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THE SCALE INSECTS (*HEMIPTERA, COCCINEA*) OF ORNAMENTAL PLANTS IN A GREENHOUSE OF THE MARIA CURIE SKŁODOWSKA UNIVERSITY BOTANICAL GARDEN IN LUBLIN

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Abstract: The aim of presented investigation was to determine the composition of scale insects species and intensity of their occurrence on some greenhouse's ornamental plants. The investigations were carried out in the greenhouse of Maria Curie Skłodowska Botanical Garden in Lublin in years 2002–2004. Eight species belonging to seven botanical families were observed: *Abutilon striatum* cv. *Thomsoni, Cyrtomium falcatum* Presl., *Dizygotheca elegantissima* (Veitch), *Hedera helix* L., *Hypoestes phyllostachya* Presl., *Nerium oleander* L., *Passiflora guadrangularia* L., *Ruscus aculeatus* L. The quantitative analysis of the studied material was performed making use of the following ecological indicators: number and density. Identification of the scale insects species was performed on the basis of microscope slides. Three species of the scale insects belonging to three families were observed on ornamental plants: *Pseudococcidae* [*Pseudococcus maritimus* (Ehrh.)], *Coccidae* [*Saissetia coffeae* (Walker)] and *Diaspididae* (*Aspidiotus nerii* Bouchè). The scale insects were noted on all species of studied plants. Observed scale insects are typical polyphagous and all of them are considered as harmful pests in greenhouses. Among scale insects inhabiting this group of plants distinctly numerous on particular host plants were *S. coffea* and *A. nerii.* On the studied plants scale insects were stated at four degree of density.

Key words: scale insects, *Hemiptera, Coccinea,* ornamental plants, greenhouse, density, number, *Pseudococcus maritimus, Saissetia coffeae, Aspidiotus nerii*

INTRODUCTION

In Poland the scale insects are reckoned one of the most troublesome pests of greenhouse production. They originate from countries of tropical climate and spread over by plant trade. These insects have successfully adopted artificial conditions created by human. Owing to the lack of natural enemies in their new habitat, high reproduction capacity and specific morphology (protective plates, wax powder, body

parts sclerotized), the effective management is a real problem (Komosińska 1961; Dziedzicka 1988a, 1988b; Łagowska 1995; Ben-Dov and Hodgson 1997).

The main harmfulness of scale insects consists in sucking the plant sap what affects the growth, leads to defoliation, withering of shoots or the entire plant. A secretion of honeydew which coats the plant surface impedes the assimilation and photosynthesis. Honeydew accumulates different dust and pollutants but first of all it is a perfect medium for sooty mould which covers plants with a black film (Dziedzicka 1988a; Kosztarab 1996; Ben-Dov and Hodgson 1997).

The aim of the study was to determine the species composition as well as the number and density of pests occurring on 8 plant species of the Botanical Garden, Lublin.

METHODS

The study was carried out in the greenhouse of Maria Curie Skłodowska University Botanical Garden, Lublin in 2002–2004. During this period chemical, biological and mechanical control of plants were conducted. The study covered 8 plant species: *Abutilon striatum* cv. *Thomsoni*, *Cyrtomium falcatum* Presl., *Dizygotheca elegantissima* (Veitch), *Hedera helix* L., *Hypoestes phyllostachya* Presl., *Nerium oleander* L., *Passiflora guadrangularia* L., *Ruscus aculeatus* L. belonging to 7 botanical families. Three thirty-centimetre-long shoots had been randomly chosen from each plant. The selected fragments (shoot with leaves) were inspected every 14 days. For species identification several specimens of scale insects were collected from each plant and then mounted as permanent microscope slides, following the method by Williams and Kosztarab (1972).

A quantitative analysis of the studied material was carried out using ecological indices: total number, density (the number of species occurring in certain habitat per surface unit) (Górny and Grüm 1981). The density of scale insects on the plant fragments examined was carried out based on a 5-degree scale: 0 – lack of scale insects; I – single scale insects; II – up to 25% of surface affected by scale insects; III – up to 50% of surface affected by scales; IV – up to 100% of surface affected by scales (mass density).

RESULTS

As a result of the study conducted, 3 species of scale insects were found on 8 species of ornamental plants. They belonged to 3 families: *Pseudococcidae* – Grape mealybug [*Pseudococcus maritimus* (Ehrh.)], *Coccidae* – Hemispherical scale [*Saissetia coffea* (Walker)] and *Diaspididae* – Oleander scale (*Aspidiotus nerii* Bouchè). The scale insects were present on all surveyed plants. *P. maritimus* showed the highest number of host plants occurring on eight species. *S. coffea* was reported from five whereas *A. nerii* from two host plants species (Table 1).

Among scale insects inhabiting this group of plants distinctly numerous on particular host of the plants were species of the families: *Coccidae* – *S. coffea*, most numerously inhabiting *D. elegantissima* (1309 specimens) and *C. falcatum* (772), and *Diaspididae* – *A. nerii* on *Hedera helix* (747). Additionally, *S. coffea* showed the highest total number (3075 specimens). The lowest number exhibited *P. maritimus* on *Hedera helix* (2) as well as on *Nerium oleander* and *C. falcatum* (3 specimens on each). This species showed also the lowest total number (972) (Table 1, Fig.1).

Table 1. Number and density of the scale insects on particular host plants in greenhouse of Maria Curie-Skłodowska University Botanical Garden (Lublin, 2002–2004)

No.	Host plant	Pest	Number of specimens	Density
1	*Nerium oleander* L.	*Aspidiotus nerii*	226	III
		Saissetia coffea	146	II
		Pseudococcus maritimus	3	I
2	*Dizygotheca elegantissima* (Veitch)	*Saissetia coffea*	1309	IV
		Pseudococcus maritimus	22	II
3	*Abutilon striatum* cv. *Thomsoni*	*Saissetia coffea*	446	III
		Pseudococcus maritimus	41	II
4	*Cyrtomium falcatum* Presl.	*Saissetia coffea*	772	III
		Pseudococcus maritimus	3	I
5	*Hypoestes phyllostachya* Presl.	*Saissetia coffea*	402	III
		Pseudococcus maritimus	7	I
6	*Hedera helix* L.	*Aspidiotus nerii*	747	IV
		Pseudococcus maritimus	2	I
7	*Ruscus aculeatus* L.	*Pseudococcus maritimus*	545	III
8	*Passiflora guadrangularia* L.	*Pseudococcus maritimus*	349	III

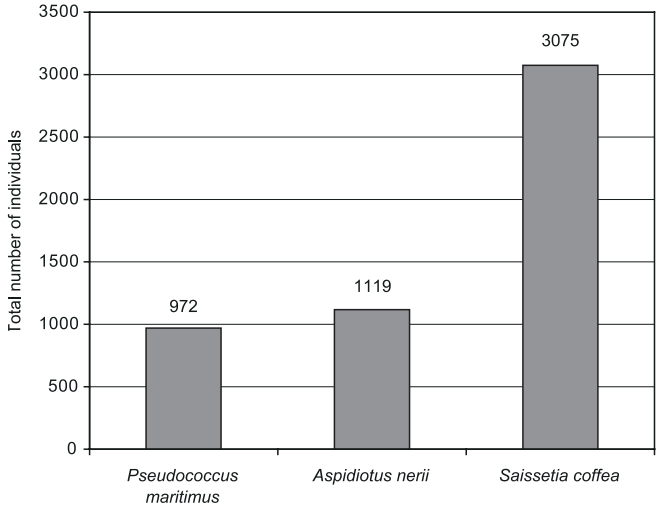

Fig. 1. Total number of the scale insects on the decorative plants in the greenhouse of Maria Curie Skłodowska University Botanical Garden (Lublin, 2002-2004)

On the studied plants scale insects were noticeded at four degree of density. Mass density (category IV) was observed on two plant species: *S. coffea* on *D. elegantissima* and *A. nerii* on *H. helix*. On six plant species scale insects occurred at the III degree of density (Table 1).

DISCUSSION

On 8 plant species observed under the greenhouse conditions, 3 scale insects species were recorded. They belonged to *Pseudococcidae* (*P. maritimus*), *Coccidae* (*S. coffea*) and *Diaspididae* (*A. nerii*). These species occurring in the majority of Polish greenhouses investigated, and considered to be common pests of pot plants and ornamental plants, belonged to typical polyphagous (Komosińska 1961; Dziedzicka 1988a, b; 1989; 1990; Hodgson and Hilburn 1990; Williams and Watson 1990; Ben-Dov 1993; Ben-Dov and Hodgson 1997; Hodgson 1994; Łagowska 1995; Gimpel and Miller 1996; Hodgson and Henderson 2000). According to the literature records, *S. coffea* has been reported from about 430 plant species grouped in 108 botanical families, *A. nerii* has been found on over 450 plant species from 107 families, whereas *P. maritimus* on over 80 species of 33 families (http://www.sel.barc.usda.gov/scalenet/query.htm). In the greenhouse of the Maria Curie Skłodowska University Botanical Garden *P. maritimus* was the species showing the highest number of host plants as it was found on all the plants studied (*A. striatum* cv. *Thomsoni, C. falcatum*, *D. elegantissima, H. helix*, *H. phyllostachya, N. oleander, P. guadrangularia*, *R. aculeatus*). Dziedzicka (1988a) reported *P. maritimus* from *Passifloraceae* what was corroborated by the results of the present study. However, other plant species could not be found on the list presenting host plants for the observed scale insects species. It is possible that considering the polyphagism of *P. maritimus* some authors might have not located all the host plants on which the pest was observed.

S. coffea occurred on 5 plant species (*N. oleander, D. elegantissima, A. striatum* cv. *Thomsoni, C. falcatum*, *H. phyllostachya*). Only one of them (*A. striatum*) could not be found on the list of host plants reported for this species. On 2 plant species (*N. oleander* and *H. helix*) *A. nerii* was observed. Both host species were reported in literature (Munting 1969; Foldi 2000).

Among recorded the scale insects species, Hemispherical scale (*S. coffea*) was the most abundant, occurring on five plant species in the number of 3075 specimens. Golan and Górska-Drabik (2004) obtained similar results for tropical plants on which *S. coffea* was also among particularly numerous species. *A. nerii* was less abundant on the plants subjected to the present study (1119 specimens). Other research conducted in the greenhouse of Maria Curie Skłodowska University Botanical Garden concerning different plant species did not reveal the occurrence of this species (Łagowska1995; Golan and Górska-Drabik 2004).

The number of scale insects species on particular host plants differed despite the fact that all the plant grew under the same conditions. *P. maritimus* was the most numerous and reached the III degree of density on *R. aculeatus* (545 specimens) and on *P. quadrangularia* (349 specimens) while the species was sparse (3 specimens) on *N. oleander* throughout the time of the study. *S. coffea* was also observed at the IV degree of density, with number of 1309 specimens on *D. elegantissima* whereas on *N. oleander* it occurred at the II degree of density with the number of 146 specimens.

The above results corroborate the data from earlier literature reports. According to many authors (Saakjan-Baranowa 1964; Tingle and Copland 1988; Łagowska 1995; Kosztarab 1996) the occurrence of scale insects is significantly determined by the species of the inhabited host plant, properties of its morphological and anatomical structure as well as the growth phase.

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POLISH SUMMARY

CZERWCE (*HEMIPTERA, COCCINEA*) NA ROŚLINACH OZDOBNYCH W SZKLARNI OGRODU BOTANICZNEGO UNIWERSYTETU MARII CURIE-SKŁODOWSKIEJ W LUBLINIE

Badania prowadzono w szklarni Ogrodu Botanicznego Uniwersytetu Marii Curie-Skłodowskiej w Lublinie w latach 2002–2004. Obserwacjami objęto 8 gatunków roślin: *Abutilon striatum* cv. *Thomsoni, Cyrtomium falcatum* Presl., *Dizygotheca elegantissima* (*Veitch*), *Hedera helix* L., *Hypoestes phyllostachya* Presl., *Nerium oleander* L., *Passiflora guadrangularia* L., *Ruscus aculeatus* L. należących do 7 rodzin botanicznych.

Celem badań było określenie składu gatunkowego, liczebności oraz klas zagęszczenia szkodników występujących na 8 gatunkach roślin w szklarni Ogrodu Botanicznego UMCS w Lublinie.

W wyniku przeprowadzonych badań, na 8 gatunkach roślin ozdobnych stwierdzono występowanie 3 gatunków czerwców, należących do 3 rodzin: *Pseudococcidae* – *Pseudococcus maritimus* (Ehrh.), *Coccidae* – *Saissetia coffea* (Walker) oraz *Diaspididae* – *Aspidiotus nerii* Bouchè. Obecność czerwców stwierdzono na wszystkich badanych gatunkach roślin. Największą liczbą roślin żywicielskich charakteryzował się *P. maritimus*, który wystąpił na 8 gatunkach roślin. Wśród czerwców stwierdzonych w tej grupie roślin, swoją liczebnością na poszczególnych żywicielach wyróżniły się gatunki: *S. coffea*, który najliczniej wystąpił na *D. elegantissima* i *C. falcatum* oraz *A. nerii* na *H. helix*. Najmniejszą liczebnością charakteryzował się gatunek *P. maritimus* na *H. helix* oraz na *N. oleander* i *C. falcatum*.