

EFFECT OF MINERAL AND PLANT OILS ON THE EFFICACY OF PREMPT AGAINST THE COTTON WHITEFLY AND BOLLWORMS IN COTTON FIELDS

A.A.KORKOR

Plant Protection Research Institute, Agricultural Research Centre, Dokki, Giza, Egypt.

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Abstract

The experiment was conducted to evaluate the efficiency of preempt (fenpropathrin + pyreproxypfen) at the rates of 400 ml. and 300 ml./fed. and its mixture with mineral oil, cottonseed oil and acetic acid against whitefly *Bemisia tabaci* (Genn.) and both cotton bollworms; *pectinophora gossypiella* (Saund.) and *Earias insulana* (Boisd.) at El-Gemmiza Agricultural Research Station during 1996 cotton growing season. Summarized results showed that preempt could be used at the rate of 300 ml./fed. which it was equitoxic to the preempt at the rate of 400 ml./fed. for controlling mature and immature stages of the cotton whitefly and cotton bollworms. This in turn minimized both pollution and costs of spray. No need was found to add any of mineral or cottonseed oil or acetic acid as having no effect on the toxicity of such compound.

INTRODUCTION

Cotton bollworms *Pectinophora gossypiella* (Saund.) and *Earias Insulana* (Boisd.) and whitefly *Bemisia tabaci* (Genn.) are considered among the most economic pests of cotton plants at present. These pests usually cause severe losses in cotton yield quantity and quality. Chemical control is still considered one of most important methods for controlling these pests (Guirguis *et al.*, (1975); Abdo *et al.*, 1981; Radwan *et al.*, 1985 and 1990; Halawa *et al.*, 1992; Korkor *et al.*, 1993, 1995 and 1996; Awad *et al.*, 1995 and 1996).

The present study aimed to evaluate the efficiency of preempt at two rates and its mixtures with mineral oil, cottonseed oil and acetic acid on cotton bollworms and whitefly infestation in cotton plantation at Gemmiza Agricultural Research Station.

MATERIALS AND METHODS

The present work was carried out during 1996 cotton growing season at El-Gemmiza Research Station. An experimental area of about 2 feddans was used for

studying the effect of certain compounds treated against both cotton bollworms *Pectinophora gossypiella* and *Earias insulana* and whitefly, *Bemisia tabaci*. Every treatment comprised 4 plots of 175 m²/each and also a check of 4 replicates. Samples of 25 green bolls (in case of cotton bollworms) or 25 cotton leaves (in case of whitefly) were collected at random from both diagonals of each plot (100 green bolls or leaves, were collected before spray time and at weekly intervals after compounds application). Bolls were externally and internally examined to determine the numbers of pink and spiny bollworms, while for whitefly, the numbers of immature and mature stages were counted. The percent reduction was calculated according to Henderson and Tilton (1955) and Chi-square method was used at 5% probability to evaluate the differences in efficacy between treatments.

Tested Compounds

Insecticides: Preempt 20% (fenpropathrin 15% + pyreproxypfen 5%), [*Fenpropathrin*: (Rs) α -cyano - 3 - phenoxybenzyl -2,2,3,3 - tetramethylcyclopropane carboxylate, *Pyreproxypfen*: 2-[1-methyl-2-(4-phenoxy phenoxy) ethoxy] pyridine.).

Natural materials: mineral oil 95% (kz-oil), cottonseed oil, acetic acid 6%.

RESULTS AND DISCUSSION

Data presented in Table 1-3 elucidate the effect of preempt alone and its mixtures with mineral oil, cottonseed oil and acetic acid sprayed two times at two-week intervals on cotton plant against mature and immature stages of whitefly *B.tabaci* and cotton bollworms.

Effect of Tested Compounds on Whitefly *B.tabaci*

The overall average number of whitefly, immature stages during the experimental period was low in plots treated with the preempt alone and its mixtures with mineral oil, cottonseed oil and acetic acid. The overall average number on 100 cotton leaves ranged from 194.5 to 291.25 individuals for the tested insecticides except of mineral oil and cottonseed oil which resulted in 826 and 968.75 individuals, respectively as compared with 1004.5 individuals for untreated check.

As shown in table 1, weak initial kill was observed after one week post-treatment with mineral oil and cottonseed oil, where they gave a percent reduction

Table 1. Percent reduction in immature stages of the whitefly *Bemisia tabaci* following the application of the tested compounds.

Treatment	Rate/Fed.	No. immatu res/100 leaves pre-spray	% Reduction in immature stages					Overall Mean	
			First spray			Second spray			
			1st week	2nd week	Mean	1st week	2nd week		Mean
Prempt 20%	300 ml.	3945	82.02a	85.11a	83.57	94.41a	69.54a	95.48	89.52a
Prempt 20%	300 ml.	4341	82.64a	82.82a	82.73	69.67a	96.95a	96.81	89.77a
+ Mineral oil (9.5%)	+1.75%								
Prempt 20%	300 ml.	3076	78.72a	81.40a	80.06	94.87a	99.37a	97.12	88.59a
+ Cottonseed oil	+1.5%								
Prempt 20%	300ml.	4263	79.22a	80.4a	79.81	91.0a	98.07a	94.54	87.17a
+ Acetic acid 6%	+1000ml.								
Prempt 20%	400ml.	4736	84.84a	90.48a	87.66	94.45a	96.62a	95.54	91.60a
Prempt 20%	400ml.								
+ mineral oil 95%	+1.75%	3980	77.36a	88.79a	83.08	95.69a	98.27a	96.98	90.03a
Prempt 20%	400ml.	3838	84.87a	90.32a	87.60	90.75a	98.82a	94.79	91.19a
+ Cottonseed oil	+1.5%								
Mineral oil 95 %	1.75%	3546	93.53b	60.80b	50.17	40.37b	64.49b	52.43	51.30b
Cottonseed oil	1.5%	3029	23.56c	35.88c	29.72	29.54b	40.02c	34.78	32.25c
Untreated	-	2187							

39.53 and 23.56%, respectively, while the rest compounds, premt alone and its mixtures with mineral oil, cottonseed oil and acetic acid gave satisfactory results with a percent reduction ranged from 77.36 to 84.87. After two weeks of the 2nd spray (the end of experimental), all the tested compounds except mineral oil and cottonseed oil had increased activity against immature stages of whitefly recording more than 94.54 reduction.

As for the residual activity, all the tested compounds had a long residual activity till 4 weeks from the 1st spray. In term of figures, premt at the rate of 400 ml, premt at the rate of 400 ml. + cottonseed oil, premt at the rate of 400 ml + mineral oil, premt at the rate of 300 ml + mineral oil, premt at the rate of 300 ml, premt at the rate of 300 ml. + cottonseed oil and premt at the rate of 300 ml.+ acetic acid, exhibited the best results and recording 91.60, 91.19, 90.03, 89.77, 89.52, 88.59 and 87.19% reduction, respectively, whereas mineral oil and cottonseed oil were the lowest effective giving 51.30 and 32.25% reduction, respectively.

Table 2 indicated that, all tested compounds except mineral oil and cottonseed oil exhibited a high percent reduction in adult population of *B.tabaci* after 1 week (initial kill) as reduced the number of adult ranged from 86.41 to 96.29%.

Considering the residual activity of the tested compounds in cotton fields, data proved the important role of the time elapsed from treatment. The longer of the time exposure the lower the reduction in adult populations occurred and vice versa, and this was more pronounced with premt at the rate of 300 ml. (86.41-68.47), premt at the rate of 300 ml. + mineral oil (93.90 - 72.42), premt at the rate of 300 ml. + cottonseed oil (96.29-83.69) and premt at the rate of 300ml. + acetic acid (89.57-70.88% reduction) at 1 and 2 weeks after spraying at 1st spray, respectively.

Data showed that the overall mean effect of premt at rate of 400 ml.+ cottonseed oil, premt at the rate of 400 ml. + mineral oil, premt at the rate of 400 ml., premt at the rate of 300 ml. + cottonseed oil, premt at the rate of 300 ml. + mineral oil, premt at the rate of 300 ml. + acetic acid and premt at the rate of 300 ml., remained satisfactoraly effective after 4 weeks of application, recording 87.66, 86.26, 84.99, 84.32, 81.85, 79.69 and 77.58% reduction, respectively in adult population.

On the other hand, mineral oil and cottonseed oil were the lowest effective giving, 50.31 and 40.40% reduction, respectively.

Table 2: Percent reduction in mature stages of the whitefly *Bemisia tabaci* following the application of the tested compounds.

Treatment	Rate/Fed.	No. immatu res/100 leaves pre-spray	% Reduction in mature stages						Overall Mean
			First spray			Second spray			
			1st week	2nd week	Mean	1st week	2nd week	Mean	
Prempt 20%	300 ml.	310	86.41a	68.47c	77.44	81.77a	73.67a	77.72	77.58a
Prempt 20% + Mineral oil (95%)	300 ml. +1.75%	329	93.90a	72.42bc	83.16	83.58a	77.50a	80.54	81.85a
Prempt 20% + Cottonseed oil	300 ml. +1.5%	324	96.29a	83.69ab	89.99	81.21a	76.09a	78.65	84.32a
Prempt 20% + Acetic acid 6%	300ml. +1000ml.	327	89.57a	70.88c	80.23	81.58a	76.09a	79.16	79.69a
Prempt 20%	400ml.	324	91.90a	82.92abc	87.44	82.36a	82.71a	82.54	84.99a
Prempt 20% + mineral oil 95%	400ml. +1.75%	327	88.96a	83.38ab	86.17	87.08a	85.62a	86.35	86.26a
Prempt 20% + Cottonseed oil	400ml. +1.5%	332	91.54a	90.24a	90.89	87.62a	81.25a	84.44	87.66a
Mineral oil 95 %	1.75%	361	46.67b	42.96d	44.82	58.36b	53.25b	55.81	50.31b
Cottonseed oil	1.5%	391	37.93b	40.83d	39.38	38.05c	44.80b	41.43	40.40b
Untreated	-	359							

Generally, it could be concluded that premt at the rate of 300 ml./fed. could suppressed the population density of mature and immature stages of whitefly. On the other hand, increase the rate of premt to 400 ml./ fed. or adding, cottonseed oil did not increase significantly the efficiency of such compound against both mature and immature stages of *B.tabaci*.

These results are in agreement with the findining of Radwan *et al.*, (1985) and (1990), and Price and Schuster (1991) who mentioned that fenpropathrin reduced the number of mature and immature stages of *B.tabaci*. Korkor *et al.*, (1995) found that synthetic pyrethroid mixed with IGR,s premt (fenpropathrin + pyreproxypfen) was the most effective compounds against whitefly. Awad *et al.* (1996) mentioned that fenpropathrin alone or mixed with acephate or methamidophos could suppress the population density of both mature and immature stages of the whitefly, causing a high initial and residual activity. Korkor *et al.*, (1996) found that, adding any of mineral or plant oil and acetic acid to the half recomended rate of pyreproxypfen had no effect on the toxicity of such compound against mature stage of the whitefly. However, mineral oil significantly increased the effect of pyreproxypfen against mature stage.

Effect of tested compounds on cotton bollworms

Data presented in Table 3 indicated significant differences in the efficiency of premt between the rate of 300 ml and 400 ml./fed. against cotton bollworms. In term of figures 70.13% reduction for premt at the rate of 300 ml./fed. compared with 79.09% reduction at the rate of 400 ml./fed. after 4 weeks (overall mean).

It is worth mentioning, that the effect of premt at the rate of 300 ml./fed. was week on cotton bollworms through the first spray recording 44.44 and 57.78% reduction after 1 and 2 weeks of spray, respectively. The effect then increased till reached 88.10% reduction after the 2 weeks from the 2nd spray. Data showed that, the mixtures of mineral oil, cottonseed oil or acetic acid to premt gave insignificant differences.

In conclusion, it is obvious that premt could be used at the rate of 300 ml./fed., where it was equitoxic to the premt at the rate of 400 ml./fed. for controlling cotton bollworms and this in turn would minimize both of pollution and spray costs. Also, there is no need for adding any of mineral oil, cottonseed oil or acetic acid as did not increase the toxicity of such compound.

Table 3. Percent reduction in numbers of cotton bollworms following the application of the tested compounds.

Treatment	Rate/Fed.	No. of cotton bollworms in 100 bolls pre-spray	% Reduction of no. of cotton bollworms in 100 bolls					
			First spray			Second spray		
			1st week	2nd week	Mean	1st week	2nd week	Mean
Preempt 20%	300 ml.	9	44.44a	57.78ab	51.11	90.20ab	88.10bc	89.15
Preempt 20% + Mineral oil (95%)	300 ml. +1.75%	7	39.56a	51.43c	45.50	70.29c	84.69bcd	77.49
Preempt 20% + Cottonseed oil	300 ml. +1.5%	8	51.92a	65.00abc	58.46	85.29abc	82.14cd	83.72
Preempt 20% + Acetic acid 6%	300ml. +1000ml.	7	34.07a	54.29bc	44.18	78.99bc	71.94d	75.47
Preempt 20%	400ml.	10	53.85a	74.00a	63.93	94.12a	94.64b	94.38
Preempt 20% + mineral oil 95%	400ml. +1.75%	9	48.72a	60.00abc	54.36	30.39bc	92.06bc	86.23
Preempt 20% + Cottonseed oil	400ml. +1.5%	10	50.00a	72.00ab	61.00	88.24ab	100a	94.12
Mineral oil 95 %	1.75%	7	0.00b	14.29e	7.15	20.17d	13.27e	16.72
Cottonseed oil	1.5%	8	0.00b	30.00d	15.00	26.47d	19.64e	23.06
Untreated	-	5						

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تأثير إضافة بعض الزيوت النباتية والمعدنية على فعالية مركب البرمبيت لمكافحة الذبابة البيضاء وديدان اللوز على محصول القطن

عبد السميع عبد المجيد قرقر

معهد بحوث وقاية النباتات - مركز البحوث الزراعية، الدقى ، الجيزة.

نفذت التجربة بغرض مقارنة فعالية مركب البرمبيت (فينبروبثرين + بيرى بروكسيغين) فى حالة استخدامه بمعدلات ٢٠٠سم^٢ و ٤٠٠سم^٢ / للفدان وأيضا دراسة تأثير إضافة كل من الزيت المعدنى (كزد) وزيت بذرة القطن وحمض الخليك وذلك لخفض تعداد الذبابة البيضاء وديدان اللوز على محصول القطن فى الحقل وذلك بمحطة بحوث الجميزة خلال موسم ١٩٩٦.

ولقد أوضحت النتائج المتحصل عليها مايلى:

المعاملة بمركب البرمبيت (فينبروبثرين + بيرى بروكسيغين) بمعدل ٤٠٠سم^٢ / فدان يعادل فى تأثيره المعاملة بمعدل ٢٠٠سم^٢ / فدان وذلك على خفض تعداد كل من طورى الحورية والحشرة الكاملة للذبابة البيضاء ويرقات ديدان اللوز وذلك بدون فروق معنوية واضحة بينهما وكذلك يكون اللجوء لإستخدام المعدل الأقل (٢٠٠سم^٢ / فدان) هو المطلوب لخفض التكلفة وترشيد استخدام المبيدات.

ومن ناحية أخرى فإن إضافة أى من الزيوت المعدنية (كزد) أو النباتية (زيت بذرة القطن) وأيضا حمض الخليك إلى مركب البرمبيت لم يعطى أى تغير معنوى فى فعالية المركب على خفض تعداد أى من الآفات موضع الدراسة.

كما أن تأثير هذه المركبات منفردة (الزيوت) كان قليلا جدا، ولكن كان تأثير الزيت المعدنى (كزد) أعلى من زيت بذرة القطن على كل من طورى الذبابة البيضاء.