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Efficiency of Two Predatory Mites *Amblyseius swirskii* and *Cheletogenes ornatus* Early Release in Controlling the Two Spotted Spider Mite, *Tetranychus urticae* Koch on Soybean Plants in Sharkia Governorate.

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ABSTRACT

The two predatory mites, *Amblyseius swirskii* Athias-Henriot and *Cheletogenes ornatus* Canestrini & Fanzago were evaluated as early release to control *Tetranychus urticae* (Koch) on Soybean plants in Sharkia governorate during the period from 15th June to 7th September 2016. Three release levels (2, 4 and 6 predators/leaf) were conducted when population of spider mite was 1-3 individual/leaf. There was no significant difference between the efficiency of the two predators all over the experiment. Reduction percentages were recorded as 54.3, 69.7 and 78.9% for *A. swirskii* while it was 48.7, 61.8 and 69% for *C.ornatus* at three rates of release, respectively. Efficiency increased significantly with predator release rate increase. There was no significant differences between the reduction percentages of 4 and 6 predators/plant. Starting release at low level of infestation to have good control in very short time after releasing is amust.
Keywords :Early release , *Amblyseius swirskii* , *Cheletogenes ornatus, Tetranychus urticae,* Soybean

INTRODUCTION

Soybean, *Glycin max* L. considered one of the most important field crops in Sharkia Governorate. The two spotted spider mite, *Tetranychus urticae* Koch is aphytophagous pest that can cause significant yield losses in many agricultural crops, Van Leeuwen *et al*., 2007.

Spider mites have developed resistance to most available pesticides. Due to the excessive use of pesticides and the associated problems of resistance and environmental pollution. There is an increasing demand for sustainable, environmentally friendly control methods. Acaricides sometimes failed to keep the number of spider mites below economic threshold levels (Tirello *et al* .,2012).Such dynamics may cause an increase in production costs and a decrease in final product quality due to the presence of toxic residues in the grains (Melgarejo *et al*. 2013). So that ,ecological management technologies, such as biological control have been played an important role as an alternative strategy in pest management without application of more pesticides (Nicholls and Altieri 2005).Many predaceous mites are now used as biological control agents and are important in IPM programs. *Amblyseius swirskii* Athias-Henriot is one of the most important generalist indigenous predator of tetranychid mites (Abo-Taka *et al*., 2014).

Cheletogenes ornatus (C.&F.) considered a predator of phytophagous mite, *Tetranynychus urticae* Koch (Zaher *et al*., 1981; Moraes *et al*. 1989; Mesbah,2014 and Hassan *et al* .,2014).

It is well known that members of the family Cheyletidae Leach show a considerable variation in their feeding habits, including acarid as well as, tetranychid and tenuipalpid mites, in addition to scale insects (Carrillo *et al*., 2012).

Some researchers thought that its slow predators but experiments indicates well the main role of Cheyletid mites in biological control programs. The feeding method of Cheyletid mites was assessed as well, because Cheyletids are known to both actively search for prey as well as use an ambush method (Hoy 2013 and Mesbah and Omar 2014).

Its the first time of releasing Cheyletid mites in fields. The present study aimed to control the phytophagous mite, *Tetranychus urticae* Koch on soybean plants by using the two predatory mite species, *A. swirskii* and *C. ornatus* as well as to evaluate the efficiency of the two predatory mites *A. swirskii* and *C. ornatus* in controlling the spider mite, *T. urticae* Koch.

MATERIALS AND METHODS

Field Experiment: The field trials were carried out at Diarb-Nigm district, Sharkia governorate. Soybean plants were planted in mid-May under field condition in summer 2016. An area of about 420 m^2 (10×42 m) was divided into seven plots, (three levels for each predator and one control) each one was 60 m^2 (10 m × 6 rows). Every plot consisted of six rows 50 cm apart (m=5 hells). Seeds were shown at a rate of two seeds/hill and 25 cm space between every two hills. The experiments comprised six treatments, to evaluate three levels of the two predatory mites 2, 4 and 6 predators/leaf were compared with untreated control. Polyethylene plastic mulch sheets were placed between different treatments to prevent predator mite from dispersal.

Rearing of mites:

The rearing and reproduction of each predators and its prey were carried out at Acarology laboratory of Plant Protection Research institute-Sharkia-Egypt

1-Culture of Cheyletid mites:-

Cheletogenes ornatus observed in high numbers associated with phytophagous mites and scale insects infestation in leaves of date palm, *phoenix dactylifera* L. (Mesbah,2014) and predators transferred for rearing on immatures of acarid mite during the period of study.

Rearing and reproduction of Acarid mite, *Tyrophagus putrescentiae* (Schrank), reproduced on yeast granules and incubated at 25°c and 70±5% relative humidity on big cages filled with a layer of mixture of (Cement: Clay: Charcoal) with percent of (6:3:1) filled on the bottom of cages to depth of 0.5 cm. Water drops was added when needed. The bottom of cages was scratched by using a needle to make convexo-concaved areas used as shelters ,photographed by video-camera and was suitable sites for predator mite rearing and laying eggs (Zaher *et al*. 1981).

2-Culture of Phytoseiid mites:-

The predator mite, *Amblyseius swirskii* was collected from soybean plant leaves at Diarb Nigm, Sharkia governorate, Egypt.

Stock colony of *Tetranychus urticae*:-*T. urticae* was maintained on Mulberry leaves in laboratory. Pure culture was initiated by transferring males and females of mite species using a fine hair brush to fresh discs of Mulberry leaves in Petri dishes (10 cm in diameter). Each leaf was put on apad of cotton saturated with water as a source of moisture and to prevent mite escaping. The rearing stocks were conducted in an incubator under 25±2°C and 70±5% relative humidity. After that the 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. The rearing stocks were conducted in an incubator under 25±2°C and 70±5% relative humidity. These trays were used in rearing the predator mite, *A. swirskii*, which used as nucleation of the predator for releasing in field. About one month when the rate of predator increased to reach 20-30 individuals/ leaflet. The predatory mite was picked in small paper bags with few prey on bean leaves and transferred inside ice box to the place of experiment(Ibrahim *et al*. 2010).

Early release of Phytoseiid mite, *Amblyseius swirskii* and Cheyletid mite ,*Cheletogenes ornatus*: The two predatory mites were early released when population of *T. urticae* was 1-3 individual/leaf of Soybean. At rate of 2, 4 and 6 individuals/ leaf.

Sampling: After 30 days post plantation, Random leaf samples of 40 leaves were collected then repeated every seven days from each treatment and examined using stereomicroscope. First samples collected just before release in 15 June for pre-count after releasing and the next collected every seven days from the period of (22 June 2016 to 7 September 2016) . Motile stages of *T. urticae* and two predatory mites, *A.swirskii* and *C. ornatus* per 40 leaves on lower and upper surface of leaves were counted for each treatment to the end of experiment and the reduction percentages were calculated according to equation of Henderson and Tilton (1955).

Data were analyzed by one-way analysis of variance (ANOVA) and mean comparison using LSD to test the significant differences between mean values and correlation coefficient between mite population and weather factors using SAS statistical software, SAS Institute (2010).

RESULTS AND DISCUSSION

1-Biological control of *Tetranychus urticae* Koch using the predatory mite *Amblyseius swirskii* Athias-Henriot on Soybean 2016:-

Results in Table (1) indicated that, the predatory mite *A. swirskii* was early released against the two-spotted spider mite *T. urticae* under three levels of 2; 4 and 6 predators/ plant.

First level of release (2predator/ leaf)

The first release of *A. swirskii* was at population density of pre-count were 73 and 100 individuals/ 40 leaves in the release and control, respectively.

A. swirskii gave (9.1; 23; 32.9; 41.4; 60.1 ; 65.8 ;72 and 73.2%) reduction percentage in (22nd June ; 29th June ; 6th July ; 13th July ; 20th July ;27th July ;3rd August and10rd August) at number of the predatory mites of (7; 13; 16; 15; 19 ; 22;30 and 36) individuals/ 40 leaves, respectively and decreased in the count of 17rd August to 70.5 % till reach 67.7% in the count of 7th September. The highest reduction of *T. urticae* observed in 10rd August was 73.2% at maximum and minimum temperature of 35.4 and 25.9ºC and relative humidity 56.4 %. The reduction percentages averaged 54.3% in the end of experiment

Second level of release (4 predator/ leaves)

The second release of *A. swirskii* was at population density of mite pest 85 and number of mites in control were 100 individuals/ 40 leaves. The percent of reduction increased gradually reaching its highest 85.6 % in 31 rd August at maximum and minimum temperature of 34.1 and 24.4 ºC and relative humidity was 59.3%. The reduction percentages averaged (69.7%) in the end of experiment.

Third level of release (6 predator/ leaves)

The third release of the predatory mite was at population density of 94 in the release and number of mites in control were 100 (individuals/ 40 leaves) . The highest percent of reduction (92.9 %) in 3rd August at maximum and minimum temperature of 35.3 and 25.4ºC and relative humidity was 58%. The reduction percentage averaged (78.9%) in the end of experiment.

2-Evaluating the efficiency of different levels of early release of predatory mite, *A. swirskii* against *T. urticae* on Soybean:- Table(1) showed that the mean percent of reduction in releasing predator *A. swirskii* were (54.3; 69.7 and 78.9)% at average number of predator were (18.5 ; 24.6 and 28.5) individuals at levels of release 2; 4 and 6 predator/leaf. There were significnt differences between the three levels(2; 4 and 6 predators). The most efficient level of release was 6 predators per soybean plant to control *T.urticae* on leaves as it produced the highest reduction percentages recording 78.9%.

Statistical analysis indicated that there was high significant positive correlation between *A. swirskii* populations and minimum temperature 0.86** while there was negative non significant correlation between *A. swirskii* and maximum temperature (-0.10). However, there was positive non significant correlation between *A. swirskii* and relative humidity 0.35.

Phytoseiid mites of the genus *Amblysieus* have been commonly observed on soybean crops (Reichert *et al*., 2014; Rezende *et al*., 2014) and demonstrated capacity to control *T. urticae* population (Moraes *et al*., 1989. Oatman *et al*., 1977) released of *Amblyseius californicus* on the Two spotted Spider Mite on Strawberry. El-Banna, *et al*. (2014) noticed the potential of predatory mite, *Amblyseius hutu* (Pritchard& Baker) as a biological control agent for tetranychid mite , *Oligonychus afrasiaticus* (McGregor) which attack date palm trees. Many successful trails have been applied using different phytoseiid predators as abio-control agents against different tetranychid mite pests infesting different crops (El-Saiedy 2003, Ibrahim *et al*. 2005 and El- Mahgoob 2006).

Table 1. Reduction percentages of *Tetranychus urticae* Koch infesting Soybean plants as influenced by early releasing of predatory mite *Amblyseius swirskii* under field conditions.

Sampling date	Number and redaction % of motile stages of *T. urticae*/40 leaves after release												
	2predators/ plant plot			4predators/ plant plot			6predators/ plant plot						
	No. of Prey	Reduction %	No. of predators	No. of Prey	Reduction %	No. of predators	No. of Prey	Reduction %	No. of predators	Control	Maximum Temp. C°	Minimum Temp. C°	Average R.H.%
Pre-count at 15th June	73	-	-	85	-	-	94	-	-	100	34	25	42
22nd June	81	9.1	7	77	25.7	12	73	36.3	9	122	36.1	24.0	47.7
29th June	77	23.0	13	68	41.6	16	63	51.1	14	137	36.4	24.3	57.6
6th July	70	32.9	16	59	51.5	19	50	62.8	18	143	34.6	24.7	58.7
13th July	65	41.4	15	47	63.6	22	33	76.9	23	152	35.7	25.0	55.4
20th July	48	60.1	19	39	72.2	26	29	81.3	30	165	34.7	24.9	50.9
27th July	44	65.8	22	28	81.3	30	22	86.7	32	176	35.6	25.0	55.3
3rdAug.	40	72.0	30	27	83.8	34	13	92.9	35	196	35.3	25.4	58.0
10 rdAug.	38	73.2	36	25	84.8	41	12	93.4	48	194	35.4	25.9	56.4
17 rdAug.	55	70.5	30	36	83.4	32	10	95.8	47	255	34.4	25.7	59.4
24 rdAug.	59	69.7	20	48	78.8	28	18	92.8	33	267	35.1	24.3	56.4
31 rdAug.	79	66.0	12	39	85.6	21	31	89.6	30	318	34.1	24.4	59.3
7th Sept.	84	67.7	7	50	83.5	14	45	86.6	23	356	33.6	24.7	57.1
Mean	62.5	54.3[c]	18.9	48.3	69.7[b]	24.6	37.9	78.9[a]	28.5	198.5	35.0	24.9	54.9

L.S.D.0.05 for reduction= 2.47

No.=Number Temp.=Temperature R.H.= Relative humidity

Correlation coefficient	Maximum Temp	Minimum Temp.	R. H.
Predatory mite *Amblyseius swirskii*	-0.10	0.86**	0.35
T. urticae	0.16	-0.81**	-0.30

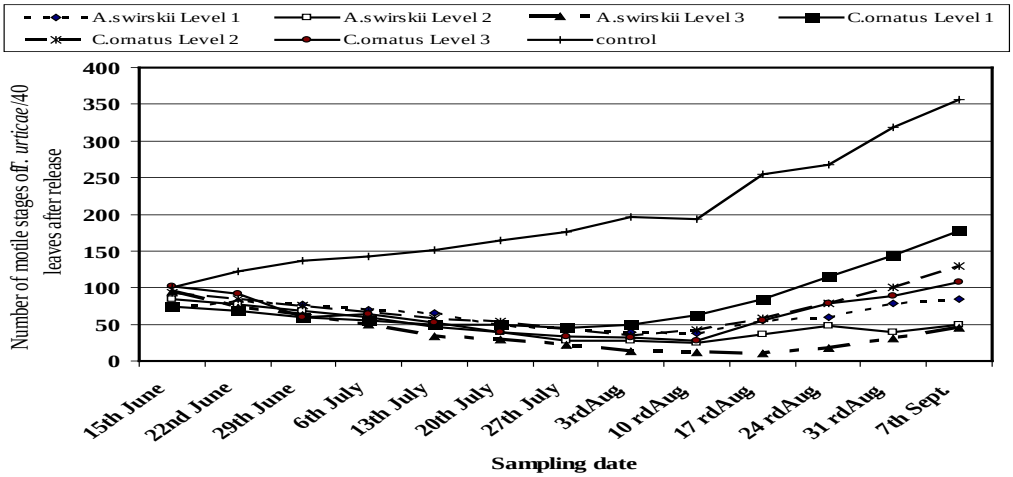

Fig. (1) Number of *T. urticae* infesting Soybean crops after releasing two predatory mites *A. swirskii* and *C. ornatus* under field conditions.

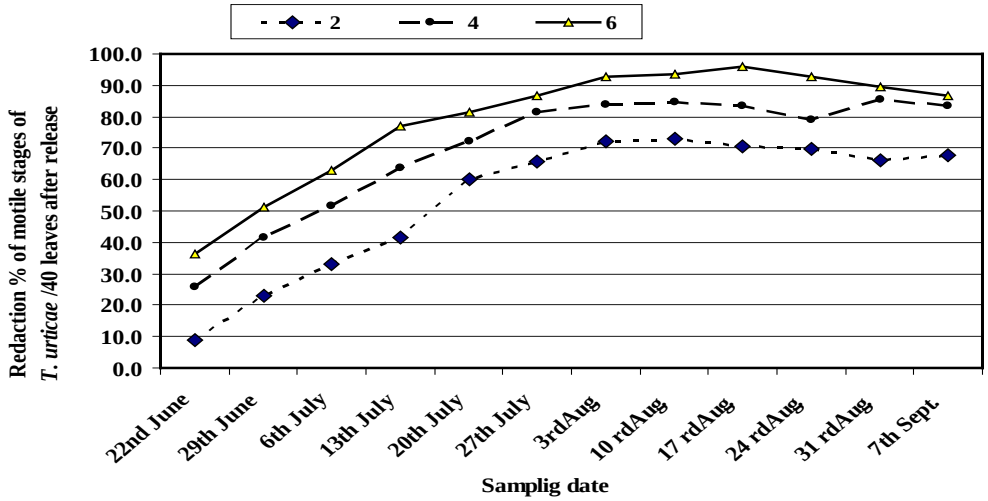

Fig. (2) Reduction percentage of *T. urticae* infesting Soybean crops as influenced by releasing of the predatory mites *A. swirskii* under field conditions.

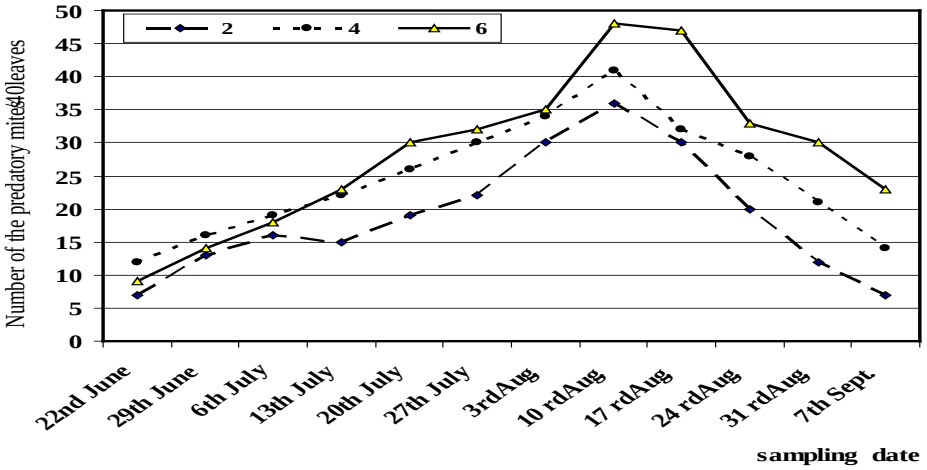

Fig. (3) Number of the predatory mites *A. swirskii* after release on *T. urticae* under field conditions.

The obtained results were in harmony with those obtained by Mowafi (2005) the reduction percentage of early release *Phytoseiulus macropils* Banks to control *T. urticae* reached 63% on cucumber. Abd Elaziz (2016) released *Phytoseiulus persimilis* Athias-Henriot by rates (2,4,6 predator /plant plot) successively reduced the population density of *T. urticae* on eggplant in Sohag governorate and 6 predator/plant enhanced the highest reduction rate 90.44 and 91.47 % in both seasons, respectively. Waheeb (2016) released *N. californicus* at 1:10 level represents auseful management strategy of *T. urticae* Koch on both soybean and cotton plants. El-Moghazy *et al.*(2012) they released the two phytoseiid mites, *N. californicus* (McGregor) and *Typhlodromips swirskii* Athias-Henriot as control agents to *T. urticae* Koch on two cultivars of faba bean, *Vicia faba* L. in open field and after releasing the reduction percentage of two spotted mite at prey predator ratio of 1:7 was achieved and *N.californicus* gave the highest reduction percentage than *T.swirskii*.

3-Biological control of *T. urticae* using the predatory mite, *C. ornatus* on Soybean plants:-

Results in Table (1) indicated that, the predatory mite *C. ornatus* was early released against the two-spotted spider mite *T. urticae* under three levels of 2; 4 and 6 predators/ leaf.

Table 2. Reduction percentages of *T. urticae* infesting Soybean influenced by early releasing of predatory mite, *C. ornatus* under field conditions.

Sampling date	Number and redaction % of motile stages of *T. urticae*/40 leaves after release									Control	Maxmum Temp.C°	Minimum Temp.C°	Average R.H.%
	2predators/ plant			4predators/ plant			6predators/ plant						
	No. of Prey	Reduction %	No. of predators	No. of Prey	Reduction %	No. of predators	No. of Prey	Reduction %	No. of predators				
Pre-count At 15th June	74	-	-	93	-	-	102	-	-	100	34	25	42
22nd June	69	23.6	10	85	25.1	13	91	26.9	12	122	36.1	24.0	47.7
29th June	60	40.8	16	76	40.4	19	60	57.1	18	137	36.4	24.3	57.6
6th July	55	48.0	19	67	49.6	22	64	56.1	21	143	34.6	24.7	58.7
13th July	50	55.5	15	58	59.0	16	52	66.5	17	152	35.7	25.0	55.4
20th July	49	59.9	19	54	64.8	17	39	76.8	21	165	34.7	24.9	50.9
27th July	45	65.4	22	43	73.7	25	34	81.1	24	176	35.6	25.0	55.3
3rdAug.	49	66.2	30	35	80.8	33	32	84.0	37	196	35.3	25.4	58.0
10 rdAug.	62	56.8	33	42	76.7	36	27	86.4	43	194	35.4	25.9	56.4
17 rdAug.	84	55.5	37	58	75.5	31	56	78.5	39	255	34.4	25.7	59.4
24 rdAug.	115	41.8	20	79	68.2	23	78	71.4	22	267	35.1	24.3	56.4
31 rdAug.	144	38.8	12	100	66.2	15	89	72.6	18	318	34.1	24.4	59.3
7th Sept.	178	32.4	2	129	61.0	5	107	70.5	9	356	33.6	24.7	57.1
Mean	79.5	48.7[c]	19.6	70.7	61.8[b]	21.3	63.9	69.0[a]	23.4	198.5	35.0	24.9	54.9
L.S.D.0.05 for reduction = 5.52													

No.=Number Temp.=Temperature R.H.= Relative humidity

Correlation coefficient	Maximum Temp	Minimum Temp.	R. H.
Predatory mite *Cheletogenes ornatus*	0.13	0.80**	0.33
T. urticae	-0.57	-0.52	0.12

First level of release (2predator/leaves)

The first release of the predatory mite, *C. ornatus* was at population density of 74 and 100 individuals/ 40 leaf in the release and control, respectively. *C. ornatus* gave (23.6; 40.8; 48; 55.5; 59.9 ; 65.4and 66.2%) reduction pest population in (22nd June ; 29th June ; 6th July ; 13th July ; 20th July ;27th July and 3rd August) at number of the predatory mite (10; 16; 19; 15; 19 ; 22 and 30) individuals/ 40 leaf, respectively. The highest reduction of *T. urticae* observed 66.2 % in 3rd August at maximum and minimum temperature of 35.3 and 25.4 °C and relative humidity was 58% and decreased in the

count of 10rd August to 56.8 % till reach 32.4% in 7th September. The reduction percentage averaged 48.7% in the end of experiment at level 2predator/ leaf of release.

Second level of release (4 predator/leaves)

The second release of *C. ornatus* was at population density of mite pest 93 and number of mites in control were 100 (individuals/ 40 leaves) in the release and control, respectively. The percent reduction of the mite pest increased gradually reaching its highest percent reduction (80.8 %) in 3rd August at maximum and minimum temperature of 35.3 and 25.4 ºC and 58% relative humidity. The reduction percentage averaged 61.8% in the end of experiment.

Third level of release (6 predator/leaves)

The third release of *C. ornatus* was at population density of 102 in the release and number of mites in control were 100 (individuals/ 40 leaf).The highest percent of reduction (86.4 %) in 10rd August at maximum and minimum temperature of 35.4 and 25.9 ºC and relative humidity was 56.4%. The reduction percentage averaged 69 % in the end of experiment.

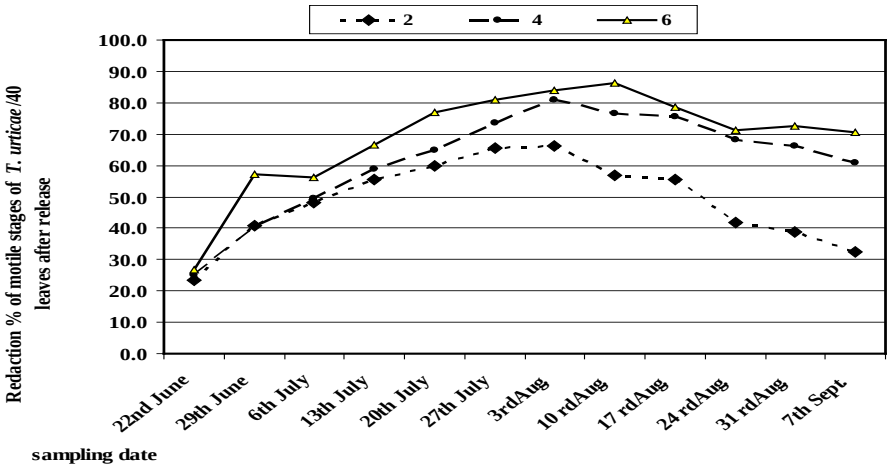

Fig. (4) Reduction percentage of *T. urticae* infesting Soybean crops as influenced by releasing of the predatory mites *C. ornatus* under field conditions.

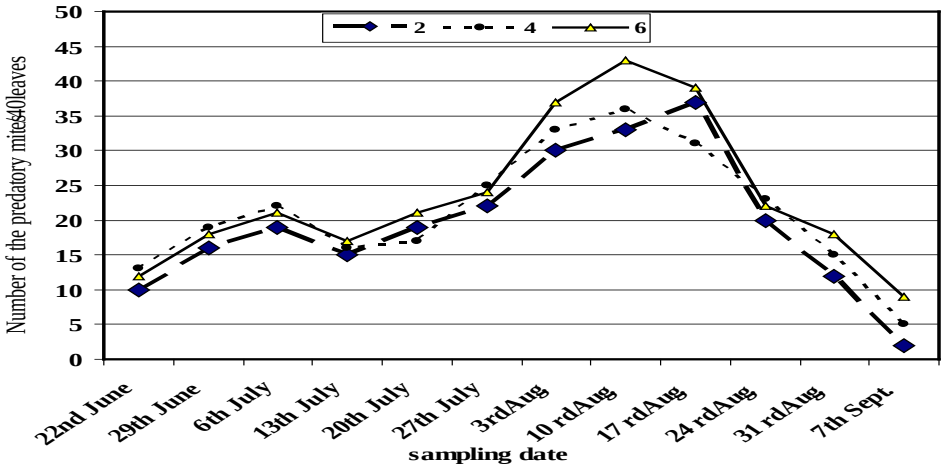

Fig. (5) Number of the predatory mites *C. ornatus* after release on *T. urticae* under field conditions.

Table 3. The mean reduction of *Tetranychus urticae* Koch as a result of early releasing of two predatory mites *Amblyseius swirskii* and *Cheletogenes ornatus.*

Predator	Rate of release	*T. urticae*	Reduction %	Number of predators
Amblyseius swirskii	2predators/ plant	62.54^{bd}	54.28^{d}	18.91^{d}
	4predators/ plant	48.31^{cd}	69.65^{b}	24.58^{b}
	6predators/ plant	37.92^{d}	78.85^{a}	28.5^{a}
Cheletogenes ornatus	2predators/ plant	79.54^{b}	48.72^{d}	19.58^{d}
	4predators/ plant	70.69^{bc}	61.75^{c}	21.25^{cd}
	6predators/ plant	63.92^{bc}	68.92^{b}	23.41^{bc}
	Control	198.54^{a}	-	-
F. value		34.77	28.15	13.23
P.		0.0001	0.0001	0.0001
L.S.D.0.05		25.80	5.59	2.78

4-Evaluating the efficiency of different levels of early release, *C. ornatus* (C &F) against *T. urticae* Koch on Soybean:- Obtained data recorded in, Table(1) showed that the mean reduction percentages in population of *T. urticae* were (48.7; 61.8 and 69 %) at average number of predator was (19.6; 21.3 and 23.4) individuals at levels of release 2; 4 and 6 predator /leaf. There were significant differences between the three levels 3; 6 and 9 predators. The most efficient of *C. ornatus* release (6 predators/soybean leaf) to control *T. urticae* as it produced the highest reduction percentage recording 69% of the mite pest. Statistical analysis indicated that there was high significant positive correlation between *C. ornatus* populations and minimum temperature

0.80** while there was non significant correlation between *C. ornatus* and maximum temperature 0.13 and relative humidity were 0.33.

It is well known that members of the family Cheyletidae show a considerable variation in their feeding habits, including acarid mites as well as, tetranychid and tenuipalpid mites, in addition to scale insects (Carrillo *et al*., 2012).

The *C. ornatus* evaluated in the present study demonstrated the capacity of using this predator in biological control in soybean, since it is able to feed on *T. urticae*. This generalist predator will have the possibility to survive in the different phases of the culture using *T. urticae* as food.

Zaher *et al*. (1981) observed that the effect of food type on the development, feeding capacity and fecundity of *C. ornatus* (C. & F.), a predator of scale insects and phytophagous mites, was investigated in the laboratory at 28 °C and 80%RH when reared on eggs and immature stages of *Tetramynychus urticae* Koch.

Moraes *et al*.(1989) they noticed that *C. ornatus*, female immature stages slightly shorter than mentioned by Zaher *et al*.(1981). Hassan *et al* .(2014) noticed that *C .ornatus* have a high predation capacity when fed on crawlers of scale insect *Hemberlisia lataniae* (Signoret); immatures of tetranychid mite *Eutetranychus orientalis*(Klein) and immatures of acarid mite, *Tyrophagus putrescentiae* (Schrank).

Mesbah and Omar (2014) reared *C. ornatus* on three different types of food, eggs and immatures of *Raoiella indica* Hirst and crawlers of *Parlatoria blanchardii* (Targ) at 35± 2°c and 50±5% R.H.. The female predator had two nymphal stages, while the male had one nymphal stage. The predatory mite was noticed under date-scale insects at date-palm-trees with a high numbers. The population of predator increased following the increase of tenuipalpid mite during October to Febrauary. The results showed that high capacity of predator population growth suggests the high ability of the predator to suppress *R.indica* and *P. blanchardii* populations on date palms. Predation potential was greatest for larvae, followed by protonymphs, then deutonymphs. Predator consumed an average of 106.8 &158.2 preys for male and female during its life span, respectively.

The statistical analysis indicated that the mean number of spider mite per soybean leaf reduced significantly in the three releasing levels compared with the control for the two predators. *A. swirskii* gave the highest reduction percentage on *T. urticae* followed by *C. ornatus*.

From statistical analysis of obtained data ,there were significant difference between the three levels (2; 4 and 6 predators/leaf). The most efficient level of release was 6 predator per plant to control *T. urticae* and reduction percentages recorded 78.9 % for *A. swirskii* and 69 % for *C. ornatus*. All the previous results cleared that, the efficiency of the two predators increased as well as increasing the rate of release also results indicated the possibility of controlling the two-spotted spider mite *T. urticae* on soybean crops. So, starting the release of the bio-control agents at the low level of infestation to have good control in very short time after releasing is a must.

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كفاءة الأطلاق المبكر للمفترسان الأكاروسيان *Amblyseius swirskii* و *Cheletogenes ornatus* لمكافحة العنكبوت الأحمر العادى على نباتات فول الصويا فى محافظة الشرقية

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تم تقييم كفاءة المفترسان الأكاروسيان *Amblyseius swirskii* (Athias-Henriot) and *Cheletogenes ornatus* (Canestrini & Fanzago) لمكافحة العنكبوت الأحمر على نباتات فول الصويا فى محافظة الشرقية فى الفترة من(١٥ يونيو الى ٧سبتمبر عام ٢٠١٦) حيث تم استخدام ثلاث مستويات مختلفة من الاطلاق المبكر للمفترسان الأكاروسيان (٢و٤و٦ مفترس /نبات)عند مستوى اصابة (١-٣ فرد / ورقة) من العنكبوت الأحمر العادى *T. urticae* .أسفرت النتائج الى وجود فروق معنوية بين مستويات الأطلاق الثلاثة وقد كانت نسبة الخفض (٥٤,٣%، ٦٩,٧% ، ٧٨,٩ %) للمفترس الفيتوسيدى وكانت (٤٨,٧%، ٦١,٨% ، ٦٩%) للمفترس الكليتدى. الأطلاق المبكر للمفترسان عند مستوى(٦مفترس /نبات) أعطى أعلى نتائج للخفض مقارنة بالمستوى الاول و الثانى . تعداد الأفة أنخفض معنويا فى المستويات الثلاثة بعد الأطلاق مقارنة بالكنترول .قد كانت أول مرة يتم الأطلاق باستخدام المفترسات من عائلة الكليتدى فى الحقل .أثبت اطلاق المفترس الكليتدى فى هذة الدراسة فاعلية وقدرة خفض تعداد العنكبوت الأحمر على نباتات فول الصويا حيث أنة لا يقل أهمية عن مفترسات عائلة الفيتوسيدى عند تطبيق برامج المكافحة البيولوجية و اطلاقة فى الحقل كعناصر حيوية لذا أوصت نتائج البحث الى استخدام برامج الأطلاق كوسائل مكافحة حيوية أن تكون الأصابة بالعنكبوت الأحمر أقل ما يمكن عند مستوى ١-٣ أفرد من الأفة على الورقة للحصول على أفضل نتائج مكافحة حيوية فى فترة قصيرة .