

Aphids on *Pinus mugo* Turra shrubs in the city of Lublin

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Introduction

Coniferous shrubs are eagerly planted in the urban area. Their asset is that their green needles remain on the plant all year long which constitutes its decorative character. *Pinus mugo* Turra, also known as dwarf mountain pine, or Swiss mugo pine is one of the most frequent coniferous shrubs to be found in the urban area. It has a slight trailer form, hence used as a ground cover shrub. Dwarf mountain pine is a plant typical for mountainous areas thus also adapts well on slopes. Its roots stabilise the slope, decreasing water erosion.

Dwarf mountain pine may be settled by several aphid species. They usually feed on shoots or needles causing overcolouring, drying up and dropping off of the needles which altogether lead to the plant's weakening.

The research carried out during three growth seasons in the urban area of the city of Lublin aimed at determining the species composition and dynamics of aphid population which settles *Pinus mugo* shrubs.

Material and methods

The research concerning species composition and aphid population dynamics was carried out in the city of Lublin in 2002-2004. The research focused on *Pinus mugo* shrubs of two separate types of site: by the street (A) and in the park (B). The street site was located in the Czechów district, in the north-western part

of the city. In this area the traffic is highly congested. Shrubs selected for the research were tenderly taken care of, with no chemical treatment involved. The park site was in the Botanical Garden of the Marie Curie University in Lublin, located in the western part of the city. The Botanical Garden boasts a rich collection of plants comprising 6000 species, divided into several divisions. Dwarf mountain pine grows in the division known as the alpinarium.

Three shrubs of dwarf mountain pine were selected in each site. On each plant 5 shoots of similar length were selected at random. Both, winged and wingless aphids were counted. Plants were reviewed every 10 days, beginning in early spring until late autumn. In order to identify aphid species the keys of BLACKMAN'S & EASTOP'S (1994), MÜLLER'S (1976) and SZELEGIEWICZ'S (1968) were used. Meteorological data was provided by the Department of Agrometeorology of Agricultural Academy in Lublin.

Results

As a result of the research carried out on the shrubs of *Pinus mugo* the presence of two aphid species was confirmed: *Cinara pini* (L.) and *Schizolachnus pineti* (F.). The run of weather conditions during the years of research is presented in Fig. 1., while the dynamics of aphid population settling the studied shrubs is presented in Figs. 2 and 3.

Cinara pini (L.) on *Pinus mugo* shrubs

In 2002 the first specimens of *C. pini* in site A appeared in the second decade of April. A warm spring with rainfall below average favoured a dynamic increase in the number of these insects which rose enormously every time the observations were recorded, reaching the highest number (175.0 specimens/shrub) in the first decade of May. During the entire growth season the aphids settled the dwarf mountain pine shrubs in large numbers, but irregularly. A low number of aphids which was observed from mid-July until the end of observation was probably caused by high temperature of above 30°C as well as frequent thunderstorms in July and August. A complete disappearance of the colonies was observed as late as in the first decade of December.

In the B site aphids of this species appeared a month later in comparison with site A, and in the second decade of May they reached the highest number (23.0 specimens/shrub). From the third decade of May until mid-August aphids were settling the surveyed shrubs permanently but in small numbers. Until the end of October their number ranged from 0 to 2 specimens per shrub. The colony disappeared in the first decade of November.

On average 612.2 aphids per shrub were registered in site A and 83.2 in site B in total.

In 2003, after a cold March and April, aphids of this species appeared in site A in the third decade of May. During subsequent observations they occurred in changeable intensity, and their highest number was recorded in the third decade of August (56.0 specimens/shrub). In September and October their number was very low and did not exceed 10 specimens per shrub. A complete disappearance of the colony took place in the third decade of October.

In the B site, *C. pini* aphids appeared much later, in the first decade of July, which was also their highest number (5.6 specimens/shrub). On the studied shrubs the presence of aphids was registered only for a short period of time, until the second decade of August, and they disappeared in the third decade of this month.

In total on average the presence of 225.6 aphids per shrub was registered in site A in 2003, and 11.8 aphids per shrub in site B.

In 2004 aphids in both sites occurred occasionally. In the A site they appeared in the first decade of May, whereas in the following observation they reached their highest number (68.0 specimens/shrub). They disappeared in the first decade of June. Single specimens were registered throughout two observations: in the third decade of July and in the second decade of October.

Nonetheless, in site B, single aphids were recorded throughout two observations: in the second decade of May and in the second decade of June. In the latter their number reached the maximum (3.3 specimens/shrub).

In total on average the presence of 96.5 aphids was registered in site A and 3.6 aphids in site B in 2004.

C. pini settled young shoots and twigs among the needles and its feeding caused the weakening of the shrubs.

***Schizolachnus pineti* (F.) on *Pinus mugo* shrubs**

The aphids of this species were recorded only in site B throughout the three research years. In 2002 first infrequent specimens of *S. pineti* appeared in the first decade of July. In the following observations they appeared in varied intensity and their highest number was registered in the first decade of September (15.3 specimens/shrub). Next, their number decreased gradually until it disappeared completely in the third decade of October.

In 2003 the aphids of this species were recorded, like in the previous year of research, in the first decade of July. Meanwhile, it was their highest number (41.0 specimens/shrub). *S. pineti* aphids remained on the studied shrub for a rather short period of time, until the second decade of August. In the third decade of October the presence of only one aphid of this species was registered.

In total, on average the presence of 59.8 aphids per shrub were registered in site B in 2003. In 2004, *S. pineti* aphids appeared only in one observation in the first decade of June (0.6 specimens/shrub). *S. pineti* fed on the bottom part of the previous year's needles causing their yellowing.

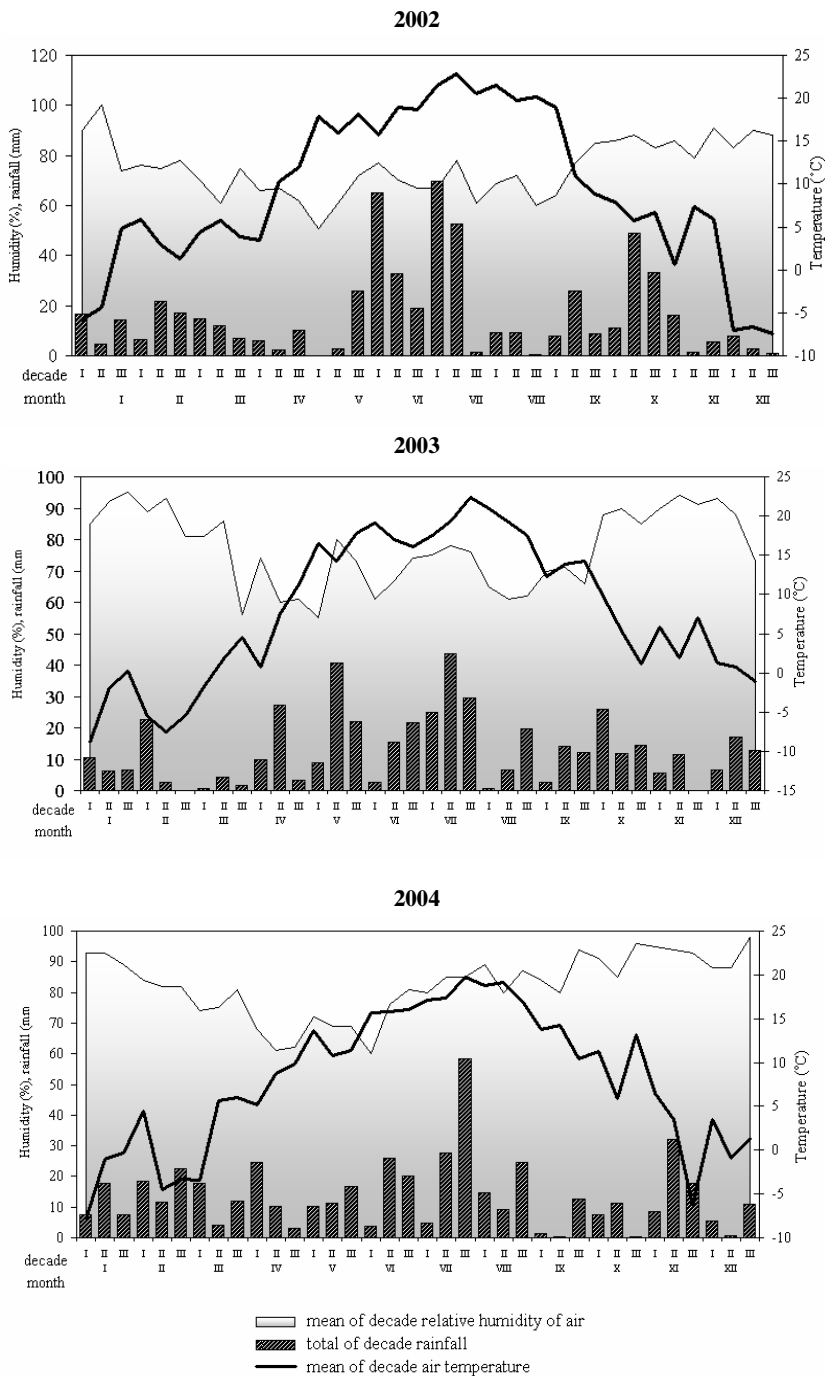


Fig. 1. Weather conditions in 2002-2004

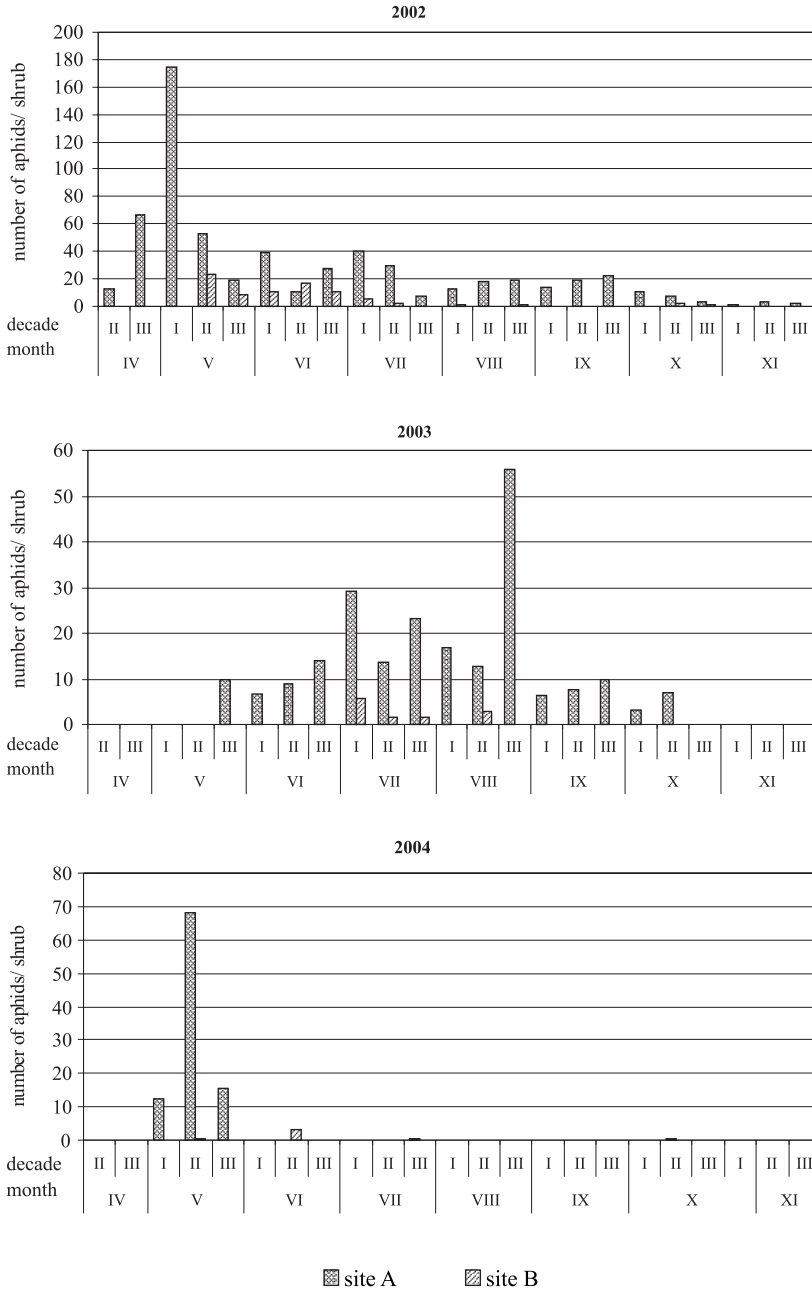


Fig. 2. Population dynamics of *Cinara pini* (L.) on *Pinus mugo* Turra in each of the sites in 2002-2004

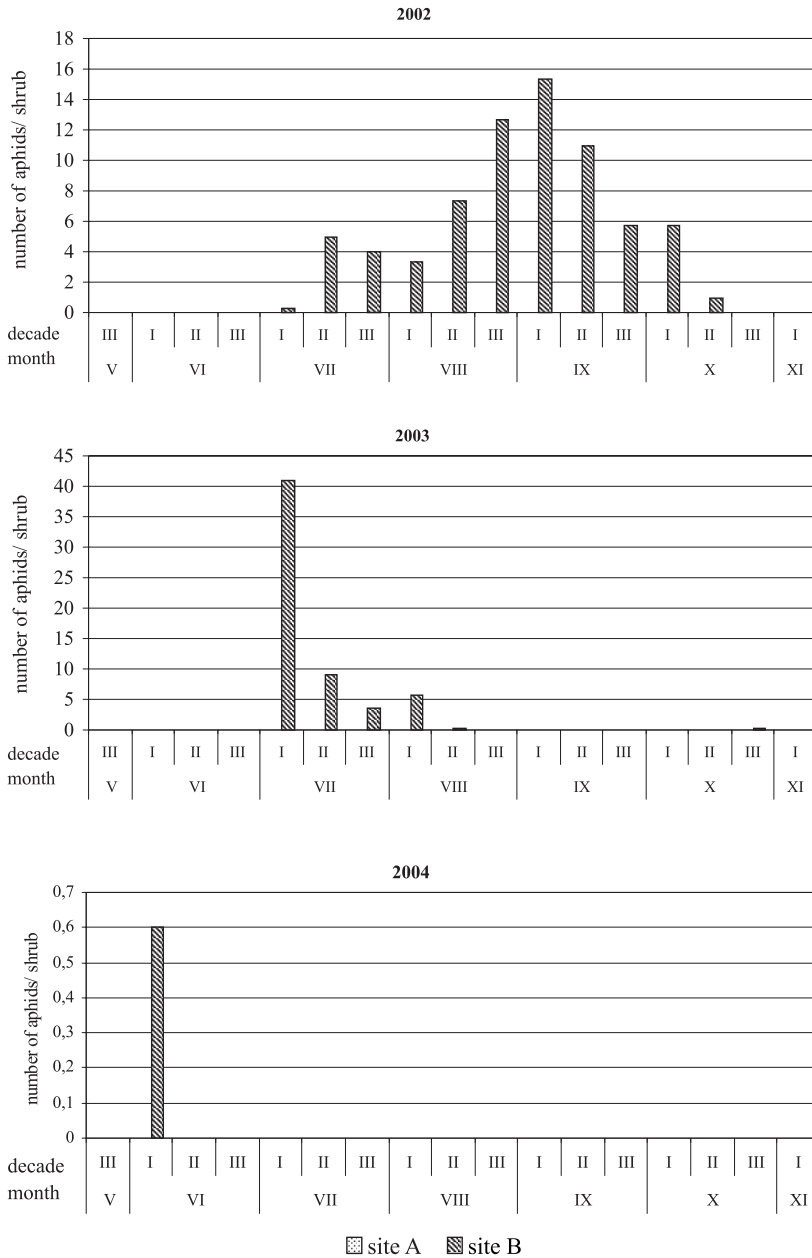


Fig. 3. Population dynamics of *Schizolachnus pineti* (F.) on *Pinus mugo* Turra in each of the sites in 2002-2004

Discussion

As a result of the three-year research on the shrubs of *P. mugo* grown in the urban area of the city of Lublin, the presence of two aphid species: *Cinara pini* and *Schizolachnus pineti* was confirmed. Previous studies by JAŚKIEWICZ (2003), JAŚKIEWICZ & SŁAWIŃSKA (2005) and SŁAWIŃSKA & JAŚKIEWICZ (2005) pointed out to the presence of four species on the shrubs of dwarf mountain pine in the area of Lublin. Also ŁABANOWSKI *et al.* (2001) asserted that dwarf mountain pine may be settled by four aphid species, while SZELEGIEWICZ (1968) stated that even 5 aphid species may appear on this shrub species.

C. pini was registered in each year of the research in both sites, however, its number was much higher in the site located by the street. Their maximum number was recorded most usually in May or June, depending on the site and research year. Such state is in accordance with the results provided by JAŚKIEWICZ (2003) and JAŚKIEWICZ & SŁAWIŃSKA (2005). The damage caused by *C. pini* mostly involved the weakening of the shrubs. However, SZUJECKI (1998) claims that the role of this species is not univocal, because the dew excreted by aphids is a source of food for many beneficial insects.

The presence of *S. pineti* in each year of the research was confirmed only in the park site. However, according to JAŚKIEWICZ (2003) it is likely to settle the shrubs of dwarf mountain pine more numerous around the street sites. The greatest intensity of this aphid was recorded in June, July or September, depending on the year of research. Similar data was provided by JAŚKIEWICZ & SŁAWIŃSKA (2005). The feeding of this species caused the yellowing of needles and inhibited shoot growth.

Weather conditions influenced the dynamics of aphid populations settling the *P. mugo* shrubs. Cool spring, high temperature above 30°C and heavy rainfall in the summer hampered extensively the growth of aphid populations. CICHOCKA (1980) and JAŚKIEWICZ (1997) provided similar data.

Conclusions

1. The presence of two aphid species: *Cinara pini* (L.) and *Schizolachnus pineti* (F.), on *Pinus mugo* shrubs was confirmed in the urban environment of the city of Lublin.
2. Only the presence of *C. pini* was confirmed in both sites in each year of the research, however, *S. pineti* was observed exclusively in the park site.
3. The highest number of *C. pini* was recorded most usually in May or June and that of *S. pineti* in June, July or September, depending on the year and site of the research.

4. Intensive feeding of *C. pini* led to shrub weakening, whereas the feeding of *S. pineti* caused the needles to yellow, which lowered the decorative quality of those plants.
5. High temperature and heavy rainfall lowered the number of aphids.

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Mszyce zasiedlające krzewy *Pinus mingo* Turra w Lublinie

Streszczenie

Badania dotyczące składu gatunkowego i dynamiki populacji mszyc zasiedlających krzewy *Pinus mugo* Turra rosnące na stanowisku przyulicznym i parkowym prowadzono w Lublinie w latach 2002-2004. W wyniku przeprowadzonych badań stwierdzono występowanie dwóch gatunków mszyc: *Cinara pini* (L.) i *Schizolachnus pineti* (F.). Spośród nich tylko obecność *C. pini* notowano w każdym roku badań na obydwu stanowiskach, natomiast *S. pineti* obserwowano wyłącznie na stanowisku parkowym. Maksimum liczebności *C. pini* obserwowano najczęściej w maju lub w czerwcu, zaś *S. pineti* w czerwcu, lipcu lub wrześniu, w zależności od roku badań i stanowiska. Przebieg warunków pogodowych w okresie wiosennym i letnim miał istotny wpływ na dynamikę populacji badanych mszyc.