagous insects, especially aphids, belonging to the most dangerous pests because of their big populations and the kind of damage they do.

The purpose of the present studies was to determine the species composition and the number of aphids on the shrubs of park rose and dwarf mountain pine in the street and park sites.

## MATERIALS AND METHODS

Observations were conducted in Lublin in the years 1999-2001, in the green area in front of the Rector's Office of the Agricultural University and its vicinity (A), and in the area of the housing estate "Czechów" (B). Area A can be included in street sites (heavy traffic), while area B (no traffic) – in park sites. The shrubs in both areas were not subjected to any protective treatments.

The studies referred to the shrubs of park rose and dwarf mountain pine in the street and park sites. Five shrubs from each of the examined species, growing close to each other were chosen for the analysis on site A and B. Both non-winged aphids (including the larvae) and winged ones were counted on five shoots (of similar length) from each shrub. The plants were monitored since early spring till late autumn, with 10-days' intervals.

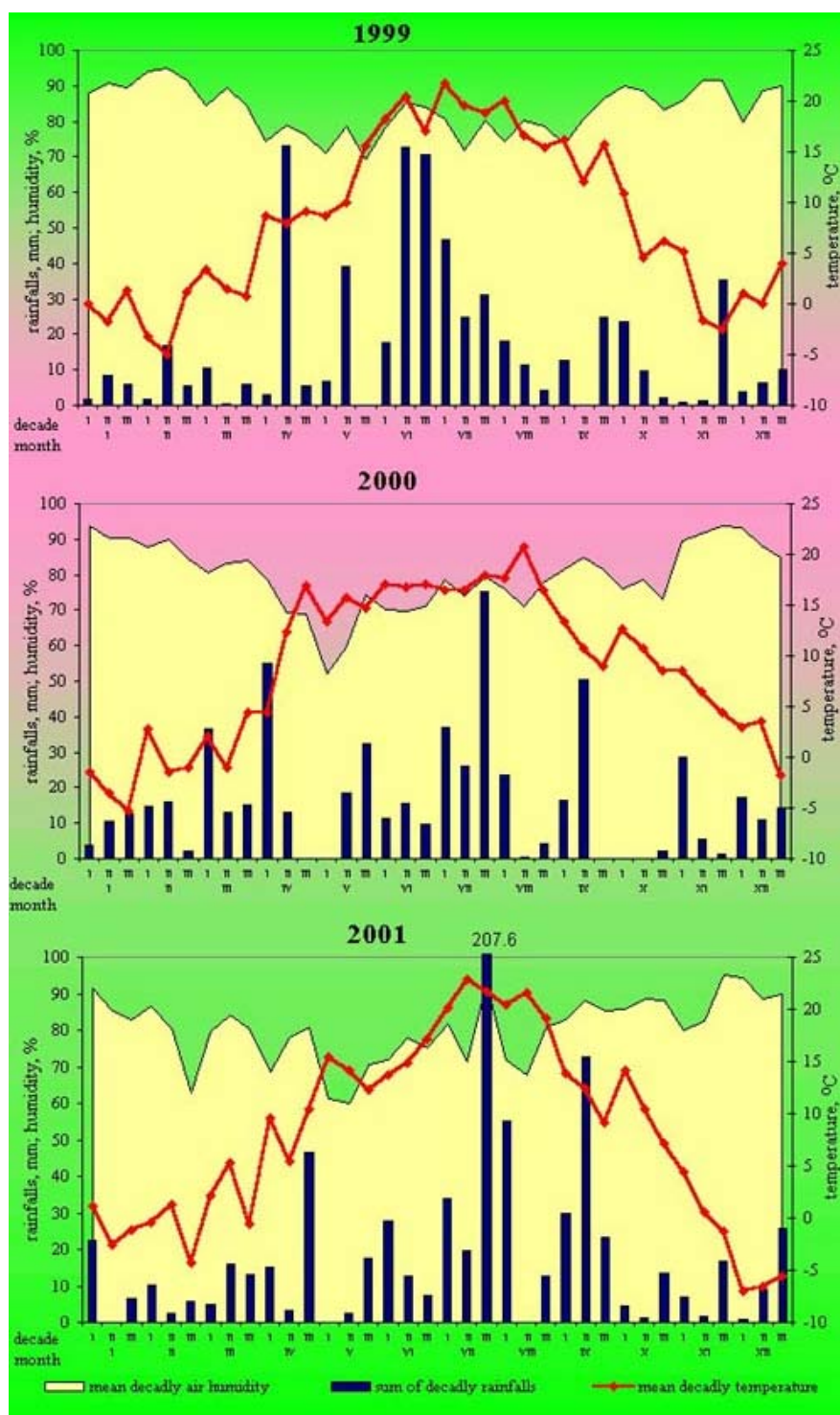
The keys of Blackman and Eastop [2], Müller [18] and Szelegiewicz [21] were used to mark the aphids. The meteorological data were obtained from the Department of Agrometeorology of the Agricultural University in Lublin.

## RESULTS

Twelve aphid species were found on the shrubs observed during the studies. Four species occurred on the shrubs of *Pinus mugo*, and eight species on *Rosa* sp.

[Figure 1](#) presents the course of the weather, while [table 1](#) provides information on the species composition and number of aphids on the examined shrubs.

Fig. 1. General information about the weather conditions in years 1999-2001



Four species of aphids were found on the shrubs of *Pinus mugo* Turra ([tab. 1](#)):

*Cinara pini* (L.) ([photo 1, 2](#)) occurred annually, in greater numbers in the park site than in the street one. The most numerous population of aphids were observed between May and July. In 2001 their number was the biggest in both sites. The beginning of vegetation, the weather in spring and summer ([fig. 1](#)) had a considerable effect on the dates of their occurrence, especially on their appearance and disappearance. This species dominated in site B in the studied years. The studies observed totally 1014.2 non-winged aphids/shrubs and 11.2 winged ones/shrub in site A, while in site B – 5509.6 non-winged aphids/shrub and 45.4 winged ones/shrub. Considering other aphid species occurring on the shrubs, their percentage contribution ranged from 17.08% to 100%.

**Table 1. Species composition and number of aphids/shrub in street site (A) and park site (B) in the years 1999-2001**

Species of		Number of aphids/shrub							
		1999		2000		2001		Totally	
Shrubs	aphids	A	B	A	B	A	B	A	B
<i>Pinus mugo</i> Turra	<i>Cinara pini</i>	86.8	869.4	300.6	2263.0	638.0	2422.6	1025.4	5555.0
	<i>Schizolachnus pineti</i>	421.4	-	1178.4	1.0	40.8	1.0	1640.6	2.0
	<i>Eulachnus rileyi</i>	-	-	0.4	0.4	-	8.6	0.4	9.0
	<i>Pineus pini</i>	-	-	-	-	24.2	7.2	24.2	7.2
	Totally	508.2	869.4	1479.4	2264.4	703.0	2439.4	2690.6	5573.2
<i>Rosa</i> sp.	<i>Macrosiphum rosae</i>	222.4	226.8	560.8	417.6	271.4	27.4	1054.6	671.8
	<i>Metopolophium dirhodum</i>	186.4	12.2	234.0	1.8	189.8	19.6	610.2	33.6
	<i>Myzaphis rosarum</i>	31.4	22.8	446.2	34.2	113.0	35.0	590.6	92.0
	<i>Chaetosiphon tetraerhodus</i>	14.8	2.2	265.6	7.6	43.0	17.4	323.4	27.2
	<i>Aphis fabae</i>	25.8	9.0	125.6	28.6	124.2	33.4	275.6	71.0
	<i>Maculolachnus submacula</i>	38.8	-	99.4	-	122.4	9.0	260.6	9.0
	<i>Longicaudus trirhodus</i>	1.0	-	2.6	-	3.0	-	6.6	-
	<i>Macrosiphum euphorbiae</i>	-	-	-	-	2.4	-	2.4	-
	Totally	520.6	273.0	1734.2	489.8	869.2	141.8	3124.0	904.6

**Photo 1. Colony of *Cinara pini* (L.) on *Pinus mugo* Turra**





**Photo 2. Aphid *Cinara pini* (L.) on *Pinus mugo* Turra**



*Schizolachnus pineti* (F.) ([photo 3](#)) – this species was clearly the most numerous in site A. It dominated in 1999 and 2000. Single individuals were observed in site B, while in 1999 their presence was not found. It was the most numerous in June and July, depending on the year of studies. In area A there were totally 1634.2 non-winged aphids/shrub and 6.4 winged ones/shrub, while in area B there were 1.4 non-winged aphids/shrub and 0.6 winged ones/shrub. Their percentage contribution ranged from 0.04% to 82.92%.

**Photo 3. Colony of *Schizolachnus pineti* (F.) on needles of dwarf mountain pine**



*Eulachnus rileyi* (Will.) – this species occurred irregularly and in small numbers, and its exceptional mobility caused big problems in determining the dynamics of population. In 2000 only two oblong dark green individuals were observed in each of the areas. In 2001 aphids were found only in site B. Considering the three years of studies, 0.4 non-winged aphids/shrub were observed totally in site A, while in site B – 8.6 non-winged ones/shrub. Their percentage contribution on the shrubs of *P. mugo* ranged from 0.02% to 0.35%.

*Pineus pini* (Ratz.) – dark red or dark brown aphids, hidden under the wax excretion, were observed exclusively in 2001. They occurred for the period of about one month: in site A in May – there were 24.2 aphids/shrub then, and in site B in June – 7.2 aphids/shrub. Their percentage contribution on the shrubs was 0.30% - 3.44%.

*C. pini* and *S. pineti* occurred in the greatest numbers on the shrubs of *P. mugo*. Aphids *C. pini* inhabited mainly the top shoots. Their colonies were frequently composed of a few hundred individuals. No distinct damage was noticed despite their big population. On the other hand, *S. pineti* fed on the needles of dwarf mountain pine, causing their yellowing and even drying, which considerably lowered the decorative value of the shrubs. The other two species fed for a short time and in small numbers, therefore they did not cause any clear damage.

On the shrubs of *Rosa* sp. eight aphid species were found ([tab. 1](#)):

*Macrosiphum rosae* L. ([photo 4](#)) – aphids of this species were characterised by big numbers and a long period of occurrence on the monitored plants. Their population was bigger in site A as compared to site B, in 2001 exceeding the number even 10 times. The maximum of their occurrence was observed since the middle of May till the end of June. In all the studied years this was the dominating species in site A, and exclusively in 2001 in site B two other species (*M. rosarum* and *A. fabae*) occurred in greater number. Totally, the studies found 1020.8 non-winged aphids/shrub and 33.8 winged ones/shrub in site A, while in site B there were 659.8 non-winged aphids/shrub and 12.0 winged ones/shrub. The percentage contribution of this species on the shrubs of park rose ranged from 19.3% to 85.3%.

**Photo 4. *Macrosiphum rosae* L. on *Rosa* sp. (green and pink race)**



*Metopolophium dirhodum* (Walk.) ([photo 5](#)) – these aphids occurred in greater numbers in site A and here their presence on the shrubs was observed for the longest period of time (till the 2<sup>nd</sup> decade of December). The greatest number of *M. dirhodum* was found in site A in 2000, while the smallest in the same year in site B. In spring the light green aphids remained on the plants for a short time and in small numbers. At the turn of May and June the winged migrants changed the host. They were observed again on the rose shrubs in September and the greatest number was found, depending on the season, in the 1<sup>st</sup> or 2<sup>nd</sup> decade of October. Totally, the studies found 572.6 non-winged aphids/shrub and 37.6 winged ones/shrub in site A, and 32.2 non-winged aphids/shrub and 1.4 winged ones/shrub in site B. Their percentage contribution in inhabiting the roses was 0.37%-35.8%.

**Photo 5. *Metopolophium dirhodum* (Walk.) on *Rosa* sp.**



*Myzaphis rosarum* (Kalt.) ([photo 6](#)) – their number in sites A and B varied in years of studies. This species occurred in the greatest numbers in site A in 2000, while the lowest numbers were observed in site B in 1999. The yellow-green aphids appeared on roses at the turn of May and June in both sites, and their maximum occurrence was observed in June or at the beginning of July. The disappearance of aphids in site A was observed in November and the 1<sup>st</sup> decade of December, while in site B much earlier, already at the turn of August and September. Totally, during the three years of studies 586.4 non-winged aphids/shrub and 4.2 winged ones/shrub were observed in site A, while in site B there were 91.0 non-winged aphids/shrub and 1.0 winged one/shrub. This species constituted 6%-26% of the aphids feeding on roses.

**Photo 6. *Myzaphis rosarum* (Kalt.) and *Chaetosiphon tetrarhodus* (Walk.) feeding together on *Rosa* sp.**



*Chaetosiphon tetrarhodus* (Walk.) ([photo 6](#)) – the most numerous aphids of this species were observed in 2000. Their number in site A considerably exceeded the number of aphids occurring in site B (e.g. in 2000 – as much as by 35 times). Their greatest intensity in areas A and B was noticed in June. In August the disappearance of aphids was noticed in site B, while in site A it was observed later, at the turn of September and October. Totally, in site A the studies found 320.8 non-winged aphids/shrub and 2.6 winged ones/shrub, while in site B – 26.6 non-winged aphids/shrub and 0.6 winged ones/shrub. Their percentage contribution in inhabiting the roses was 0.8%-15.3%.



*Aphis fabae* Scop. ([photo 7](#)) – on the shrubs of *Rosa* sp. dwarf individuals of this aphid occurred. They were observed only in the period of blooming on the petals of roses. This species was most frequently observed in June and July. They were much more numerous in site A. In 2000 and 2001 the number of these aphids was the highest and comparable in both sites – A and B (tab. 1). Totally, in the studied years 261.0 non-winged aphids/shrub and 14.6 winged ones/shrub were found in site A, and 68.6 non-winged aphids/shrub and 2.4 winged ones/shrub in site B. Their percentage contribution ranged from 3.3% to 23.5%.

**Photo 7. *Aphis fabae* Scop. on *Rosa* sp. bud**



*Maculolachnus submacula* (Walk.) ([photo 8, 9](#)) occurred in site A every year, while in site B it occurred only in 2001. The highest number of this species in site A was observed in 2001, and the lowest in 1999. Their maximum occurrence was found in May or June. These aphids remained on the rose shoots the longest, until November, as compared to other species inhabiting these plants. In site B the period of their occurrence was also long but they were very scarce ([tab. 1](#)). Totally, during the three years of studies 255.0 non-winged aphids/shrub and 5.6 winged ones/shrub were observed in site A, while in site B there were 9.0 non-winged aphids/shrub. Their percentage contribution ranged from 0% to 14.1%.

**Photo 8. Winter eggs of *Maculolachnus submacula* Walk. on *Rosa* sp. shoots**





**Photo 9. Colony of *Maculolachnus submacula* Walk. on *Rosa* sp.**



*Longicaudus trirhodus* (Walk.) like *Macrosiphum euphorbiae* (Thom.) occurred scarcely on rose shrubs and only in site A. The former of these species appeared in May, and the three years of studies found out 5.2 non-winged aphids/shrub and 1.4 winged ones/shrub. On the other hand, the other species was observed only in autumn of 2001, and the number of this species was 2.4 non-winged aphids/shrub ([tab. 1](#)). Their percentage contribution in inhabiting the park roses never exceeded 1.0%.

The clearest damage on the examined shrubs of roses was done by the feeding aphids *M. rosae*. Those aphids formed big compact colonies on young shoots, leaves and flower buds. The shoots were shorter and their top parts dried out. The leaves where aphids fed fell down earlier and the flower buds did not develop or were deformed. Besides, the excreted honey-dew where the fungi developed considerably lowered the decorative value of the roses. Aphids *A. fabae* also affected the ornamental character of rose flowers, causing faster drying out and falling down of the petals. Aphids *M. submacula* fed on young twigs in spring and caused their twisting, bending, growth inhibition and even dying out of the shoot ends. During the short and scarce occurrence of *L. trirhodus* and *M. euphorbiae* on roses no distinct signs of damage were found. On the other hand, aphids *M. dirhodum*, *M. rosarum* and *Ch. tetrarhodus*, independently of their numbers, did not cause any distinct damage that could negatively affect the decorative value of roses.

## DISCUSSION

During the three years of studies on the shrubs of *Pinus mugo* Turra the presence of four aphid species was found out: *Cinara pini* (L.), *Schizolachnus pineti* (F.), *Eulachnus rileyi* (Will.) and *Pineus pini* (Ratz.). Aphid *Cinara pini*, inhabiting pine trees, is considered as a pest of common pine [2, 19, 20, 21]. Numerous colonies of this aphid were always visited by ants. This species occurred in five as great numbers in the park site. The presence of *Schizolachnus pineti* was observed in the Lublin region for the first time by Judenko [15], and for the second time in the same area it was found in the present studies. This aphid feeds on the needles of common pine, Austrian pine and mountain pine individually or in small colonies [21]. Its number varied considerably on the examined plants depending on the year and the site. *Eulachnus rileyi* has not been observed in the Lublin region so far. In the present studies it occurred irregularly and very scarcely and its exceptional mobility made it difficult to establish the population dynamics in the season. The presence of this species from other areas on dwarf mountain pine was observed by Szelegiewicz [21] and Ripka et al. [19]. Aphids *Pineus pini* have not been found out in the Lublin area, either. Their presence was found only in 2001 in the period between May and June. Other authors consider it as a pest of pine in tree nurseries, parks and forests [17, 19].

The shrubs of park roses – *Rosa* sp. were inhabited by eight species of aphids, namely: *Macrosiphum rosae* (L.), *Metopolophium dirhodum* (Walk.), *Myzaphis rosarum* (Kalt.), *Chaetosiphon tetrarhodus* (Walk.), *Aphis fabae* Scop., *Maculolachnus submacula* (Walk.), *Longicaudus trirhodus* (Walk.) and *Macrosiphum euphorbiae* (Thom.). All the aforementioned species of aphids occurred in Lublin on the roses in the street site (A), while in the park site (B) the two last species were absent.

Despite many years of observations, the aphid species enumerated by Szelegiewicz [21] such as *Rhodobium porosum* (Sand.) and *Brachycaudus helichrysi* (Kalt.) were not found. The absence of *R. porosum* can be accounted for by the fact that it is a very rare species in Europe [10], while in Poland it occurs only in glasshouses [5]. Aphids *B. helichrysi* appear on roses very rarely; they are most frequently indicated on the plants from the genus *Prunus* [3].

*M. rosae* is the most frequent aphid on roses [5, 19, 21]. This aphids appeared on roses annually, most often in April and it fed in numerous colonies till August. It inhabited the leaves, top shoots, flower buds and flowers of roses. Because it is a species migrating in a facultative way, a part of the aphids fed on roses in summer as well. The autumn generations were observed since September till the end of November in site A. Similar observations are supplied by Jaśkiewicz [13], while Lampel [16] is of the opinion that this species obligatorily migrates onto the dipsaceous.

*M. dirhodum* is an aphid migrating from roses to grasses; hence it can be observed on roses in spring and autumn [5, 13, 18, 21]. In spring aphids appeared on roses in the middle of April and they fed till the end of May, while the autumn generations were observed in September. The aphids of this species formed scarce colonies (up to 72 specimens/shrub), which were bigger in autumn and in site A.

*M. rosarum* inhabited the shoot tops and the leaves of roses throughout the vegetation period. In the Lublin area it was shown by Achremowicz [1] and Jaśkiewicz [11, 12, 13]. Aphids of this species occurred on the examined roses from May even till December, depending on the weather in the season. Sometimes, the population of this aphid reached the number of about 200 individuals/shrub.

*Ch. tetrarhodus* is a one-home aphid connected with the family *Rosaceae*. It inhabited the leaves and ends of the rose shoots [18, 21]. On park roses it occurred scarcely throughout the vegetation season, however, causing no clear damage. Similar data are quoted about *Rosa rugosa* Thunb. by Jaśkiewicz [11, 12, 13], who also observed this species for the first time in the Lublin region.

*A. fabae* appeared on roses during the anthesis, at the turn of May and June and only on the flower petals. Those were dwarf individuals occurring in greater numbers in site A (up to 43 individuals/shrub). No mentions to the roses being inhabited by this species was found in the references.

*M. submacula* is the only aphid on roses inhabiting the lignified shoots, hypocotyls, and more rarely the green shoots. Similar dates are quoted by Czyżewski [7], Gottschalk [8] and Jaśkiewicz [14]. Aphids fed on the park rose from April till November, and their numbers in the years of studies varied. Aphids inhabited roses in greater numbers in site A.

*L. trirhodus* are the aphids that are rare in Poland [21]. In the Lublin region they were observed for the first time in 1973 [11]. On the examined shrubs single individuals were found only in site A in May, and their percentage contribution in the inhabiting of park roses did not exceed 1%. More numerous colonies were observed by Jaśkiewicz [12] on *Rosa rugosa* Thunb. Also *M. euphorbiae* fed on roses in small numbers and for a short period of time. It was observed only in autumn of 2001 in site A.

Weather conditions affect the number of aphids in the season [6, 13]. The dates of the beginning of vegetation, the temperature and rainfalls in spring are important factors. In the years 2000 and 2001 (early spring) aphids were found on the shrubs as early as in April. The temperatures of above 30°C and dry summer together with rainfalls inhibited their growth, increasing the death rate. Such conditions were observed in Lublin in 1999 and most probably they were the cause of higher death rate of a lot of aphid species in summer. Warm and long autumn was conducive to egg laying by oviparous females [4], in 2000 aphids lay the eggs till the 2<sup>nd</sup> decade of December. Greater pollution in the cities (industry, transportation) results in greater populations of pests with the stinging-sucking mouth apparatus [6, 14]. Those studies also found more numerous populations of aphids in the street area, only on dwarf mountain pine two aphid species (*Cinara pini* and *Eulachnus rileyi*) occurred in greater numbers in the park area.

## CONCLUSIONS

1. Twelve aphid species were found on the examined shrubs. They included two species that were observed in the Lublin area for the first time on the shrubs of dwarf mountain pine (*Pinus mugo* Turra) – *Eulachnus rileyi* (Will.) and *Pineus pini* (Ratz.).
2. A new host plant was established for *Aphis fabae* Scop. Those were the petals of park rose flowers.

3. More numerous populations and more species of aphids were observed in the street site (A). Certain aphids (*C. pini* and *E. rileyi*) inhabiting dwarf mountain pine were an exception; their number was greater in the park site (B).
4. The highest population of all aphid species was found in 2000, while the lowest in 1999.
5. The decorative character of dwarf mountain pine (*Pinus mugo* Turra) was remarkably lowered by aphid – *Schizolachnus pineti* (F.), while on park rose (*Rosa* sp.) by *Macrosiphum rosae* L., *Aphis fabae* Scop. and *Maculolachnus submacula* (Walk.).

## REFERENCES

1. Achremowicz J., 1986. Materiały do poznania fauny mszyc (*Homoptera, Aphidoidea*) Lubelszczyzny [Materials to observe the aphid fauna of the Lublin region]. Zesz. Probl. Post. Nauk. Rol. 329, 69-91 [in Polish].
2. Blackman R. L., Eastop V. F., 2000. Aphids on the World's Crops. An Identification and Information Guide. The Natural History Museum, London, 466 pp.
3. Cichocka E., 1980. Mszyce roślin sadowniczych Polski (Aphids of Polish orchards). PWN, Warszawa, 119pp (in Polish).
4. Cichocka E., 1995. Przyczyny masowego wystąpienia mszyc w sadach w 1994 r. [Causes of massive occurrence of aphids in orchards in 1994]. Sad Nowoczesny, 3, 4-6 [in Polish].
5. Cichocka E., Goszczyński W., 1975. Mszyce (*Aphidoidea*) szkodniki roślin uprawianych pod szkłem [Aphids as pests of plants grown in glasshouse]. Fragn. Faun. 20, 17, 273-305 [in Polish].
6. Cichocka E., Goszczyński W., 1991. Mszyce zasiedlające drzewa przyuliczne w Warszawie. [w:] Mszyce ich bionomia, szkodliwość i wrogowie naturalni (Aphids inhabiting street trees in Warsaw. [In:] Aphids and bionomy, harmfulness and natural enemies). (red. Cichocka E., Goszczyński W.), PAN, Warszawa, 9-18 [in Polish].
7. Czyżewski J. A., 1975. Choroby i szkodniki roślin ozdobnych [Diseases and pests of decorative plants]. PWRiL, Warsaw, 668 pp [in Polish].
8. Gottschalk H. J., 1989. Zur Verbreitung von *Maculolachnus submacula* (Walker, 1848) in den Nordbezirken der DDR und die Beschreibung der Sexuales (*Homoptera: Aphidinea: Lachnidae*), Entomologische Nachrichten und Berichte 33, 4, 161-163.
9. Hofman J., 1971. Krzewy ozdobne (Decorative shrubs). PWRiL, Warsaw, 134pp (in Polish).
10. Ilharco F. A., 1968. *Rhodobium porosum* (Sanderson) em Portugal. Agron. lusit., Oeiras 3, 133-135.
11. Jaśkiewicz B., 1986. Badania nad składem gatunkowym mszyc występujących na wybranych gatunkach krzewów ozdobnych w Parku Akademickim w Lublinie (Studies on species composition of aphids occurring on selected species of decorative shrubs in the University Park in Lublin). Fol. Soc. Lub. 28, 51-58 (in Polish).
12. Jaśkiewicz B., 1988. Dynamika występowania mszyc na *Rosa rugosa* Thunb. w Lublinie [Dynamics of the occurrence of aphids *Rosa rugosa* Thunb. in Lublin]. Roczn. Nauk. Roln., F, 18, 2, 255-266 [in Polish].
13. Jaśkiewicz B., 1997. Skład gatunkowy i dynamika pojawu mszyc na wybranych krzewach ozdobnych w latach 1973-1993 [Species composition and dynamics of the aphid occurrence on selected decorative shrubs in the years 1973-1993]. Habilitation dissertation. Wyd. AR in Lublin s. Rozprawy Naukowe 183, 1-93 [in Polish].
14. Jaśkiewicz B., 2000. Aphids colonising the shrubs of *Juniperus communis* L. and *Rosa canina* L. in urban conditions. Electronic Journal of Polish Agricultural Universities, Series Horticulture, Volume 3, Issue 2, <http://www.ejpau.media.pl/series/volume3/issue2/horticulture/art-02.html>
15. Judenko E., 1930. Materiały do poznania fauny mszyc (*Aphididae*) okolicy Puław z uwzględnieniem ich biologii [Materials to observe the aphid fauna of the area of Puławy considering their biology]. Pol. Pismo Ent. 9, 3-4, 129-181 [in Polish].
16. Lampel G., 1968. Die Biologie des Blattlaus – Generationswechsels. Jena, 264.
17. Łabanowski G., Orlikowski L., 1997. Ochrona roślin iglastych i wrzosowatych (Protection of coniferous and heather plants). Plantpress Sp. z o. o., Kraków, 256 pp [in Polish].
18. Müller F. P., 1976. Mszyce – szkodniki roślin. Terenowy klucz do oznaczania [Aphids – plant pests. A field key for marking]. PWN, 118 pp [in Polish].
19. Ripka G., Reider K., Szalay-Marzso L., 1998. New data to the knowledge of the aphid fauna (*Homoptera: Aphidoidea*) on ornamental trees and shrubs in Hungary. Acta Phytopathol. Entomol. Hung. 33, 1-2, 153-171.
20. Soika G., Łabanowski G., 2001. Aphids belonging to *Cinara* Curtis (*Aphidoidea, Lachnidae*) – the pest of ornamental conifers in Poland. Aphids and Other Homopterous Insects, 8, PAS, Siedlce, 175-184.
21. Szelegiewicz H., 1968. Mszyce – *Aphidoidea*. Katalog fauny Polski [Aphids – *Aphidoidea*. A catalogue of the Polish fauna]. XXI, 4, 316, PWN, Warszawa [in Polish].

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