

**Aphids (*Homoptera*, *Aphidodea*) inhabiting the shrubs of
Pinus mugo Turra in the green areas of Lublin. Part I.
The population dynamics**

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S u m m a r y

The studies were conducted on the shrubs of mountain pine (*Pinus mugo* Turra) in the years 1999-2001. Observations were performed on the plants growing in the green areas of Lublin in two sites: a street site (A) and a park one (B). The purpose of the studies was to establish the species composition and the population dynamics of aphids inhabiting dwarf mountain pine. The studies on the shrubs of the mountain pine found out the presence of four species of aphids: *Cinara pini* L., *Schizolachnus pineti* F., *Eulachnus rileyi* (Will.) and *Pineus pini* (Ratz.). Among those, only *C. pini* occurred in both sites in each of the studied years. Weather conditions had an effect on the development of aphid population. A delayed period of vegetation, air temperatures above 30°C as well as stormy rainfalls considerably limited the population of aphids.

Key words: *Pinus mugo* Turra, aphids, *Cinara pini* L., *Schizolachnus pineti* F., *Eulachnus rileyi* (Will.), *Pineus pini* (Ratz.), city green areas

INTRODUCTION

The mountain pine (*Pinus mugo* Turra) (dwarf mountain pine) is a plant highly valued in horticulture due to its remarkable ornamental properties. Hence, it is often planted in the parks and other urban green areas. It makes a variety of forms – from low shrubs to tree-like forms; it has small soil and climatic requirements and it shows considerable resistance to the air pollution (Bugala, 2000; Chojnowska, 2000).

A number of pests, e.g. *Neodiprion sertifer* (*Hymenoptera*, *Diprionidae*), *Rhyaciona buoliana* (*Lepidoptera*, *Tortricidae*) as well as different aphid species (*Homoptera*, *Aphidodea*) occur on dwarf mountain pine (Łabanowski and Orlikowski, 1997). The aphids occurring on mountain pine are especially dangerous since they decrease the decorative value of those plants.

The Polish and foreign literature lacks information concerning the dynamics of aphids population on the shrubs of *Pinus mugo* Turra. That was the reason why the purpose of the present studies was to establish the species composition and the population dynamics of aphids occurring on those plants in the urban green areas of Lublin.

MATERIAL AND METHODS

Observations were carried out in the years 1999-2001 on the shrubs of dwarf mountain pine (*Pinus mugo* Turra) growing on two sites: a street site A (the area in the vicinity of the Rector's Office of the Agricultural University) and a park site

B (the urban green area in the housing estate Czechów). In each site, five shrubs growing close to each other were selected and five shoots of similar length were chosen on each. Aphids and their larvae were counted on shoots. The plants were monitored since early spring till late autumn, with about 10-days' intervals. The examined plants were not submitted to any protective treatment. The keys of Blackman and Eastop (2000), Müller (1976) and Szelęgiewicz (1968) were used to mark the species.

Meteorological data were obtained from the Department of Agrometeorology of the Agricultural University in Lublin.

RESULTS

The studies conducted on the shrubs of mountain pine (*Pinus mugo* Turra) found out four species of aphids: *Cinara pini* L., *Schizolachnus pineti* F., *Eulachnus rileyi* (Will.) and *Pineus pini* (Ratz.).

Fig. 1-4 present the population dynamics of particular species of aphids inhabiting the shrubs of dwarf mountain pine, while Fig. 5 shows the course of the weather conditions in the years of studies.

Cinara pini L. (Photo 1)

In 1999 the period of vegetation was delayed and the spring was cool (Fig. 5). The first colonies of grey brown aphids appeared about a month later as compared to the following years of studies. In site A they were observed in the second decade of May and at the same time it was the maximum of their occurrence (46.8 aphids/shrub) (Fig. 1). In site B, on the other hand, the first specimens of this species were found on the first decade of May, and the maximum was reached in the third decade of that month (227.4 aphids/shrub). In subsequent observations the number of aphids decreased. In site A, in June, only singular specimens were found on the observed branches and they disappeared in the third decade of June. It was probably caused by unfavorable weather conditions. In summer the air temperatures frequently exceeded 30°C and there were stormy rains which often washed down the aphids from the top parts of the shoots. Singular specimens of *C. pini* were noticed again in the second and third decade of July. A decrease of the aphid population was also observed in site B since the

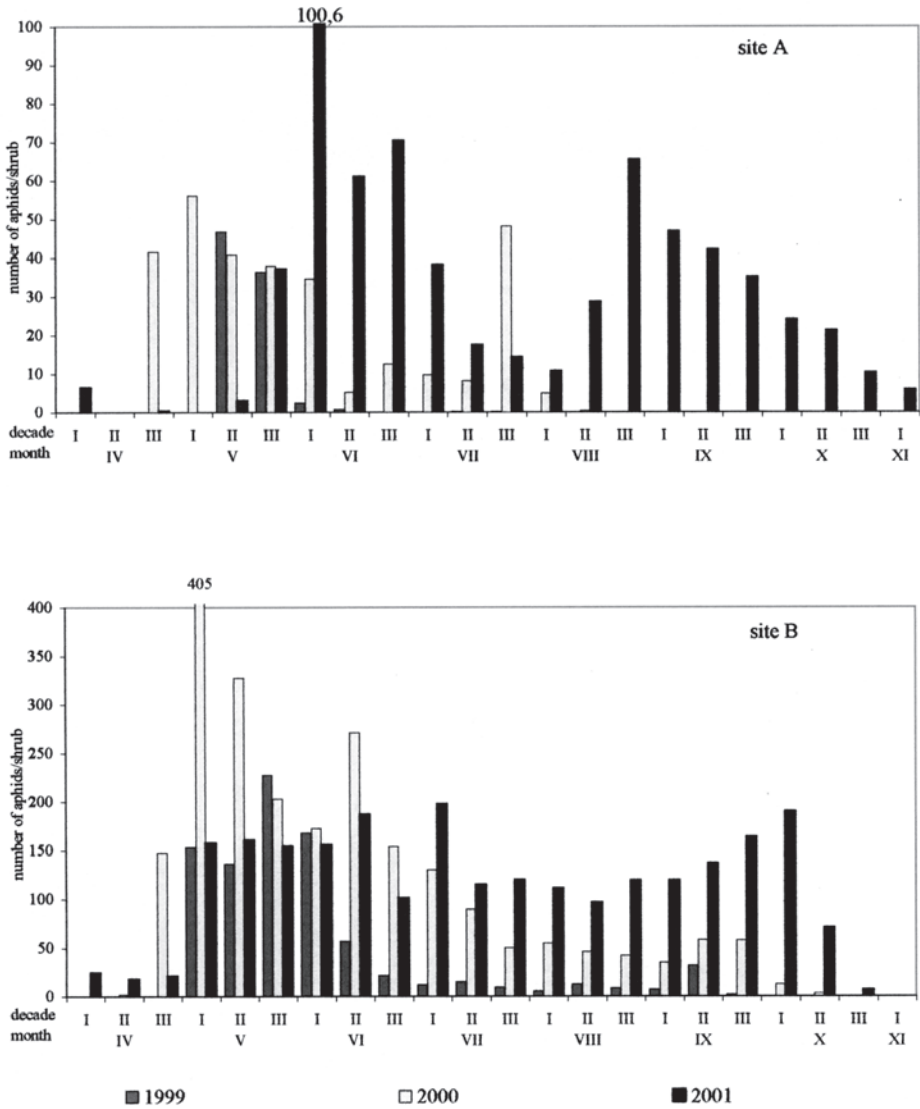


Fig. 1. Dynamics of *Cinara pini* L. population on *Pinus mugo* Turra shrubs in the years 1999-2001



Photo 1. *Cinara pini* L. on the shrubs of *Pinus mugo* Turra

second decade of June. Between the first decade of August and the first decade of October aphids occurred scarcely and with varying intensity. Their disappearance was found out in the second decade of October.

In 2000, after a mild winter, aphids appeared on plants as early as in April (in site A, it was in the third decade, and in site B in the second decade). That month was very warm with much rainfall of little intensity. The subsequent observation (the first decade of May) found out in both sites an increase of the aphid population, which was at the same time the maximum (in site A there were 56.2 aphids/shrub, and in site B 405.0 aphids/shrub). In site A the number of aphid population changed between the middle of May and the beginning of June. From the second decade of June till the second decade of August aphids *C. pini* occurred with varying intensity, and even in the third decade of July their number reached 48.0 aphids/shrub. The disappearance of aphids in site A took place in the third decade of August. In site B, the studies also found out a decrease of the aphid population since the second decade of May but their number was much higher as compared to site A, and the period of their occurrence was two month longer. The disappearance of aphids took place in the third decade of October.

An early period of vegetation and a warm spring in 2001 favored the development of aphids. The first colonies of this species in both sites were found out at the beginning of April. A rapid increase of their numbers was observed in May. Their maximum in site A was found on the first decade of June (100.6 aphids/shrub), and in site B on the first decade of July (197.6 aphids/shrub). In the summer months of that year the number of aphids varied considerably. This was probably caused by weather conditions, frequent stormy rainfalls and heat waves. The disappearance of aphids in both sites took place at the same time, namely in the second decade of November.

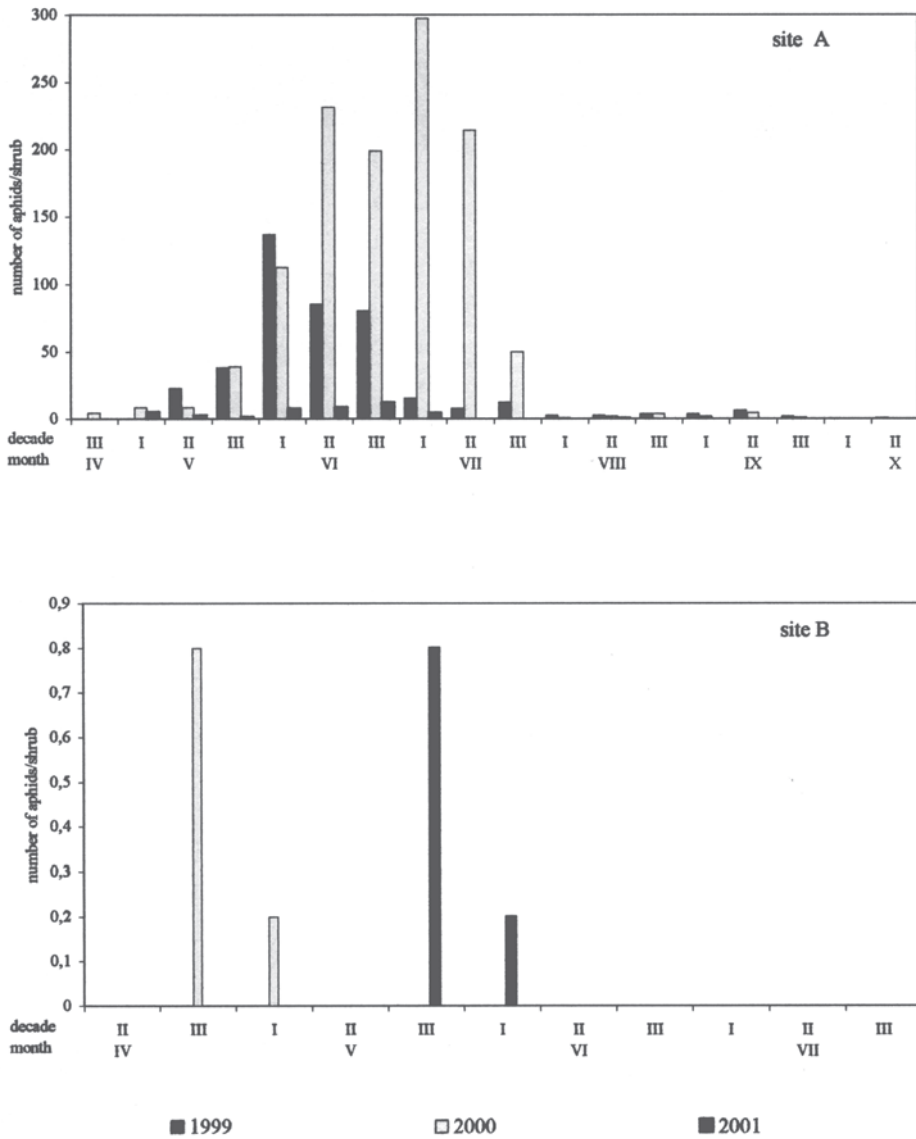


Fig. 2. Dynamics of *Schizolachnus pineti* F. population on *Pinus mugo* Turra shrubs in the years 1999-2001

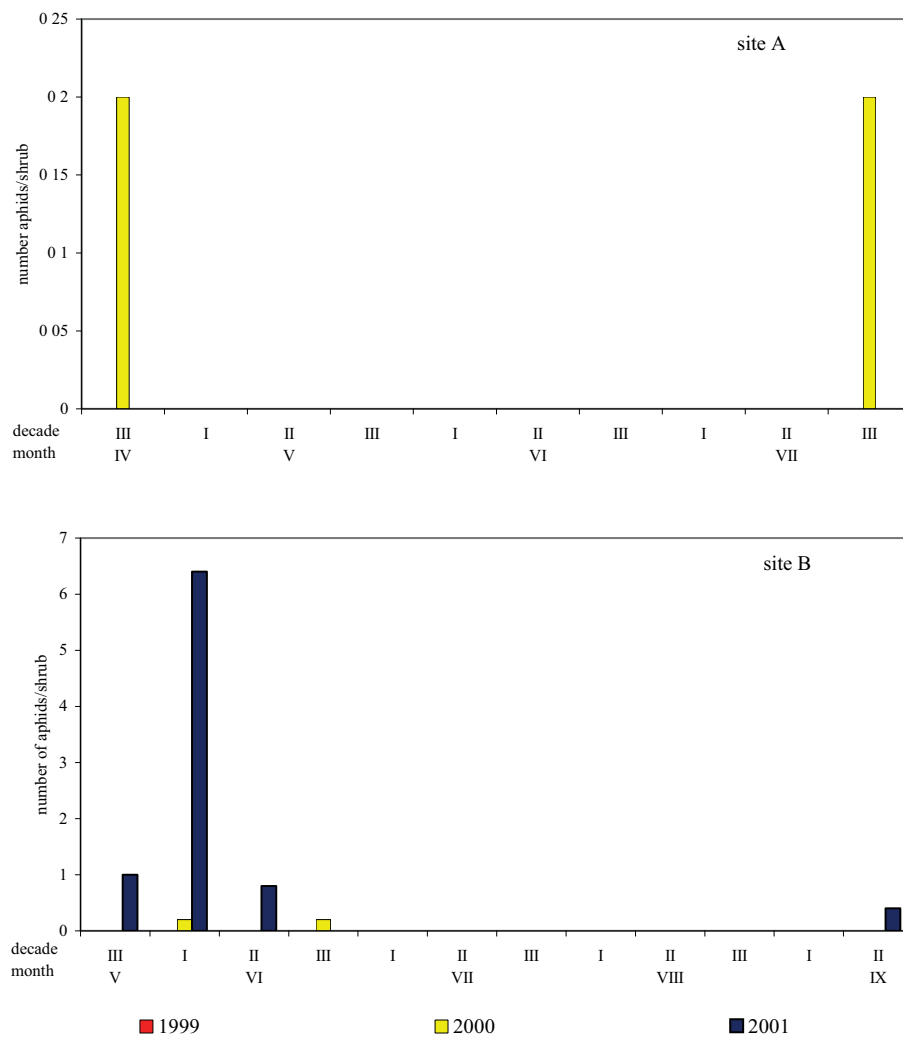


Fig. 3. Dynamics of *Eulachnus rileyi* (Will.) population on *Pinus mugo* Turra shrubs in the years 1999-2001

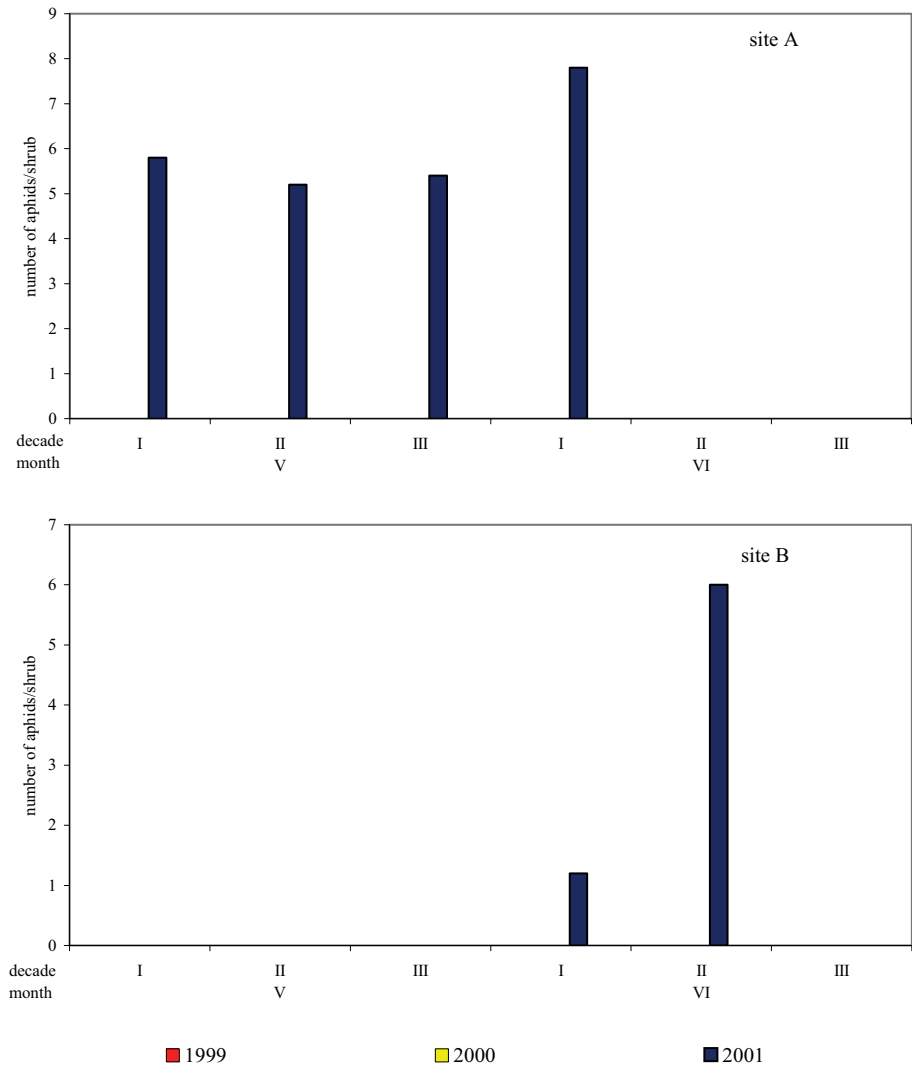


Fig. 4. Dynamics of *Pineus pini* (Ratz.) population on *Pinus mugo* Turra shrubs in the years 1999 2001

Schizolachnus pineti F. (Photo 2)

In 1999 aphids of this species occurred only in site A (Fig. 2). The first non-winged grey brown and dark green specimens with thick and long hair appeared in the second decade of May. Their maximum was observed on the first decade of June (136.6 aphids/shrub). Subsequent observations found out a slow decrease of their numbers. Between the first decade of August and the second decade of October only singular specimens were found. The disappearance of aphids was observed in the third decade of October.

In 2000 aphids *S. pineti* were observed in both sites. In site A the presence of first singular specimens was observed beginning with the third decade of April, and their maximum was found out on the first decade of July (297.4 aphids/shrub). In subsequent observations the number of aphids decreased, and their disappearance took place on the first decade of October. In site B only 5 specimens of this species were found throughout the whole season. Their presence was observed at the turn of April and May. In site A (the street site) aphids *S. pineti* occurred in greater numbers (over 1000 times as many) as compared to site B (the park site).

In 2001 in site A this species occurred in much smaller numbers and they preyed much shorter than in previous years of studies. The first aphids appeared on the first decade of May, while the maximum was reached in the third decade of June (12.0 aphids/shrub). Their disappearance was observed in the second decade of July, while in the second decade of August only one specimen of this species was found. In site B only 5 aphids were found on the examined shrubs in the course of two observations (in the third decade of May and in the first decade of June).



Photo 2. Colony of *Schizolachnus pineti* F. on the shrubs of *Pinus mugo* Turra

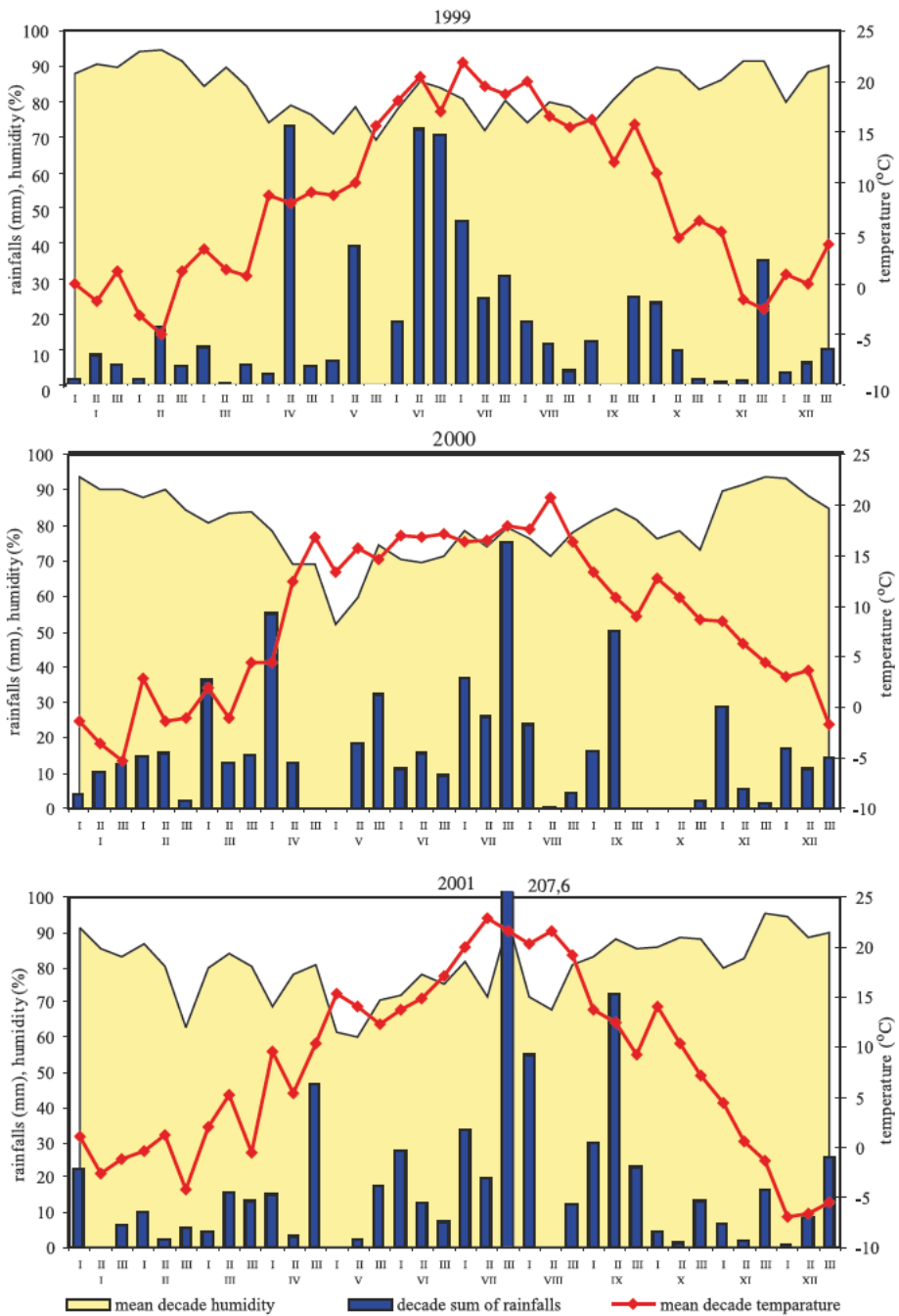


Fig. 5. General information about the weather conditions in the years 1999 2001

Eulachnus rileyi (Will.)

In 1999, no aphids *E. rileyi* were found on the examined shrubs (Fig. 3).

In 2000, two dark green, oblong individuals of this species were observed in each site. In site A, their presence was observed in the third decade of April and in the third of July, while in site B they were observed in the first and third decade of June.

In 2001, aphids *E. rileyi* appeared only in site B. Their presence was found between the third decade of May and the second decade of June. Their maximum number was observed on the first decade of June (6.4 aphids/shrub). Singular specimens were noticed again during one observation in the second decade of September.

Pineus pini (Ratz.)

In the years 1999 and 2000 no aphids of this species were observed on the examined shrubs in either of the sites (Fig. 4).

In 2001, dark red or dark brown aphids (hidden under wax secretion) occurred for a short period. In site A they inhabited the shrubs from the first decade of May till the first decade of June. They were most numerous on the first decade of June (7.8 aphids/shrub). In site B they were found in the first and second decade of June.

DISCUSSION

Analyzing the three years of studies it was found out that the shrubs of mountain pine (*Pinus mugo* Turra) are the host plants for four aphid species: *Cinara pini* L., *Schizolachnus pineti* F., *Eulachnus rileyi* (Will.) and *Pineus pini* (Ratz.).

The present studies found no aphids mentioned by other authors (Blackman and Eastop, 1994; Ripka et al., 1998; Soika and Łabanowski, 2001; Szełęgiewicz, 1968) such as *Eulachnus agilis* (Kalt.), *E. brevipilosus* Börn. and *Cinara pinea* (Mordv.).

Cinara pini L. occurred on the examined shrubs annually and in great numbers, forming big colonies always visited by ants. The presence of this species was observed throughout the period of vegetation (from April till November), and the most numerous occurrence was found out in May and June. Aphids occurred much more numerous in the park site as compared to the street one. *C. pini* is considered by other authors (Blackman and Eastop, 2000; Ripka et al., 1998; Soika and Łabanowski, 2001; Szełęgiewicz, 1968) as a pest of common pine (*Pinus silvestris* L.), Austrian pine (*P. nigra* Arn.) and mountain pine (*P. mugo* Turra). Müller (1976) states that this aphid inhabits young twigs without needles, while Szełęgiewicz (1968) refers to the branches or roots.

Schizolachnus pineti F. was found in the Lublin region (near Puławy) by Judenko in 1930, and in Lublin it was found first time in the present studies. Aphids of this species prey on the needles of common pine, Austrian pine and mountain pine individually or in small colonies. In Poland they occur commonly, except the upper parts of the mountains (Szełęgiewicz, 1968). On the examined shrubs,

the differences in the number of the aphids of this species were considerable depending on the year and site. In the street site, their number ranged from 40 to 1176 aphids/shrub, while in the park site only singular specimens appeared or there were no aphids at all. The greatest number of these insects were noted in June and July.

Eulachnus rileyi (Will.) is the species that has not been observed in the Lublin region so far. Its presence on Austrian and mountain pines in other areas was observed by Ripka et al. (1998) and Szelęgiewicz (1968). This aphid occurred irregularly and scarcely on the studied shrubs. Due to the exceptional mobility of those aphids it was difficult to establish their population dynamics.

Pineus pini (Ratz.) has not been observed in the Lublin region so far, either. This species is considered as a pest on pine in nurseries, parks and forests (Łabkowski and Orlikowski, 1997; Ripka et al., 1998). Aphids *P. pini* hidden under the wax secretion was observed only in 2001, between May and June.

A significant influence on the population of aphids was exerted by weather conditions in spring and summer. A delayed period of vegetation, high temperatures (30°C-36°C) taking place a few times during the season as well as stormy rainfalls washing the aphids off the plants considerably decreased the population of those insects (e.g. the year 1999). A mild winter (the year 2001), an early period of vegetation as well as a warm spring with the rainfalls within the norm favored the development of aphids. Similar information is given in the papers by other authors (Cichocka, 1980; Hole et al., 1998; Zhou et al., 1997).

1. Four aphid species were found on the shrubs of mountain pine (*Pinus mugo* Turra), namely *Cinara pini* L., *Schizolachnus pineti* F., *Eulachnus rileyi* (Will.) and *Pineus pini* (Ratz.).
2. Among all the aphid species, only *C. pini* occurred in both sites in each of the studied years.
3. Weather conditions affected the number of aphid population. A mild winter and a warm spring caused an increase of the number of aphids, while a delayed period of vegetation, the air temperatures of above 30°C as well as stormy rainfalls limited the development of their population.

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Mszyce (*Homoptera, Aphidoidea*) zasiedlające krzewy *Pinus mugo* Turra na terenie zieleni miejskiej Lublina. Część I. Dynamika liczebności populacji

Streszczenie

Badania prowadzono na krzewach sosny górskiej (*Pinus mugo* Turra) w latach 1999-2001. Obserwacjami objęto rośliny rosnące na terenach zieleni miejskiej Lublina na dwóch stanowiskach: przyulicznym (A) i parkowym (B). Celem pracy było ustalenie składu gatunkowego oraz dynamiki populacji mszyc zasiedlających koso-drzewinę. W wyniku przeprowadzonych badań na krzewach sosny górskiej stwierdzono obecność czterech gatunków mszyc: *Cinara pini* L., *Schizolachnus pineti* F., *Eulachnus rileyi* (Will.) i *Pineus pini* (Ratz.). Spośród nich tylko *C. pini* występowała w każdym roku badań na obydwu stanowiskach. Na rozwój populacji mszyc miały wpływ warunki pogodowe. Opóźniony okres wegetacji, temperatury powietrza powyżej 30°C oraz opady typu burzowego znacznie zmniejszały liczebność mszyc.