BIOLOGICAL CONTROL OF *TETRANYCHUS URTICAE* KOCH USING THE PHYTOSEIID MITE, *PHYTOSEUILUS PERSIMILIS* A.-H. ON APPLE SEEDLINGS.

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Abstract

The predator mite *P. persimilis* A.- H. was released in April 5, 2003 and July 24, 2003 at levels (10, 20 and 30 adults per apple seedling). At level of infestation with two-spotted spider mite *T. urticae* with averaged 3.0, 3.5 and 3.3 per leaf, after seven months from first and second release the reduction percent of the mite pest averaged 61.95, 80.68 and 88.63%, respectively.

INTRODUCTION

Tetranychus urticae Koch was the first pest mite on apple trees, which cause a lot of damage resulting reduction in Plant growth and production (Abdel-Wahed, 2003).

Due to the excessive use of acaricides, some problem were appeared especially reducing the beneficial species and polluting the ecosystem so that, it seems necessary to look forward to the natural enemies as one of the alternative methods in controlling different agricultural pests.

The predator mite, *P. persimilis* A.- H. successfully used in controlling *T. urticae.* Several authors controlled the two-spotted spider mite *T. urticae* on certain plants which released many predators mite species; Nawar (1989), Chermiti (1991), Kilincer, *et al.* (1992),El-Sayed,(1994), El-Halawany, *et al.* (2000), Heikal *et al.* (2000), Abdel-Samad *et al.* (2001), Ebrahim *et al.* (2001), Heikal *et al.* (2000), Abdel-Samad (2002), Abdel-Wahed (2003), Heikal *et al.* (2004), Fawzy *et al.* (2005), Gamal *et al.* (2005) and El-Ghobashy (2006)).

This study aim to confirm the role of the predatory mite *P. persimilis* A.- H. in controlling the mite pest *T. urticae* on apple seedlings.

MATERIAL AND METHODS

Design of experiment

These experiment was carried out using eighty seedling divided into four groups each one of twenty seedlings as four treatments three levels of release 10, 20 and 30 and control.

Mass rearing of predator

Bean plant *Phaseoulus vulgaris* L. used as host plant. Bean seeds were planted in plastic trays (40x40x12cm) with the rate of 20 seeds per trays. These trays were used in rearing the predatory mite, which used as nucleation of the predator for releasing in the green house of mass rearing. Small greenhouse divided to three isolated parts: a) rearing of clean bean plants; b) clean plants at the stage of 12 leaves were artificially infested with *T. urticae*; c) one week later, five females of predatory mite *P. persimilis* transferred to each bean plant; there were followed up the relation between the predator and the prey inside the greenhouse, when it need for prey, it was supported with more prey. About one month when the rate of predator increased to reach 15-25 individuals/ leaflet. The predatory mite was picked in small paper bags with few prey on bean leaves and transferred inside ice box. El-Sayed (1994).

Predators release:

When the number of predator increased for suitable number to collect and release. The leave of the beans peering the predator and small number of prey were picked in paper bag and transmitted to the seedling in ice box and the predator release on the seedling with three levels 10, 20 and 30 per seedling. Random samples 30 leaflet were collected every ten days from each treatments and inspected aid stereomicroscope. First sample was collected just before release and the next were collected every 10 days. The number of prey and predator were recorded to the end of experiment and the reduction percent was calculated according to equation of Henderson and Tilton (1955).

RESULTS AND DISCUSSION

First level of release

Data in table (1) cleared that, the predatory mite, *P. persimilis* was released in April 5, 2003 at levels 10, 20, 30, predators per apple seedlings (with age of two years old) at level of infestation with *T. urticae* reached an average about 3 individuals per leaf of apple seedlings. The population of the two-spotted spider mite, *T. urticae* was generally moderate in the pre-count. It was 90 and 110 mite individuals/ 30 leaves in the first level of release (10 predator/ seedlings) and control treatment, respectively. After releasing of the predator the reduction percent of the mite pest increased gradually reaching it's highest reduction percent 82.6% at average temperature 26.7ºC and 55.8%

R.H., where the number of pest in control treatment recorded 353 individual/ 30 leave but in treated seedling reached 50 individual/ 30 leaves.

The reduction percent decreased to 38.3% at July 24th and the number of the mite pest reached to 255 individuals/ 30 leaves in treated seedling, Thus it seemed a necessary for making second release then the reduction percent fluctuated from 47.5 to 59.4% in Nov.1st recording the highest percent of reduction in Oct. 2nd reaching 70.6 % at average temperature 25.5ºC and 67.3% R. H. Finally at level of release 10 predators per seedling the reduction percent about 61.95%.

Second level of release

Also, obtained results in table (1) indicated that, when the predatory mite *P. persimilis* was released at level 20 predators/ seedling the pre-count population density of *T. urticae* were 105 and 110 individuals/ 30 leaves of seedlings for treatment and control, respectively.

The reduction percent of the mite pest increased gradually reaching it's highest percentage 92.1% at average temperature 26.53ºC and 68.8% in June 14th, when the number of mite pest in control 387 individuals/ 30 leaves while in treated seedling reached 53 individuals/ 30 leaves.

Table (1) Biological control of *Tetranychus urticae* Koch using the predatory mite *Phytoseiulus persimilis* A.-H. on apple seedlings in spring 2003.

Sampling date	Number and redaction % of motile stages of *T. urticae*/30 leaves after release of the predatory mite.									control	Temp. °C	R.H %
	10 predators/ seedling		No. of pred.	20 predators/ seedling		No. of pred.	30 predators / seedling		No. of pred.			
	No.	R.%		No.	R.%		No.	R.%				
Pre-count before first release April 5th	90	-	-	105	-	-	99	-	-	110	20.4	60.4
Apr.15th	81	25	3	92	26.9	8	61	48.6	10	132	20.19	64.5
Apr.25th	65	56.8	13	77	56.2	9	43	74	17	184	21.3	56.3
May 5th	60	66.9	18	52	75.5	14	30	84.9	32	222	21.17	60.3
May 15th	51	77.2	26	43	83.5	29	22	91	40	274	24.76	56.95
May 25th	42	82.5	35	37	86.8	38	15	94.3	47	295	26.2	54.2
Jun.4th	50	82.6	36	28	91.6	40	9	97.2	52	353	26.7	55.8
Jun.14th	88	72	27	29	92.1	53	17	95.1	64	387	26.53	56.8
Jun.24th	102	70.3	15	57	85.8	42	32	91.5	50	420	27.8	57.3
Jul.4th	163	58.2	8	94	79.3	30	58	86.4	39	477	28.1	59.35
Jul.14th	197	51	7	125	73.5	19	88	80.2	22	495	26.95	64.6
Second release July 24th	255	38.3	2	160	66.8	9	96	78.8	18	505	27.7	68.3
Aug.3rd	231	47.5	7	132	74.3	5	72	85.13	12	538	28.0	66.5
Aug.13th	200	53.8	9	106	79	10	51	89.28	16	529	28.5	70.5
Aug.23rd	172	59.8	11	88	82.4	15	36	92.4	22	523	28.9	65.6
Sep.2nd	153	61.4	15	61	86.8	18	20	95.4	19	484	29.2	66.2
Sep.12th	126	66.5	19	32	92.7	26	18	95.6	23	460	27.1	66.0
Sep.22nd	110	70.12	18	30	93	28	11	97.3	27	450	27.2	64.9
Oct.2nd	104	70.6	17	29	92.9	36	17	95.6	30	432	25.5	67.3
Oct. 12th	100	70.5	16	25	93.7	27	8	97.8	14	414	24.87	67.1
Oct. 22nd	126	60.6	8	33	91.1	18	18	94.9	12	391	26.3	66.1
Nov. 1st	129	59.4	8	35	90.5	13	14	95.9	7	388	25.1	65.0
Mean	124.05	61.95	15.14	65	80.68	23.19	35.05	88.63	27.28	384.6	25.83	62.72

No.=Number R.%=Reduction Temp.=Temperature R.H.= Relative humidy

No. of pred.= Number of predators

Correlation coefficient	Temp	R. H.
Predatory mite at level 10 predators/ seedlings	0.20	-0.52*
Predatory mite at level 20 predators/ seedlings	0.58*	-0.01
Predatory mite at level 30 predators/ seedlings	0.58*	-0.02

When the efficiency of the predatory mite decreased to 66.8% at 24 July 24th and the number of the mite pest reached to 160 individuals/ 30 leaves in treated seedlings, there was needed to release the predatory mite again at level of 20 predators/ seedling and then the reduction percent fluctuated from 74.3 to 90.5% in Nov. 1st observed highly reduction percentges in the *T. urticae* population in Oct.12th reaching 93.7% with number of predator 27 individuals at average temperature 24.87ºC and 76.1% R. H.

The average of reduction percentage of *T. urticae* population recorded 80.68% after seven months of releasing the predatory mite *P. persimilis* at level 20 predators/ seedling.

Statistic analysis of data in Table (1) indicated that there was significant positive correlated between the predatory mite population and temperature while non- significant negative correlated between predatory mite population and the relative humidity at level 20 predators/ seedling.

Third level of release

When the predatory mite *P. persimilis* released against the two-spotted spider mite *T. urticae* with level 30 predators/ apple seedling. The average number of *T. urticae* per leave was 3.3 and 3.66 individuals for the treated and control treatment, respectively (Table1).

After releasing the predatory mite, the population of *T. urticae* decreased gradually on treated apple seedlings reaching the lowest number in June 4th recording 9 individuals/ 30 leaves with percentage of reduction 97.2% at average temperature 26.7ºC and 55.8% R H.

After that population of mite pest gradually increased in number and reach 96 individual / 30 leaves with average number of 3.2 individual per leaf and the number of predatory mite were 18 individuals in July 24th. So, it needed other release for the predatory mite again in July 24.

The average of reduction percent in *T. urticae* of releasing the predatory mite *P. persimilis* at 30 predators/ seedling was 88.63% reduction after seven months of release.

Statistical analysis of data obtained in Table (1) indicated that, There was significant positive correlation between the predator mite population and temperature , while non-significant negative correlation between the predatory mite population and relative humidity at level 20 and 30 predator mites/ seedling.

These results showed that the predatory mite was still active on *T. urticae* until seven months from the second release, and giving a good results, so that it can be successfully use as bio-control agent in controlling *T. urticae* on different vegetables and orchard trees.

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المكافحة الحيوية للعنكبوت الأحمر العادي بالمفترس الأكاروسى *Phytoseiulus persimilis* على شتلات التفاح

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عند إطلاق المفترس الأكاروسى *Phytoseiulus persimilis* على شتلات التفاح المصابة بالعنكبوت الأحمر العادي بثلاثة مستويات ١٠، ٢٠، ٣٠ مفترس لكل شتلة لمكافحة العنكبوت الأحمر العادي . اثبت المفترس فاعلية كبيرة فى خفض مستوى الإصابة على شتلات التفاح بعد سبعة أشهر من الإطلاق بلغت نسبة الخفض ٦١,٩٥، ٨٠,٦٨، ٨٨,٦٣% على مستوى ١٠، ٢٠، ٣٠ مفترس لكل شتلة وأن مستوى إطلاق ٣٠فرد لكل شتلة أعطى أعلى نسبة خفض.

وتشير نتائج التحليل الإحصائى أن هناك ارتباط طردى معنوى بين تعداد المفترس ودرجة الحرارة بينما كان هناك ارتباط عكسى بين تعداد المفترس والرطوبة النسبية.

من النتائج السابقة نجد أن المفترس الأكاروسى يلعب دور هام فى مكافحة العنكبوت الأحمر العادى على شتلات التفاح، لذلك يمكن استخدام هذا المفترس بنجاح فى المكافحة الحيوية للآفات الأكاروسية على الخضر والبساتين.