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PRELIMINARY STUDIES ON THE RELEASE OF THE PREDATORY MITE *PHYTOSEIULUS MACROPILIS* (BANKS) ON STRAWBERRY PLANTS TO CONTROL *TETRANYCHUS URTICAE* KOCH (ACARI: TETRANYCHIDAE-PHYTOSEIIDAE)

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Abstract

In a field study, the predatory mite, *Phytoseiulus macropilis* (Banks) was released two, four and six times at a rate of 10 individuals/bit to control the two-spotted spider mite, *Tetranychus urticae* Koch in about 175 m^2 of a commercial strawberry field at El-Qalyobia Governorate. The spider mite population was reduced at all numbers of predator release; the decrease had a positive relationship with number of releases. The mite reduction was slightly few after the first release but increased gradually after every predator release. It averaged 41, 48 and 35% in the first post-count, but reached 92, 95 and 97% in the last inspection in treatments that received two, four and six releases, respectively. It could be advisable to release this predator species when *T.urticae* population is at a low density to allow a suitable chance for the predator to play its role successfully. The associated weeds (mainly blackberry) seemed to be important as a good shelter for the predator, from which it could disperse to adjacent plants or next crop.

INTRODUCTION

Strawberry is considered one of the important fruits for local market and exportation. Its cultivated area reached about 470,000 feddans; most of which are located at Qalyobia, Ismailia and Sharkia Governorates. The national income from exporting strawberry in the coming years is expected to be increased and this requires to obtain healthy clean fruits without chemical pesticide treatments. The two-spotted spider mite is known to be its most important pest causing severe damage to plants and fruit yields. Although in Egypt, growers still depend on chemical control of this noxious pest, yet in some other countries specially U.S.A. some phytoseiid mite predators are successfully used for its biocontrol; *Phytoseiulus persimilis* Athias-Henriot (Oatman & McMurtry, 1966; Oatman *et al.*, 1967, 1968 & 1977; Decou, 1994); *Amblyseius californicus* (McGregor); and *Typhlodromus occidentalis* Nesbitt (Oatman *et al.*, 1977).

Thus, the present work was conducted to determine the effect of releasing the

predatory mite, *P.macropilis* (Banks) as a biological control agent of the two-spotted spider mite, *Tetranychus urticae* Koch in a strawberry fields.

MATERIALS AND METHODS

An area of about 175 m^2 cultivated with commercial strawberry (Taftis variety) at El-Kanater Experiment Station (Qalyobia Governorate) was used for this experiment and left without any pesticide treatments. Twelve strawberry lines each with fifteen bits were chosen and each line was separated from the other by three ones to prevent connection between release plants. The twelve chosen lines were divided into four treatments, each with three lines (considered as replicates). The predatory mite, *P.macropilis* which was reared on the two-spotted spider mite, *T.urticae* in a green-house was collected by an aspirator pump and kept in 0.5 x 1.5 cm gelatin capsules at rates of 10 predator individuals/capsule. Release of the predator started on January 12, 1998 at a rate of one capsule/bit. The first treatment received two biweekly releases, while the second and third treatments received four and six biweekly ones, respectively.

The predator individuals were released in the field by opening the gelatin capsules and pinning the separated parts on the strawberry leaflets. Randomized samples of 30 leaflets/replicate were taken just before every release, where the first sample was considered as the pre-count and the second one as the first post-count and so on with the subsequent samples as post-counts. Moving stages of both the pest and the predator were counted. The statistical equation of Henderson and Tilton (1955) was applied to calculate the reduction in the two-spotted spider mite populations.

RESULTS AND DISCUSSION

Percentage of infestation of the two-spotted spider mite, *T.urticae* just before the first release of the predator mite, *P.macropilis* ranged between 91 and 97%, with mite population of 270-404 moving stages/30 leaflets on the release plants. These values amounted 94% leaflets infestation and 313 moving stages/replicate in the control, Table 1. After the first predator, release on January 26, 1998, population of the two-spotted spider mite slightly increased on both release and non-release plants. High mite populaions were observed after the second and third predator releases on February 8th and 23rd, with a comparatively high population on untreated plants. The initial high density of *T.urticae* before releasing the predator individuals might be the reason

of this high population. These findings agree with those obtained by Heikal and Mowafi (1998) when released the same predator species on bean plants highly infested with the two-spotted spider mite. Then the population of the two-spotted spider mite decreased noticeably on the release and control plants from March 9th until the end of experiment. There was a problem in water supply during the last three inspections, so that the plants were irregularly watered where suffering appearance of water was observed on the strawberry foliage. This problem might have negatively affected the mite population.

Percentages of infested leaflets with the two-spotted spider mite increased after the second and third predator release to reach 100% in both release lines and the control. Then, infestation gradually declined in treated plants to reach 17-27% on April 9th, while it continued at the level 100% in the control.

Reductions in the two-spotted spider mite population following different predator releases were also estimated. Data in Table 1 indicated that all the predator release rates affected *T.urticae* population. After the first release in January 26th, 1998, reduction of the two-spotted spider mite populations was 41, 48 and 35% then increased after the second release to reach 60, 66 and 63% in treatments A, B and C, respectively. It appeared that the predator individuals were taking a comparatively too long time to achieve control. These findings agreed with those obtained by Decou (1994) who advised growers to have patience to allow the predators to affect the spider mite population more slowly than chemicals. Also, reduction increase continued on February 23rd, 1998 to be 73% in treatment A (which received two releases), 77% in treatments B and C (Which received three releases). By March 23th, these values were 70% in treatments A (which received two releases) and 78% in B (which received five releases). In the last inspection on April 9th, reduction percentage became 92, 95 and 97% in treatments A, B and C (which received two, four and six releases, respectively). Similar trend was obtained by Heikal and Mowafi (1998).

Population of *P.macropilis* were 21, 17 and 32/replicate after the first release in treatments A, B and C, respectively. The highest predator increase was observed after the third release to be 255, 465 and 550 predators/replicate in aforementioned treatments, respectively. The presence of sufficient prey individuals seemed to be the reason of this predator increase as reported by Prasad (1967). Population of the predator then gradually decreased in the following inspections with the decline of *T.urticae* population and beginning of the native predators appearance. Also, the irregular watering of strawberry plants in this period might have adversely affected the predator

Table 1. Release of *Phytosiulus macropilis* on strawberry plants for controlling *Tetranychus urticae*.

Sampling date	Treatments	No *T. urticae*/ replicate	Leaflets infestation %	Reduction of *T.urticae* %	No. *P.macropilis*/ replicate
Jan. 12, 1998*	A (2 releases)	270	97	-	-
	B (4 releases)	404	94	-	-
	C (6 releases)	354	91	-	-
	D (no releases)	313	94	-	-
Jan. 26, 1998**	A (2 releases)	277	97	41	21
	B (4 releases)	363	97	48	17
	C (6 releases)	400	97	35	32
	D (no releases)	545	100	-	0
Feb. 8, 1998	A (2 releases)	935	100	60	101
	B (4 releases)	1212	100	66	52
	C (6 releases)	1128	100	63	93
	D (no releases)	2731	100	-	0
Feb. 23, 1998	A (2 releases)	914	100	73	255
	B (4 releases)	1132	100	77	465
	C (6 releases)	1029	100	77	550
	D (no releases)	3878	100	-	0
Mar. 9, 1998	A (2 releases)	221	73	63	89
	B (4 releases)	239	80	73	94
	C (6 releases)	191	50	76	117
	D (no releases)	698	100	-	8
Mar. 23, 1998	A (2 releases)	52	43	70	9
	B (4 releases)	57	50	78	14
	C (6 releases)	33	20	86	14
	D (no releases)	204	83	-	6
Apr. 9, 1998	A (2 releases)	31	27	92	5
	B (4 releases)	27	20	95	5
	C (6 releases)	14	17	97	5
	D (no releases)	438	100	-	6

* Date of first predator release and represents pre-count.

** Date of second predator release and represents first post-count.

population.

Examining associated weeds (mainly black-berry) indicated that it harboured a high population of *P.macropilis* from which it could disperse to the adjacent plants or the next crop. This coincides with the findings of Heikal and Mowafi (1998), concerning the same predator species when released to control *T.urticae* on bean plants.

However, the present results proved that this experiment is a preliminary one that needs other experiments to assure results of the possibility of using the predatory mite, *P.macropilis* as a biological control agent against the two-spotted spider mite, *T.urticae* on commercial strawberries, specially during late winter and early spring months. It could be advisable to release the predator individuals when *T.urticae* population is at a low density to offer a suitable chance for the predator to play its role successfully.

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دراسات أوليه على اطلاق الأكاروس المفترس *Phytoseiulus macropilis* على نباتات الفراولة كوسيلة لمكافحة اكاروس العنكبوت الأحمر *Tetranychus urticae*

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فى دراسة حقلية تم إطلاق المفترس الأكاروسى *Phytoseiulus macropilis* (Banks) بمعدل مرتين أو أربعة أو ستة إطلاقات لمكافحة أكاروس العنكبوت الأحمر *Tetranychus urticae* Koch فى مساحة حوالى ١٧٥ م ٢ من حقل منزرع بنباتات الفراولة بمحافظة القليوبية .انخفض تعداد أكاروس العنبكوت الأحمر على نباتات الإطلاق فى مستويات الاطلاق المختلفة وتناسب معدل الانخفاض تناسبا طرديا مع عدد الإطلاقات . وكان النقض فى تعداد أكاروس العنكبوت الأحمر أقل نوعا ما بعد الاطلاقة الأولى ، لكن ازداد النقص تدريجيا بعد كل اطلاقة ، حيث كان ٤١ ، ٤٨ ، ٣٥ ٪فى الفحصة الأولى بعد الاطلاق ليصل إلى ٩٢ ، ٩٥ ، ٩٧ ٪ فى الفحصة الأخيرة فى المعاملات أ (والتى تم بها اطلاقتين) ، والمعاملة ب (والتى تم بها ٤ إطلاقات) ، والمعاملة جـ (والتى تم بها ٦ اطلاقات) على التوالى . ويمكن النصح بإطلاق أفراد المفترس عندما تكون الكثافة العددية للعنكبوت الأحمر عند مستوى منخفض لإتاحة الفرصة للمفترس أن يؤدى دوره بنجاح . وظهر أن الحشائش المصاحبة للفروالة (أساسا العليق) كانت هامة كمأوى للمفترس حيث يمكن لأفراد المفترس أن تنتشر للنباتات المجاورة أو المحصول التالى .