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Efficacy of Predacious Mite, *Phytoseiulus, Presimilis* and The acaricide, Ortus in Cntrolling the Spider Mits, *Tetranychus urticae* on Eggplant at Beni-Suef Governorate, Egypt

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ABSTRACT

In this study, the evaluation of some control methods against the two-spotted spider mite, *Tetranychus urticae* Koch on Eggplant *Solanum melongen* L. was carried out under field conditions at Beni-Suif Governorate, Egypt in season 2014.The predatory mite *Phytoseiulus persimilis* Athias-Henriot, (Acarina: Phytoseiidae), and The acaricide (Ortus) 5% E.C were tested. Obtained results showed that the total average number of the mite population was significantly different with control (F= 75.37, P < 0.0001 & EV = 87.6%), with the mean reduction percentage of significance (F= 56.31, P < 0.0001 & EV = 84.07%).The mean reduction percentage of the mite population on Eggplant cultivars using the released predatory mite *P. persimilis* at rate of 30 adult predators/eggplant seedling was significantly the highest reduction (82.74%), followed by (Ortus) (77.27%). The second trial included the released predator at levels 20 and 10 adult predators/eggplant seedling and gave the highest reduction at the level of 20 adult predators/eggplant seedling (70.71 and 61.43%). It could be concluded that the using *P. persimilis* at rate of 30 adult predators/eggplant for controlling *T.urticae* was superior than using The acaricde , Ortus 5% (E.C)

Keywords: *Tetranychus urticae* Koch, *Phytoseiulus persimilis* A.–H., eggplant and control.

INTRODUCTION

Eggplant *Solanum melongen* L. is widely cultivated in many parts of the world as major and strategy food crop to the human. Eggplant is considered an important host to a several number of pests such as the two-spotted spider mite, *Tetranychus urticae* Koch; however there is a considerable variation in the respective importance of the different pests in different countries.The spider mite, *T. urticae*, is one of the main pests of agriculture crops due to its broad host range. This polyphagous species feeds on more than 1,100 plant species, from which about 150 are of great economic value. Thus, it represents a very important pest for field crops, ornamentals, annual and perennial plants all over the world (Takafuji *et al.*, 2000, Sim *et al.*, 2003). The importance of this mite pest is not only due to direct damage to plants including defoliation, leaf burning, and even in excessive outbreaks plant death but also indirect damage to plants which decreases in photosynthesis and transpiration and great less in yield, (Brandenburg and Kennedy, 1987 and Golam,2002). Host plants of spider mites differ in the degree of food quality, which either depend on the level of primary plant metabolites, or on the quantity and nature of secondary metabolites (Rosenthal and Berenbaum, 1991). Unfortunately, chemical control of this pest has limitations because of development of resistance (Tsagkarakou *et al.*, 2002). As a result, a more integrated approach including biological control with predatory insects and/or mites is increasingly being recommended (Grafton-Cardwell *et al*., 1997, Skirvin and Fenlon 2001). Biological control of spider mites has centered on the use of predatory mites in the family Phytoseiidae (Schausberger and Croft 2000, Schausberger and Walzer 2001).The predator *Phytoseiulus persimili*s A. H. (Acarina: Phytoseiidae) is one of the most important biological control agents against the two spotted spider mite, *T. urticae* koch, infesting different crops. The present study aimsto evaluate the efficiency of the predatory mite *Phytoseiulus persimilis* comparising with The acariide, Ortus 5% E.C . in controlling the spider mite , *T. urticae* as the main pest of eggplant crop.

MATERIALS AND METHODS

Planting for reared predator:

Bean plant *Phaseoulus vulgaris* L. was used as host plant. Bean seeds were planted in plastic trays (50 x 50 x 15cn) with the rate of 15 seeds per trays. These trays were used in rearing the predatory mite persimils which used as bio-agent predacious mite *P. persimitis* releasing on Eggplant seedling at Beni-Suif Governorate Egypt.

Pry used: On the other hand castor bean leaves infested with the two-spotted spider mite *T. urticae* Koch were collected from Giza Governorate and transferred to the laboratory to use in the feeding of the predatory mites *P. persemilis*.

Mass rearing of predator: Five females of predatory mite *P. persimilis* transferred to each bean plant, there were followed up the relation between the predator and the pry *T. urticae* when it need for pry, it was supported with more pry. About one month when the rate of predator increased to reach 20-25 individuals/ leaflet.The predator mite was picked in small paper bag with few pry on bean leaves and transferred to inside ice box.

Field experiments: The present study was conducted at the farm of Agricultural Research Station, Beni-Suif Governorate, Egypt, during the eggplant season 2014. An area of about half Feddan was divided into15 equal plots (1/200 feddan) and arranged in completely randomized blocks with three replicates for each treatments.

Predator release: When the number predator mite increased for suitable number, collect and release. The leave of the beans having the predator and small number of pry were picked in small paper bags with few pry on bean leaves and transferred inside ice box and the predator released on the seedling with three levels 10, 20, 30 predator females/ seedling. Samples of 10 leaves were randomly selected biweekly from uppermiddle and lower level of Eggplant per each plot. Samples started after 15 days from sowing date then continued to harvesting. The selected samples were transferred to the laboratory for inspection using stereomicroscope to determine the number of *T. urticae* and predator whereby, recorded to the end of experiment whereas reduction percentages

were calculated according to equation of Henderson and Tilton (1955). Also, the obtained data were analyzed using ANOVA with the computer program (SAS Inistitute 1988) determine any significant difference between the means applied with age of the weeks seedling eggplant of each trials.

Chemical used: The acaricide, (Ortus); 5% E.C.

RESULTS AND DISCUSSION

As shown in the Table (1) obtained data reveated that the mean number and reduction percentages of *T. urticae* Koch by, the predator mite, *Phytoseiulus persimili*s A. H. on Eggplant crop at Beni-Suef Governorate. The predatory mite, *T. urticae* , *P. persimilis* released three times after 30,60 and 90 days of sowing date during April, May and June 2014 at rates 10,20 and 30 adult predators/plant of eggplant. The same trend was follow with The acaricide , Ortus (5% E.C) at 3-4 individuals of spider mite, *T. urticae* infestation.

The first release: As shown in Table (1) obtained results demonstrated that, when the predator mite was released at rate of 10 individuals/plant; the spider mite pest population were generally low than pre-count. They were 48.0, 46.3, 55.7 and 75.0 individuals/30 leaves.

While in the second and the third levels of the predatory mite, released at 20 and 30 predators / plant. The population of mite pest were (32.3 & 25) ,(32.7 & 21) , (36.3 & 24) and (59 & 31.7) at the same trend.

On the other hand The acaricide , Ortus 5%E.C decreased the population of spider mite , *T.urticae* by 22.3 , 22 , 36 and 69.7 mites / 30 leaves , therefore, the obtained results showed that the reduction percentages of spider mites reached 66.17 , 76.77 and 86.9 % at rate of 10 ,20 and 30 predators after three weeks of releasing , while , in case of using Ortus 5%E.C. the reduction percentage was 87.43 % .

The second release: Results in the table (1) indicated the count of spider mite, *T. urticae* population was highly decreased at level 30 predatory mites released per plant to (32, 32, 29.3 and 38) spider mites individual , while , the non release treatment , the mite pest increased gradually from 250 to 311.7 motle stages / 30 leaves.

On the other hand The acaricide , Ortus (5% E.C) , the population of mite pest decreased in number to 31.3 , 27.3 , 41.3 and 68.0 mite individuals / 30 leaves respectively

Ultimately, this predator can be use in controlling the spider mite, *T. urticae* on different crops, when it release at low infestation and early season.

The third released: The obtained data revealed that, in comparison between the three levels of release, the efficiency of the predator mite suppressing the population density of the mite pest increased with increasing the level of release. Resulting 61.43 at level of 10 predators/plant while it was 88.740 at level of 30 predatory mites/plant , whereas at level of 20 predatory mites/plant , the reduction percentages of spider mites population was 70.7 %. On the other hand The acaricide , Ortus (5% E.C), gave 77.27 % reduction of spiders mites by the fourth of investigation. These results coinicided with that obtained by (Gould,1977 and Mori & Saito, 1979).

The mean number of spider mite (*Phytoseiulus persimilis)* population per sample: Weekly fluctuations in the mean number of spider mite (*P. persimilis)* population showed a regression between time (week) and the mean average of *T. urticae* population/ treatment of the three levels released (10, 20 and 30) adult predators per eggplant seedling, respectively, Table (2) & Fig. (1).The average number of the mite predators at of the three levels released (10, 20 and 30) adults female predators per eggplant seedling, respectively, were 29, 40 & 56 predators/ plant, respectively, in 3d week of April, while, in the 2nd and 3rd released the high average number of the mite predators at of the three levels released were 35, 55.67 & 74 predators/ plant and 53.33, 83.33 & 123.3 adults female predators /eggplant seedling at the three levels released (10, 20 and 30), respectively, at the 4th week of May and Jun, respectively. The total average number of the mite predators' population was 30.95, 48.56 and 67. 67 adult females predators per eggplant seedling, respectively, Table (1).

Table (1): Evaluation the efficiency of the predatory mite, *Phytoseiulus persimilis* (A - H) against spider mite *Tetranychus urticae* on eggplant crop at Beni-Suif Governorate

Source	Application	1				2				3				Mean
	inspection	1	2	3	4	1	2	3	4	1	2	3	4	
Mite Counts	Control	97	121.3	177	199	250	280	308	311.7	356.7	398.3	438.3	453.3	282.55
	10	48	46.3	55.7	75	45.3	49.7	50.7	62.3	54	54	52	67.7	55.06
	20	32.3	32.7	38.3	59	32	32	29.3	38	36	35.7	31.3	40.7	36.44
	30	25	21	24	31.7	17.3	14	13	19	14.7	14.3	11	16	18.42
	Ortus	22.3	22	36	69.7	31.3	27.3	41.3	68	32.3	27	44.3	83.3	42.07
Reduction percentage	10	48	59.4	66.17	59.73	62.9	63.9	66.53	59.6	59.3	63.62	68.1	59.9	61.43
	20	63	71.4	76.77	68.76	68.7	71.77	76.63	70	66	69.82	75.93	69.76	70.71
	30	75	82.97	86.9	84.73	79.4	85.5	87.57	81.57	78.8	81.4	87.32	81.73	82.74
	Ortus	79.1	87.43	84.33	67.1	80.37	84.7	78.73	65.33	79.6	84.8	77.17	58.63	77.27

Relation sheep between the release rate and predator count:

Data in Table (2) and Fig (1) showed that the relation between the release rate and predator count, the total number of predator population was high significantly increased when the predator level increased from 10 to 30 individuals, the regression line values of release rate (R =0.321) and the regression coefficient values of release rate (R = 0.403) and the partial regression values (F= 75.37, P < 0.0001 and EV = 87.6%).

Table (2): The mean number of *Phytoseiulus persimilis* on eggplant crop after difference of level releases at Beni-Suef Governorate season 2014

Application	1				2				3				Mean
Inspection	1	2	3	4	1	2	3	4	1	2	3	4	
10	10.33	15.67	29	28	16	22	34	35	35.7	42.33	50	53.33	30.95
20	18	29	40	38.33	25.7	35.3	51.7	55.67	59	66.67	80	83.33	48.56
30	25	35	56	54.67	36.7	48	72.3	74	76.7	93.3	120.7	123.3	67.97

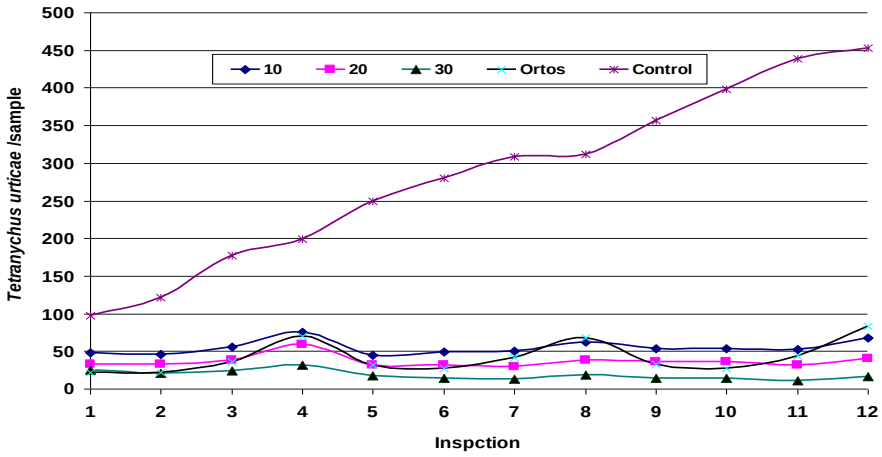

Fig. 1. Mean number of *Tetranychus urticae* per sample over time.

Relation sheep between the release rate and percent reduction: Data presented in Tables (3&4) and Fig. (2) show that, the relation between release rate the predator mite, *P. persimilis* and the percent redaction the population of *T. urticae*. The redaction percentage of the spider mite population by the predatory mite *P. persimilis* was significantly the highest; the regression Lin values of redaction rate (R = 0.802), and the regression coefficient values of release rate (R=0.004), the partial regression values (*F*=56.31, *P*<0.0001 & *EV* = 84.07%). Greenhouse experiments were conducted in Turkey by Karut and Dokera (2015) to determine the effectiveness of single and combined releases of Turkish populations of two predatory mite species, *P. persimilis* and *Neoseiulus* californicus (McGregor), for control of two spotted spider mite *T. urticae* on eggplant. The authors concluded that releasing *N. californicus* either alone or in combination with *P.* persimilis did not show any improvement in controlling to *T. urticae* on greenhouse eggplant when compared to the release of *P. persimilis* alone. In conclusion: The eggplant cultivar in Beni-Suef, was relatively much infestation to the spider mite, using the predatory *P. persimilis* at (30 individual) released was the best control method among the other methods tested for controlling the spider mite using the chemical compound as there was no significant difference between them.

Table (3): Relation between release rate and predator population

Source	Simple regression				Partial regression				
	a	b	R^2	P	b	P	F	P	EV %
Rate	12.13	1.851	0.312	0.0004	1.851	<.0001			
Release	7.046	21.06	0.403	<.0001	21.06	<.0001	75.37	<.0001	87.6
Inspection	24.88	9.711	0.161	0.0153	9.711	<.0001			

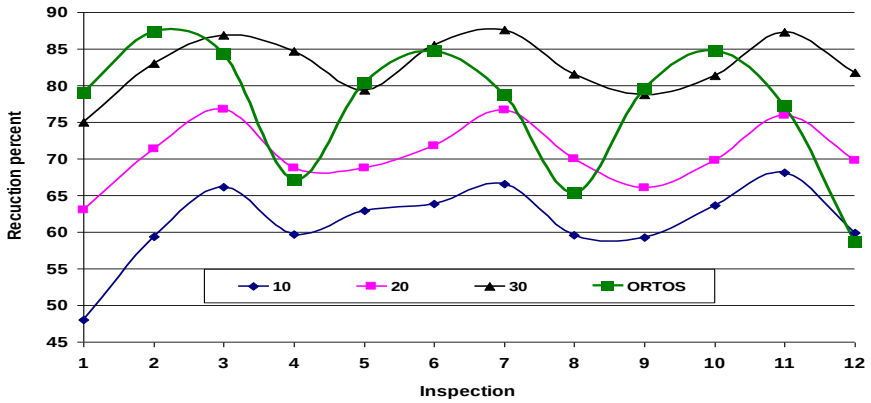

Fig. 2. Reduction percentages due to different tratments.

Table (4): Relation between release rate and reduction percentages

Source	Simple regression				Partial regression				
	a	b	R^2	P	b	P	F	P	EV %
Rate	50.32	1.066	0.802	<.0001	1.066	<.0001			
Release	70.06	0.785	0.004	0.7022	0.785	0.357	56.31	<.0001	84.07
Inspection	67.57	1.624	0.035	0.2752	1.624	0.012			

REFERENCES

Brandenburg, R. L. and G. G. Kennedy (1987). Ecological and agricultural considerations in the management of two spotted spider mite (*Tetranychus urticae* Koch).Agricul. Zool. Reviews, 2:185-236.

Golam, A. (2002). Management of spider mite *Tetranychus urticae* in vegetable crops in Caernarvon Published by the department of Agriculture Western Australia Looked Bag. No4 Bentley Delivery Center, W. A.G., 983

Gould, H. J. (1971). Large- scale trials of an integrated control program for cucumber pests on commercial nurseries. Plant Path. 20:149-156.

Grafton-Cardwell E.; Y. Ouyang and R. A. Striggow (1997). Predaceous mite (Acari: Phytoseiidae) for control of spider mites (Acari: Tetranychidae) in nursery citrus. Environ. Entomol. 26(1): 121-130.

Henderson, C. F. and E. W. Tilton (1955).Test with acaricides against the brown wheat mite. J. Econ. Entomol., 48: 157-161.

Karut, K. and I. Dokera (2015).Indigenous populations of *Neoseiulus californicus* and *Phytoseiulus persimilis* (Acari: Phytoseiidae): single and combined releases against *Tetranychus urticae* (Acari: Tetranychidae) on greenhouse eggplant. International Journal of Acarology, 41 (2): 108-114.

Mohamed, O.M.O. and N. A. Omar (2007).Occurrence of *Tetranychus urticae* Koch and its main mite predators on lupine At El-Khatara District, Sharkia Governorate, Egypt (Tetranychidae & Phytoseiidae). J. Product. & Dev., 12 (2): 701- 707.

Mori, H. and Y. Saito (1979). Biological control of *Tetranychus urticae* Koch population by three species of phytoseiid mites (Acarina: Phytoseiidae). J. Fac. Agric. Hokkaido Univ. 59: 303-311.

Rosenthal, G. A. and M. R. Berenbaum, (1991). Herbivores: Their Interaction with Secondary Plant Metabolites. vol. 2,

SAS Institue. (1988). SAS/STAT Users Guide, Ver. 6.03. SAS Institue Inc., Cary, North Carolina, USA.

Schausberger P and A.Walzer (2001). Combined versus single species release of predaceous mites: predator-predator interactions and pest suppression. Biol. Control 20: 269-278.

Schausberger P and B. A. Croft 2000.Cannibalism and intraguild predation among phytoseiid mites: Are aggressiveness and prey preference related to diet specialization? Exp.Appl.Acarol.24:709-725.

Sim C.; E. Seo and K. Cho (2003). Life table and sensitivity analysis as fitness evaluation method of fenpyroximate and pyridaben resistant two spotted spider mite (*Tetranychus urticae* Koch). J. Asia-Pacific Entomol. 6: 193-199.

Skirvin, D. J. and J. S. Fenlon (2001). Plant species modifies the functional response of *Phytoseiulus persimilis* (Acari: Phytoseiidae) to *Tetranychus urticae* (Acari: Tetranychidae): implications for biological control. Bull. Entomol. Res. 91: 61–67.

Takafuji A,; A. Ozawa; H. Nemoto and T. Gotoh (2000). Spider mites of Japan: their biology and control. Exp. Appl. Acarol. 24: 319-335.

Tsagkarakou A.; N. Pasteur; A. Cuany, C. Chevillon and M. Navajas (2002). Mechanisms of resistance to organophosphates in *Tetranychus urticae* (Acari: Tetranychidae) from Greece. Insect Biochem. Molec. Biol. 32: 417-424

VanLeeuwen,T. ; J.,T Vontas and A. Sagkarakou. (2009).Mechanisms of acaricide resistance in the two spotted spider mite *Tetranychus urticae.* In: Ishaaya,I., Horowitz, A. .(Eds.), Biorational Control of Arthropod Pests. Springer, The Netherlands, pp.347e393.

استخدام المفترس الاكاروسى *Phytoseiulus persimilis* Athias-Henriot والمبيد الاكاروسى اورتس ٥ E.C% فى مكافحة العنكبوت الاحمر العادى ذى البقعتين *Tetranychus urticae* Koch على نباتات الباذنجان بمحافظة بنى سويف- مصر

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اجريت هذه الدراسة لتقييم استخدام المفترس الاكاروسى *Phytoseiulus persimilis* المنتمى لعائلة Phytoseiidae مع استخدام المبيد الاكاروسى اورتس ٥% E.C فى مكافحة العنكبوت الاحمر العادى *Tetranychus urticae* على نباتات البازنجان بمحافظة بنى سويف فى موسم ٢٠١٤. ولقد اوضحت النتائج المتحصل عليها ان تعداد العنكبوت الاحمر العادى قد تاثر بصورة معنوية عند استخدام المفترس الاكاروسى بمعدلات اطلاق مختلفة حيث وجد انه عند اطلاق الاكارس المفترس بمعدل ٣٠ فرد لكل نبات للباذنجان اعطى نسبة خفض فى تعداد العنكبوت الاحمر مقدارها ٨٢.٧٤ % يليها المبيد الاكاروسى اورتس بنسبة خفض مقداره ٧٧.٢٧ % بينما معدلات الاطلاق للمفترس ٢٠ و ١٠ افراد ادى الى خفض التعداد بنسبة ٧٠.٧١ و ٦١.٤٣ % على الترتيب وعلى هذا الاساس يمكن التوصية باستخدام معدل اطلاق المفترس الاكاروسى ٣٠ فرد للنبات لمكافحة العنكبوت الاحمر *T.urticae* على نبات الباذنجان