

SPREAD OF THE STRAWBERRY MITE (*Phytonemus pallidus* ssp. *fragariae* ZIMM.) ON THIRTEEN STRAWBERRY CULTIVARS

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A B S T R A C T

From 1995 to 1997, a trial was done on thirteen strawberry cultivars at the Dąbrowice Research Station. Strawberry mites (*Phytonemus pallidus* ssp. *fragariae*) were counted three to five times a season and classified by active stage and eggs. Strawberry mites were most numerous in June and July. None of the cultivars tested were completely resistant to strawberry mites. However, when healthy plants were planted, the number of strawberry mites was low for three growing seasons, and no control was needed even though the population increased from year to year. The cultivars least infested were 'Redgauntlet', 'Dukat', 'Marmolada' and 'Senga Sengana', which was the standard cultivar. The cultivars most infested were 'Kama', 'Syriusz' and 'Gerida'. Cultivars moderately infested were 'Kent', 'Elsanta', 'Dana', 'Cortina', 'Real' and 'Honeoye'.

Key words: strawberry, strawberry mite, *Phytonemus pallidus* ssp. *fragariae*, strawberry cultivars infestation

INTRODUCTION

The strawberry mite (*Phytonemus pallidus* ssp. *fragariae*) was first observed in England in 1924 (Masse, 1931). Eight years later, it was observed in Poland on cyclamen (Ruszkowski, 1935). Now it is one of

the most common strawberry pests in many countries in Europe and North America (Alford, 1972; Łęska, 1964; Schaefers, 1963; Suski, 1958). The strawberry mite usually damages the youngest leaves of the strawberry plant. Its population peaks in July and August, when flower buds start

to form. Infestation decreases fruit size, yield and quality (Alford, 1972; 1976; Stenseth and Nordby, 1976). Some cultivars have been reported to be less susceptible to the strawberry mite, but no cultivar has been found which is completely resistant (Alford, 1972).

The aim of this study was to investigate the spread of the strawberry mite in a plantation over three growing seasons, and to evaluate the susceptibility of thirteen strawberry cultivars to the strawberry mite. 'Senga Sengana' was used as the standard strain because it is commonly grown in Poland.

MATERIAL AND METHODS

The trial was conducted from 1995 to 1997 at Dąbrowice Research Station near Skierniewice in central Poland. The experiment was set up in a block design of two rows of 50 plants each (24 m²) with four replicates. Sample of ten of the youngest leaves, still folded, were taken three to five times during the growing season for each replicate. The number of mites and eggs in the samples were counted with a binocular microscope. Before statistical analysis, results for each date were transformed according to the logarithmic function $y = \sqrt{x} + \sqrt{x+1}$, where x is the number of mites found in each sample of ten leaves. Significance of differences was evaluated with Duncan's t-test at P = 0.05. The numbers of mites and eggs per leaf of each of the thirteen cultivars are presented in Tables 1, 2, 3a and 3b. The

percentages of infested leaves are presented in Table 4.

RESULTS AND DISCUSSION

In September 1994, the year the strawberries were planted, only single mites were found on three of the cultivars: 'Syriusz', 'Elsanta' and 'Senga Sengana'.

During the first year of the experiment, strawberry mite populations were also very low, and single mites were found on ten cultivars (Tab. 1). In most cultivars, only a small percentage of leaves were infested (Tab. 4).

In the second year of the trial, strawberry mite was found on all thirteen cultivars (Tab. 2). In July, the number of mites was not very high except for 'Gerida', on which 2.7 mites per leaf were found. In August, mite populations significantly increased. The lowest numbers of mites were observed on 'Senga Sengana', 'Redgauntlet', 'Dukat' and 'Syriusz', with no more than 0.3 mites per leaf. The number of eggs on these cultivars was also very low. The highest numbers of mites were observed on 'Dana', with 3.7 mites per leaf, and 'Kent', with 2.5 mites per leaf. Medium numbers of mites were observed on 'Gerida', 'Elsanta', 'Kama', 'Honeoye', 'Cortina', 'Marmolada' and 'Real' with 0.4 – 1.4 mites per leaf. The lowest percentage of infested leaves was observed on 'Redgauntlet' (5.0%) and 'Senga Sengana' (6.3%). The highest percentages of infested

leaves were observed on 'Gerida' (33.8%) and 'Real' (30.0%) (Tab. 4).

Table 1. Number of strawberry mites and eggs per leaf on thirteen strawberry cultivars in 1995

Cultivar	Number per leaf	
	mites	eggs
1. 'Kama'	0.0	0.0
2. 'Kent'	0.0	0.03
3. 'Elsanta'	0.03	0.0
4. 'Dana'	0.0	0.0
5. 'Gerida'	0.1	0.2
6. 'Cortina'	2.4	0.0
7. 'Redgauntlet'	0.1	0.04
8. 'Marmolada'	1.2	0.8
9. 'Dukat'	0.05	0.0
10. 'Syriusz'	0.03	0.0
11. 'Senga Sengana'	0.08	0.05
12. 'Real'	0.0	0.0
13. 'Honeoye'	0.05	0.0

Table 2. Number of strawberry mites and eggs per leaf on thirteen strawberry cultivars in 1996

Cultivar	Number per leaf			
	mites		eggs	
	2 July	2 August	2 July	2 August
1. 'Kama'	0.2 b*	0.8 cdef	0.03 ab	0.8 bc
2. 'Kent'	0.4 b	2.5 fg	0.2 abc	3.0 de
3. 'Elsanta'	0.04 a	0.7 cde	0.07 abc	0.7 bc
4. 'Dana'	0.1 ab	3.7 g	0.09 abc	4.9 e
5. 'Gerida'	2.7 c	0.4 cd	1.6 d	0.8 bc
6. 'Cortina'	0.1 ab	1.0 def	0.3 bc	0.7 bc
7. 'Redgauntlet'	0.03 a	0.06 ab	0.0 a	0.04 a
8. 'Marmolada'	0.4 b	1.0 def	0.3 bc	1.3 cd
9. 'Dukat'	0.4 b	0.3 bc	0.3 bc	0.2 ab
10. 'Syriusz'	0.02 a	0.3 bc	0.05 ab	0.1 a
11. 'Senga Sengana'	0.1 ab	0.0 a	0.2 abc	0.03 a
12. 'Real'	0.2 b	1.4 efg	0.4 c	2.3 cde
13. 'Honeoye'	0.04 a	1.0 def	0.02 ab	0.9 cd

* Means followed by the same letter are not significantly different with Duncan's multiple range t-test at P = 0.05 level

Table 3a. Number of strawberry mites (active stages) per leaf on thirteen strawberry cultivars in 1997

Cultivar	Number of mites per leaf		
	5 June	24 June	15 July
1. 'Kama'	0.7 de*	6.2 c	30.2 g
2. 'Kent'	4.4 h	7.9 c	9.2 ef
3. 'Elsanta'	0.3 cd	0.8 b	5.5 d
4. 'Dana'	2.1 gh	5.8 c	7.2 de
5. 'Gerida'	1.2 efg	3.0 c	11.3 f
6. 'Cortina'	2.6 gh	7.1 c	6.3 de
7. 'Redgauntlet'	0.1 ab	0.2 a	0.1 a
8. 'Marmolada'	0.8 ef	3.2 c	3.3 c
9. 'Dukat'	0.2 bc	0.7 b	1.9 b
10. 'Syriusz'	1.8 fg	21.8 d	5.7 d
11. 'Senga Sengana'	0.02 a	0.3 ab	2.9 c
12. 'Real'	0.9 ef	8.8 cd	7.0 de
13. 'Honeoye'	0.7 de	3.7 c	6.3 de

*For explanation, see Table 2

Table 3b. Number of strawberry mite eggs per leaf on thirteen strawberry cultivars in 1997

Cultivar	Number of eggs per leaf		
	5 June	24 June	15 July
1. 'Kama'	0.7 cd*	7.2 cde	11.5 I
2. 'Kent'	6.3 f	9.3 cde	5.4 fg
3. 'Elsanta'	0.1 ab	0.5 ab	2.7 cd
4. 'Dana'	3.5 ef	3.9 c	6.9 fgh
5. 'Gerida'	1.3 de	2.8 c	11.0 hi
6. 'Cortina'	2.1 de	4.7 cd	2.9 de
7. 'Redgauntlet'	0.04 ab	0.1 a	0.04 a
8. 'Marmolada'	0.7 cd	5.2 cd	4.6 ef
9. 'Dukat'	0.2 bc	0.9 b	0.8 b
10. 'Syriusz'	2.1 de	17.1 e	4.5 ef
11. 'Senga Sengana'	0.0 a	0.2 a	1.8 c
12. 'Real'	0.7 cd	13.7 de	8.1 ghi
13. 'Honeoye'	1.6 de	3.6 c	9.9 hi

*For explanation, see Table 2

Table 4. Percentage of leaves infested by strawberry mites for thirteen strawberry cultivars from 1995 to 1997

Cultivar	Percentage of infested leaves		
	1995	1996	1997
1. 'Kama'	0.0	16.3	64.2
2. 'Kent'	2.5	27.5	82.5
3. 'Elsanta'	2.5	12.5	43.3
4. 'Dana'	0.0	26.3	54.2
5. 'Gerida'	10.0	33.8	66.7
6. 'Cortina'	10.0	26.3	75.0
7. 'Redgauntlet'	28.0	5.0	8.3
8. 'Marmolada'	28.0	28.8	45.8
9. 'Dukat'	5.0	12.5	25.0
10. 'Syriusz'	2.5	12.5	71.7
11. 'Senga Sengana'	1.0	6.3	18.3
12. 'Real'	0.0	30.0	65.0
13. 'Honeoye'	2.5	11.3	62.5

In the third year of the trial, mite populations were quite low in May, but increased in June and July, though the numbers of mites per leaf were still very low. The least mites were observed on 'Redgauntlet', with 0.2 mites per leaf, and 'Dukat', with 1.9 mites per leaf. 'Senga Sengana' had 2.9 mites per leaf. The highest numbers of mites were found on 'Kama' (30.2), 'Syriusz' (21.8) and 'Gerida' (11.3). Medium numbers of mites were found in the remaining cultivars (Tab. 3a). In the third year of the study, egg counts correlated with the numbers of mites observed (Tab. 3b). The lowest percentages of infested leaves were observed on 'Redgauntlet' (8.3%), 'Senga Sengana' (18.3%), and 'Dukat' (25.0%). The highest percentages of infested leaves were observed on 'Kent' (82.5%) and 'Syriusz' (71.7%, see Tab. 4).

To summarize, when healthy strawberry plants were planted in the spring, only single strawberry mites were found on only three of the cultivars tested at the end of that season. One year later, that is, in the first year of the trial, mites were found on ten cultivars, but populations were still very low and there was no significant effect on growth and yield. Alford (1972; 1976) found that infestation with up to four mites per leaf does reduce growth and yield the following year. In the second year of the trial, the numbers of mites again increased, but remained below four mites per leaf. The percentages of infested leaves ranged from 5.0% to 33.8%. In July of the third year of the trial, the percentage of infe-

cted leaves was over 50% on eight cultivars, and the number of mites per leaf was greater than four per leaf on nine cultivars. This indicated that chemical control should be applied to control the mite. In this trial, no pesticides were applied because the plantation was already three years old and at the end of its productive lifespan.

CONCLUSIONS

1. When healthy plants are planted, the population of strawberry mites increased over the next three growing seasons, but never to the point that chemical control was necessary.
2. Mite populations peaked in June or July. None of the cultivars tested were completely resistant to strawberry mites.
3. 'Senga Sengana', 'Redgauntlet', 'Dukat' and 'Marmolada' were least infested.
4. 'Kama', 'Syriusz' and 'Gerida' were most infested.
5. 'Kent', 'Elsanta', 'Dana', 'Cortina', 'Real' and 'Honeoye' were moderately infested with mites.

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WYSTĘPOWANIE ROZTOCZA TRUSKAWKOWCA
Phytonemus pallidus ssp. *fragariae* ZIMM. NA
TRZYNASTU ODMIANACH TRUSKAWKI

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S T R E S Z C Z E N I E

Doświadczenia nad występowaniem roztocza truskawkowca na 13 odmianach truskawek prowadzono w latach 1995-1997 w Sadzie Doświadczalnym w Dąbrowicach k. Skierniewic. Liczebność stadiów ruchomych i jaj roztocza określano 3-5 razy w sezonie wegetacji. Roztocz najliczniej występował w czerwcu i lipcu. Wśród obserwowanych odmian nie było żadnej całkowicie odpornej na roztocza. Plantację założono ze zdrowych roślin, wolnych od roztocza. Jego populacja wzrastała z każdym rokiem, była jednak na tyle niska, że przez 3 lata uprawy nie było potrzeby zwalczania tego szkodnika. Najslabiej zasiedlane były odmiany: 'Redgauntlet', 'Dukat', 'Marmolada' i 'Senga Sengana', którą przyjęto jako odmianę standardową. Najsilniej zasiedlane były odmiany: 'Kama', 'Syriusz' i 'Gerida'. Odmiany średnio zasiedlane to: 'Kent', 'Elsanta', 'Dana', 'Cortina', 'Real' i 'Honeoye'.

Słowa kluczowe: truskawka, roztocz truskawkowiec *Phytonemus pallidus* ssp. *fragariae*, zasiedlanie odmian