

Effect of certain natural products compared with the chemical insecticide, imidacloprid (Admire) against immature stage (nymph) of whitefly *Bemisia tabaci* (genn.) infesting tomato plants

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ABSTRACT

Efficiency of three natural products Jojoba oil (Enco-1) 96 % EC, KZ oil 95 % EC and sulphur as a dust comparing with the insecticide, imidacloprid (Admire 20 % SC) against immature stage of white fly, *Bemisia tabaci* (Genn.) were investigated during summer season 2001. at Etay El-Baroud Agricultural Research Station. Concerning the initial mortality after 48 h of the spray, significant differences occurred between imidacloprid and the three natural products at two rates, except for Jojoba oil at the rate of 2 L. / 100 L. water. Imida caused maximum reduction of 92 %, while KZ oil caused only 52.5 %. After 7 days of spraying, no significant differences occurred between imida and all treatments. The obtained data revealed that, it can be use The Jojoba oil and KZ oil can be used at the rate of 1 L. / 100 L. water and sulphur at the rate of 5 kg / feddan instead of the higher rates . These natural products are effective, cheap and safe for both human and environment.

INTRODUCTION

The whitefly is one of the most harmful pests of vegetable crops, especially tomato plants. It cause direct damage by sucking juices of plants and transmits viral diseases (Zeid and Herakly, 1972 and Bird and Maramorsch, 1978). Chemical control is still considered one of the most important methods for controlling white fly (Hamid, 1999). Many problems arose from using chemical insecticides such as environmental pollution, hazardous effects on man, animals and natural enemies of pests. Therefore, many efforts were directed to use natural products, such as natural oils, to control sucking pests; (Larew, 1988, Butler *et al.* 1989, Daoud 1993 and Rizk *et al.* 1999).

The aim of the present work is to investigate the pesticidal efficiency of some local formulated natural oils; Jojoba oil (Enco-1) 96 % EC, KZ oil 95 % EC (mineral oil) and Sulphur as a dust against immature stage (nymph) of whitefly on tomato plants compared with the recommended chemical insecticide, imidacloprid (Admire 20 % SC) during summer season 2001.

MATERIALS AND METHODS

Tested compounds and rates :

a) The natural products :

- 1- Jojoba oil (Enco – 1) 96 %, Provided by Egyptian Natural Oil Company and applied at the rate of 2 and 1 L. 100 liters of water.
- 2- KZ oil 95 % EC (mineral oil), Provided by Kafr El-Zayat Company for Pesticides, applied at the rate of 2 and 1 L. 100 liters of water.
- 3- Sulphur : Used as dust at the rate of 5 kg and 10 kg / feddan, Provided by Kafr El-Zayat Company for Pesticides.

b) The recommended chemical insecticide :

Imidacloprid (Admire 20 % SC) : Arecommended insecticide against whitefly. Provided by Bayer Company.

Experimental procedures : The tested materials were used against immature stage (nymph) of whitefly on tomato plants during summer season 2001 at Etay El-Baroud Agricultural Research Station. An area of 0.6 feddan was divided into 32 plots (each about 21 m²) in a randomized block design. Knapsack sprayer with one nozzle was used. The experiment started at 15/8/2001 with 7 days intervals between each successive sprays. The efficiency against immature stage (nymph) of whitefly was determined by randomly taking 25 leaves/plot and examined by using a binocular microscope in the laboratory. Reduction percentage was calculated according to Henderson and Tilton equation (1955). Analysis of variance at 0.05 level was done by Duncan's multiple test (1955).

RESULTS AND DISCUSSION

The pesticidal efficiency of three sprays of Jojoba oil applied at the rate of either 2 L or 1 L / 100 L water, two rates of KZ oil 95 % EC (mineral oil) 2 L. and 1 L / 100 L. water, also two rates of Sulphur as dust 10 kg and 5 kg / feddan comparing with the chemical insecticide, imidacloprid

(Admire 20 % SC) against immature stage of whitefly infesting tomato plants during summer season 2001 is summarized in Tables (1 & 2).

The data in Table (1) indicated that the differences in initial kill after 48 h of spraying was significant between the chemical insecticide Imidaclopride and the natural products at the two rates except for the rate (2 L / 100 L water) of Jojoba oil which was not significant. Also, no significant difference occurred between the two rates of KZ oil at an effeciant rate of 60.1 % and 52.5 % at rate 2 L and 1 L / 100 L water, respectively. Similar results were obtained with the sulphur and the reduction percentage was 63.0 % and 55.8 % at the 10 kg and 5 kg / feddan, respectively. The results also indicated that, the Jojoba oil at rate 2 L / 100 L water was intermediate between the chemical insecticide imidacloprid which had the highest effect and KZ oil which had the lowest one.

Data in Table (2) revealed that the residual effect after 7 days of spraying was a positive relationship between the reduction percentage and time, *i.e.*, the mortality percentages of KZ oil were 60.1 % and 52.5 % increased to 81.9 % and 78.8 % at rate 2 L. and 1 L / 100 L. water after 7 days as a residual effect, respectively. The same trends was obtained for Sulphur with its two tested rates.

Concerning to the residual effect, the results showed that there were no significant differences between the natural products and the tested insecticide, imidacloprid. The efficiency of Jojoba oil was 82.8 % and 77.0 % at rate 2 L. and 1 L / 100 L. water, respectively. Efficiency of KZ oil was 81.9 % and 78.8 % at rate 2 L. and 1 L / 100 L. water, respectively; while the efficiency of Sulphur was 85.0 % and 78.0 % at rate 10 kg and 5 kg/feddan, respectively. The field observations showed that plants treated with Sulphur were more healthy than the others.

As a general conclusion, Jojoba oil and KZ oil sprayed at rate 1 L / 100 L. water and Sulphur dusting at rate 5 kg/feddan could be used instead of imidacloprid against the nymph of stage of whitefly (*B. tabaci*). These natural products are active, cheap and safe for human and environment. Therefore, they are useful in IPM programmes.

Table (1): The initial kill of two rates of certain natural products compared with the chemical insecticide "Admire" against immature stage (nymph) of white fly, *Bemisia tabaci* on tomato plants during summer season 2001.

Tested compound	Rate / 100 liters of water	Initial kill after 48 h.									
		Pre treatment	1 st spray Post treatment	Reduction %	Pre treatment	2 nd spray Post treatment	Reduction %	Pre treatment	3 rd spray Post treatment	Reduction %	Mean
Admire 20 % Sc	125 ml	2121	171	91.9	362	33	90.9	45	3	93.3	92.0 ^a
Jogoba oil (Enc0-10 96 % Ec	2 L.	2292	222	90.3	609	88	85.6	129	16	87.6	87.8 ^a
	1 L.	2392	544	77.3	658	199	69.8	172	42	75.6	74.2 ^b
K2 oil 95 % EC	2 L.	2556	1309	48.8	338	159	53.0	51	11	78.4	60.1 ^c
	1 L.	2371	1391	41.3	464	238	48.7	89	29	67.4	52.5 ^c
Sulpher (dust)	10 K g/F	2467	1072	56.5	535	249	53.5	67	14	79.1	63.1 ^b
	5 K g/F	2434	1263	48.1	626	327	47.8	109	31	71.6	55.8 ^c
Control	-	2535	2543	-	2633	2639	-	2591	2549	-	-

Mean of Reduction is average of three sprays.

Count of each spray was done 2 days post treatment on 100 leaves (25 leaves / replicate)

Mean followed by the same letter in each column are not significantly different.

% reduction was calculated according to equations of Hendersen and Teltion (1997).

Table (2): The residual effect of two rates of certain natural products compared with the chemical insecticide "Admire" against immature stage (nymph) of white fly, *Bemisia tabaci* on tomato plants during summer season 2001.

Tested compound	Rate / 100 liters of water	Initial kill after 48 h.									
		Pre treatment	1 st spray Post treatment	Reduction %	Pre treatment	2 nd spray Post treatment	Reduction %	Pre treatment	3 rd spray Post treatment	Reduction %	Mean
Admire 20 % Sc	125 ml	2121	354	84.2	362	41	88.7	45	4	91.1	88.0*
Jobba oil (Emul-10 96 % Ec	2 L. 1 L.	2292 2392	554 617	76.6 75.0	609 658	105 176	82.8 73.3	129 172	14 30	89.1 82.6	82.8*
KZ oil 95 % EC	2 L. 1 L.	2556 2371	596 574	77.4 76.5	338 454	61 103	82.0 77.8	51 89	7 2169	86.3 82.0	81.9*
Sulphur (dust)	10 Kg/F 5 Kg/F	2467 2434	551 808	78.3 67.8	535 626	70 102	87.0 83.3	67 109	7 19	89.6 82.6	85.0*
Control	-	2535	2606		2633	2639	-	2591	2603		

Mean of Reduction is average of three sprays.
Count of each spray was done 2 days post treatment on 100 leaves (25 leaves / replicate)
Mean followed by the same letter in each column are not significantly different.
% reduction was calculated according to equations of Henderson and Teleton (1995).

These results are in agreement with Broza *et al.* (1998) who mentioned that, crude cottonseed oil (5 - 7 %) aqueous sprays, effectively suppressed sweet potato whitefly on cotton. Butler and Henneberry (1991) found that one or two applications of 1 - 7 % oil (cottonseed oil or soybean oil) in water killed adult and immature stages of *B. tabaci* up to 7 days following application on watermelon, squashes and cucumbers. El-Khawalka *et al.* (1996) added that, natural oil gave excellent control against various stages of the whitefly on tomato plants. Korkor *et al.* (1996) reported that, the high rate of cotton seed oil 5 % exhibited the highest overall mean after 3 sprays in immature stages of whitefly. Hamid (1999) showed the addition cotton seed oil to Baythroid induced significant increase of percent reduction of numbers of cotton bollworms. Recently, Rizk *et al.* (1999) indicated success of mineral oils against sucking pests.

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تأثير بعض المواد الطبيعية مقارنة بالمبيد الكيماوى "إيميداكلوبريد" على خفض تعداد حوريات الذبابة البيضاء على نباتات الطماطم

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محطة البحوث الزراعية، إينى البارود، مركز البحوث الزراعية

أجرى هذا البحث فى محطة البحوث الزراعية بإينى البارود (محافظة البحيرة) فى الموسم الصيفى ٢٠٠١ لدراسة الكفاءة الإبادية على خفض حوريات الذبابة البيضاء على نباتات الطماطم لثلاث مواد طبيعية وهى زيت الهموويا ٩٦ % فى صورة مستحلب، كزد أويل ٩٥ % مستحلب بمعدلين ٢ لستر، ١ لتر لكل منهما، والكبريت فى صورة مسحوق تعفير بمعدلين ١٠ كجم و ٥ كجم لكل فدان. وقورنت الكفاءة الإبادية لهذه المواد بالمبيد الكيماوى الموصى به "إيميداكلوبريد" (المير ٢٠ % SC) وتم حساب الإيادة الفورية بعد ٤٨ ساعة من الرش، والأثر الباقى بعد سبعة أيام وأخذ متوسط ثلاث رشات متتالية .. وكانت النتائج كالتى :

- ١- بالنسبة للإيادة الفورية : أظهرت النتائج وجود فروق معنوية بين المعاملات وكانت أعلى كفاءة للمبيد الكيماوى أمير الذى أعطى كفاءة ٩٢ % وأقل كفاءة لكزد أويل بمعدل ١ لتر/ ١٠٠ لتر ماء (٥٢,٥ %).
- ٢- بالنسبة للأثر الباقى : أظهرت النتائج عدم وجود فروق معنوية بين المبيد أمير وباقي المعاملات، حيث بلغت كفاءة زيت الهموويا ٨٢,٨ %، ٧٧,٠ % بالمعدلين ٢ لتر، ١ لتر/ ١٠٠ لتر ماء على التوالي؛ وزيت كزد أويل ٨١,٩ %، ٧٨,٨ % بالمعدلين ٢ لتر، ١ لتر على التوالي؛ أما كفاءة الكبريت التعفير فكانت ٨٥,٠ %، ٧٨,٠ % بالمعدلين ١٠ كجم، ٥ كجم/ فدان على التوالي بينما أعطى المبيد "أمير" كفاءة ٨٨,١ %.

من هذه النتائج فإنه يمكن استخدام هذه المواد الطبيعية بالمعدل المنخفض حيث يمكن استخدام الزيوت بمعدل ١ لتر/ ١٠٠ لتر ماء والكبريت التعفير بمعدل ٥ كجم/ فدان فى برامج المكافحة المتكاملة لمكافحة الذبابة البيضاء حيث تتميز هذه المواد بالكفاءة وإنخفاض أسعارها وعدم ضرورتها على البيئة من التلوث حيث يمكن الحصول على ثمار طماطم خالية من المبيدات حفاظا على صحة المستهلك خاصة وأنها تؤكل طازجة.