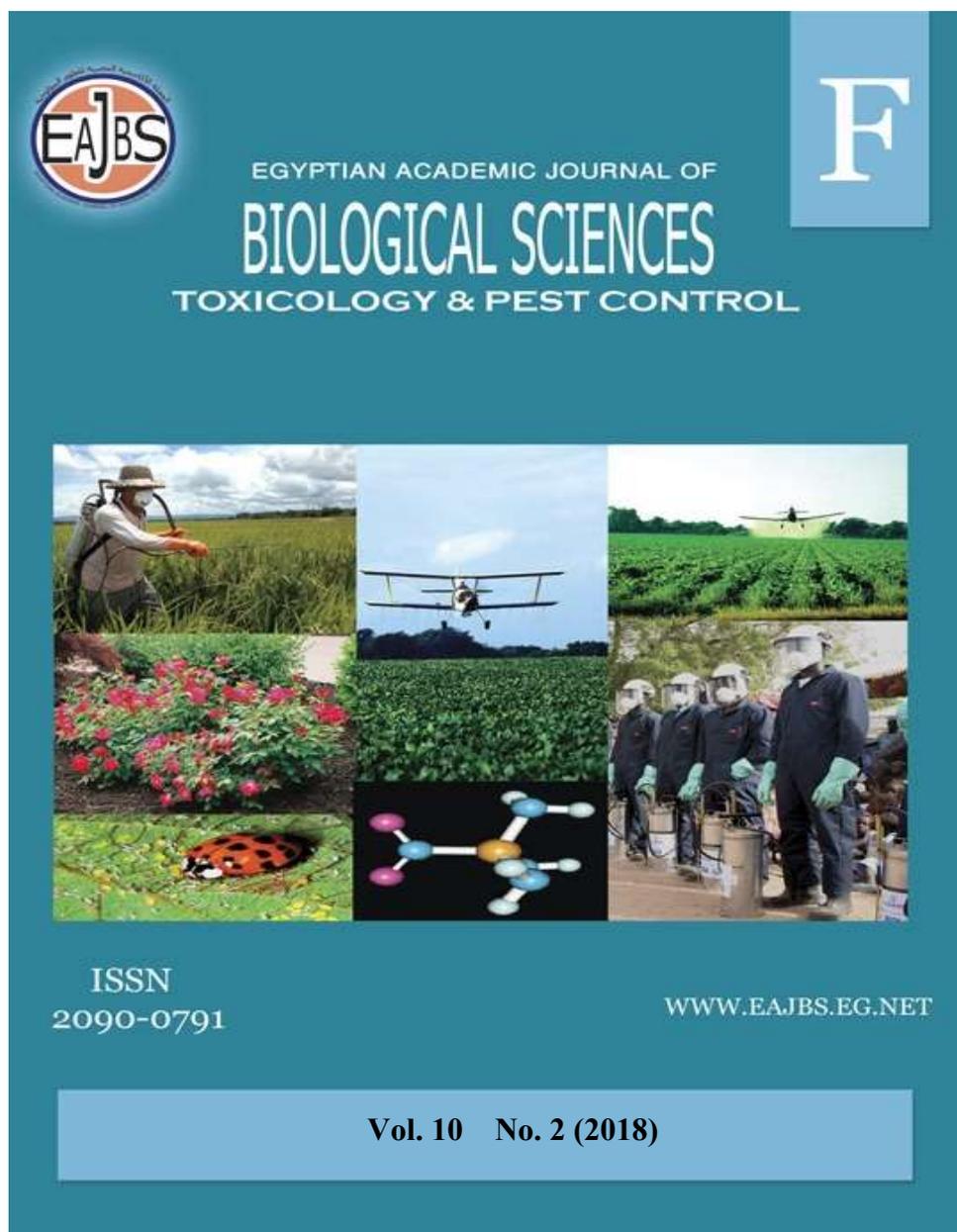


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## Efficacy Of Some Pesticides Against Piercing-Sucking Pests and Associated Predators on *Cucumis sativus* (L.) and *Cucumis melo* var. *flexuosus* (L.) Plants in Sharkia Province, Egypt.

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### ABSTRACT

Field experiments were conducted in the Shubak-Basta village Sharkia province, Egypt on the Cucumber, (*Cucumis sativus* L.) and Cucumis, (*Cucumis melo* var. *flexuosus* L.) to study the effect of pesticides i.e. (Thiamethoxam, Melbimectine and Pyredaben) against the piercing-sucking pests encompass; (the aphids, *Aphis gossypii* Glov., the thrips, *Thrips tabaci* Lind., whitefly, *Bemisia tabaci* Genn., the leafhoppers, *Empoasca* spp., the green stink bug, *Nezara veredula* L. in addition to the spider mite, *Tetranychus* spp. and side effects against associated predators ladybird beetle, *Coccinella* spp., aphid lion, *Chrysoperla carnea* Steph. and true spiders during 2017 and 2018 seasons. The results revealed that the tested compounds recorded the high initial reduction 100.00% in all the tested pests on Cucumber and Cucumis plants. Thiamethoxam compound (1<sup>st</sup> spray) was more effective on the *T. tabaci*, *Empoasca* spp., *A. gossypii* and *Tetranychus* spp. during the two seasons on Cucumber and Cucumis plants while, the Melbimectine compound (2<sup>nd</sup> spray) was more effective on all treated pests as the initial effect in Cucumber and Cucumis plants, while the high annual mean reduction was varied in values according to the crop and pest tested during the two seasons. It was also found that the Pyridabin compound (3<sup>rd</sup> spray) had a significant impact on the tested pests and on the two crops. In the case of the effect on predators, the results showed that 1<sup>st</sup> spray, 2<sup>nd</sup> spray and 3<sup>rd</sup> spray of the tested compounds caused had a significant effect on associated predators. The annual mean reduction was 97.35, 75.95% for thrips and leafhoppers in the 1<sup>st</sup> and 2<sup>nd</sup> spray and 100.00% for the whitefly and leaf hoppers in the 3<sup>rd</sup> spray on the Cucumber plants while in the Cucumis plants had the highest annual mean reduction of the tested pesticides 74.82, 65.76% on the aphids and whitefly insects in the 1<sup>st</sup> and 2<sup>nd</sup> spray and 100.00% on leafhoppers in the 3<sup>rd</sup> spray in 2017 season. The results showed that the annual mean reduction of the three sprays was 100.00% in the 1<sup>st</sup> spray on the green stink bug and 100.00 % in the 2<sup>nd</sup> spray on the aphids, third, leafhoppers and mites while in the 3<sup>rd</sup> spray, the highest annual mean reduction of 89.78% in the 2018 season on the thrips in Cucumber plants. In the case of the effect of three sprays on insect piercing-sucking pests in the Cucumis plants, the highest annual mean reduction was 92.04, 100.00 and 65.97% for the three spray on the thrips. The seasonal mean of the three sprayers on the Cucumber plants caused the highest percentage of the decrease in the number of piercing-sucking pests where it was 78.98, 78.24 and 73.85% on the thrips, leafhoppers and whiteflies in 2017 season. In the 2018 season, the highest seasonal mean of the three sprayers recorded on the Cucumis plants were 74.82, 72.18 and 66.13% on the aphids, leafhoppers and whitefly numbers in 2017 season. But in 2018 season the seasonal mean of the three sprayers on the Cucumber plants caused the highest percentage of the decrease in the number of piercing-sucking pests where it was 100.00, 96.33, 86.58, 84.99 and 76.69% on green stink bug, leafhoppers, thrips and mites numbers in 2018 season. Incase of Cucumis plants, the highest seasonal mean of the three sprayers recorded were 86.00, 80.59 and 80.28 % on

the thrips, green stink bug and mites numbers in 2018 season. The effect of the three sprayers on the tested predators as seasonal mean of reduction on the Cucumber plants caused the highest percentage of the decrease in the number of predators where it was 100.00, 79.23 and 70.37 % & 85.21, 66.11 and 63.02 % on aphid lion, lady bird beetle and true spider numbers in 2017 season in the two crops. While in the second season, the seasonal mean of the three sprayers on the Cucumber plants caused the highest percentage of the decrease in the number of predators where it were 89.67, 84.78 and 79.17 % on aphid lion, lady bird beetle and true spiders numbers in 2018 season. While in case of the effect of three tested sprayers on predators in Cucumis plants were 89.25, 57.75 and 47.79 % reduction on lady bird beetle, aphid lion and true spiders numbers, respectively.

## INTRODUCTION

The Cucumber and Cucumis crops, rank among the top 10 in economic importance among the vegetable crops of the world (Ishaaya *et al.*, 2001). In addition, efforts have been made to develop compounds acting selectively on groups of insects by inhibiting or enhancing biochemical sites such as respiration acetamiprid, the GABA receptors (Avermectins), the salivary glands of sucking pests (Pymetrozine) and others pests. The most recent novel insecticides with selective properties are Thiamethoxam caused by ingestion and contact. Avermectin derivative acts on GABA receptor affecting diversity of insects such as mites, lepidopterans and thrips. (Schaffer and Parise 2003); the fruits of the two crops used fresh so; it very important to know what is used to control the pests infested these plants. The piercing-sucking pests (spider mite, aphids, whitefly, leafhoppers and thrips) are widely spread attacking a wide variety of crops and causing considerable damage, either directly by sucking plant juice or indirectly as vectors of plant diseases and inhibits the photosynthesis and considered as principal pests of Cucurbitaceae plants (Sannino and Piro 2015) field trails indicated abamectin caused complete control against *Ttranychus urticae*. (Carter, 1990); (Blackman and Eastop 2000); (Sanchez *et al.*, 2011; Gavkare, 2012; Gavkare *et al.*, 2014 and Dogan *et al.*, 2016). Also, the two spotted spider mite *T. urticae* is considered as one of the important pests during summer plantation causing various degrees of damage and lately yield losses (Faris *et al.*, 2004). The Abamectin bio-pesticide caused high toxic effect and high toxicity index on the, eggs of *T. urticae* and the females of their predators *Amblyseius gossipi*, *Phytoseiulus macropilis* and *Stethorus gilvifrons*. Field experiments indicated that, Imidachlopride and Thiamethoxam compounds tested on aphid, *Myzus persicae* infested two variety potato (Kurado and Desiree) potato caused significant suppressed (Khan *et al.*, 2011). The Avermectins, streptomycete-derived macrocyclic lactones originally isolated as antiparasitic agents and used for control phytophagous mites and its toxicity is fundamentally different from those associated with current natural and synthetic pesticides (Putter *et al.*, 1981). The Pyridaben: (Sanmit), is active against mature and immature stages of acari, Aleyrodidae, Aphididae, Cicadellidae and Thysanoptera on field crops, fruit trees, ornamentals and vegetables (Niu *et al.*, 2014). The Avermectin insecticide, milbekot had a considerable pesticidal activity against insects, mites and nematode (White *et al.*, 1997).

The main objective of this study was to study the effect of Thiamethoxam, Milbemectine and Pyridaben tested compounds against certain piercing-sucking pests and their associated predators on Cucumber and Cucumis crops.

## MATERIALS AND METHODS

### 1. Seasonal incidence of the piercing-sucking pests and their associated predators on Cucumber and Cucumis plants:

The field experiments were conducted at Shubak–Basta village Zagazig district, Sharkia province, Egypt in Cucumber, *Cucumis sativus* (L.) variety Seminis and Cucumis, *Cucumis melo var. flexuosus* (L.) variety amaranthine. The Cucumber and Cucumis were planted at 4<sup>th</sup> of March and 25<sup>th</sup> of Feb. during 2017 and 2018 growing seasons, respectively.

#### a. Used compounds and application programs:

Trade name	Active ingredient	Used rate/ feddan	The Producing company
Thiamex	Thiamethoxam 25 % WG	80g/feddan	Sigmarzell, Germany MaAC-GMBH
Milbekot	Milbemectine 1 % EC	50ml/100 liters water	Nemo-chemical lazagro
Sanmit	Pyridaben 75 % WP	25g/100 liters water	Gowan

#### b. Application programs

Treatments	Season	Treatments	1 <sup>st</sup> spray	2 <sup>nd</sup> spray	3 <sup>rd</sup> spray
<i>Cucumis sativus</i>	2017	Date	4/5	28/5	12/6
		Compound	Thiamethoxam	Milbemectine	Pyridaben
<i>Cucumis melo var. flexuosus</i>		Application date	4/5	28/5	12/6
		Compound	Thiamethoxam	Milbemectine	Pyridaben
<i>Cucumis sativus</i>	2018	Application date	19/4	3/5	17/5
		Compound	Thiamethoxam	Milbemectine	Pyridaben
<i>Cucumis melo var. flexuosus</i>		Application date	19/4	3/5	17/5
		Compound	Thiamethoxam	Milbemectine	Pyridaben

### 2. Experimental Design:

The area 2800 m<sup>2</sup> cultivated by Cucumber and Cucumis each 1400m<sup>2</sup> was divided into two plots for treatments and one for untreated, each was divided four replicates each 175m<sup>2</sup> distributed as completely randomized block design for the two seasons 2017 and 2018, respectively. Treatment plots were sprayed using a knapsack motor sprayer, 20 liters in capacity and using 200 liter volume of insecticidal solution (insecticide + water as solvent ) per feddan.

The target piercing-sucking pests stages were, cotton aphids, (*Aphis gossypii*) Glover; cotton thrips, (*Thrips tabaci*) Lind.; whitefly, (*Bemisia tabaci*) Genn.; leafhoppers, (*Empoasca* spp.); green stink bug, (*Nezara viridula* L.) was direct counted under the field conditions and spider mites (*Tetranychus* spp.). Also, the population density of associated predators viz, ladybird beetle, *Coccinella* spp., aphid lion *Chrysoperla carea* Steph. and true spiders mite.

The treatments were received normal agricultural practical's treated according to the Ministry of Agriculture recommendation of both crops.

### 3. Sampling technique:

Observations were made at weekly intervals throughout the two years on number of aphid, thrips, whitefly, leafhopper, green stink bug and mites were counted visually individual on 25 randomly selected plants from treated and untreated plots. Weakly samples of 25 plant leaves/replicate of both crops were collected early in the morning from each plant top, middle and bottom were considered. The plant samples for Cucumber and Cucumis plants were put in paper bags, transferred to laboratory and examined using binocular stereo microscope. The numbers of each aphids, thrips, whitefly were counted individually in the two leaves surface as well as *Tetranychus* spp. were counted /inch<sup>2</sup> for treated and untreated

plots at weekly intervals. Samples were collected before spray and after one day, seven and 14 days.

The common predators: lady beetles, *Coccinella* spp.; green lacewing, *Chrysoperla carnea* and true spiders found on each crop were visual counted and recorded at the same time. The efficiency of tested treatments was measured as a percentage of reduction in population density of piercing-sucking pests and their associated predators using the Henderson and Tilton equation (1955).

## RESULTS

### 1. Impact of tested compounds on piercing-sucking pests during 2017 season:

The tested compounds were reduced the numbers of inspected piercing-sucking pests in treated plots compared to untreated ones, while the reduction percentages have differed insecticides compound, time after spraying and treated crop.

The results in Table (1) showed that the treatment of piercing-sucking pests with the 1<sup>st</sup> spray in cucumber plants significantly affected their populations, with the highest percentage of reduction as initial effect after one day of spraying, 100.00% on thrips insects, followed by leaf hoppers 92.82% reduction recording on mites. The residual mean of the tested compound was as follows: 96.03, 88.22, 83.76 and 57.95% reduction on the thrips, leafhoppers, mites and whitefly after 14 days of treatment. The results also showed that the highest annual mean of reduction in pests recorded was 97.35% on thrips, followed 86.78% reduction on mites. In case of the effect of the 1<sup>st</sup> spray on piercing-sucking pests in Cucumis plants results cleared that significantly affected their populations, with the highest percentage of reduction as initial effect after one day of spraying, 100.00% reduction on aphids, leafhoppers and green stink bug, followed by mites 90.20 and 81.52% of reduction for mites and whitefly. The effect of the residual mean reduction of the tested compound was as follows: 62.43, 61.54, 48.88, 37.63 and 17.57% reduction on the aphids, whitefly, leafhoppers, mites and green stink bug numbers after 14 days of treatment. The results also showed that the highest residual mean of reduction in pests recorded were 74.82, 66.05 and 65.92% for aphids, whitefly and leafhoppers, respectively as the annual mean of percent reduction. Also results in the same table showed that the treatment of piercing-sucking pests with 2<sup>nd</sup> spray in Cucumber plants significantly affected their populations, with the highest percentage of reduction as initial effect after one day of spraying, 100.00% on all treated pests. The effect of the residual mean of the same sprayer was as follows: 63.93, 58.04, 52.66, 40.91% and 28.59% reduction on the leafhoppers, mites, thrips, whitefly and aphids numbers after 14 days of treatment. Also, the highest annual mean of reduction in pests recorded were 75.95, 72.03 and 69.11% reduction on leafhoppers, mites and thrips numbers. In case of the effect of the 3<sup>rd</sup> spray on piercing-sucking pests in Cucumis plants the results cleared that significantly affected their populations, with the highest percentage of reduction as initial effect after one day of spraying 100.00% reduction on all tested pests. The effect of the residual mean of the same sprayer were 100.00, 100.00 and 80.82% on whitefly, leafhoppers and aphids numbers.

Generally, the results showed that the highest initial reduction 100% on the tested pests was recorded on thrips and leafhoppers, followed by the high residual mean effect of the 1<sup>st</sup> spray 97.35 and 66.05% recorded on aphid and whitefly numbers on the Cucumber and the Cucumis plants, and then the effect of 2<sup>nd</sup> spray on all pests as initial effect in cucumber 100.00% reduction and 81.52% in Cucumis plants on whitefly, but in case of the effect as annual mean reduction noticed on leafhoppers on Cucumber and Cucumis plants. while the effected of the 3<sup>rd</sup> spray, the

highest initial reduction on all tested pests, but the high residual mean and annual mean recorded on whitefly and leafhoppers in Cucumber and on leafhoppers on Cucumis plants. The seasonal mean of the three sprayers on the Cucumber plants caused the highest percentage of the decrease in the number of piercing-sucking pests where it was 78.98, 78.24 and 73.85% on the thrips, leafhoppers and whiteflies in 2017 season. In the 2018 season, the highest seasonal mean of the three sprayers recorded on the Cucumis plants were 74.82, 72.18 and 66.13% on the aphids, leafhoppers and whitefly numbers.

**Table (1): Reduction percentages in piercing-sucking-pests numbers on Cucumber and Cucumis plants sprayed with different compounds as experimental program during 2017 season**

Pests	Cucumber plants														Annual mean	Seasonal mean of three sprayers	
	1 <sup>st</sup> spray					2 <sup>nd</sup> spray					3 <sup>rd</sup> spray						
	Initial day	Residual days			Annual Mean	Initial day	Residual days			Annual Mean	Initial day	Residual days					Annual mean
	1	7	14	Mean		1	7	14	Mean		1	7	14	Mean			
<i>Aphis gossypii</i>	Not found					100.00	41.17	16.00	28.59	32.39	Not found					52.39	
<i>Thrips tabaci</i>	100.00	100.00	92.06	96.03	97.33	100.00	80.32	23.00	52.66	69.11	100.00	80.89	80.75	80.82	87.21	78.98	
<i>Bemisia tabaci</i>	83.88	100.00	33.26	37.93	60.39	100.00	83.81	18.00	40.91	60.60	100.00	100.00	100.00	100.00	100.00	73.83	
<i>Empoasca spp.</i>	100.00	100.00	76.34	88.22	88.67	100.00	83.86	42.00	63.93	75.93	100.00	100.00	100.00	100.00	100.00	78.24	
<i>Neposa stridula</i>	Not found																
<i>Tetranychus cuneatus</i>	92.82	91.70	75.82	83.76	86.78	100.00	93.08	23.00	58.04	72.03	100.00	34.98	15.00	19.99	46.66	68.40	
<b>Cucumis plants</b>																	
<i>Aphis gossypii</i>	100.00	84.48	40.00	62.43	74.82	Not found					Not found				74.82		
<i>Thrips tabaci</i>	Not found					75.82	34.36	17.83	25.90	41.87	100.00	89.89	83.50	80.69	87.13	64.39	
<i>Bemisia tabaci</i>	81.32	73.83	47.42	61.34	66.95	81.32	73.65	40.11	37.88	65.76	Not found					66.13	
<i>Empoasca spp.</i>	100.00	36.50	41.26	48.88	63.92	36.50	34.14	41.26	74.71	50.63	100.00	100.00	100.00	100.00	100.00	72.18	
<i>Neposa stridula</i>	100.00	30.14	13.00	17.37	45.05	Not found					Not found				45.05		
<i>Tetranychus cuneatus</i>	90.20	38.08	37.39	37.63	53.15	28.00	13.87	13.00	13.43	18.29	62.81	36.81	34.00	33.41	44.54	39.33	

1<sup>st</sup> spray= Thiamethoxam      2<sup>nd</sup> spray = Milbemectine      3<sup>rd</sup> spray = Pyridaben

**2. Impact of the tested compounds on piercing-sucking pests during 2018 season:**

The results in Table (2) showed that the treatment of piercing-sucking pests with the 1<sup>st</sup> spray in Cucumber plants caused significantly affected their populations, with the highest percentage of reduction as initial effect after one day of spraying, 100.00% on aphids, leafhoppers, green stink bug, and mites. The highest residual mean were 100.00, 88.98 and 78.48% reduction on green stink bug, leafhoppers and thrips after 14 days of treatment. Also results cleared that the highest annual mean of reduction in pests recorded were 100.00, 92.65, 83.21 and 80.71 % reduction on green stink bug, leafhoppers, mites and aphids numbers. But in case of the effect of the 1<sup>st</sup> spray on the tested pests in Cucumis plants the highest percentage of reduction as initial effect after one day of spraying on thrips, leafhoppers and green stink bug numbers. The effect of the residual mean of the tested insecticide was as follows: 88.06 and 74.73% reduction on the thrips and leafhoppers numbers after 14 days of treatment. Also, the highest annual mean of reduction in pests recorded were 92.04 83.15 and 80.59 % for thrips, leafhoppers and green stink bug numbers. Also results in the same table showed that the effect of the 2<sup>nd</sup> spray on all treated pests in Cucumber plants significantly affected their populations, with the highest percentage of reduction as initial effect after one day of spraying, 100.00% on all treated pests except whitefly recorded 59.52 % reduction. The highest effect of the residual mean of tested compound was 100.00 % reduction on the whole pests except 32.53 % for whitefly numbers after 14 days of treatment. Also, the highest annual mean of reduction in pests recorded 100.00 % for all pests except 41.53 % for whitefly

numbers. In case of the effect of the 2<sup>nd</sup> spray on the treated pests in Cucumis plants the results cleared that significantly affected their populations, with the highest percentage of reduction as initial effect after one day of spraying on the hole pests except for whitefly and leafhoppers. Also, data cleared that the effect of the 2<sup>nd</sup> spray as the residual mean was as follows: 100.00, 93.00 and 92.00 % reduction on thrips, mites and aphids numbers after 14 days of treatment. But in the highest annual mean of reduction in pests recorded were 100.00, 95.33 and 94.67 % for thrips and mites and aphids numbers. In case of the effect of the 3<sup>rd</sup> spray on piercing-sucking pests in Cucumber plants, it caused significantly affected their populations, with the highest percentage of reduction as initial effect after one day of spraying on thrips and mites numbers in Cucumber and on thrips only on Cucumis plants. The effect of the highest residual mean after 14 days of treatment and annual mean of tested compound were 84.67 and 89.78 % & 48.95 and 65.97 % of reduction on the thrips numbers in the two crops, respectively.

Generally, the results showed that the highest initial reduction of the 1<sup>st</sup> spray recorded on the most pests, followed by the high mean of residual effect on green stink bug and thrips on the Cucumber and the Cucumis plants, and then the effect of the same sprayer on all treatment pests as initial effect in Cucumber crop, but in case of the high effect as annual mean reduction noticed on all pests except whitefly, but in case of Cucumis plants. The high annual mean recorded on thrips numbers. Mean while the treatment pests were affected at the 3<sup>rd</sup> spray, the highest initial reduction recorded on all tested pests except on the other pests, but the high mean of residual and annual mean of the 3<sup>rd</sup> spray were 89.78 and 65.97 % recorded on thrips in Cucumber and Cucumis plants. The seasonal mean of the three sprayers on the Cucumber plants caused the highest percentage of the decrease in the number of piercing-sucking pests where it was 100.00, 96.33, 86.58, 84.99 and 76.69% on green stink bug, leafhoppers, thrips and mites numbers in 2018 season. In case of Cucumis plants, the highest seasonal mean of the three sprayers recorded were 86.00, 80.59 and 80.28 % on the thrips, green stink bug and mites numbers.

**Table (2): Reduction percentages in piercing-sucking pests numbers on Cucumber and Cucumis plants sprayed with different compounds as experimental program during 2018 season**

Pests	Cucumber plants															Seasonal mean of three sprayers
	1 <sup>st</sup> spray				Annual Mean	2 <sup>nd</sup> spray				Annual Mean	3 <sup>rd</sup> spray				Annual Mean	
	Initial day	Residual days				Initial day	Residual days				Initial day	Residual days				
	1	7	14	Mean		1	7	14	Mean		1	7	14	Mean		
<i>Aphis gossypii</i>	100.00	82.71	59.43	71.07	80.71	100.00	100.00	100.00	100.00	100.00	67.94	39.84	20.33	40.09	49.37	76.69
<i>Thrips tabaci</i>	52.96	100.00	56.96	78.48	69.97	100.00	100.00	100.00	100.00	100.00	100.00	100.00	69.33	14.67	19.78	86.58
<i>Bemisia tabaci</i>	59.21	36.16	9.77	22.97	35.05	56.52	45.23	19.85	32.53	41.53	18.57	13.81	2.55	8.18	9.77	28.78
<i>Empoasca spp.</i>	100.00	100.00	77.96	88.98	92.65	100.00	100.00	100.00	100.00	100.00	Not found				96.33	
<i>Necora striolata</i>	100.00	100.00	100.00	100.00	100.00	Not found				Not found				100.00		
<i>Leptocorpus carinae</i>	100.00	92.71	56.93	74.82	83.21	100.00	100.00	100.00	100.00	100.00	100.00	100.00	12.34	57.67	71.78	84.99
<b>Cucumis plants</b>																
<i>Aphis gossypii</i>	63.88	27.43	4.45	16.04	32.65	100.00	100.00	84.00	92.00	94.67	20.61	18.57	13.52	16.03	17.37	48.29
<i>Thrips tabaci</i>	100.00	88.87	87.25	88.06	92.04	100.00	100.00	100.00	100.00	100.00	100.00	60.29	37.61	48.95	65.97	86.00
<i>Bemisia tabaci</i>	82.66	31.17	22.66	26.92	43.49	96.87	82.03	59.91	66.47	77.30	51.81	14.94	2.23	8.59	22.86	48.32
<i>Empoasca spp.</i>	100.00	100.00	49.46	74.73	83.15	14.69	11.00	6.00	8.50	10.33	Not found				46.74	
<i>Necora striolata</i>	100.00	100.00	41.77	70.89	80.59	Not found				Not found				80.59		

1<sup>st</sup> spray = Thiamethoxam      2<sup>nd</sup> spray = Milbemectine      3<sup>rd</sup> spray = Pyridaben

**3. Impact of the tested compounds on associated predators during 2017 season:**

The results that in Table (3) showed that the effect of the 1<sup>st</sup> and 2<sup>nd</sup> spray on the numbers of predators on the Cucumber and Cucumis plants, where the highest reduction percentages were found after one day of treatment, 100.00 % reduction in all predators except the true spiders recorded 55.55% reduction in Cucumis plant in season 2017. It was also found that the highest residual mean reduction of the 1<sup>st</sup> spray were 44.04 and 31.53% on ladybird beetle and the true spiders on Cucumber and Cucumis plants. The highest residual mean reduction in the number of predators due to the treatment of the 1<sup>st</sup> spray recorded 62.69 % on ladybird beetle and 39.54% on the true spiders. The highest percentage of the 2<sup>nd</sup> spray as initial reduction was 100.00 % recorded after one day of spraying on all predators on the two crops. On the other hand, it was found that the highest residual mean and annual mean of reduction of the 2<sup>nd</sup> spray was 62.50 and 44.12 % & 75.00 and 62.71 % on ladybird beetle and the true spider numbers on the two crops. The results showed that predators were significantly affected by the 3<sup>rd</sup> spray in the Cucumber plants and recorded the highest rate of the remaining effect and the highest residual mean and annual mean of reduction recorded on all predators on the two crops. While in Cucumis plants the highest annual mean was 100.00 % recorded on ladybird beetle.

Generally, the all tested compounds were reduced the numbers of all investigated pests with varying in percentages which differed from crop to another. The highest initial effect for the 1<sup>st</sup> and the 2<sup>nd</sup> spray recorded on ladybird beetle and true spiders numbers in Cucumber plants. The three inspected predators were found more sensitive to the 3<sup>rd</sup> spray recorded throughout the whole examination periods. Also, the high annual mean was recorded on all predators in Cucumber plants and only on lady bird beetle in Cucumis plants. The seasonal mean of the three sprayers on the Cucumber plants caused the highest percentage of the decrease in the number of predators where it was 100.00, 79.23 and 70.37 % & 85.21, 66.11 and 63.02 % on aphid lion, lady bird beetle and true spider numbers in 2017 season in the two crops.

**Table (3): Reduction percentages in insect predators numbers on Cucumber and Cucumis plants sprayed with different compounds as experimental program during 2017 season**

Treatments	Cucumber plants															Seasonal mean of three sprayers
	1 <sup>st</sup> spray				Annual Mean	2 <sup>nd</sup> spray				Annual Mean	3 <sup>rd</sup> spray				Annual Mean	
	Initial day	Residual days				Initial day	Residual days				Initial day	Residual days				
	1	7	14	Mean	1	7	14	Mean	1	7	14	Mean				
<i>Coccinella spp.</i>	100.00	48.69	39.39	44.04	62.69	100.00	100.00	25.00	62.50	75.00	100.00	100.00	100.00	100.00	100.00	79.23
<i>Chrysoperla &amp; coccin.</i>	Not found				Not found				100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<i>True spiders</i>	100.00	55.60	28.00	41.80	63.20	100.00	34.76	15.00	24.88	49.92	100.00	100.00	100.00	100.00	100.00	70.37
<b>Cucumis plants</b>																
<i>Coccinella spp.</i>	100.00	11.14	7.14	9.14	39.43	100.00	41.18	35.53	38.36	58.90	100.00	100.00	100.00	100.00	100.00	66.11
<i>Chrysoperla coccin.</i>	Not found				Not found				100.00	100.00	55.37	77.87	85.12	85.12	85.12	85.21
<i>True spiders</i>	55.55	53.10	100.00	100.00	39.54	100.00	78.54	9.59	44.12	62.71	100.00	100.00	60.47	86.24	96.82	63.02

1<sup>st</sup> spray = Thiamethoxam      2<sup>nd</sup> spray = Milbemectine      3<sup>rd</sup> spray = Pyridaben

**4. Impact of the tested compounds on associated predators during 2018 season:**

The results that in Table (4) showed the effect of the 1<sup>st</sup> spray, the 2<sup>nd</sup> spray and the 3<sup>rd</sup> spray on the predators in the Cucumber and Cucumis plants, where the highest reduction percentages were found after one day of treatment, 100.00 % reduction were recorded on all predators after one day of treatment in the two crops. The high residual mean after 14 days of treatments were 92.00 and 78.39 & 94.67

and 85.59 % recorded on ladybird beetle and true spider numbers in Cucumber and Cucumis plants., also data revealed that the highest residual mean of reduction were 93.00 and 81.00 % & 95.33 and 87.33 % recorded on aphid lion and ladybird beetle on the two crops. The results showed that predators were significantly affected by the 3<sup>rd</sup> spray in the Cucumber plants and recorded the highest rate of the remaining effect and recorded 62.50 and 100.00 % & 75.00 and 100.00 % on ladybird beetles in the two crops tested, respectively.

Generally, the all tested compounds were highly decreased all associated predators with varying in reduction percentages differed from crop to another. The highest initial effect of 100.00% reduction was recorded on ladybird beetle, aphid lion and true spider numbers for the 1<sup>st</sup> spray and 2<sup>nd</sup> spray in Cucumber and Cucumis plants. The seasonal mean of the three sprayers on the Cucumber plants caused the highest percentage of the decrease in the number of predators where it was 89.67, 84.78 and 79.17 % on aphid lion, lady bird beetle and true spider numbers in Cucumber plant. While in case of the effect of three tested sprayers on predators in Cucumis plants were 89.25, 57.75 and 47.79 % reduction on lady bird beetle, aphid lion and true spider numbers.

**Table (4): Reduction percentages in insect predators numbers on Cucumber and Cucumis plants sprayed with different compounds as experimental program during 2018 season**

Treatments	Cucumber plants														Annual Mean	Seasonal mean of three sprayers
	1 <sup>st</sup> spray					2 <sup>nd</sup> spray					3 <sup>rd</sup> spray					
	Initial day			Residual days		Mean	Annual Mean	Initial day			Residual days		Mean	Annual Mean		
	1	7	14	Mean	Annual Mean			1	7	14	Mean	Annual Mean				
Predators																
Coccinella spp.	100.00	100.00	84.00	92.00	94.67	100.00	100.00	84.00	77.00	84.67	100.00	71.00	92.00	62.50	62.50	84.78
Chrysopa carnea	100.00	100.00	52.00	76.00	84.00	100.00	100.00	86.00	93.00	95.33	Not found				89.67	
True spiders	100.00	74.00	23.00	48.50	65.67	100.00	100.00	78.00	89.00	92.67	Not found				79.17	
	Cucumis plants															
Coccinella spp.	100.00	95.00	46.25	70.63	80.42	100.00	100.00	62.00	81.00	87.33	100.00	100.00	100.00	100.00	100.00	89.25
Chrysopa carnea	100.00	45.21	25.31	35.26	60.16	Not found				100.00	100.00	56.00	78.00	85.33	73.75	
True spiders	100.00	100	56.77	78.39	85.59	Not found				100.00	100.00	71.00	85.50	90.00	47.79	

1<sup>st</sup> spray= Thiamethoxam      2<sup>nd</sup> spray = Milbemectine      3<sup>rd</sup> spray = Pyridaben

## DISCUSSION

This study was carried out in order to evaluate the efficacy of pesticides in special sequence against piercing-sucking pests and the side effect of tested compounds on main associated natural predators. The previous suggests indicated that Acetamiprid (Samprid), a neonicotinoid pesticide was highly effective against whiteflies and aphids (Zabel *et al.*, 2001); also, other study mentioned that the *B.tabaci* were differed in susceptibility to the neonicotinoid insecticides, Acetamiprid, and Thiamethoxam in Cucumis melo fields (Dennehy *et al.*, 2010). In field studied the treated whitefly and some lepidopteran using Acetamiprid and Thiamethoxam caused more effect (Horowitz *et al.*, 2004). All neonicotinoid insecticides are effective against piercing-sucking insects such as aphids, whiteflies and plant hoppers (Elbert and Nauen 1998; Elbert *et al.*, 2000). In the same trend the earlier studies stated that compatibility of Emamectin benzoate had harmful effect on predatory *Orius laevigatus* in field trials and *C. carnea* in semi-field studies at the highest recommended concentration (Fermin, *et al.*, 2012). Also, each of (Nauen and Bretschneider 2002) and (Torres and Ruberson 2004) recorded that Thiamethoxam

can be more successful against whiteflies and aphids. In related study, Abamectin had toxic effect against eggs and females of the spider mite, *T. urticae* and females adult. The effect of neonicotinoid insecticides, Acetamiprid, Imidacloprid and Thiamethoxam on immature stages and adults of *B. tabaci* was high on cucumber *C. sativus* under field conditions, while the side effect was significantly lower on *C. undecimpunctata* and *C. carnea*. Therefore, the tested neonicotinoids could be considered promising candidates in controlling whitefly with a lower effect on their predators (Wafaa AL-Kherb, 2011). Each of (Fermin *et al.*, 2012 and Ahmad and Akhtar 2013 and kumara *et al.*, 2016) tested the effect of the neonicotinoids compound Thiamethoxam against Cabbage aphid, *Brevicoryne brassicae* in Pakistan and mentioned that under heavy infestations the application of insecticides having very low effectiveness against aphids. (Marilina *et al.*, 2013) revealed that a high toxicity of Acetamiprid on immature stages of *Eriopsis connexa* a native *coccinella* predator and could also likely using IPM programs for control aphids and wheelies. Also found neonicotinoid applied on vegetable crops and Acetamiprid, and caused effect on immature stages of *E. connexa* eggs and larvae, respectively. The impact of Thiamethoxam caused high effect on the whitefly in Cucumber and Cucumis crops. In field trails, the efficacy of seven acaricides with their distinctive modes of action against the two-spotted, *T. urticae*, Pyridaben decreased the adults and immature of *T. urticae*. At one week post-treatment, Abamectin reduced the immatures up to two weeks post-treatment. Field trails recorded the effect of neonicotinoid caused highly affect *A. gossypii* population in cucumber, the insecticide use reduced *A. gossypii* numbers. (Pan *et al.*, 2013); (Matsuura and Masakazu 2014); (Niu *et al.*, 2014) and (Yao *et al.*, 2015). Field experiments indicated that Thiamethoxam used for control of *B. tabaci* in integrated pest management (IPM). Also, stated that the efficacy of the neonicotinoid insecticides Imidacloprid (Nufidor) and Thiamethoxam against three wheat aphids: *Rhopalosiphum padi*, *Schizaphis graminum* and *R. maidis* and their effects on the *C. carnea* and *Coccinella* spp. were assessed. Significant differences found between the tested insecticides and the recommended doses of all insecticides were more efficient against aphids on wheat plants. Also, found the weekly reduction of infestation was higher at the recommended doses of each tested insecticide. The reduction in infestation noticed until the 8<sup>th</sup> week, while Actara, no significant differences between treatments in *C. carnea* and recorded a significant difference in *coccinella*. Thiamethoxam caused significant effect in the ladybird beetles population on wheat plants 3, 4, 7 and 8 weeks before application. Also, found the effect of Thiamethoxam, Imidacloprid and Acetamiprid in *C. sativus* plants, reduce population of whitefly, thrips, aphid and red mite (Mahmoud *et al.*, 2017) and Mona *et al.*, (2017).

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## ARABIC SUMMERY

كفاءة بعض مبيدات الآفات ضد الآفات الثاقبة الماصة والمفترسات المصاحبة لها على نباتات الخيار والقثاء في محافظة الشرقية-مصر

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أجريت التجارب الحقلية في قرية شوبك-بسطا بمحافظة الشرقية ، مصر على محصولي الخيار والقثاء لدراسة تأثير مبيدات الآفات (ثياميثوكسام ، ميلبمكتين وبيريدايين) ضد الآفات الثاقبة الماصة (المن ، التربس ، الذبابة البيضاء ، نطاطات الأوراق والبقة الخضراء ، بالإضافة إلى أكاروس العنكبوت الأحمر وكذلك لدراسة التأثيرات الجانبية ضد المفترسات المصاحبة لها ،خنافس ابو العيد ، أسد المن و العناكب الحقيقية خلال موسمين ٢٠١٧ و ٢٠١٨ على التوالي ، وقد أظهرت النتائج أن المركبات المختبرة سجلت أعلى نسبة إبادة أوليه ١٠٠,٠٠٪ لمركب ثياميثوكسام ( رشه اولي) وكان أكثر فعالية على التربس ، نطاطات الأوراق والبقة الخضراء والأكاروسات خلال موسمي الدراسة على نباتات الخيار والقثاء بينما كان مركب ميلبمكتين ( رشه ثانيه) أكثر فعالية على كل الآفات حيث أعطى أعلى إبادة أوليه في الحشرات الثاقبة على كلا المحصولين ، بينما اختلف متوسط الخفض السنوي وفقا للمحصول والآفة خلال موسمي الدراسة. ووجد أيضا أن مركب بيريدابين ( رشه ثالثه) كان له تأثير كبير على الآفات المختبرة وعلى المحصولين وأوضحت النتائج أن متوسط الخفض السنوي للرشات الثلاثة هي ٩٧,٣٥ ، ٧٥,٩٥ ٪ على التربس ونطاطات الأوراق في الرش الأولي والثانيه و ١٠٠,٠٠ ٪ على الذبابة البيضاء ونطاطات الأوراق في الرش الثالثه على نبات الخيار بينما على نباتات القثاء كان أعلى متوسط للخفض السنوي للمبيدات المختبره ٧٤,٨٢ ، ٦٥,٧٦ ٪ على حشرات المن والذبابة البيضاء في الرش الأولي والثانيه و ١٠٠,٠٠ ٪ على نطاطات الاوراق في الرشة الثالثه في موسم ٢٠١٧ . كما شاربت النتائج ان متوسط الخفض السنوي للرشات الثلاث هي ١٠٠,٠٠ ٪ في الرش الاولى على البقه الخضراء ، ١٠٠,٠٠ في الرش الثانيه على المن ، التربس نطاطات الاوراق والاكاروسات وفي الرش الثالثه سجل أعلى متوسط خفض سنوي ٨٩,٧٨ ٪ على التربس في موسم ٢٠١٨ على نبات الخيار. وفي حاله تأثير الرشات الثلاثة على الحشرات الثاقبه الماصه في محصول القثاء وجد أن أعلى متوسط للخفض السنوي ٩٢,٠٤ ، ١٠٠,٠٠ و ٦٥,٩٧ ٪ للرشات الثلاثة على التربس . أشارت النتائج أن متوسط الخفض السنوي للمبيدات الثلاثة المختبره كان ٦٢,٦٩ و ٧٥,٠٠ ٪ لكل من خنافس أبو العيد في الرش الأولي والثانيه و ١٠٠,٠٠ ٪ على جميع المفترسات في الرش الثالثه في نباتات الخيار بينما في محصول القثاء سجل أعلى متوسط خفض سنوي ٣٩,٥٤ ، ٦٢,٧١ ٪ على العناكب الحقيقية في الرشات الأولي والثانيه و ١٠٠,٠٠ ٪ في الرش الثالثه على خنافس ابو العيد في موسم ٢٠١٧ . في موسم ٢٠١٨ أشارت النتائج إلى أن متوسط الخفض السنوي في الرش الأولي والثالثه هو ٩٤,٦٧ و ٧٥,٠٠ ٪ على خنافس أبو العيد بينما في الرش الثانيه كان أعلى متوسط للخفض السنوي ٩٥,٣٣ ٪ على أسد المن في نباتات الخيار. ولكن في حالة نباتات القثاء سجل أعلى متوسط للخفض السنوي ٨٥,٥٩ ٪ في الرش الاولى على العناكب الحقيقيه و ٨٧,٣٣ و ١٠٠,٠٠ ٪ في الرش الثانيه والثالثه على خنافس ابو العيد. أوضحت النتائج أن المتوسط الموسمي للخفض في الرشاشات الثلاثة على نباتات الخيار والقثاء ١٠٠,٠٠ و ٧٩,٢٣ و ٧٠,٣٧ ٪ و ٨٥,٢١ و ٦٦,١١ و ٦٣,٠٢ ٪ على أسد المن وخنافس ابو العيد والعناكب الحقيقيه في موسم ٢٠١٧ . أوضحت النتائج أن المتوسط الموسمي للخفض في الرشاشات الثلاثة على نباتات الخيار ٨٩,٦٧ ، ٨٤,٧٨ و ٧٩,١٧ ٪ على أسد المن وخنافس أبو العيد والعناكب الحقيقيه في موسم ٢٠١٨ . بينما سجل المتوسط الموسمي للخفض للثلاثة رشات على المفترسات في نباتات القثاء ٨٩,٢٥ ، ٧٥,٧٥ و ٤٧,٧٩ ٪ على خنافس أبو العيد، أسد المن و العناكب الحقيقيه في موسم ٢٠١٨ .