

SEASONAL DYNAMICS OF PREDATORY MITES (ACARI: PHYTOSEIIDAE) ON STRAWBERRIES IN LATVIA

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Abstract

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Ten species of phytoseiid mites were found on strawberries during the period 1997-98; *Neoseiulus agrestis*, *N. aurescens*, *N. barkeri*, *N. bicaudus*, *N. cucumeris*, *N. herbarius*, *N. reductus*, *N. zwoelferi*, *Typhlodromips rademacheri*, *Propriseiopsis okanagensis*. Studies were made of the abundance and seasonal dynamics of phytoseiid species composition.

Introduction

Predatory mites of the family Phytoseiidae are important biological control agents of phytophagous arthropods and, especially, of phytophagous mites (NESBITT, 1951; RAMAKERS, 1980; GERSON, 1985).

Faunistic surveys of the natural phytoseiid mite fauna have been carried out in most countries. In Latvia the fauna of free-living phytoseiid mites has been studied by A. Prieditis, E. Plise, N. Kuznetsov, and V. Petrov, (LAPINA, 1988). The first record concerning phytoseiid species associated with strawberry in Latvia was made by KUZNETSOV, PETROV (1984), who recorded three species of Phytoseiidae.

The aim of this investigation was to identify naturally occurring phytoseiid mites associated with the phytophagous mites *Tetranychus urticae* KOCH and *Tarsonemus pallidus* BANKS (Acari: Tetranychidae, Tarsonemidae) on strawberries. We studied the occurrence of mite species on strawberries, their abundance and the seasonal dynamics of the total number of phytoseiids.

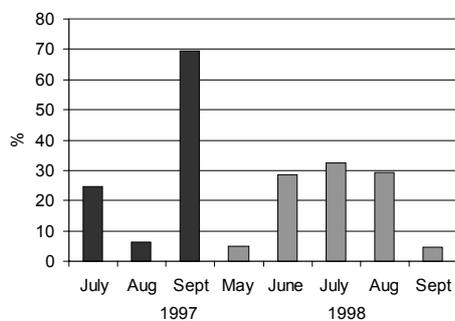


Fig. 1. Seasonal occurrence of phytoseiid mites (% ind./sample) on strawberries in 1997-1998.

Material and methods

Field observations were carried out in 1997-1998 in strawberry plantings of the Pure State Horticultural Experimental Station, located in the main strawberry production area in the northwestern part of Latvia. The total area of strawberry fields was 6 hectares.

A random sample of 100 plants was taken monthly from 3 or 4 fields (in 1997, from June to September and in 1998, from May to September). The samples consisted of 200 randomly selected (100 mature, fully opened and 100 young, unfolded) leaves, but only two leaves from any one plant. The leaves from each strawberry field were collected into plastic bags and were stored at 4°C until studied. The leaves were inspected using a stereoscopic microscope, and all phytoseiids were recorded. Totally, thirty samples of strawberry leaves were examined for Phytoseiidae mites and 187

specimens were found. Twenty-three samples (125 specimens) were examined and the species of phytoseiid mites were identified.

We define the abundance is number of individuals of a species as a percentage of total individuals (all species) in a sample, and domination is number of a species as a percentage of total individuals (all species) in all samples.

Results

The seasonal dynamics of phytoseiid mites on strawberries was studied (Figure 1). A total of 55 specimens (6.9 ind./sample) were found in samples in 1997, and 132 (6.0 ind./sample) in 1998. In 1997, the number of phytoseiids decreased in August. We found a correlation between the low number of phytoseiids and low amount of precipitation (1.5 mm) during August. A high number of phytoseiids was recorded in September and this was correlated with the relatively large amount of the rainfall (84.7 mm) and moderately warm weather (12-16°C) during the month. In 1998, the weather conditions were quite stable, with exceptions in May and September characterised by relatively low temperature and amount of precipitation (13.6°C, 29.4 mm in May and 12.7°C, 40.6 mm in September, respectively). The relative abundance of phytoseiids found from June to August 1998, peaked in July, but was least in May and September (Fig. 1).

Ten species of Phytoseiidae were observed among the phytophagous mite populations on strawberry. Two dominating species together constituted 52% of the totals in 1997-1998. These were *Neoseiulus aurescens* ATHIAS-HENRIOT (25.6%) and *Neoseiulus cucumeris* OUDEMANS (26.4%). These phytoseiids preserved their status as dominant species throughout the whole investigation period (Table 1). From the total number of species, 6 were recorded during the whole period of investigation (1997-98) and 4 species were recorded only in 1997 or 1998 (Table 1).

In 1997, we recorded 8 phytoseiid species, including 6 species in July, 3 species in August and 4 in September. The species *N. cucumeris* (33.3%), *Neoseiulus zwoelferi* DOSSE

Table 1. Seasonal occurrence of phytoseiid mite species in samples on strawberries in 1997-1998.

Species	1997			total	1998				total
	July	Aug.	Sept.		May	June	July	Aug.	
<i>Neoseiulus agrestis</i> KARG	2		11	13					
<i>Neoseiulus aurescens</i> ATHL.-HENR.	1		6	7		9	7	9	25
<i>Neoseiulus barkeri</i> HUGH.					1				1
<i>Neoseiulus bicaudus</i> WAIN.	1		2	3	1		1	1	3
<i>Neoseiulus cucumeris</i> OUDE.	8	10	7	25	4		3	1	8
<i>Neoseiulus herbarius</i> WAIN.	3			3			5	2	7
<i>Neoseiulus reductus</i> WAIN.		2		2					
<i>Neoseiulus zwoelferi</i> DOSSE	9			9		1			1
<i>Propriseiopsis okanagensis</i> CHANT								4	4
<i>Typhlodromips rademacheri</i> DOSSE		13		13		1			1

(37.5%), and *Neoseiulus herbarius* WAINSTEIN (12.5%) dominated in July. Later, in August, the status of dominant species was: *Typhlodromips rademacheri* DOSSE (52%) and *N. cucumeris* (40%). The species *Neoseiulus reductus* WAINSTEIN (8%) was found only during one month of the season. *Neoseiulus agrestis* KARG (42.3%), *N. cucumeris* (26.9%), and *N. aurescens* (23.1%) were dominant species in September. Overall in 1997, the dominating species were *N. cucumeris* (33.4%), *N. agrestis* (17.3%), and *T. rademacheri* (17.3%).

In 1998, we also recorded 8 phytoseiid mite species, including 3 species in May, 3 species in June, 4 species in July, and 5 species in August (Table 1). The species *N. cucumeris* (66.6%), *Neoseiulus barkeri* HUGHES (16.7%), and *Neoseiulus bicaudus* WAINSTEIN (16.7%) were recorded as dominant in May. The species *N. aurescens* (81.8%) was one of the most abundant in June. Three very dominant phytoseiid species, i.e. *N. aurescens* (43.7%), *N. herbarius* (31.2%), and *N. cucumeris* (18.8%) were recorded in July. The species *N. aurescens* (52.9%) and *Propriseiopsis okanagensis* CHANT (23.5%) were found to be dominant in August. Overall in 1998, the dominating species were *N. aurescens* (50%), *N. cucumeris* (16%), and *N. herbarius* (14%).

Discussion

This is the first report that concentrates on Phytoseiidae mites on strawberry in Latvia. The majority of the species of Phytoseiidae recorded in this study are widely distributed in strawberry plantations in Russia, Lithuania, in South Sweden, and other countries (BEGLJAROV, MALOV, 1976; STEEGHS et al., 1993; MESHKOV, 1996.). In total, 13 species of Phytoseiidae have been found on strawberries in Latvia. In our study we found 10 phytoseiid species on strawberries. Three species, i.e. *Euseius finlandicus* OUDEMANS, *Neoseiulus subsolidus* BEGLJAROV, and *Phytoseius salicis* WAINSTEIN ET ARUTJUNJAN have been reported by KUZNETSOV, PETROV (1984), but were not found in our study reported here.

The majority of the recorded phytoseiid mite species mentioned above may be looked at as potential predators of phytophagous mites on strawberry according to BEGLJAROV et al. (1980) and MESHKOV (1996). From the phytoseiid species found on strawberry, only five, i.e. *Neoseiulus agrestis*, *N. bicaudus*, *N. cucumeris*, *N. herbarius*, and *N. reductus* have been registered as potential predators of the strawberry mite *Tarsonemus pallidus*; six species, i.e. *N. agrestis*, *N. aurescens*, *N. bicaudus*, *N. cucumeris*, *N. herbarius*, and *N. reductus* have been registered as potential predators of spider mite *Tetranychus urticae*. Five of these, i.e. *N. agrestis*, *N. bicaudus*, *N. cucumeris*, *N. herbarius*, and *N. reductus* can feed on both phytophagous mites (BEGLJAROV et al., 1980; MESHKOV, 1996; MEESTERS et al., 1998). Two phytoseiids *Typhlodromips rademacheri* and *Propriseiopsis okanagensis* are not specialised predators of *T. pallidus* and *T. urticae* on strawberry according to MESHKOV (1996), and they do not feed or feed to an insignificant degree on these mites.

Thus only 8 phytoseiid species from the total number of recorded predatory mites are potential and specialised predators of phytophagous mites on strawberry. All species of Phytoseiidae mentioned in this article were recorded on strawberries in Latvia for the first time. The species *N. barkeri* is a new species to the fauna of Latvia.

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