

DENSITY AND DEGREE OF DAMAGE TO LEAVES AND SHOOTS OF SOME PLUM AND PEAR CULTIVARS BY ERIOPHYOID MITES (*Eriophyoidea*)

Summary

In 2011-2013, a study was conducted on the colonization and damage to the leaves and shoots of plum trees by the plum rust mite *Vasates fockeui* (Nal.) and on the damage to the leaves of pear trees by the pear-leaf blister mite *Eriophyes piri* (Pgst.). Observations were carried out in the Experimental Ecological Orchard of the Research Institute of Horticulture, located in Nowy Dwór-Parcela near Skierniewice. Colonization of leaves by the plum rust mite was checked four times during the growing season, from May to August. In late July or early August, there was executed an assessment of the damage to the leaves and shoots of 4 plum cultivars ('Herman', 'Żółta Afaska', 'Čačanska Rana' and 'Valjevka') and 6 pear cultivars ('Faworytka', 'Radana', 'Konferencja', 'Erika', 'Concorde' and 'Amfora'). The damage was assessed on a 4-point grade scale, where 0 – meant no symptoms of feeding by the mites, and 3 – severe damage (90% discoloured leaves of pear trees, and premature drop of plum tree leaves). The highest degree of damage to plum trees by the plum rust mite was recorded in the cultivar 'Herman', and the lowest in 'Valjevka'. The average extent of grade 3 damage to shoots was 31.8% and 2.7%, respectively. On pear trees, leaves most severely damaged by the pear-leaf blister mite were observed in the cultivars 'Amfora' and 'Erika', while the lowest degree of damage was shown by the cultivars 'Radana' and 'Konferencja'.
Key words: plum trees, pear trees, cultivars, damage, *Vasates fockeui* (Nal.), *Eriophyes piri* (Pgst.)

ZASIEDLENIE ORAZ STOPIEŃ USZKODZENIA LIŚCI I PĘDÓW KILKU ODMIAN ŚLIWY I GRUSZY PRZEZ SZPECIELE *Eriophyoidea*

Streszczenie

W latach 2011-2013 badano zasiedlenie oraz uszkodzenie liści i pędów śliwy przez porzewiacza śliwowego *Vasates fockeui* (Nal.) i uszkodzenie liści gruszy przez podskórnika gruszowego *Eriophyes piri* (Pgst.). Badania wykonano w Ekologicznym Sadzie Doświadczalnym Instytutu Ogrodnictwa, w Nowym Dworze-Parceli k. Skierniewic. Zasiedlenie liści przez porzewiacza śliwowego sprawdzano czterokrotnie w sezonie od maja do sierpnia. W końcu lipca lub na początku sierpnia oceniano uszkodzenia liści i pędów 4 odmian śliwy ('Herman', 'Żółta Afaska', 'Cacanska Rana' i 'Valjevka') oraz 6 odmian gruszy ('Faworytka', 'Radana', 'Konferencja', 'Erika', 'Concorde' i 'Amfora'). Ocenę prowadzono wg. czterostopniowej skali gdzie 0 – oznaczało brak objawów żerowania roztoczy, a 3 silne uszkodzenia (90% przebarwionych liści gruszy i przedwczesne opadanie liści śliwy). Najwyższy stopień uszkodzenia śliwy przez porzewiacza śliwowego notowano na odmianie 'Herman', a najniższy na odmianie 'Valjevka'. Średni stopień uszkodzenia pędów w stopniu 3 wyniósł odpowiednio 31,8 i 2,7%. Na gruszy, najsilniej uszkadzane liście przez podskórnika gruszowego notowano na odmianie 'Amfora' i 'Erika', a najniższym stopniem uszkodzenia charakteryzowały się odmiany 'Radana' i 'Konferencja'.
Słowa kluczowe: śliwy, grusze, odmiany, uszkodzenie, *Vasates fockeui* (Nal.), *Eriophyes piri* (Pgst.)

1. Introduction

The plum rust mite *Vasates fockeui* (Nal.) and the pear-leaf blister mite *Eriophyes piri* (Pgst.) are phytophagous mites commonly occurring in plum and pear tree plantings [1]. When present in large numbers and after prolonged feeding on leaves, Eriophyoid mites reduce the intensity of photosynthesis and chlorophyll content [1, 2]. As a result, especially with the plum rust mite, premature leaf drop occurs [3, 4]. Among the many properties that have a significant effect on the proliferation of Eriophyoid mites, an important role is played by the morphological and biochemical characteristics of plants [5]. These are the specific characteristics of plant varieties that determine whether they are accepted by Eriophyoid mites for colonization, feeding, and reproduction. There is very little information in the available literature on the occurrence of Eriophyoid mites on the different varieties of plum and pear trees. The aim of this study was to assess the extent of colonization and damage to several plum and pear tree cultivars by

the plum rust mite and the pear-leaf blister mite.

2. Material and methods

The study was conducted in 2011-2013 in the Experimental Ecological Orchard of the Research Institute of Horticulture, located in Nowy Dwór-Parcela near Skierniewice. In each year of the study, four times during the growing season, beginning from the middle of May, 40 randomly selected leaves were collected from 10 trees of each cultivar (10 leaves x 4 replications). Then, at the base of each leaf, discs with a 1 cm² surface area were excised and plum rust mites (adult individuals and nymphs) were counted on them using a binocular microscope with a 30× magnification. The study assessed the extent of damage to four plum cultivars and six pear cultivars (Fig. 1 and 2). The damage was assessed on a 4-point grade scale, where 0 – represented no damage, and 3 – severe damage (about 90% of leaves with spots caused by the pear-leaf blister mite, or leaf drop and withering of shoot tips caused by the plum rust mite).

3. Results and discussion

In all the years of the study, the largest number of plum rust mites in late June and mid-July (over 40 individuals/cm²) was found on the leaves of the cultivar ‘Herman’, and the smallest (less than 20 individuals/cm²) on the leaves of the plum cultivars ‘Čačanska Rana’ and ‘Valjevka’

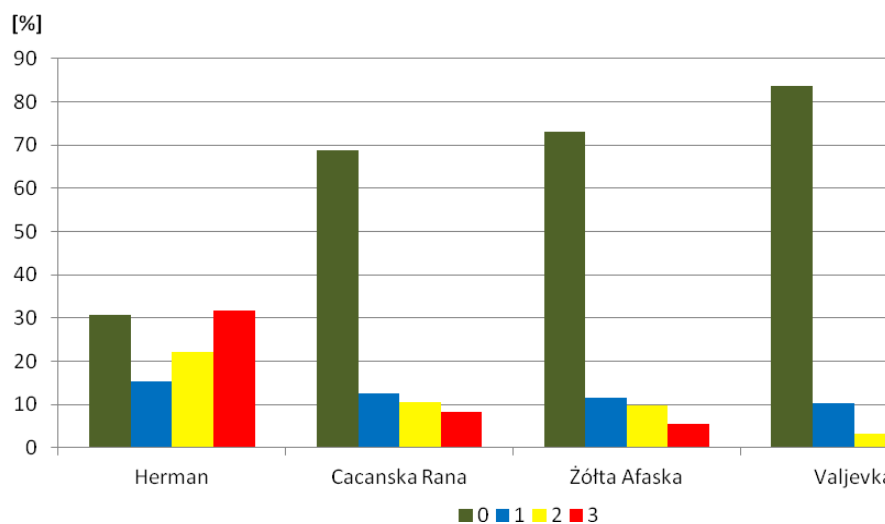
(Tab. 1). The highest average percentage of damaged shoots (grade 2 and 3 damage) was recorded at the end of July and the beginning of August in the cultivar ‘Herman’, and the lowest in the cultivar ‘Valjevka’ (Fig. 1). The average extent of grade 3 damage to shoots was 31.8% and 2.7%, respectively.

Table 1. Density of plum rust mite *Vasates fockeui* (Nal.) on the plum leaves in 2011-2013

Tab. 1. Liczebność porzewiacza śliwowego *Vasates fockeui* (Nal.) na liściach śliwy w latach 2011-2013

Cultivars	Mean number of plum rust mite/ cm ²			
	in the middle of May	III decade of June	in the middle of July	in the middle of August
Herman	1,4 c	40,7 c	86,0 c	26,2 a
Žółta Afaska	0,6 b	17,9 b	59,7 b	18,4 a
Čačanska Rana	0,1 a	3,5 a	16,6 a	14,4 a
Valjevka	0,0 a	7,3 a	23,4 a	15,9 a

Source: Authors' own research / Źródło: opracowanie własne

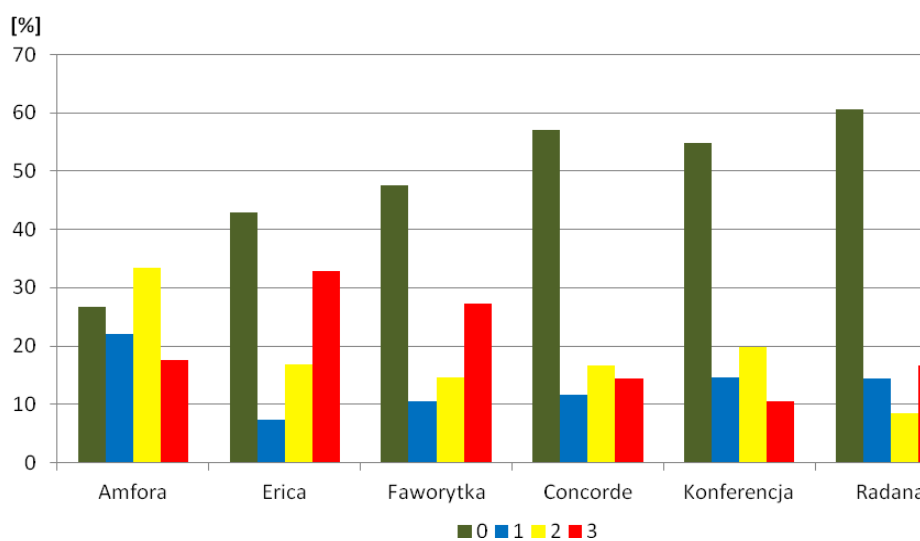


mean % plum injuries level on scale 0-3 / Średni procentowy udział uszkodzeń wg skali 0-3

Source: Authors' own research / Źródło: opracowanie własne

Fig. 1. Injury of leaves and shoots by plum rust mite *Vasates fockeui* (Nal.) in 2011-2013

Rys. 1. Uszkodzenia liści i pędów śliwy przez porzewiacza śliwowego *Vasates fockeui* (Nal.) w latach 2011-2013



mean % plum injuries level on scale 0-3 / Średni procentowy udział uszkodzeń wg skali 0-3

Source: Authors' own research / Źródło: opracowanie własne

Fig. 2. Injury of leaves by pear leaf blister mite *Eriophyes piri* (Pgst.) in 2011-2013

Rys. 2. Uszkodzenia liści gruszy przez podskórnik gruszowego *Eriophyes piri* w latach 2011-2013

In all the tested cultivars of pear trees, the number of pear-leaf blister mites in early spring exceeded the threshold level. For the early spring period, it is set at 20% of buds inhabited by overwintering females of the mite. During the early spring inspections, large differences were observed in the number of mites overwintering in buds. The number of them ranged from a few individuals to several hundred per one bud. The most extensive damage to the leaves in all the cultivars tested was recorded in the first year of the study. In June 2011, over 70% of the leaves of the cultivars 'Erika', 'Amfora' and 'Faworytka' were found damaged. Because of such extensive leaf damage, a protective treatment was carried out during bud break in 2012 and 2013. To reduce the mite populations, a formulation permitted for use in organic farming, in which paraffin oil was the active ingredient, was used. In the years in which the treatments to control Eriophyoid mites were carried out on pear trees, the average percentage of grade 2 and 3 damage to the leaves was highest in the cultivars 'Amfora' (51.1%), 'Erika' (49.7%) and 'Faworytka' (41.9%). The cultivars with the lowest percentage of leaves showing grade 2 and 3 damage were 'Radana' (25.0%), 'Konferencja' (30.5%) and 'Concorde' (31.3%) (Fig. 2).

There is little information in the literature on the occurrence of the plum rust mite in the different cultivars of plum trees. Gilmer and McEwen (1958) had reported that the pest occurred in large numbers in the cultivars 'Węgierka Włoska' and 'Stanley'. Research carried out in the 1990s in plum orchards located in Skierniewice indicated that the largest numbers of plum rust mites were found in the cultivars 'Herman', 'Oneida' and 'Książę Walii' [7], and on plum seedlings obtained by crossing the cultivars 'Čačanska Lepotica' and 'Herman' [8].

Information on the occurrence of the pear-leaf blister mite on the different cultivars of pear trees is even more scarce than in the case of the plum rust mite. Daniel et al. (2007) had reported an observation that the number of mites in the buds of pear trees did not correspond to the level of damage to the leaves. In the present study, a similar trend was also observed. The use of an oil-based formulation reduced the numbers of pear-leaf blister mites. Experiments conducted in Italy in the 1990s produced a similar effect when a mineral oil was applied during bud swelling [10].

4. Conclusions

1. The study showed variability in the colonization and damage to the leaves and shoots of the tested cultivars of plum and pear trees by the species of Eriophyoid mites under consideration.
2. The average number of plum rust mites on the leaves of plum trees (2011-2013) was highest in mid-July. At that time, it was, on average, from 16.6 individuals/cm² in the cultivar 'Čačanska Rana' to 86 individuals/cm² in the cultivar 'Herman'.

3. The highest average percentage of plum tree leaves and shoots that showed grade 2 and 3 damage by the plum rust mite was recorded in the cultivar 'Herman', and the lowest in the cultivar 'Valjevka'.

4. The highest average percentage of pear tree leaves that showed grade 2 and 3 damage by the pear-leaf blister mite was recorded in the cultivars 'Amfora' and 'Erika', and the lowest in the cultivars 'Radana' and 'Konferencja'.

5. Acknowledgements

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