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SUITABILITY OF SOME NATURAL AND MINERAL OILS AS PESTICIDAL SYNERGISTS AGAINST *APHIS GOSSYPII* GLOVER.

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Abstract

The present study was carried out to evaluate the efficiency of five insecticides, two oils and their combinations against cotton aphids. The results showed that carbosulfan was the most effective insecticide when was used at the recommended rate.

Combinations of half the recommended rates between M.V. oil and the insecticides, malathion, pirimiphos-methyl, lambdacyhalothrin and carbosulfan produced above 90% mortality. On the other hand, monocrotophos when was combined with the M.V. oil at the above mentioned rate produced only 82.5 % mortality. Similar findings were also observed when tar oil was mixed with pirimicarb at the same rate, however, mortality was further improved when the rate of mixing was reduced to one fourth of the recommended rate.

INTRODUCTION

Mineral oils play an important role in enhancing the efficiency of insecticides. Several investigators have found that when mineral oils are used in combination with insecticides increased their efficiency on the cotton leafworm *Spodoptera littoralis* Boisd. (Darwish 1987; Zidan *et al.*, 1987; Abdel-Megeed *et al.*, 1984-1985, Moustafa and El-Attal 1985, and El - Attal *et al.*, 1983). Similar results were also obtained by Moustafa and El - Attal (1985) on thrips and El-Deeb *et al.*, (1989) on the apricot aphid *Hyalopterus pruni* Geoffry.

The aim of the present work is to study the role of oils in reducing the rates of field application of aphicides against the cotton aphid *Aphis gossypii* Glover.

MATERIALS AND METHODS

Insecticides

The insecticides used were:

Monocrotophos (Nuvacron) 40 % EC at 400 ml/f

Primiphos-methyl (Actellic) 50% EC at 1 l /f

Malathion (Malathion) 57% EC at 1 l /f

Lambda-cyhalothrin (Kendo) 5% EC at 400 ml /f

Carbosulfan (Marchal) 25% WP at 600 gm/f

Tar oil

Special fraction is provided by Egyptian Coke Co. and formulated as 95% EC in the Central Agricultural Pesticides Laboratory, Ministry of Agriculture, Dokki, Egypt (Osman, 1991).

Modified vegetable oil

A sample of vegetable oil is chemically modified and formulated as 50% EC in the Central Agricultural Pesticides Laboratory.

The recommended rate of field application for each oil was 3 l/f

Three dilutions from each insecticide were prepared in water based on the recommended field rate then diluted into half and one fourth of that rate. Similar dilutions were also made for both oils. The mixture between insecticides and oils was used at concentrations corresponding to half and one fourth of the recommended rates.

Insecticidal test

Cotton leaves infested with aphids were collected from cotton fields at Dakahlia Governorat. Slide- dip technique was used to evaluate the toxicity of the tested materials against the adult stage of aphids, *Aphis gossypii* Glover. Ten adults were affixed to double faced scotch tape (using a fine brush) and stuck tightly to the slide on their dorsal side. The slides were then dipped in the prepared insecticide - water solutions for ten seconds. Each treatment was replicated four times. The same technique was used with the control treatment using water only.

Natural mortality was corrected according to Abbott's formula (Abbott, 1925). Mortality count was recorded two hours after application, and all insects responded to touching with the fine brush were considered alive.

RESULTS AND DISCUSSION

Toxicity of insecticides, oils and their combinations are presented in Table 1. Based on the recommended concentrations, carbosulfan was the most effective against *A. gossypii*, while the other insecticides showed moderate toxicity.

Reducing the concentrations to half and one fourth of the recommended rate produced poor toxicity. The only exception was carbosulfan which produced 75% mortality at half the recommended concentration.

All combinations between insecticides and the oil M.V.O. showed high toxicity. On the other hand, primiphos-methyl/M.V.O. mixture at the lower rate produced low mortality (22.5%) . As for the mixtures of Tar oil with insecticides, only the mixture carbosulfan/Tar oil showed increasing toxicity , while Malathion/Tar oil at half the recommended rate reduced the toxicity. A slight increase in toxicity was also observed for the other mixtures.

El-Deeb *et al.* (1989) found that the wettable powder primiphos-ethyl was highly synergised by Shokrona Super and moderately synergised by Star oil, however the three mineral oils antagonized all other chemicals formulated as emulsifiable concentrations when tested against the apricot aphid, *Hyalopterus pruni* Geofry. Also , Omar *et al.*, (1987) found that mineral oils improve the efficiency of insecticides used against thrips and aphids on tomato.

Table 1. Joint action of Tar and modified vegetable oils with insecticides against the cotton aphids, *Aphis goosypii* Glover.

Treatment	Rate of application	Mortality %	Treatment	Rate of application	Mortality %
Monocortophos	1	72.5	Lambda-cyhalothrin	1	67.5
"	0.5	42.5	"	0.5	52.5
"	0.25	27.5	"	0.25	45.0
" + M.V. oil	0.5 + 0.5	82.5	" + M.V. oil	0.5 + 0.5	95.0
" + Tar oil	0.5 + 0.5	65.0	" + Tar oil	0.5 + 0.5	60.0
" + M.V. oil	0.25+0.25	82.5	" + M.V. oil	0.25+0.25	75.0
" + Tar oil	0.25+0.25	45.0	" + Tar oil	0.25+0.25	67.5
Malathion	1	60.0	carbosulfan	1	92.5
"	0.5	45.0	"	0.5	75.0
"	0.25	12.5	"	0.25	10.0
" + M.V. oil	0.5 + 0.5	97.5	" + M.V. oil	0.5 + 0.5	97.5
" + Tar oil	0.5 + 0.5	37.5	" + Tar oil	0.5 + 0.5	97.5
" + M.V. oil	0.25+0.25	80.0	" + M.V. oil	0.25+0.25	97.4
" + Tar oil	0.25+0.25	32.5	" + Tar oil	0.25+0.25	67.5
Pirimiphos-methly	1	70.0	M.V. oil	0.50	72.5
"	0.5	42.5	"	0.25	30.0
"	0.25	20.0	" + Tar oil	0.50	45.0
" + M.V. oil	0.5 + 0.5	97.5	"	0.25	25.0
" + Tar oil	0.5 + 0.5	57.5			
" + M.V. oil	0.25+0.25	22.5			
" + Tar oil	0.25+0.25	32.5			

M.V. oil = Modified vegetabel oil.

It is clear then, that the combinations of M.V. oil with malathion, primiphos-methyl, lambda-cyhalothrin and carbosulfan as well as the combination between Tar oil and carbosulfan at half the recommended concentrations produced above 90% mortality. The mortality was further improved when M.V. oil was mixed with carbosulfan at the lower concentration (97.5%).

The effect of oils in enhancing the activity of insecticides may allow a significant decrease in their rates of application for the control of cotton aphids.

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ملاءمة بعض الزيوت الطبيعية والمعدنية عند خلطها ببعض المبيدات كمنشاطات ضد آفة من القطن *Aphis gossypii* Glover

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المعمل المركزي للمبيدات – مركز البحوث الزراعية – الدقي

قدرت الكفاءة السمية لخمسة مبيدات ونوعين من الزيوت ومخاليطهما مع المبيدات علي آفة من القطن *Aphis gossypii* .وهذه المبيدات هي مونوكروتوفوس - ملاثيون - بريميفوس مثيل - لمبدا سايها لوثرين - كاربوسلفان ، وكانت الزيوت المستخدمة هي Tar oil, Modified vegetable oil

وقد كانت الجرعات المستخدمة لكل من المبيدات والزيوت في الإختبار هي الجرعةالحقلية ونصف وربع الجرعة منفردة . أما في حالة مخاليط المبيدات والزيوت فقد كانت نسب الخلط المستخدمة هي نصف وربع جرعة الحقل لكل من المبيد والزيت وقد استخدمت طريقة غمر الشرائح في تقدير فعالية المواد المستخدمة ، كما سجلت نسب الموت بعد ساعتين من المعاملة .

أوضحت النتائج أن مبيد كاربوسلفان كان أكثر المبيدات فعالية عند تركيز الحقل ، كما أعطت مخاليط M.V.Oil مع مبيدات ملاثيون - بريميفوس ميثيل - لمبداسايها لوثرين حينما أستخدمت بنصف جرعة الحقل نسب موت أعلى من ٩٠٪ بينما أعطى مخلوط M.V.Oil مع مونوكروتوفوس بنفس نسبة الخلط أقل من ٩٠٪ (٨٢.٥٪) أما مخلوط Tar oil مع كاربوسلفان فقد أعطي نتائج متقاربه عندما أستخدم بنفس نسبة الخلط السابقة (نصف جرعة الحقل) .

وقد أظهرت النتائج أيضا أن نسب الموت قد زادت عندما إنخفضت نسب الخلط الى ربع جرعة الحقل بمقارنتها بنفس جرعة المبيد الحقلية منفردة .