

**A PRELIMINARY STUDY ON RELEASING *PHYTOSEIULUS*  
*MACROPILIS* (BANKS) IN CANTALOUPE FIELD TO CONTROL  
*TETRANYCHUS URTICAE* KOCH  
(ACARI : PHYTOSEIIDAE & TETRANYCHIDAE)**

**HEIKAL, I.H., M.M. FAWZY AND K.E.M. EL-SAYED**

*Plant Protection Research Institute, Agricultural Research Centre, Dokki-Giza, Egypt.*

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**Abstract**

Studies were conducted during two successive seasons in cantaloupe field, at Ismailia Governorate, to control the two-spotted spider mite, *Tetranychus urticae* Koch by releasing the predatory mite, *Phytoseiulus macropilis* (Banks) using gelatin capsules or bean leaflets harbouring the predator individuals. The pest populations were generally low or moderate at the time of the predator releases then decreased and continued in low densities till last inspection. Obtained results indicated the possibility to control the two-spotted spider mite, *T. urticae* in cantaloupe field in early spring season by releasing the predatory mite, *P. macropilis* at the rate of about 5 individuals/bit using gelatin capsules or bean leaflets harbouring the predator individuals. One predator release also seemed to be effective for phytophagous mite control.

**INTRODUCTION**

Cantaloupe is considered one of the important vegetable crops in Egypt for local market and exportation. Its cultivated area reached in 2002 season of about 61000 feddan, mainly in summer season; most of which were cultivated in Nobarria district, Behera, Alexandria and Ismailia Governorates. It was noticed that area of organic agriculture in Egypt is expected to be increased and then requires not using chemical pesticides.

The two-spotted spider mite, *Tetranychus urticae* Koch is one of cucurbitaceae important pests, which includes cantaloupe where recommendation of certain acaricides are still the only method for controlling this serious pest, nevertheless the predatory mite *Phytoseiulus macropilis* (Banks) was released by several authors to

control this pest on certain plants (Hamlen, 1978 on some ornamental plants; Hamlen & Poole; 1980 on *Diffenbachia*; Price, 1981 on chrysanthemum and carnation; Watanabe *et al.*, 1994 on cucumber and strawberry; Ramos & Rodriguez, 1995 on banana; Heikal & Mowafi, 1998 on beans; Heikal & Fawzy, 2002 on cucumber; Heikal *et al.*, 2003 on strawberry). Successful trials were also undertaken by several authors for mass rearing and producing the predatory mite, *P. macropilis* in Egypt (Heikal & Ali, 1996; Heikal, 2001 and Heikal & Ibrahim, 2002), and this encouraged to increase its application as a biological control agent against spider mites on different plants.

The present study is a preliminary trial to control the two-spotted spider mite, *T. urticae* on cantaloupe plants in open field during two successive years without using chemicals.

## MATERIALS AND METHODS

**Predator's source and collection :** Individuals of the predatory mite, *P. macropilis* were obtained from its mass rearing on spider mites on bean plants grown on a mixture of peatmoss and vermiculite as described by Heikal and Ali (1996). The predator individuals were collected by an aspirator pump and kept in 0.5 x 1.5 cm gelatin capsules. Bean leaflets harbouring the predators individuals were also collected and kept in paper bags and transferred to the field using an ice box.

**Predator's release :** An open field of about two kirats (350 m<sup>2</sup>) cultivated with cantaloupe plants variety "Galia" was chosen at Ismailia Governorate and left without pesticide treatments.

In the first year of study (2002 Season), fifteen cantaloupe lines were selected and divided into five treatments, three lines each, which considered as replicates. The predator individuals were released on March 11 in the first and third treatments at the rate of 5 individuals/bit, while in the second and fourth treatments 10 predator individuals/bit were applied. Second predator release was also applied with the same rates on the third and fourth treatments after two weeks, while fifth treatment was left without any predator release as a control.

In the second year of study (2003 season), the previous treatments were applied. Additional nine cantaloupe lines were also selected for releasing the predator individuals using bean leaflets harbouring the predator at the rate of about 5 individuals/bit (on the first three lines) or about 10 individuals/bit (on the second three lines), while the rest lines were left free as a check.

Randomized samples of 10 cantaloupe leaves/ replicate were taken just before the predator release as pre-count. Then several post-counts were then taken at weekly intervals in the first two experiments and biweekly intervals in the last experiment. Moving stages of *T. urticae* and *P. macropilis* were counted in the field with the aid of hand lens (20X). The equation of Henderson and Tilton (1955) was applied to calculate the percentage reduction in spider mite populations.

## RESULTS AND DISCUSSION

In the first year of study, infestations with the two-spotted spider mite, *T. urticae* was generally low as its populations at the pre-count on March 11 (the time of the first release), were 0.6, 0.8, 0.6, 1.0 and 0.3 moving stages/leaf in the treatments A, B, C, D and E, respectively, Table, 1. Mite populations on the release plants slightly increased during the different post-counts until the last inspection in April 16, to reach 6.8, 6.8, 6.6 and 6.4 moving stages/leaf in treatments "A" (one release, 5 predator individuals/leaf), "B" (one release, 10 predator individuals/leaf), "C" (two releases, 5 predator individuals/leaf) and "D" (two releases, 10 predator individuals/leaf), respectively. Comparatively high increases in the pest population were found on the non-released plants to reach its highest level in the last inspection (25.1 moving stages/leaf). Subsequent reductions of the pest population were obtained during the different post-counts. It attained 81, 77, 81 and 82 % in treatments A, B, C and D, respectively in the first post-count, while in the last inspection increased to be 86, 90, 87 and 92 % in the same previous treatments, respectively, Table 1.

In the second year of study, when the predator individuals were released by using gelatin capsules, the pest populations were also low at the pre-count and then it generally decreased after the first predator release and continued at very low

densities till the last inspection on April the 2<sup>nd</sup> to reach 0.4, 0.2, 0.3 and 0.1 in treatments A, B, C and D, respectively. On the non-release plants mite population increased slowly to reach its highest level (9.2 moving stages/leaf) in the last inspection, Table, 2. Population of the pest was rapidly reduced on the release plants which ranged between 53 to 95 % in the second inspection (about three weeks after the predator release), then attained more then 90 % in all treatments in the last inspection. Results might be attributed to the lowest pest densities at the time of the first release.

#### DISCUSSION

The results of this study show that the release of *Phytosewlas macropilis* was effective in reducing the population of *Tetranychus bimaculatus* on citrus plants. The population of the pest was rapidly reduced on the release plants which ranged between 53 to 95 % in the second inspection (about three weeks after the predator release), then attained more than 90 % in all treatments in the last inspection. Results might be attributed to the lowest pest densities at the time of the first release. The population of the pest was rapidly reduced on the release plants which ranged between 53 to 95 % in the second inspection (about three weeks after the predator release), then attained more than 90 % in all treatments in the last inspection. Results might be attributed to the lowest pest densities at the time of the first release.

Table 1. Effect of *P. macropilis* release (using gelatin capsules) in a cantaloupe field to control *T. urticae* during 2002 season.

Sampling date	Treatments	No. mites / leaf		Reduction of <i>T. urticae</i> %
		<i>T. urticae</i>	<i>P. macrop- ilis</i>	
Mar. 11, 2002 (pre-count, date of 1 <sup>st</sup> release)	A) One release, 5 predators/bit	0.6	-	-
	B) One release, 10 predators/bit	0.8	-	-
	C) Two releases, 5 predators/bit	0.6	-	-
	D) Two releases, 10 predators/bit	1.0	-	-
	E) No release (check)	0.3	-	-
Mar. 19 (1 <sup>st</sup> post-count)	A) One release, 5 predators/bit	0.5	0.1	81
	B) One release, 10 predators/bit	0.8	0.2	77
	C) Two releases, 5 predators/bit	0.5	0.1	81
	D) Two releases, 10 predators/bit	0.8	0.1	82
	E) No release (check)	1.3	0.0	-
Mar. 25 (Time of 2 <sup>nd</sup> release)	A) One release, 5 predators/bit	1.2	0.3	79
	B) One release, 10 predators/bit	0.7	0.0	91
	C) Two releases, 5 predators/bit	1.2	0.2	79
	D) Two releases, 10 predators/bit	0.8	0.0	91
	E) No release (check)	2.8	0.0	-
April 2	A) One release, 5 predators/bit	2.4	0.0	87
	B) One release, 10 predators/bit	1.9	0.1	92
	C) Two releases, 5 predators/bit	2.6	0.0	85
	D) Two releases, 10 predators/bit	1.9	0.0	94
	E) No release (check)	8.9	0.0	-
April 9	A) One release, 5 predators/bit	2.8	0.2	92
	B) One release, 10 predators/bit	1.7	1.1	96
	C) Two releases, 5 predators/bit	2.4	0.4	93
	D) Two releases, 10 predators/bit	2.1	0.2	97
	E) No release (check)	18.1	0.0	-
April 16	A) One release, 5 predators/bit	6.8	0.1	86
	B) One release, 10 predators/bit	6.8	0.1	90
	C) Two releases, 5 predators/bit	6.6	0.3	87
	D) Two releases, 10 predators/bit	6.4	0.9	92
	E) No release (check)	25.1	0.0	-

Table 2. Effect of *P. macropilis* release (using gelatin capsules) in a cantaloupe field to control *T. urticae* during 2003 season.

Sampling date	Treatments	No. mites / leaf		Reduction of <i>T. urticae</i> %
		<i>T. urticae</i>	<i>P. macropilis</i>	
Feb. 10, 2003 (pre-count, date of 1st release)	A) One release, 5 predators/bit	1.2	-	-
	B) One release, 10 predators/bit	2.9	-	-
	C) Two releases, 5 predators/bit	2.9	-	-
	D) Two releases, 10 predators/bit	3.2	-	-
	E) No release (check)	1.8	-	-
Feb. 25 (1st post-count), time of second release	A) One release, 5 predators/bit	1.8	0.0	52
	B) One release, 10 predators/bit	1.2	0.2	87
	C) Two releases, 5 predators/bit	2.1	0.0	77
	D) Two releases, 10 predators/bit	1.1	0.3	89
	E) No release (check)	5.6	0.0	-
Mar. 4	A) One release, 5 predators/bit	1.1	0.0	53
	B) One release, 10 predators/bit	0.4	0.0	93
	C) Two releases, 5 predators/bit	0.4	0.0	93
	D) Two releases, 10 predators/bit	0.3	0.1	95
	E) No release (check)	3.5	0.0	-
March 11	A) One release, 5 predators/bit	0.5	0.0	85
	B) One release, 10 predators/bit	0.3	0.1	96
	C) Two releases, 5 predators/bit	0.2	0.2	98
	D) Two releases, 10 predators/bit	0.2	0.1	98
	E) No release (check)	5.1	0.0	-
March 18	A) One release, 5 predators/bit	0.4	0.0	91
	B) One release, 10 predators/bit	0.3	0.0	97
	C) Two releases, 5 predators/bit	0.3	0.0	97
	D) Two releases, 10 predators/bit	0.2	0.1	98
	E) No release (check)	6.8	0.0	-
March 25	A) One release, 5 predators/bit	1.3	0.1	73
	B) One release, 10 predators/bit	1.1	0.0	91
	C) Two releases, 5 predators/bit	1.1	0.0	91
	D) Two releases, 10 predators/bit	0.5	0.0	96
	E) No release (check)	7.2	0.0	-
April 2	A) One release, 5 predators/bit	0.4	-	93
	B) One release, 10 predators/bit	0.2	-	99
	C) Two releases, 5 predators/bit	0.3	-	98
	D) Two releases, 10 predators/bit	0.1	-	99
	E) No release (check)	9.2	-	-

Results agreed with that of Hamlen and Poole (1980) who indicated that population of *T. urticae* infesting *Diffenbachia maculatus* in the greenhouse in Florida was significantly reduced two weeks of the release of the predaceous mite, *P. macropilis*, and that of Heikal and Mowafi (1998) who obtained satisfied results on bean plants when releasing the same predatory mite on low population density of *T. urticae* which gave the predator a suitable chance to play its role successfully.

Releasing the predator using bean leaflets harbouring the predator individuals, relatively high population densities of *T. urticae* were noticed in the pre-count, averaging 8.7, 7.7 and 6.1 moving stages/leaf in treatments A, B and C, respectively, Table, 3. The pest densities also decreased in the subsequent post-counts in the two releasing rates, to reach its lowest level in the last inspection on May 18<sup>th</sup>, where 1.7 and 0.7 moving stages/leaf were obtained on treatment "A" (5 predator individuals/bit) and "B" (10 predator individuals/bit), respectively. On the opposite, the pest densities on the non-release plants increased gradually to attain their highest level in the last inspection (16.2 moving stages/leaf). Compared with that of pre-count (6.1 individuals/bit). Similar trends of rapid reductions of *T. urticae* population were observed at the different post-counts.

The predator individuals were generally low on the release plants in the previous three experiments probably due to the low prey densities at the time of the first release.

The foregoing results indicated the possibility of controlling the two-spotted spider mite, *T. urticae* in cantaloupe fields by releasing the predatory mite, *P. macropilis*. A single release with the predator individuals at the rate of about 5 predators/leaf (using gelatin capsules or bean leaflets harbouring the predator individuals) could be effectively applied when pest population is at its low density. Additional studies should be carried out to support the previous results.

Table 3. Effect of *P. macropilis* release (using bean leaflets) in a cantaloupe field to control *T. urticae* during 2003 season.

Sampling date	Treatments	No. mites / leaf		Reduction of <i>T. urticae</i> %
		<i>T. urticae</i>	<i>P. macropilis</i>	
Mar. 22, 2003 (pre-count, time of release)	A) 5 individuals/bit	8.4	-	-
	B) 10 individuals/bit	7.7	-	-
	C) No release (control)	6.1	-	-
April 5 (1 <sup>st</sup> post-count)	A) 5 individuals/bit	3.4	0.7	75
	B) 10 individuals/bit	1.9	1.2	85
	C) No release (control)	9.9	0.0	-
April 12 (2 <sup>nd</sup> post-count)	A) 5 individuals/bit	1.0	0.1	92
	B) 10 individuals/bit	0.7	0.3	94
	C) No release (control)	9.1	0.0	-
April 19	A) 5 individuals/bit	0.7	0.2	96
	B) 10 individuals/bit	0.7	0.2	96
	C) No release (control)	12.8	0.0	-
May 4	A) 5 individuals/bit	1.0	0.1	95
	B) 10 individuals/bit	0.9	0.0	95
	C) No release (control)	13.7	0.0	-
May 18	A) 5 individuals/bit	1.7	0.0	92
	B) 10 individuals/bit	0.7	0.0	97
	C) No release (control)	16.2	0.0	-



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دراسة أولية لإطلاق المفترس الأكاروسى *Phytoseiulus macropilis*  
فى حقل كانتالوب لمكافحة العنكبوت الأحمر *Tetranychus urticae*

إبراهيم حسن هيكل، مجدى محمد حسين فوزى، كرم السيد محمد السيد

معهد بحوث وقاية النباتات، مركز البحوث الزراعية، الدقى - الجيزة، مصر.

أجريت دراسة لمدة موسمين متتاليين على نباتات الكنتالوب فى حقول مفتوحة بمحافظة الإسماعيلية لمكافحة العنكبوت الأحمر *Tetranychus urticae* Koch بإطلاق المفترس الأكاروسى *Phytoseiulus macropilis* (Banks) باستخدام كبسولات جيلاتينية أو وريقات فاصوليا تأوى أعداداً معروفة من أفراد المفترس. وكان تعداد الآفة بصفة عامة منخفضاً أو متوسطاً أثناء إطلاق المفترس، وقد لوحظ إنخفاض تعداد الآفة بعد إطلاق المفترس وإستمر الإنخفاض حتى الفحصات الأخيرة. وقد دلت النتائج المتحصل عليها على إمكانية مكافحة العنكبوت الأحمر *T. urticae* على نباتات الكنتالوب فى بداية عروة الربيع بإطلاق المفترس الأكاروسى *P. macropilis* بمعدل حوالى خمسة أفراد للجورة باستخدام كبسولات الجيلاتين أو وريقات الفاصوليا التى تأوى أفراد المفترس. كما ظهر أن إطلاقاً واحدة بأفراد المفترس كانت كافية لمكافحة هذه الآفة الأكاروسية.