

THE IMPACT OF CHEMICAL AND BIOLOGICAL CONTROL FOR COMMON BEAN PESTS, *TETRANYCHUS URTICAE* & *T. CUCURBITACEARUM*

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Abstract

Field studies were carried out to determine the effect of two pesticides, Ortus & Kanemite and also two predacious mites released, *Phytoseiulus persimilis* (Athias-Henriot) and *Amblyseius gossypii* (El-Badry) against the phytophagous mites, *Tetranychus urticae* Koch, and *T. cucurbitacearum* (Sayed) which attack common beans, paulista variety in Horticultural Research Station in Al Kanater El-Khairiya, Qualiobeya Governorate throughout 2012 and 2013 seasons. The application of the acaricide, Kanemite shown better than the other, ortus to reduce the population density of the spider mite, *T. urticae*, eggs and mobile stages throughout two seasons, 2012 and 2013 by occurrence higher reduction percent to eggs and mobil stages. This result led to having green pods yield higher for kanemite treatment than ortus treatment in the previous mentioned seasons. The application of acaricides, kanemite and ortus contributed better effect than check to control two species of spider mites. The predators were released by bean leaflets harboring the predator individuals. The predator, *P. persimilis* had a higher effect comparing to the second predator, *A. gossypii*. This is reversed on the yield by occurrence green pods yield higher for the treatment, *P. persimilis* than the other treatment, *A. gossypii* throughout 2012 and 2013 seasons.

The release of *P. persimilis* and *A. gossypii* revealed better effect than the check to the phytophagous mites, *Tetranychus urticae* Koch, and *T. cucurbitacearum* (Sayed).

Key words: bean-paulista-acaricides-ortus-kanemite-predator mites-*P. persimilis*-*A. gossypii*-phytophagous mites- *Tetranychus urticae*- *T. cucurbitacearum*.

INTRODUCTION

Bean, *Phaseolus vulgaris* L. is one of the important vegetable legume crops cultivated in Egypt which consume as dry seeds and or vegetable pods throughout the local market and exportation. These plants are infested difficult pest to manage on bean. This mite become a major problem because of the excessive use of

pesticides, these kill not only two spotted spider mite, *T. urticae*, but also making environmental pollution. Pesticides use results in the development of strains of that are highly resistant to almost all classes of pesticides. In addition, chemical control of is highly restricted in Egypt because of increasing cancer over pesticides residues on fruits which are consumed fresh without removal of the skin. So we must use it in suitable time and limited doses. Fortunately, the predator mite, *phytoseiulus persimilis* A.-H., is now available for control of on bean in Egypt. Port and Scopes (1981) showed that small numbers of *p. persimilis* could control TSM on strawberries in walk – in plastic tunnels in Southern England. However, it was necessary to reduce overwintering populations of *T. urticae* by introducing predators in Autumn. Cross (1984) showed that introductions of predatory mites in March or early April at rate of one mite per plant were consistently successful. Batlaglia et al (1990) studied the biological control to two spotted spider mite, *T. urticae* by *p. persimilis* on strawberry in green house in Metapontum area of Italy in 1988-1989. Different predator mite species were released by several authors to control this pest on certain plants instead of acaricides as reported by (Manjunantha et al. 1999, Mallik et al. 1999, Heikal & Fawzy 2003, Abdalla et al. 2003 and Fawzy et al. 2006).

The present study was conducted the effectiveness of releasing predator mites, *Phytoseiulus persimilis* and *Amblyseius gossypii* as biological control and acaricides, Kanemite and Ortus as chemical control to suppress the population of the phytophagous mites, *T. urticae* and *T. cucurbitacearum* on bean.

MATERIALS AND METHODS

Seeds of bean, Paulista variety were planted on the 1st of March in two successive years 2012 and 2013 in the Horticultural Research Station at Kanater El- Khairiya, Qualiobeya Governorate.

An area of about 97.2 m² was divided into three replicates for each treatment and each replicate consisted of two lines with 3 m² long and 0.6 m wide. Sampling of 10 leaflet per plot were randomly picked and placed directly into paper bags and transferred to the laboratory for examination. The pests and their eggs were recorded after 45 and 50 days of planting for chemical and biocontrol treatments when the foliage of plants became suitable. The applied chemical control treatments (acaricides) were

- 1- Kanemite 15 SC at the rate 100 ml /100 L water.
- 2- Ortus super at the rate 50 cm³ / 100 L water.

These compounds were applied at low volume sprays at the rate of 100 L. of spray solution per feddan and done once on April 15th and 13th For two seasons respectively. samples for examination of the spider mites eggs and mobile stages were taken just before acaricide application and after one, three, five, seven, ten and fourteen days from application. Each sample consisted of ten leaflet from each replicate, and thirty leaflet for each treatment. Each leaflet was inspected on their upper and lower surface.

Individuals of the two predators were obtained from their mass rearing on spider mites *T. urticae* Koch on bean plants *Phaseolus vulgaris* (L.) in a laboratory of the Plant Protection Research Institute. The predator individuals were released on April 19th and 20th for the two seasons respectively when each plant host of 5 – 7 true leaves. The predator release was carried out with bean leaflet harboring the predator 10 – 12 individuals per leaflet. Randomized samples of 10 bean leaflets per replicate were investigated just before the predator release to record the number of movable stages of *T. urticae* and *T. cucurbitacearum* as precount, while post counts were undertaken weekly until the harvest.

Percentage of reduction in mite population for each Acaricides and predators were calculated according to Henderson and Tilton equation (1955)

Statistical analysis

Statistical analysis for ANOVA was carried out by using SAS 9.3.1 portable. Whereas the means were compared through LSD tests, least significant differences at p: 0.05 level.

RESULTS AND DISCUSSION

Table (1&3) shown the application of acaricides, ortus and kanemite In the first year of study, they referred to the reduction percentage which were highly effect after 24 hour on two spotted spider mites, *Tetranychus urticae* and *T. cucurbitacearum*, egg and mobil stages when they infested bean plants, paulista variety compared with control by recording 95.71, 93.94, 99.46 and 99.66% reduction to *T. urticae* and *T. cucurbitacearum*, eggs respectively by the acaricides, Ortus and Kanemite respectively and 98.75, 98.23, 97.91 and 96.81% reduction to mobile stages of the same two species of Acarine resp. by the previous mentioned of two Acaricides respectively. After a period of time the reduction percent decreased gradually to reach after fourteen days 73.20, 72.56, 85.87 and 81.935% reduction to *T. urticae* and *T. cucurbitacearum*, eggs respectively by treatments, Ortus and Kanemite respectively and 80.90, 82.27, 94.34 and 91.32% reduction to *T. urticae* and *T. cucurbitacearum*

mobile stages by the same Acaricides resp. Also, we can notice that the treatment, Kanemite is better than the treatment, Ortus in their reduction with mean 82.53 and 82.27% to *T. urticae*, eggs and mobiles resp. while the Ortus treatment were 82.30 and 80.90% reduction at the same stages resp.

Statistical analysis show significant differences between inspections.

This data was agreement with Adel A. Abou El-Ela (2014) he recorded that the acaricide, Ortus led to reduce the populations of *T. urticae* moving stages with mean 80.62% during 2007 season on the early seedling time.

In the second year, table (2&4) revealed the reduction percent of *T. urticae* and *T. cucurbitacearum*, eggs and mobile stages by the previous mentioned of Acaricides which were the highest after 24 hour compared with any other inspection and related with 97.13, 97.36, 81.55, and 82.70% reduction to *T. urticae* and *T. cucurbitacearum*, eggs respectively by treatments, Ortus and Kanemite respectively and 95.05, 95.30, 75.13 and 73.54% reduction to *T. urticae* and *T. cucurbitacearum* mobile stages by the same acaricides resp. reduction percentage decreased gradually to reach 76.07, 75.83, 62.42 and 59.14% reduction to *T. urticae* and *T. cucurbitacearum*, eggs respectively and 82.84, 82.79, 63.76 and 55.94% reduction to *T. urticae* and *T. cucurbitacearum* mobile stages resp. by the same acaricides respectively.

Statistical analysis of data demonstrated significant differences between inspections each eggs and mobile stages.

The effect on the yield

Table (5) revealed relationship between plants treated with acaricides and resultant yield throughout 2012 and 2013 seasons and recorded acaricide treatment, Kanemite the highest weight of green pods, 600.00 and 635.00 Kg/fed. Throughout two seasons respectively. On the other hand, check plants related with the least weight of green pods by recording 160.00 and 185.00 kg/fed. For the same mentioned seasons resp. while the plants of acaricide, Ortus had moderate weight of green pods (548.33 and 595.00) kg/fed. For the same seasons resp. Statistical analysis of data show insignificant differences between acaricide treatments and significant to check.

Data shown in table (6&8) the reduction percent to *T. urticae*, egg and mobile stages were higher by phyto-seiid mite, *p. persimilis* than the other, *A. gossypii* with mean 57.50 and 51.11% reduction to eggs in 2012 and 2013 seasons respectively.

And 58.17 and 56.47% reduction to mobile stages in the same seasons resp. while, the reduction percent to *T. urticae*, eggs by *A. gossypii* were 50.83 and 42.29% reduction in the same mentioned seasons resp. and 44.33 and 50.96% reduction to mobiles at the same previous seasons resp. this data agreement with PICKETT C.H.

and GILSTRAP(1986),they recorded that *P.persimilis* and *Amblyseius californicus* when fed on Tetanychid, *oligonychus pratensis* led to reduce to pest densities to 60% and 28% resp.

Data tabulated in table (7&9) show the same trend of reduction percent by phytoseiid mite, *p.persimilis* to the phytophagous mite, *T.cucurbitacearum*,egg & motel stages and were higher than the other, *A.gossypii* ; whereas, recorded 46.57 and 33.77% reduction to eggs in 2012 and 2013 seasons resp. and 70.68&69.30% reduction to motel stages throughout the same seasons resp. while the reduction percent to *T.cucurbitacearum*,eggs and motil by *A.gossypii* were 17.57 and 33.76% reduction to eggs and 16.83 and 64.73% reduction to motel in the same mentioned seasons resp.

The effect on the yield

Data in table (10) revealed the means of green pod yields resultant from planting bean,paulista variety in the first March and released by two phytoseiid mite, *p.persimilis* and *A.gossypii* throughout 2012-2013 seasons.Treatment, *p.persimilis* recorded the highest weight of green pods 425.00 and 555.00 kg/fed. In two seasons respectively being significantly higher than check in two season seasons resp.

Treatment,*A.gossypii* revealed less weight of green pods 343.33 and 468.33 kg/fed. Being insignificantly lower than the previous treatment and higher the other treatment (check).

Check is the lowest weight and recorded 253.33 and 335.00 kg/fed.of green pods throughout the same seasons resp. being significantly lower than the remaining treatments except for their related to treatment,*A.gossypii* insignificant lower during second season only.

CONCLUSION

The present study aimed to reach suitable control programs for controlling the important sap-sucking pests infesting bean plants(*Tetranychus urticae* Koch, and *T.cucurbitacearum* Sayed) by using chemical and biological control which planting on March,1st throughout 2012 and 2013 seasons in Horticulural Research Station in Al Kanater El- Khairiya, Qualiobeya Governorate. acaricide,Kanemite related to the best application to reduce the population density of the pests and give high yield of green pods compared with control. Also, phytoseiid mite, *p.persimilis* when released on April,19th and 20th during the previous two seasons demonstrated high effect on populations of the pests and give high yield of green pods.

Table 1. The reduction percent of the two acaricides on the population density of *T.urticae* and *T.Cucurbitacearum* infesting bean plant during 2012.

inspections	<i>T.urticae</i>				<i>T.Cucurbitacearum</i>			
	Ortus		Kanemite		Ortus		Kanemite	
	Egg	Mob.	Egg	Mob.	Egg	Mob.	Egg	Mob.
After day	95.71	98.75	93.94	98.23	99.46	97.91	99.66	96.81
After 3 day	86.52	85.75	85.99	91.33	99.29	96.62	99.48	91.78
After 5 day	84.25	79.07	83.20	86.63	94.86	94.55	94.08	90.75
After 7 day	77.74	77.66	82.52	77.47	92.48	93.49	89.57	90.06
After 10 day	76.38	76.63	76.97	72.85	88.28	92.06	86.13	89.74
After 14 day	73.20	67.53	72.56	67.08	85.87	91.39	81.93	88.80
Mean	82.30	80.90	82.53	82.27	93.37	94.34	91.81	91.32
L.S.D.	10.07	14.39	10.07	14.39	8.32	3.49	8.32	3.49

Table 2. The reduction percent of the two acaricides on the population density of *T.urticae* and *T.Cucurbitacearum* infesting bean plant during 2013.

inspections	<i>T.urticae</i>				<i>T.Cucurbitacearum</i>			
	Ortus		Kanemite		Ortus		Kanemite	
	Egg	Mob.	Egg	Mob.	Egg	Mob.	Egg	Mob.
After day	97.13	95.05	97.36	95.30	81.55	75.13	82.70	73.54
After 3 day	90.21	93.95	93.99	95.01	80.33	68.32	81.90	62.55
After 5 day	89.82	92.26	92.58	94.64	76.92	66.06	80.67	58.54
After 7 day	86.84	91.42	91.48	91.69	75.60	65.78	75.22	57.35
After 10 day	80.83	84.23	85.69	89.32	71.77	64.25	64.29	56.12
After 14 day	76.07	82.84	75.83	82.79	62.42	63.76	59.14	55.94
Mean	86.82	89.96	89.49	91.46	74.77	67.22	73.99	60.67
L.S.D.	9.75	6.43	9.75	6.43	11.09	7.23	11.09	7.23

Table 3. The effect of the two acaricides on the population density of *T.urticae* and *T.cucurbitacearum* infesting bean plant in 2012

inspections	<i>T.urticae</i>						<i>T.Cucurbitacearum</i>					
	Ortus		Kanemite		Control		Ortus		Kanemite		Control	
	Egg	Mob.	Egg	Mob.	Egg	Mob.	Egg	Mob.	Egg	Mob.	Egg	Mob.
أبريل-15	19.93	8.00	16.33	8.69	12.43	8.50	7.80	1.63	8.27	1.60	6.80	1.23
أبريل-20	1.00	0.13	1.13	0.20	14.20	11.07	0.06	0.06	0.04	0.90	9.73	2.17
أبريل-22	3.37	1.77	2.87	1.17	15.59	13.20	0.90	0.13	0.07	0.31	11.07	2.90
أبريل-24	5.00	3.17	4.37	2.20	19.80	16.09	0.90	0.33	1.10	0.55	15.27	4.57
أبريل-26	6.87	3.47	5.07	3.80	22.08	16.50	1.70	0.50	2.50	0.75	19.70	5.80
أبريل-29	10.30	3.97	8.23	5.01	27.20	18.05	3.37	0.67	4.23	0.85	25.07	6.37
مايو-03	12.43	6.60	10.43	7.27	28.93	21.60	5.01	0.90	6.79	1.15	30.90	7.89
Mean	8.41	3.87	6.92	4.05	20.03	15.00	2.82	0.60	3.29	0.87	16.93	4.42
L.S.D.	6.78	3.93	6.78	3.93	6.78	3.93	6.33	1.63	6.33	1.63	6.33	1.63

Table 4. The effect of the two acaroids on the population density of *T.urticae* and *T.cucurbitacearum* infesting bean plant in 2013

inspections	<i>T.urticae</i>						<i>T.Cucurbitacearum</i>					
	Ortus		Kanemite		Control		Ortus		Kanemite		Control	
	Egg	Mob.	Egg	Mob.	Egg	Mob.	Egg	Mob.	Egg	Mob.	Egg	Mob.
أبريل-13	5.77	17.87	6.27	10.77	4.67	5.38	3.10	0.50	3.47	0.47	2.03	0.22
أبريل-21	0.17	1.17	0.17	0.67	4.80	7.12	0.60	0.13	0.63	0.13	2.13	0.23
أبريل-23	0.75	1.60	0.50	0.82	6.20	8.33	0.67	0.18	0.69	0.20	2.23	0.25
أبريل-25	0.97	2.15	0.76	0.95	7.63	8.85	0.80	0.27	0.75	0.31	2.27	0.35
أبريل-27	1.28	2.57	0.90	1.50	7.87	9.02	0.95	0.35	1.08	0.41	2.55	0.45
أبريل-30	1.90	4.90	1.54	2.02	8.02	9.45	1.25	0.39	1.77	0.45	2.90	0.48
مايو-04	2.67	5.74	2.93	3.47	9.03	10.07	1.75	0.42	2.13	0.48	3.05	0.51
Mean	1.93	5.14	1.87	2.88	6.89	8.32	1.30	0.32	1.50	0.35	2.45	0.36
L.S.D.	2.15	4.58	2.15	4.58	2.15	4.58	0.92	0.15	0.92	0.15	0.92	0.15

Table 5. The effect of acaricides on the green pod crops of bean plant during 2012&2013

	weight of green pods/fed.			weight of green pods/fed.		
	<i>The first season</i>			<i>The sound season</i>		
	Kanemite	Ortus	control	Kanemite	Ortus	control
	560.00	490.00	120.00	590.00	550.00	150.00
	650.00	600.00	200.00	690.00	645.00	230.00
	590.00	555.00	160.00	625.00	590.00	175.00
Mean	600.00	548.33	160.00	635.00	595.00	185.00
LSD.	94.83			112.18		

Table 6. The effect of *P. persimilis* and *A. Gossypii* on the population density of *T. urticae* infesting bean plants through 2012 season .

inspections	<i>P.persimilis</i>				<i>A.gossypii</i>				Control	
	<i>T.urticae</i>				<i>T.urticae</i>				<i>T.urticae</i>	
	Egg	reduction%	Individual	reduction%	Egg	reduction%	Individual	reduction%	Egg	Individual
أبريل-19	0.5	-	0.52	-	0.45	-	0.33	-	0.30	0.50
أبريل-25	0.79	21	0.45	33	0.80	47	0.47	46	1.00	0.65
مايو-02	1.1	56	0.49	48	1.05	53	0.25	58	1.5	0.90
مايو-09	2.01	57	0.97	63	1.88	55	0.63	63	2.80	2.55
مايو-16	4.23	79	2.33	77	7.65	57	1.67	74	11.90	9.83
مايو-23	7.43	71	2.57	86	12.13	48	11.93	16	15.53	21.63
مايو-30	12.40	61	14.17	42	15.50	45	14.17	9	18.87	23.47
Mean	4.07	57.50	3.07	58.17	5.64	50.83	4.21	44.33	7.41	8.50
L.S.D.	7.06	18.68	8.32	30.5	7.06	18.68	8.32	30.5	7.06	8.32

Table 7. The effect of *P. persimilis* and *A. Gossypii* on the population density of *T. cucurbitacearum* infesting bean plants through 2012 season .

inspections	<i>P.persimilis</i>				<i>A.gossypii</i>				Control	
	<i>T.cucurbitacearum</i>				<i>T.cucurbitacearum</i>				<i>T.cucurbitacearum</i>	
	Egg	reduction%	Individual	reduction%	Egg	reduction%	Individual	reduction%	Egg	Individual
أبريل-19	2.03	—	0.47	—	2.00	—	0.38	—	2.10	0.53
أبريل-25	2.67	30.95	0.63	26.76	3.40	10.75	0.61	12.29	4.00	0.97
مايو-02	1.97	52.93	0.13	88.46	3.13	24.1	0.75	17.63	4.33	1.27
مايو-09	1.27	81.57	0.21	88.16	4.73	30.34	1.05	26.78	7.13	2.00
مايو-16	3.77	50.82	1.37	78.63	6.35	15.92	4.05	21.87	7.93	7.23
مايو-23	7.13	35.69	2.93	73.71	9.55	12.58	7.75	14.01	11.47	12.57
مايو-30	13.67	27.48	3.85	68.38	16.53	10.99	9.02	8.37	19.50	13.73
Mean	4.64	46.57	1.37	70.68	6.53	17.45	3.37	16.83	8.07	5.47
L.S.D.	5.81	19.57	4.5	21.73	5.81	19.57	4.5	21.73	5.81	4.5

Table 8. The effect of *P. persimilis* and *A. Gossypii* on the population density of *T. urticae* infesting bean plants through 2013 season .

inspections	<i>P.persimilis</i>				<i>A.gossypii</i>				Control	
	<i>T.urticae</i>				<i>T.urticae</i>				<i>T.urticae</i>	
	Egg	reduction%	Individual	reduction%	Egg	reduction%	Individual	reduction%	Egg	Individual
أبريل-20	4.93	—	1.73	—	4.50	—	1.73	—	4.67	1.37
أبريل-27	3.83	41.42	1.10	71.9	2.77	53.63	1.83	53.25	6.20	3.10
مايو-03	2.17	73.06	0.90	78.6	2.40	67.36	1.23	70.75	7.63	3.33
مايو-10	1.77	78.45	2.17	59.08	4.50	39.97	2.03	61.72	7.78	4.20
مايو-17	7.07	35.6	3.75	38.77	6.77	32.44	3.67	40.08	10.40	4.85
مايو-24	9.27	27.01	7.56	33.99	9.50	18.05	8.13	29.02	12.03	9.07
Mean	4.84	51.11	2.87	56.47	5.07	42.29	3.10	50.96	8.12	4.32
L.S.D.	3.4	30.90	3.17	26.62	3.4	30.90	3.17	26.62	3.4	3.17

Table 9. The effect of *P. persimilis* and *A. Gossypii* on the population density of *T. cucurbitacearum* infesting bean plants through 2013 season .

inspections	<i>P. persimilis</i>				<i>A. gossypii</i>				Control	
	<i>T. cucurbitacearum</i>				<i>T. cucurbitacearum</i>				<i>T. cucurbitacearum</i>	
	Egg	reduction%	Individual	reduction%	Egg	reduction%	Individual	reduction%	Egg	Individual
أبريل-20	1.85	_	0.27	_	1.63	_	0.24	_	2.13	0.15
أبريل-27	1.73	10.68	0.26	48.41	1.43	16.2	0.21	53.13	2.23	0.28
مايو-03	1.73	30.51	0.22	65.08	1.68	32.9	0.25	55.36	2.27	0.35
مايو-10	0.51	75.84	0.07	89.49	0.56	69.89	0.03	94.93	2.43	0.37
مايو-17	2.03	43.41	0.29	61.64	1.91	39.57	0.25	62.8	4.13	0.42
مايو-24	3.50	8.42	0.33	60.99	3.07	10.25	0.32	57.45	4.47	0.47
Mean	1.89	33.77	0.24	69.30	1.71	33.76	0.22	64.73	2.94	0.34
Mean	1.17	37.36	0.12	25.04	1.17	37.36	0.12	25.04	1.17	0.12

Table 10. The effect of the predaceous mites on the green pod crops of bean plant during 2012 & 2013

	weight of green pods/fed.			weight of green pods/fed.		
	<i>The first season</i>			<i>The second season</i>		
	<i>A. gossypii</i>	<i>P. persimilis</i>	control	<i>A. gossypii</i>	<i>P. persimilis</i>	control
	290.00	350.00	210.00	410.00	490.00	290.00
	400.00	500.00	300.00	520.00	625.00	375.00
	340.00	425.00	250.00	475.00	550.00	340.00
Mean	343.33	425.00	253.33	468.33	555.00	335.00
LSD.	119.27			93.18		

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تأثير المكافحة الكيماوية والحيوية لآفتى الفاصوليا *Tetranychus urticae* & *T. cucurbitacearum*

باسم صبرى وهبه

معهد بحوث وقاية النباتات - مركز البحوث الزراعيه - الدقى - الجيزة

أظهرت النتائج الحقلية نوعين من المبيدات الاكاروسية Kanemite & Ortus وكذلك إطلاق نوعين من المفترسات الاكاروسية

على *Phytoseiulus persimilis* (Athias-Henriot) and *Amblyseius gossypii* (El-Badry)

الاکاروسات النباتية العنكبوت الاحمر ذات البقعتين *Tetranychus urticae* Koch, and

T. cucurbitacearum (Sayed) التى تصيب نباتات الفاصوليا- صنف بوليستا بمحطة بحوث القناطر

الخيرية - محافظة القليوبية خلال عامى ٢٠١٢-٢٠١٣.

أظهر المبيد Kanemite أفضل من Ortus فى ارتفاع معدل الخفض للعنكبوت الاحمر لطور البيض

من ٨٢,٣ الى ٨٢,٥٣% والاطوار المتحركة من ٨٠,٩ الى ٨٢,٢٧% خلال عام ٢٠١٢، من

٨٦,٨٢ الى ٨٩,٤٩% لطور البيض، من ٨٩,٩٦ الى ٩١,٤٦% للاطوار المتحركة خلال عام

٢٠١٣. وبهذه النتيجة ادت الى زيادة محصول القرون الخضراء لمعاملة Kanemite عن معاملة

Ortus خلال الموسمين السابق ذكرهم.

كما ارتبط كل من معالمتى المبيدات الاكاروسية بتاثير افضل من الكنترول (check) فى نقص اعداد

الافه وزيادة المحصول.

اطلاق المفترسات الاكاروسية تم بواسطة وريقات نباتات الفاصوليا وارتبط المفترس الاكاروسى

Phytoseiulus persimilis بتاثير اعلى من المفترس الاخر *Amblyseius gossypii* فى ارتفاع معدل

الخفض لجمهور الافه من ٥٠,٨٣، ٤٤، ٣٣% لطورى البيض والاطوار المتحركة على الترتيب الى

٥٧,٥، ٥٨,١٧% لنفس الطورين على الترتيب خلال عام ٢٠١٢، من ٤٢,٢٩، ٤٠,٩٦% لطورى

البيض والاطوار المتحركة على الترتيب الى ٥١,١١، ٥٦,٤٧% لنفس الطورين على الترتيب خلال

عام ٢٠١٣. والنسبة انعكست على محصول القرون الخضراء بالزيادة لمعاملة المفترس الاول عن معاملة

المفترس الاخير.

أظهر إطلاق المفترسات الاكاروسية السابقة الذكر تأثير افضل من الكنترول على كل من العنكبوت

الاحمر بنوعية.