

**FIELD EVALUATION OF SOME NEW SAFE ACARICIDES AGAINST
THE TWO-SPOTTED SPIDER MITE,
TETRANYCHUS URTICAE KOCH (ACARI : TETRANYCHIDAE)
INFESTING COWPEA AT FAYOUM GOVERNORATE**

**EL-KHATEEB, H. M. NADIA H. HABASHY
AND AIDA K.F. ISKANDAR**

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

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Abstract

The effectiveness of some new safe chemicals were evaluated against the moving stages of the two spider mite, *Tetranychus urticae* Koch infesting cowpea plants, "Cream-7 variety" at Fayoum Governorate during two successive summer seasons (2001 and 2002). This evaluation was conducted in comparison with one of the recommended chemical acaricides Ortus % SC at rate of 50 ml/100 lit. water.

Obtained results cleared that, Vertimec 1.8 % EC at the rate of 40 ml/100 lit. water, Ortus 5 % SC at rate of 50 ml/100 lit. water, Milbecknock 1 % EC at rate of 50 ml/100 lit. water and S-1283 at the highest rate 300 ml/100 lit. water were the most efficient compounds on mite moving stages on cowpea plants; gave more than 85 % percent reduction all over the two tested years, 2001 and 2002 with respective mean of reduction 91.01 & 91.91 %; 90.65 & 90.57 %; 89.71 & 89.92 % and 85.90 & 85.44 %.

On the other hand, Dipel 2X at rate of 50 g/100 lit. water, S-1283 at its lowest rate 150 ml/100 lit. water and three Targets at its highest rate 500 ml/100 lit. water came next in their effect with approximately equal percent reduction all over the two experimented years, 2001 and 2002 with respective mean of 74.98 & 75.82 %; 73.70 & 74.86 % and 74.53 & 74.43 %. Three Targets at the lowest rate 250 ml/100 lit. water was the least effective material with 68.03 & 68.80 % reduction in the two respective years.

INTRODUCTION

Cowpea, *Vigna unguiculata* L. is one of the important vegetable crops in Egypt. Cowpea is, normally, liable to infestation with the spider mite *Tetranychus urticae* Koch which is considered very injurious specially during summer plantation

(Abdel-Salam *et al.*, 1980 and Farrag *et al.*, 1998). Pod quality is greatly influenced by mite infestation and significant yield losses are possible at severe infestation (Wahba, 2000).

The mite was primarily controlled for more than the past half century through application of chemical acaricides which used for suppressing mite population on vegetables and other fields crops (Atalla and Farrag, 1969; Atalla *et al.*, 1969, Atalla *et al.*, 1970a & b; Iskandar, 2000). The search to reduce development of resistance against the common acaricides, persistence of residues in food, emergence of new and secondary pests, destructive of beneficial organisms, human toxication and environmental health problems caused by the excessive use of synthetic acaricides, led to research for other materials to protect plants against mite infestation and without any risk to human, animal and environment (Iskander, *et al.*, 1990; Zedan, 1991; Ibrahim *et al.*, 1994; El-Duweini and Sedrak, 1998).

The present study aimed to evaluate the effectiveness of some new materials compared with recommended acaricides, on the moving stages of the spider mite, *T. urticae* infesting cowpea plants under field conditions at Fayoum Governorate.

MATERIALS AND METHODS

Two field experiments were conducted during the summer growing season of cowpea plants of 2001 and 2002 seasons at Demo village, Fayoum Governorate to evaluate the effectiveness of some new safer chemicals against moving stages of the two-spotted spider mite, *T. urticae* in both growing seasons. An area of about half of feddan was cultivated with the cowpea, variety "Cream-7". Seeds were sown on 12th and 15th June of 2001 and 2002 seasons, respectively and normal agricultural practices were carried out. The cultivated area was divided into 36 plots each of about 100 square meters. Four plots were used for each treatment including the check treatment control which sprayed with only water. The complete randomized block design was used in this respect and treatments applied are :

- 1-Three Targets, natural products consisted from some plant natural oil, some fatty acids mixed with some essential micronutrients, at rate of 250 and 500 ml/100 lit. water.

- 2- Milbecknock 1 % EC (milbectin), a new miticide derived from natural compound (*Streptomyces hygroscopicus* subsp. *aureolacrimosus*), at rate of 50 ml/100 lit. water.
- 3- S-1283, a new selective acaricide (2, 4-diphenyloxazoline derivatives), at rate of 150 and 300 ml/100 lit. water.
- 4- Dipel 2X (*Bacillus thuringiensis*), at rate of 50 g/100 lit. water.
- 5- Vertimec (abamectin) 1.8 % EC, a natural product produced by the soil microorganisms, *Streptomyces avermitilis* [a mixture containing a minimum 80 % avermectin B_{1a} and a maximum of 20 % avermectin B_{1b} at a rate of 40 ml/100 lit. water.
- 6- Ortus 5 % SC at the rate of 50 ml/100 lit. water (as recommended acaricides).
- 7- Control (untreated), sprayed with water only.

The rate of applications used for each of the indicated chemical was applied with knapsack-sprayer (CP-3) equipped with one nozzle in 200 liter water per feddan. Chemical application was carried out once, three weeks after planting, on 3rd and 6th July of the two seasons, respectively.

A sample of ten cowpea leaves representing the lower, middle and upper part of the plants was taken from every plot and both leaf surfaces were examined for mite moving stages at the laboratory. Samples were taken just before spray and five times afterwards at 48 h, 7, 14, 21 and 28 days. Percentages of reduction in mite population were estimated according to Henderson and Tilton equation (1955).

RESULTS AND DISCUSSION

Tables 1 & 2 show the effectiveness of some new and safer materials used on cowpea plants against the two-spotted spider mite, *T. urticae* at Demo village, Fayoum Governorate, during 2001 and 2002 summer growing seasons.

Data in Table 1 clearly showed that, in 2001 season, Vertimec 1.8 % EC at rate of 40 ml./100 lit. water was the most effective materials in reducing mite moving stages with average percentage reduction of 91.01 %, followed by Ortus 5 % SC at rate of 50 ml/100 lit. water with average percentage reduction of 90.65 %, Milbecknock 1 % EC at rate of 50 ml/100 lit. water with average percentage reduction of 89.71 % and S-1283 at its highest rate 300 ml/100 lit. water with

average percentage reduction of 85.90 %. Dipel 2X at rate of 50 g/100 lit. water with average percentage reduction of 74.98 %, S-1283 at its lowest rate 150 ml/100 lit. water with average percentage reduction of 73.70 % and Three Targets at its highest rate 500 ml/100 lit. water with average percentage reduction of 74.53 % came in the second category concerning their effect against the mites moving stages. Three Targets at the lowest rate 250 ml/100 lit. water was the least effective material with 68.03 % reduction in mite moving stages.

Similar trend occurred regarding the effect of same previous tested materials against the mites moving stages during the growing season of 2002 at Fayoum Governorate, Tables, 2. It is also found that Vertimec 1.8 % EC, Ortus 5 % SC, Milbecknock 1 % EC and S-1283 at the highest rate were the most efficient compounds on mite moving stages with respective percentage of reduction 91.91, 90.57, 89.92 and 85.44. On the other hand, Dipel 2X, S-1283 at its lowest rate 150 ml/100 lit. water and Three Targets at its highest rate 500 ml/100 lit. water gave nearest subequal percentages reduction of 75.82, 74.86 and 74.43 %, respectively. Three Targets at the lowest rate 250 ml/100 lit. water was the least effective material with 68.80 % reduction in mite moving stages population.

Data from the above mentioned results, revealed that during the two successive seasons of 2001 and 2002, Vertimec 1.8 % EC (biopesticide) at rate of 40 ml/100 lit. water, Ortus 5 % SC (Chemical pesticide) at rate of 50 ml/100 lit. water, Milbecknock 1 % EC (biopesticide) at rate of 50 ml/100 lit. water and S-1283 (IGR) at the highest rate 300 ml/100 lit. water were the most superior safer compounds against the moving stages of *T. urticae* mites infesting cowpea plantation.

Table 1. Population of *T. urticae* moving stages on cowpea plants before and after spray with some chemicals and percentage reduction during 2001 summer season at Fayoum Governorate.

Tested materials	Rate of application	Number of mite moving stages per 40 cowpea leaves						Mean
		Pre-treatment	After treatment at indicated sampling periods					
			48 hours	1 week	2 weeks	3 weeks	4 weeks	
Three Targets	250 ml/ 100 lit.	734	179 (76.59)	221 (72.60)	255 (68.39)	311 (64.84)	383 (57.74)	(68.03)
Three Targets	500 ml/ 100 lit.	749	153 (80.39)	191 (76.80)	234 (72.82)	251 (72.19)	273 (70.48)	(74.53)
Milbecknock	50 ml/ 100 lit.	728	59 (92.22)	71 (91.13)	84 (89.97)	96 (89.06)	121 (86.21)	(89.71)
S-1283	150 ml/ 100 lit.	752	163 (79.20)	191 (76.89)	226 (73.86)	261 (71.20)	303 (67.37)	(73.70)
S-1283	300 ml/ 100 lit.	751	84 (89.27)	101 (87.77)	117 (86.45)	133 (85.31)	179 (80.70)	(85.90)
Dipel 2X	50 g/ 100 lit.	762	156 (80.35)	181 (78.39)	211 (75.91)	247 (73.10)	309 (67.16)	(74.98)
Vertimec	40 ml/ 100 lit.	747	48 (93.86)	59 (92.82)	69 (91.97)	94 (89.56)	121 (86.88)	(91.01)
Ortus 5 %	50 ml/ 100 lit.	753	53 (93.25)	64 (92.27)	76 (91.22)	93 (89.75)	123 (86.77)	(90.65)
Control (untreated)		748	783	819	853	891	923	

* Values between brackets represent the percent reduction in mite moving stages.

Table 2. Population of *T. urticae* moving stage on cowpea plants before and after spray with some chemicals and percentage of reduction during 2002 summer season at Fayoum Governorate.

Tested materials	Rate of application	Number of mite moving stages per 40 cowpea leaves						Mean
		Pre-treatment	After treatment at indicated sampling periods					
			48 hours	1 week	2 weeks	3 weeks	4 weeks	
Three Targets	250 ml/ 100 lit.	630	154 (76.29)	183 (72.99)	217 (69.35)	254 (65.33)	307 (60.04)	(68.80)
Three Targets	500 ml/ 100 lit.	636	132 (79.87)	159 (76.75)	181 (74.68)	199 (73.10)	250 (67.77)	(74.43)
Milbecknock	50 ml/ 100 lit.	628	47 (92.75)	57 (91.56)	69 (90.23)	81 (88.91)	106 (86.16)	(89.92)
S-1283	150 ml/ 100 lit.	641	126 (80.48)	153 (77.81)	179 (75.15)	211 (71.70)	241 (69.18)	(74.86)
S-1283	300 ml/ 100 lit.	637	67 (89.80)	83 (87.89)	101 (85.89)	116 (84.34)	161 (79.58)	(85.44)
Dipel 2X	50 g/ 100 lit.	624	127 (80.26)	147 (78.10)	163 (76.76)	191 (73.68)	226 (70.31)	(75.82)
Vertimec	40 ml/ 100 lit.	639	37 (94.38)	46 (93.31)	58 (91.92)	67 (90.98)	86 (88.97)	(91.91)
Ortus 5 %	50 ml/ 100 lit.	631	43 (93.39)	51 (92.48)	61 (91.40)	73 (90.06)	96 (87.52)	(90.57)
Control (untreated)		632	654	681	713	731	769	

* Values between brackets represent the percent reduction in mite moving stages.

This result agreed with that of Zedan (1991) who applied some insect growth inhibitors against *T. urticae* infesting cotton seedlings and found that Cascade 5 % was most effective followed by Applaud 25 % WP. Ibrahim *et al.* (1994) stated that eggs of 1-day old of two-spotted spider mite, *T. urticae* was more susceptible to

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On the other hand, Dipel 2X at rate of 50 g/100 lit. water, S-1283 at its lowest rate 150 ml/100 lit. water and Three Targets at its highest rate 500 ml/100 lit. water were moderately effective against the spider mite moving stages and can be used as safer than chemical acaricides to avoid their harmful results on the environment. Moreover, a compound as Three Targets has a nutritional value to the plants. In this concern, Ibrahim *et al.* (1994) and Iskanar (2000) reported a similar conclusion.

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التقييم الحقلى لبعض المبيدات الأكاروسية الامنة الجديدة
ضد العنكبوت الأحمر العادى *Tetranychus urticae* Koch
 الذى يصيب نباتات اللوبيا بمحافظة الفيوم

هناء محمد الخطيب - نادية حنا حبشى - عايده خليل فهمى إسكندر

معهد بحوث وقاية النباتات، مركز البحوث الزراعية، النقى - الحيزة - مصر.

تم تقييم كفاءة بعض المبيدات الأكاروسية الامنة على الأطوار المتحركة للعنكبوت الأحمر العادى *Tetranychus urticae* Koch التى تصيب نباتات اللوبيا "صنف كريم - ٧" بقرية نمو بمحافظة الفيوم خلال موسمين متعاقبين ٢٠٠١ و ٢٠٠٢. حيث تمت المقارنة بأحد المبيدات الأكاروسية الموصى بها وهو أورتنس ٥ % SC..

أوضحت النتائج المتحصل عليها أن مركبات فيرثيميك ١,٨ % بمعدل ٤٠ سم^٣/١٠٠ لتر ماء، أورتنس ٥ % بمعدل ٥٠ سم^٣/١٠٠ لتر ماء، ميلبكتوك ١ % بمعدل ٥٠ سم^٣/١٠٠ لتر ماء، S-1283 بمعدل الإستخدام العالى (٣٠٠ سم^٣/١٠٠ لتر ماء) كانت أكثر المركبات فعالية حيث أعطت معدل خفض فى تعداد الأطوار المتحركة للعنكبوت الأحمر أكثر من ٨٥ % (٩١,٠١ و ٩١,٩١ %) و (٩٠,٦٥ و ٩٠,٥٧ %) و (٨٩,٧١ و ٨٩,٩٢ %) و (٨٥,٩٠ و ٨٥,٤٤ %) عامى ٢٠٠١ و ٢٠٠٢ على الترتيب.

ومن ناحية أخرى جاءت مركبات دايبيل ٢ × بمعدل ٥٠ سم^٣/١٠٠ لتر ماء، S-1283 بمعدل الإستخدام المنخفض (١٥٠ سم^٣/١٠٠ لتر ماء)، ومركب Three Targets بمعدل الإستخدام العالى (٥٠٠ سم^٣/١٠٠ لتر ماء) فى المرتبة الثانية حيث أعطت معدلات خفض لتعداد الأطوار المتحركة للعنكبوت الأحمر متقاربة (٧٤,٩٨ و ٧٥,٨٢ %) و (٧٣,٧٠ و ٧٤,٨٦ %) و (٧٤,٥٣ و ٧٤,٤٣ %) على الترتيب خلال عامى ٢٠٠١ و ٢٠٠٢. وأخيرا جاء مركب Three Targets بمعدل الإستخدام المنخفض (٢٥٠ سم^٣/١٠٠ لتر ماء) فى المرتبة الأخيرة وبمعدل خفض تعداد الأطوار المتحركة للعنكبوت الأحمر (٦٨,٠٣ و ٦٨,٨٠ %) خلال الموسمين على التوالى.