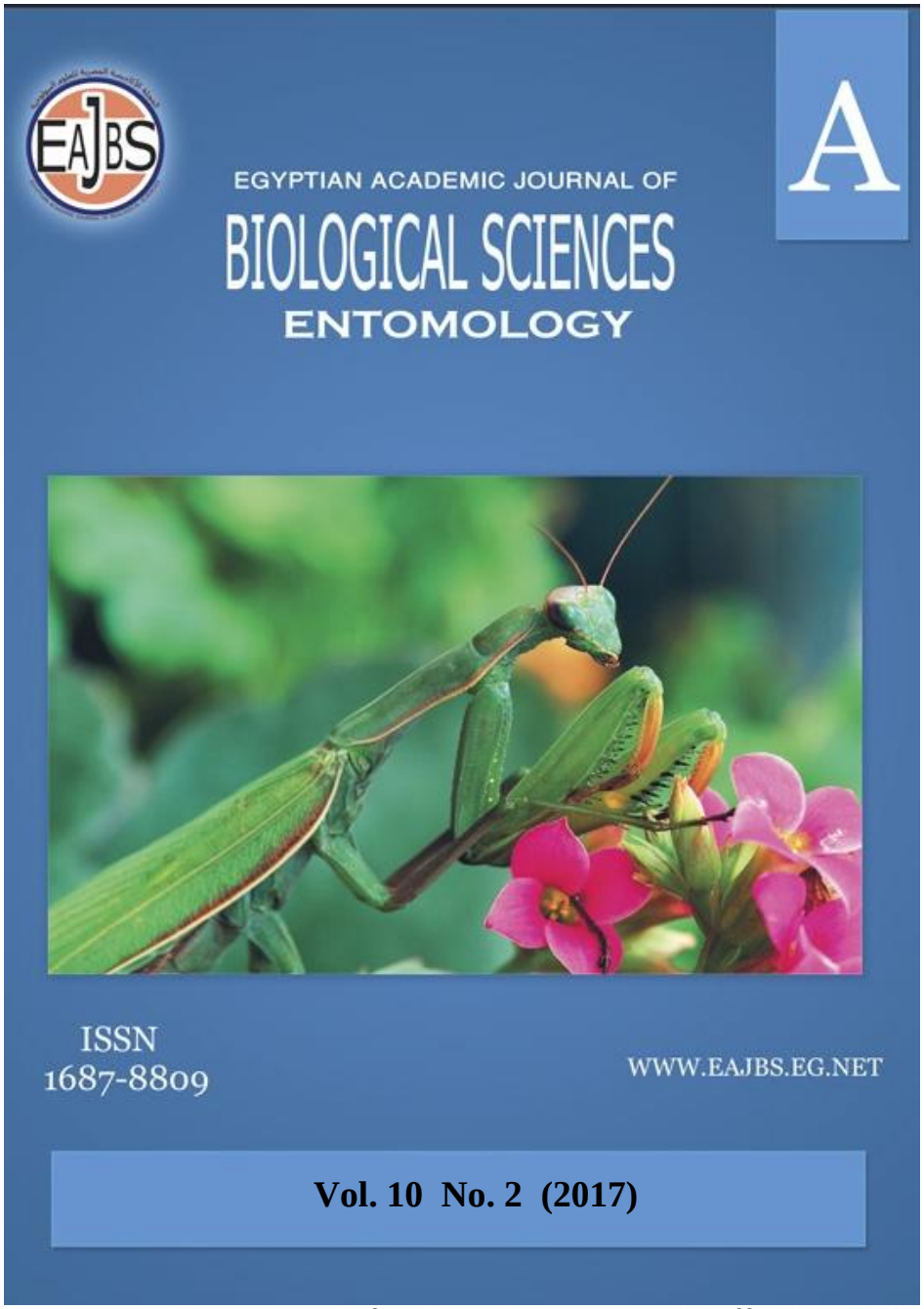

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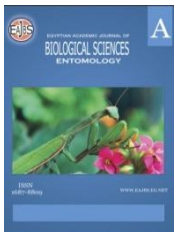

Effect of Some Bio- insecticides against *Tetranychus urticae* Koch

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ABSTRACT

Efficacy of fife bio-insecticides against *Tetranychus urticae* Koch. The most effective for controlling *T. urticae* , Marshal, followed by the botanical insecticide, Bemistop, Biosect, Admiral and Vertimec .Results revealed that, the addition of Marshal, at its half-recommended rate to Vertimec and/or Bemistop at two application rates had increased obviously their toxicity against and *T. urticae*. Than separately, and exhibited an additive effect at the two sprays. In addition, results obtained from addition of the botanical compound, Vertimec at 200 and 100 cm^3/100L. to Admiral at its recommended and half-recommended rate at the two sprays increased its effectiveness than separately and induced an additive effect at two sprays with the two application rates. This increase was determined and termed as additive effect in which the total mortality of the combination is higher than the mortality of summation of each compound respectively.

INTRODUCTION

The spider mites are plant feeders of considerable economic importance, infesting almost major vegetable and fruit crops , Safaa and Halloum(2012). They usually feed on the leaves injuring the epidermis resulting in blotching, stippling or bronzing and sometimes even accompanied by leaf full. Majority of them are poly phages and have a wide rang of hosts. Some of the species are known to be of great economic importance as *Tetranychus urticae* Koch. They cause many indirect damages by transmitting several microorganisms such as viral and fungal pathogens Nicoli (1997) ; Nasser,*et al*(*2002*) Vishwanath, and Singh, (2003):. The present works include the efficiency of new control measures of potato spider oregano phosphorus compound, Marshal 25%wp., the two botanical insecticides (Marshal 0.15% & Bemistop 21.1% EC.), the bioinsecticide, Biosect 32 x 10^6 conidia/mg *(Beauveria bassiana*) and the insect growth regulator, Admiral 10% EC. (Pyriproxyfen).

MATERIAL AND METHODS

Tetranychus urticae Koch.**,** was done by choosing 10 random inches per replicate.

The percentage of population reduction (% mortality) was calculated according the equation of Hinderson and Tilton (1955) as follow:

$$\text{Reduction (\% mortality)} = \left[\left(\frac{C_b}{C_a} \quad \frac{T_a}{T_b}\right) \quad X \quad -1\right] X\ 100$$

While, to evaluate the effect of different pairs of insecticides used here, the following

equation was used:

$$\text{Co-toxicity factor} = \frac{\text{Observed \% mortality} - \text{Expected\% mortality}}{\text{Expected\%Mortality}} \times 100$$

This factor was used to differentiate the results into three categories. A positive factor of 20 or more meant potential, a negative factor of 20 or more meant synergistic, and any intermediate value (i.e., between –20 and +20) was considered only additive effect.

The expected mortality for the mixture of 2 insecticides was the sum of the expected mortalities of each of dosage used in the combination, (After, Mansour *et al*., 1966).

Treatment procedures:

The area of this experiment was divided into 54 equal replicates of about 15 m^2 each. The experimental replicates were arranged in complete randomized design with three replicates for each treatment. All agricultural practices were run in this experiment except for the studied variant.

Application concentrations:

1- Marshal at 75 cm^3 and 37.5 cm^3/100L.
2. a- Vertimec at 200 cm^3 and 100 cm^3/100L.
2. b- Bemistop at 500 cm^3 and 250 cm^3/100L.
3- Biosect at 200 gm. and 100 gm. /100L.
4- Admiral at 300 cm^3 and 150 cm^3/100L.
5- Combinations of the chemical compounds used:
5. a- Marshal at 37.5 cm^3/100L. plus Vertimec at 200 cm^3/100L.
Marshal at 37.5 cm^3/100L.plus Vertimec at 100 cm^3 / 100L.
Marshal at 37.5 cm^3 / 100L. plus Bemistop at 500 cm^3 /100L.
Marshal at 37.5 cm^3/100L. plus Bemistop at 250 cm^3/100L.
5. b- Vertimec at 200 cm^3/100L. plus Admiral at 300 cm^3/100L.
Vertimec at 100 cm^3/100L.plus Admiral at 300 cm^3l100L.
Vertimec at 100 cm^3/100L.plus Admiral at 150 cm^3/100L.
6-Control, water used without any insecticides.

By using a knapsack sprayer (20 liters) the compounds were sprayed; the sprayer was filled with the prepared concentrations just before each treatment.

RESULTS AND DISCUSSION

The effects of mixtures of the botanical insecticide, Vertimec 0.15% at (high, 200 cm^3 and low application rate, 100 cm^3/100 L.) and/or Bemistop 21.1% at (high, 500 cm^3 and low application rate, 250 cm^3/100L.) plus Marshal 25% at its half recommended rate (75 cm^3 and 37.5 cm^3/100L.), also mixtures of the insect growth regulator, Admiral 10% at (high, 300 cm^3 and low application rate, 150 cm^3/100L.) plus Vertimec 1.8 % against *Tetranychus urticae* Koch., during 2014 and 2015seasons are presented in Tables (1 and 2).

Data of the first spray in Table (1) showed that, the averages number of *T. urticae* were reduced evidently after the following 3 days from spraying as compared with the control to reach (20.0, 185.0), (15.5, 100.0) and (46.0, 61.0 and 200.0 individuals/10 inches) on the 3rd day post-treatment for the mixture of Marshal plus Vertimec at (200, 100 cm^3/100 L.), mixture of Marshal plus Bemistop at (500, 250 cm^3/ 100 L.) and mixture of Vertimec at (200, 100 cm^3/100 L.) plus Admiral at (300, 300 and 150 cm^3/100 L.), respectively. The corresponding reduction rates were (95.9,

70.6), (95.3, 84.1) and (92.3, 86.3 and 67.1%) for various combinations, respectively.The averages reduction rates of *T. urticae* population of various combinations during the 1st spray reached (77.9, 50.4), (84.4, 67.4) and (73.2, 66.1 and 49.1%) for various treatments, respectively. Values of the general means of *T. urticae* population showed a significant decrease in all treatments as compared with the control.

Table 1: Co-toxicity resulted from addition of Marshal at its half-recommended rate to the botanical insecticides (Vertimec /or Bemistop) for *Tetranychus urticae* Koch.

Application rate(cm^3/100 L.)		**% Mortality after 3 days from treatment**			**Co-toxicity factor**	**Type of joint action**
		Marshal **alone**	**Botanical Insecticide alone**	**Botanical insecticide** + Marshal		
		Expected mortality		*Observed mortality*		
Vertimec 0.15 % EC.						
1st spray	200	69.1	89.5	96.0	-4.0	d
	100		72.1	79.0	-21.0	a
2nd spray	200	76.2	81.6	95.9	-4.1	d
	100		77.1	70.6	-29.4	a
Bemistop 21.1% EC.						
1st spray	500	69.1	88.6	95.6	-4.4	d
	250		69.7	82.6	-17.4	d
2nd spray	500	76.2	83.2	95.3	-4.7	d

a: antagonistic effect (-20 or more) d: additive effect (between –20 & +20).

Table 2: Co-toxicity resulted from addition of Vertimec at 200 and 100cm^3/100L to Admiral at two rates for *Tetranychus urticae* Koch.

Application rate (cm^3/100 L.)		**% Mortality after 3 days from treatment**			**Co-toxicity factor**	**Type of joint action**
		Vertimec alone	**Admiral alone**	**Admiral + Vertimec**		
		Expected mortality		*Observed mortality*		
At 200cm^3/100L						
1st spray	300	89.2	96.4	95.7	-4.3	D
2nd spray	300	81.6	88.0	92.3	-7.7	D
At 100cm3/100L.						
1st spray	300	72.1	96.4	83.6	-16.4	D
	150		72.1	59.1	-40.9	A
2nd spray	300	77.1	88.0	86.3	-13.7	D
	150		67.1	67.1	-32.9	A

On the other hand, the 2nd spray Table (2) showed the same trend as indicated in the 1st spray.Co-toxicity resulted from addition of the organ phosphorus compound, Marshal to the two botanical insecticides, Vertimec and Bemistop against *T. urticae* during the season of 2014 and2015 were presented in Table (1), also co-toxicity resulted from addition of the botanical compound, Vertimec to the Admiral were summarized in Table (2). Results indicated that, addition of insecticide, Marshal at its half recommended rate to Vertimec at its high application rate induced an additive effect while, at its low application rate induced an antagonistic effect where, the high application rate of Vertimec plus Marshal increased the toxicity of the combination against *T. urticae* than separately at the two sprays. Whereas, the

addition of the insecticide, Marshal at its half recommended rate to Bemistop at its high and low application rate induced an additive effect at the two sprays.

Also, results obtained of addition of the botanical compound, Vertimec at its high and low application rate, (200 & 100cm^3) to Admiral at its recommended rate at the two sprays, Table (2) induced an additive effect. Thus, the joint action of the two compounds in the mixtures was more effective against the tested pest than each compound alone. But, an antagonistic effect was obtained from the same combination at the low application rate of Vertimec and low application rate of Admiral.

In this respect, El-Lakwah *et al.* (1996) studied the efficiency of Acetone and Petroleum ether extracts of *Lantana camara* and *Nerium oleander* alone and in mixtures with the LC_{50} of Pirimiphos methyl and/or Fenvalerate. Results of co-toxicity factor values for *R. dominica* showed that, all Pirimiphos methyl and *L. camara* Acetone extracts mixtures resulted in a pronounced additive effect, while in case of *N. oleander* the combinations induced an antagonistic effect. The mixtures of Pirimiphos methyl plus *L. camara* Petroleum ether extracts produced additive effect at 1 and 16% concentrations and synergistic effect at 2, 4 and 8% concentrations. while in case of *N. oleander* plus Pirimiphos methyl mixtures an obvious antagonistic effect was shown. Mixtures of the LC_{50} of Fenvalerate plus Acetone or Petroleum ether extracts of *N. oleander* or *L. camara* resulted in a pronounced antagonism at all concentrations.

El-Lakwah *et al*. (1997) revealed that, Pirimiphos-methyl plus extract of *Nerium oleander* and *Lantana camara* in Acetone showed a potentiating action with *Tribolium castaneum*. Also, co-toxicity factor values in case of Pirimiphos-methyl plus Petroleum ether extract of the plant indicated an additive effect at 8 and 16% concentrations, and a pronounce antagonism at 1, 2 and 4% concentrations of *L. camara* Petroleum ether extracts plus Pirimiphos-methyl. Combinations *N. oleander* extracts and the insecticide mixtures produced an additive effect. Results concerning co-toxicity factor values for *T. castaneum* with the mixtures of Fenvalerate plus Acetone or Petroleum ether extract of the plants showed clearly antagonistic effects.Mohamed (1997) stated that, co-toxicity factor values showed a pronounce synergistic effect for the combination of datura (*Datura stramonium*) extract in Petroleum ether plus Malathion and an additive effect for the mixture of datura in Ethyl alcohol plus Malathion. Meanwhile, mixtures of datura in Acetone plus Malathion exhibited a synergistic effect at higher concentrations and an additive effect at low concentrations (1.25 & 2.5%).El-Lakwah *et al*. (1998) reported that, addition of Chlorpyrifos-methyl to the plant extract (datura leaves and black pepper seeds) or Neemazal-T increased its effectiveness against cabbage aphid, *Brevicoryne brassicae* L. (adult and immature stages), cabbage butterfly, *Pieris brassicae* L. (larvae) and diamondback moth, *Plutella maculipennis* (larvae) and induced an additive effect. This result indicates that the joint action of the two compounds in the mixture was more effective against the population of the tested insects than the compound alone. El-Lakwah and Mohamed (1999) investigated the toxic effects of datura (*Datura stramonium*) fruit extracts in Acetone, Petroleum ether and Ethyl alcohol alone and in combination with the LC_{50} of Malathion on mortalities of the cowpea beetle, *Callosobruchus maculatus* (F). Results of co-toxicity factor values revealed a pronounced additive effect at all tested concentrations for the mixtures of plant Acetone extract and plant Petroleum ether extract plus Malathion. But, in case of the Ethyl alcohol plant extract plus insecticide, a pronounced synergistic effect at higher concentrations (5 & 10%) and an additive effect at the two lower concentrations (1.25 & 2.5%), were achieved.

El-Lakwah *et al.* (1999) revealed that, co-toxicity resulted from addition of the LC_{50} of Malathion to Neemazal-W (powder contains 10% Azadirachtin) indicated an additive effect with the cowpea weevil, *Callosobruchus maculatus* (F). at 50, 100, 250, 500 and 1000 ppm.

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ARABIC SUMMERY

تأثير بعض المبيدات الطبيعية والمخلقة على أكاروس العنكبوت الأحمر *Tetranychus urticae* Koch.

نفين فوزى عرفات

معهد بحوث وقاية النبات – مركز البحوث الزراعية الدقى- مصر

تأثير بعض المبيدات الطبيعية ومبيد المارشال ضد اكاروس العنكبوت الأحمر وأظهرت النتائج أن المارشال أعلى فاعلية يليه البيموستوب ثم البيوسكت ثم الادميرال ثم الفيرتمك.

وايضا أضافة مبيد المارشال الى نصف المعدل للفيرتميك و البيموستب أعطت أعلى نتائج عن المركبات الطبيعية بدون المبيد خلال الرشتين على التوالى.