

NATURAL COMPOUNDS FOR CONTROLLING SUCKING PESTS INFESTING FABA BEAN IN ASSUIT GOVERNORATE

Ahmed, M. A.

Agric. Zoology and Nematology Depart., Fac.of Agric., AL-Azher Univ., Assuit, Egypt.

ABSTRACT

A field experiment was conducted in Assiut Governorate during the winter seasons of 2006/07 and 2007/08 to evaluate some natural compound (Vertimec 1.8, RM 131, Super-Misrona oil, Potassium solution and Micro-elements) in addition to fintera thion as a conventional acaricide for controlling sucking pests infesting faba bean.

The obtained data revealed that all tested materials were significantly effective against *A. craccivora* and *T. urticae* compared to the untreated plots (control). In both seasons vertimec and super-misrona were the most potent compounds in reducing the population size of *A. craccivora* at the initial kill with reduction% of 85 and 84, respectively, followed by RM131 with reduction % of 75.5. Potassium and micro-nutrients were the least effective one (43 reduction %). The efficiency of sprayed materials (potassium or micro-nutrient) increased as the time proceeds.

Also, in both seasons, vertimec and super-misrona were the most potent compounds in reducing the population size of *T. urticae* at the initial kill with reduction % of almost 87.5 and 85 %, respectively, followed by RM131 with reduction % of almost 81.5 %. Potassium and micro-nutrients were the least effective one (almost 76 and 71.5% reduction, respectively). The used natural products were more effective in reducing the population number of *T. urticae* than that of *A. craccivora*. The residual effect % followed the previous trend and could be arranged in descending order of vertimec > super-misrona > RM131 > potassium > micro-nutrients.

Keywords: Natural products, aphids, spider mite, faba bean

INTRODUCTION

In recent years efforts are directed to use natural materials or alternative methods in pest control without using pesticides. The environmentally safe materials are very useful for their safe to human and warm blooded animals. Also, they have no residual effect on beneficial predaceous and parasitic insects, mites and the spiders which play important role in biological control and minimizing the population pests on different crops. Moreover, these materials are available and cheap than other insecticides (Taha, 2000).

Botha *et al.* (1994) concluded that vertimec was more effective to control *T. urticae* on apple orchards than propagate (Comite). Ezzeldin *et al.* (2007) found that methomyl was the most effective material in reducing the infestation of maize plants by *S. cretica*, followed by Agreïn, Sisi 6, and barium nitrate. The same potency order of tested materials on maize was also found on sorghum varieties during the two seasons. Ishaaya *et al.* (2007) reported that natural products acting selectively on insect pests, such as avermectins, spinosad and azadirachtin, have been introduced for controlling selected groups of insect pests. Compounds acting on the nervous site that controls the sucking pump of aphids and whiteflies, such as

pymetrozine, or respiration, such as diafenthiuron, have been introduced for controlling sucking pests. All the above compounds are important components in pest and resistance management program.

Abdel-Mageed *et al.* (2008) conclude that the change in response to tested biocides could be associated with the increase in β -E activity and decrease in α -E, ALK-P, AST, ALT, amylase and invertase activities, and multifarious effect in Ali-E and AC-P activities that, after treatment with LC₅₀ of each compound for 24 h on treated leaves and 3 days on untreated leaves. Zaki (2008) found that the plant extract Neem azal-S markedly decreased the numbers of the aphid, *B. brassicae* and the whitefly, *B. abaci* after spraying on infested cabbage. The numbers of the two parasitoids *D. rapae* and *E. mundus* were also decreased after the application of the extract. Repeating the application three times during October, November and December caused severe reduction in the population of the two pests as well as the two parasitoids. The two predators *C. undecimpunctata* and *C. carnea* were markedly affected and their populations on cabbage decreased after each application of Neem azal-S.

The present work aimed to evaluate the influence of some natural products (Vertimec, RM131, Super-Misrona, Potassium and Micro-nutrients) compared with Fintera thion as standard material against aphids (*A. craccivora*) and spider mites (*T. urticae*) on faba bean plants during the two winter seasons of 2006/ 07 and 2007/ 08.

MATERIALS AND METHODS

An experimental field of faba bean (*Vicia faba L. cv. Giza Blanks*) was conducted in Assiut Governorate during the winter seasons of 2006/07 and 2007/08. The experimental field was divided into equal plots with an area of 1/42 feddan (20x5 m) with four replicates. Treated and untreated plots were arranged in a complete randomized block design, receiving routine agricultural practices. The tested materials were as follows: (1) Fintera thion, Sumthione, (50% EC at rate of 200ml/ 100 liter water) as standard material. (2) Vertemic 1.8 (at rate of 50ml/ 100 liter water) a natural product produced by the soil microorganisms *Streptomyces avermilitis*. (3) RM 131 (at rate of 400 ml/ 100 liter water), a natural product consisted of 70% lipid acids and 30% Esters. (4) Super-Misrona oil (1%), a light mineral oil. (5) Potassium solution (350 ppm) as a foliar application. (6) Micro-elements (Fe, Mn, Zn, and Cu 120 ppm each) as a foliar application and (7) Untreated plots for comparison (control).

Each material was sprayed on 17/12/2006 in the 1st and on 21/12/2007 in the 2nd season (45 days after plantation) by using a sprayer equipped with one nozzle. Used materials were diluted with water at the rate of 200 liter/feddan (4200m²). Random plants were examined for each replicate to count aphid insects. Plants were investigated before spraying directly and after 2, 5, 7, and 11 days post-treatments. While for spider mite *T. urticae* the motile stages of mites were count in two square inch lower surface in 20 leaflets / replicate. Leaflet investigated before spraying directly

and after 3, 7, 14 and 21 days. The number of aphids and mites in treated and untreated plants were counted and the reduction percentages were calculated according to Henderson and Tilton (1955) equation. Data were analyzed by using analysis of variance (ANOVA) test.

RESULTS AND DISCUSSION

Obtained results showed that all tested materials exhibited different degree of mortality of aphids and mites. Data in Table (1) clear that the initial and residual activity of certain compound against *A. craccivora* during the winter seasons of 2006/ 07 and 2007/ 08. It is clear that all tested materials were significantly effective against *A. craccivora* compared to the untreated plots (control). The field tests in both growing seasons showed that vertimec and super-misrona were the most potent compounds in reducing the population size of *A. craccivora* after 2 days from application (initial kill), their reduction percentages were almost 85 and 84 %, respectively. They were followed by RM131 since its reduction value was almost 75.5 % (Fig. 1).

Table (1). Some natural products for controlling aphids (*A.craccivora*) on faba bean crop during the growing seasons of 2006/07 and 2007/08

Treatment	Year	Before spraying	Periods after spraying (days)								Residual effect %	Mean effect %
			2		5		8		11			
			No.	Reduction %	No.	Reduction %	No.	Reduction %	No.	Reduction %		
Fintera thion 50% EC	2006/07	317.00	16.00	96.28	33.00	92.69	45.00	91.37	56.00	89.19	91.08	92.38
	2007/08	331.00	25.00	93.59	39.00	90.50	49.00	89.48	52.00	88.65	89.54	90.55
Vertimec 1.8	2006/07	284.00	71.00	85.21	96.00	80.96	135.00	76.80	155.00	73.19	76.98	79.04
	2007/08	297.00	65.00	85.03	85.00	81.42	117.00	77.45	148.00	71.03	76.63	78.73
RM 131	2006/07	337.00	101.00	75.04	131.00	69.16	165.00	66.36	178.00	63.47	66.33	68.51
	2007/08	328.00	95.00	75.84	118.00	71.52	142.00	69.78	166.00	64.11	68.47	70.31
super-Misrona oil	2006/07	362.00	62.00	83.54	112.00	71.68	134.00	70.65	142.00	68.70	70.34	73.64
	2007/08	354.00	58.00	84.08	106.00	72.38	127.00	70.83	139.00	67.56	70.26	73.72
Potassium spray	2006/07	342.00	217.00	45.58	164.00	60.82	132.00	72.69	125.00	73.97	69.16	63.26
	2007/08	354.00	212.00	41.82	172.00	55.19	166.00	61.87	137.00	68.03	61.70	56.73
Micro-elements	2006/07	371.00	206.00	43.96	190.00	50.76	195.00	56.23	198.00	55.27	54.09	51.55
	2007/08	358.00	209.00	42.00	183.00	51.79	192.00	55.40	196.00	53.75	53.64	50.73
Control	2006/07	357.00	382.00	....	401.00	....	463.00	....	460.00	....	....	....
	2007/08	344.00	375.00	....	395.00	....	448.00	....	441.00	....	....	....
LSD at 0.05	2006/07	11.79	6.68	''''	6.85	''''	7.66	''''	7.78	''''	''''	''''
	2007/08	12.02	6.44	''''	6.68	''''	7.52	''''	7.66	''''	''''	''''

*Number of aphids / 100 plants

However, the foliar application of potassium and micro-nutrients were the least effective one (43 reduction percent). After 11 days, vertimec demonstrated the highest significant reduction in the numbers of *A. craccivora* (72%), followed by super-misrona (68 %). The sprayed micro-nutrients were the least effective one (54.5%). It is worthy to mention that the efficiency of sprayed materials (potassium or micro-nutrient) increased as the time proceeds. The reduction percent was 43.3 after 2 days and jumped to 71 after 11 days when potassium applied as a foliar application. While the

reduction percent for sprayed micro-nutrients were 43 after 2 days and reached to 54.5 after 11 days. The residual effect percentage followed the previous trend and could be arranged in descending order of vertimec > super-misrona > RM131 > potassium > micro-nutrients.

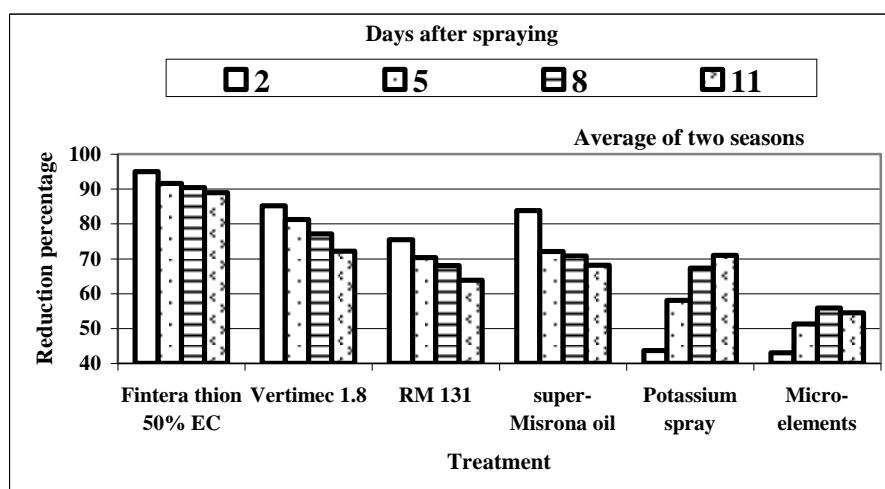


Fig. (1): Reduction percentage in relation to spraying time of used natural products.

Data in Table (2) shows that the initial and residual activity of natural compound against *T. urticae* during the winter seasons of 2006/ 07 and 2007/ 08. It is obvious that all tested materials were significantly effective against *T. urticae* compared to the untreated plots (control). The field tests in both growing seasons showed that vertimec and super-misrona were the most potent compounds in reducing the population size of *T. urticae* after 3 days from application (initial kill), their reduction percentages were almost 87.5 and 85 %, respectively. They were followed by RM131 since its reduction value was almost 81.5 % (Fig. 2).

However, the foliar application of potassium and micro-nutrients were the least effective one since their reduction were almost 76 and 71.5%, respectively. After 21 days, vertimec demonstrated the highest significant reduction in the numbers of *T. urticae* (78.5%), followed by super-misrona (75.5 %). The sprayed micro-nutrients were the least effective one (63.5%). It is worthy to mention that the used natural products were more effective in reducing the population number spider mites (*T. urticae*) than that of aphides (*A. craccivera*). The residual effect percentage followed the previous trend and could be arranged in descending order of vertimec > super-misrona > RM131 > potassium > micro-nutrients. These results are in agreement with those obtained by several investigators. El-Sisi and El-hariry (1991) evaluated three fractions of the local Egyptian oils were formulated as emulsifiable concentrates and tested against *T. urticae*. Ahmed (2001) stated that vertimec gave the highest initial kill against *T. urticae*

Table (2). Some natural products for controlling spider mites infesting faba bean crop during the growing seasons of 2006/07 and 2007/08

Treatment	Year	Before spraying	Periods after spraying (days)								Residual effect %	Mean effect %
			3		7		14		21			
			No.	Reduction %	No.	Reduction %	No.	Reduction %	No.	Reduction %		
Fintera thion 50% EC	2006/07	559.00	35.00	94.57	41.00	93.52	56.00	90.80	68.00	89.24	91.19	92.03
	2007/08	574.00	42.00	93.30	48.00	92.33	62.00	89.60	80.00	86.53	89.49	90.44
Vertimec 1.8	2006/07	546.00	84.00	87.26	99.00	84.73	111.00	82.18	133.00	79.45	82.12	83.40
	2007/08	550.00	79.00	87.93	96.00	85.30	117.00	81.20	140.00	77.42	81.31	82.96
RM 131	2006/07	541.00	124.00	81.37	137.00	79.06	151.00	75.98	169.00	74.13	76.39	77.63
	2007/08	569.00	115.00	81.82	120.00	81.00	168.00	72.07	180.00	69.97	74.34	76.21
super-Misrona oil	2006/07	597.00	96.00	84.08	113.00	80.94	127.00	77.71	139.00	76.52	78.39	79.81
	2007/08	568.00	88.00	86.11	107.00	83.08	141.00	76.60	152.00	74.68	78.12	80.12
Potassium spray	2006/07	611.00	145.00	75.39	152.00	73.76	159.00	71.43	179.00	69.05	71.42	72.41
	2007/08	594.00	138.00	77.22	158.00	73.88	169.00	70.67	180.00	68.65	71.06	72.60
Micro-elements	2006/07	621.00	161.00	72.23	177.00	68.95	193.00	64.76	201.00	64.68	66.13	67.65
	2007/08	615.00	172.00	70.61	183.00	68.68	192.00	65.49	210.00	62.13	65.43	66.73
Control	2006/07	603.00	597.00	....	587.00	....	564.00	....	586.00	....	....	....
	2007/08	589.00	611.00	....	610.00	....	581.00	....	579.00	....	....	....
LSD at 0.05	2006/07	20.28	8.76	'''	9.05	'''	8.60	'''	9.45	'''	'''	'''
	2007/08	20.03	8.76	'''	8.93	'''	9.17	'''	9.68	'''	'''	'''

*Number of spider mites / 20 leaflets

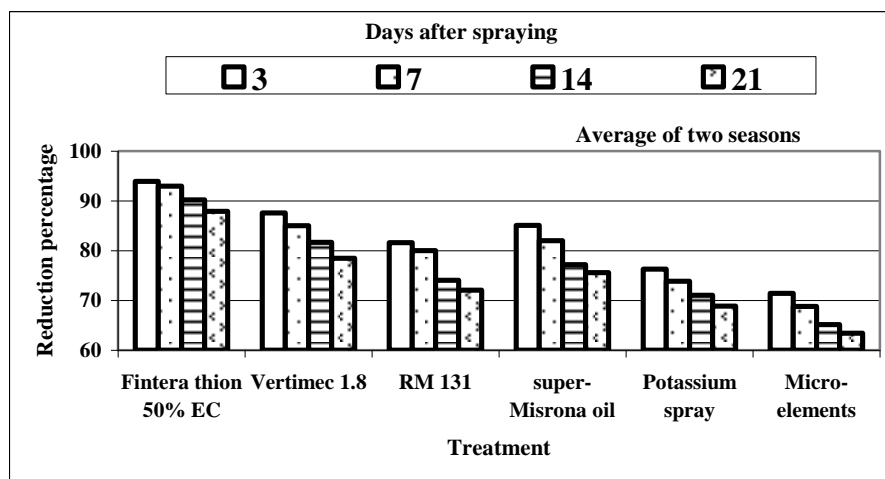


Fig. (2): Reduction percentage in relation to spraying time of used natural products.

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المركبات الطبيعية لمكافحة الآفات الثاقبة الماصة لنبات الفول البلدى فى محافظة أسيوط

مسعد عبدالحليم أحمد

قسم الحيوان الزراعى والنيماتودا- كلية الزراعة- جامعة الأزهر- مصر.

تم اقامة تجربة حقلية بمحافظة أسيوط خلال الموسم الشتوى ٢٠٠٦/٠٧ ، ٢٠٠٧/٠٨ لتقييم بعض المركبات الطبيعية (فيرتيميك ١,٨، ريم ١٣١، زيت سوبر مصرونا، محلول البوتاسيوم، والعناصر الصغرى) بالإضافة الى الفينترا سيون كمبيد كيموى لمكافحة الآفات الثاقبة الماصة لنباتات الفول البلدى. وقد اظهرت النتائج أن:

كل المركبات المختبرة كانت فعالة ضد المن والعنكبوت الأحمر بالمقارنة بمعاملة الكنترول. وخلال موسمى الزراعة كان الفيرتيميك و زيت سوبر مصرونا أكثر المركبات فاعلية فى خفض تعداد المن والقتل الفورى بنسبة ٨٥، ٨٤% على الترتيب تم تلاهما مركب ريم ١٣١ بنسبة قتل فورى ٧٥,٥%. وكان البوتاسيوم والعناصر الصغرى الأقل فاعلية بنسبة قتل فورى ٤٣% . وكانت كفاءة المركبات المضافة بالرش (البوتاسيوم، العناصر الصغرى) تزيد بمرور الزمن.

وأيضاً خلال موسمى الزراعى كان الفيرتيميك و زيت سوبر مصرونا أكثر المركبات فاعلية فى خفض تعداد العنكبوت الأحمر والقتل الفورى بنسبة ٨٧,٥، ٨٥% على الترتيب ثم تلاهما مركب ريم ١٣١ بنسبة قتل فورى ٨١,٥%. وكان البوتاسيوم والعناصر الصغرى الأقل فاعلية بنسبة قتل فورى ٧٦، ٧١,٥% على الترتيب. وكانت المركبات المستخدمة أكثر كفاءة فى خفض تعداد العنكبوت الأحمر من خفض أعداد المن ويمكن ترتيب المركبات المستخدمة ترتيباً تنازلياً طبقاً للنسبة المنوية للأثر المتبقى كالتالى الفيرتيميك < زيت سوبر مصرونا < ريم ١٣١ < محلول البوتاسيوم < العناصر الصغرى.