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# EFFICACY OF SOME COMPOUNDS AGAINST THE TWO-SPOTTED SPIDER MITE, *Tetranychus arabicus* ATTIAH AS ALTERNATIVES TO CHEMICAL ACARICIDES

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## ABSTRACT

Experiments were carried out sweet pepper variety "Polo Wonder" during two successive seasons 2001 and 2002 at Fayoum governorate to evaluate the efficacy of some compounds as safe alternative compunds against the two spotted spider mite, *Tetranychus arabicus* Attiah.

Results indicated that among the seven tested alternatives, the highest percent of reduction in mite moving stages were recorded with Vertimec followed by Vabcomic which gave more than 85 % percent reduction (92.93 & 88.64 and 87.80 & 86.24) all over the two tested years, 2001 & 2002, respectively. Sulfofine came the least in this respect with about 70 % reduction (70.15 & 69.91) in mite population in the two respective years. The rest tested materials were moderate in their effect.

## INTRODUCTION

Vegetable crops shelter several mite species, some of which are phytophagous causing qualitative and quantitative reduction in the yield allover the world (Abdel-Salam *et al.*, 1980). They could induce a pronounced effect on the vegetable plants. Among these injurious mites, *Tetranychus arabicus* Attiah is considered the most injurious phytophagous mite on solanaceous plants especially eggplant and pepper. It feeds on the plant sap causing serious damage according to the degree of infestation. At the end of growing season in case of severe infestation, mite individuals were also found infesting pepper fruits. It is also the most abundant species on leaves of vegetable plants in both open field and plastic houses.

For several decades ago, chemical acaricides were the only tools used for suppressing mite population on vegetables and other field crops (Atalla and Farrag, 1969; Atalla *et al.*, 1969, and Atalla *et al.*, 1970a & b). It is emphasized that the indiscriminate use of insecticides gave rise to adverse consequences such as development of resistance, persistence of residues in food, emergence of new and secondary pests, destructive of beneficial organisms, human toxication and environmental health problems, in addition, to its greater expense, testifies that new approaches to insect control are urgently needed. One of the most promising approaches is the use of new alternative chemicals safe to environment and in the same time effective against the destructive mites.

The present study was carried out to determine the efficacy of some materials other than acaricides on the the two-spotted spider mite, *T. arabicus* infesting pepper plants at Fayoum Governorate, during 2001 and 2002 summer growing seasons.

# MATERIALS AND METHODS

Two experiments were conducted during the summer growing season of pepper plants of 2001 and 2002 seasons at Fayoum Governorate to evaluate the efficacy of some alternative chemicals against *T. arabicus*. For this purpose, in both years, an area of about half of feddan was cultivated with the sweet pepper variety "Polo Wonder". The nursery were transplanted to the permanent area on 10*th* and 13*th* July in 2001 and 2002 seasons, respectively. In both years, the cultivated area was divided into 32 plots each of about 100 square meters. Four plots were used for each treatment including the check treatment which sprayed only with water. The complete randomized block design was used in this respect. Chemicals used are :

1- Vertimec (abamectin) 1.8 % EC [a mixture containing a minimum 80 % avermectin B,a (5-O-demethyl-avermectin A,a) and a maximum of 20 % avermectin B,b (5-O-demethyl-25-de-(1-methylpropyl-25-(1-methyl) avermectin A,a.] at a rate of 40 ml/100 lit. if water.
2- Cascade 10 % DC (flufenoxuron) (an insect growth regulator compound) at rate of 50 ml/100 lit. of water.
3- Vabcomic (abamectin) 1.8 % EC, at a rate of 40 ml/100 lit. of water.
4- Biosect (32 x 106 spore/ml) (bio-fungicide) at rate of 2 lit./100 lit. of water.
5- Triology (oil extracted from neem trees, *Azadirachta indica*) at the rate of 2 lit./100 lit. of water.
6- Admiral 10 % (pyriproxyfen) (insect growth regulator) at the rate of 75 ml/100 lit. water.
7- Sulfofine 98 % dust (sulfur) at the rate with 10 kg/feddan.

Spraying was carried out by means of a back motor sprayer using 200 liters of water per feddan and in the case of sulfofine 98 % hand duster was used.. Chemical application was carried out once, two weeks after transplanting, on 25*th* and 28*th* July in the two seasons, respectively.

Samples were taken at random from each plot by collecting thirty pepper leaflets; ten from the lower part, ten from the middle and ten from the upper part of the plants. Both leaflerts surfaces were examined for mite moving stages at the laboratory using an stereomicroscope. Samples were taken just before spray and five times afterwards at 2, 7, 14, 21 and 28 days. Percentages of reduction in mite population were estimated according to Henderson and Tilton equation (1955).

## RESULTS AND DISCUSSION

The effects of seven alternative compounds tested against the red spider mite, *T. arabicus* on pepper plants at Fayoum Governorate, during 2001 and 2002 summer growing seasons are shown in Tables (1 & 2).

In 2001 season, data in Table (1) revealed that Vertimec 1.8 % EC at rate of 40 cc/100 lit. water was the most effective compound in reducing mite population with an average percentage reduction of 92.93 %. The lowest average reduction percentages was with Sulfofine 98 % dust treatment at the rate of 10 kg/fed. (70.15 %). The average percentages reduction in mite

population of the rest materials were 87.80, 78.88, 77.02, 74.99 and 74.49 % for Vabcomic 1.8 % at the rate

**Table (1) : Population of mite moving stages on pepper plants variety "Polo Wonder" before and after spraying or dusting of some compounds and percentage of reduction during 2001 summer season at Fayoum governorate.**

| Compounds tested | Rate Used | Number of mite moving stages per 30 pepper leaflets | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Pre-treatment | After treatment at indicated sampling periods : | | | | | |
| | | | 48 hours | 1 week | 2 weeks | 3 weeks | 4 weeks | Mean |
| Vertimec | 40 ml/ 100 lit. | 672 | 34 (95.09) | 41 (94.33) | 52 (93.35) | 61 (92.65) | 94 (89.33) | 56.4 (92.93) |
| Cascade | 50 ml/ 100 lit. | 645 | 114 (82.86) | 124 (82.12) | 176 (76.53) | 184 (76.89) | 201 (76.00) | 159.8 (78.88) |
| Vabcomic | 40 ml/ 100 lit. | 688 | 62 (91.26) | 75 (89.86) | 93 (88.37) | 121 (85.75) | 143 (83.79) | 98.8 (87.80) |
| Biosect | 200 gm/ 100 lit. | 633 | 116 (82.22) | 132 (80.61) | 189 (74.32) | 197 (75.80) | 226 (72.16) | 172.0 (77.02) |
| Triology | 2 lit./ 100 lit. | 629 | 121 (82.34) | 129 (80.93) | 211 (71.15) | 224 (71.15) | 267 (66.90) | 190.4 (74.49) |
| Admiral | 75 ml/ 100 lit. | 653 | 129 (80.84) | 143 (79.64) | 199 (73.80) | 233 (71.10) | 264 (68.47) | 193.6 (74.77) |
| Sulfofine | 10 kg/ fed. | 644 | 152 (77.11) | 192 (72.23) | 233 (68.89) | 263 (66.93) | 283 (65.60) | 224.8 (70.15) |
| Control (untreated) | | 663 | 684 | 714 | 772 | 819 | 853 | 768.4 |

* Values between brackets represent the percent reduction of infestation.

**Table (2) : Population of mite moving stages on pepper plants variety "Polo Wonder" before and after spraying or dusting of some compounds and percentage of reduction during 2002 summer season at Fayoum governorate.**

| Compounds tested | Rate Used | Number of mite moving stages per 30 pepper leaflets | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Pre-treatment | After treatment at indicated sampling periods : | | | | | |
| | | | 48 hours | 1 week | 2 weeks | 3 weeks | 4 weeks | Mean |
| Vertimec | 40 ml/ 100 lit. | 873 | 57 (93.67) | 78 (91.69) | 103 (89.26) | 141 (85.63) | 173 (82.96) | 110.4 (88.64) |
| Cascade | 50 ml/ 100 lit. | 867 | 164 (81.65) | 182 (80.48) | 193 (79.75) | 241 (75.26) | 301 (70.14) | 216.2 (77.46) |
| Vabcomic | 40 ml/ 100 lit. | 855 | 69 (92.17) | 84 (90.86) | 121 (87.12) | 169 (82.41) | 212 (78.68) | 131.0 (86.24) |
| Biosect | 200 gm/ 100 lit. | 861 | 155 (82.54) | 181 (80.45) | 199 (78.97) | 261 (73.02) | 296 (70.44) | 218.4 (77.08) |
| Triology | 2 lit./ 100 lit. | 847 | 165 (81.20) | 176 (80.68) | 219 (76.47) | 293 (69.21) | 334 (66.08) | 237.4 (74.73) |
| Admiral | 75 ml/ 100 lit. | 838 | 169 (80.44) | 211 (77.55) | 223 (76.79) | 241 (74.40) | 378 (61.91 | 244.4 (74.22) |
| Sulfofine | 10 kg/ fed. | 872 | 183 (79.75) | 266 (71.63) | 301 (68.59) | 342 (65.10) | 359 (64.60) | 290.2 (69.91) |
| Control (untreated) | | 853 | 879 | 913 | 934 | 961 | 987 | 934.8 |

* Values between brackets represent the percent reduction of infestation.

of 40 cc/100 lit., Cascade 10 % DC at the rate of 50 cc/100 lit., Biosect at the rate of 200 gm/100 lit., Admiral 10 % EC at the rate of 75 cc/100 lit. and Triology at the rate of 2 lit./100 lit., respectively.

Regarding the effect of the same previous seven tested materials on the population of *T. arabicus* during 2002 summer plantation of pepper plant at Fayoum governorate, it is also found from data presented in Table (2) that Vertimec 1.8 % EC followed by Vabcomic 1.8 % were the most promising materials with reduction percentages averaged 88.64 and 86.24, respectively. On the other hand, the rest materials gave nearest avergae percentages reduction, being 77.46, 77.08, 74.73 and 74.22 % for Cascade 10 % DC, Biosect (32 x 106 spore/ml), Admiral 10 % EC and Triology (neem oil), respectively. Sulfofine 98 % dust came the least with average reduction percentage of 69.91 %.

Data from the abovementioned results, of the two seasons, revealed that Vertimec 1.8 % EC and Vabcomic 1.8 % EC at the rate of 40 ml/100 lit. water were the most superior alternatives against the moving stages of *T arabicus* infesting pepper plantation. These results agreed with Rangel *et al.* (1990), El-Enany & Zedan (1991), Baranowski (1996 & 1998), and Abdel-Rahman & Ibrahim (2001).

Baranowski (1996) evaluated the effectiveness of abamectin (Vertimec) for the control of adults and eggs of *T. urticae*. Low concentrations (0.01-0.05 %) had high toxicity to the mite and stated that this preparation was not toxic to eggs, but larvae emerging from treated eggs died within 5 days. The same author (1998) stated that preparation Vertimec 1.8 % EC (0.05 %) (abamectin) was highly effective against *T. urticae* on chrysanthemum cv. Veria in the green house in Poland, with no phytotoxic effects. Antonin *et al.* (1997) showed that abamectin (Vertimec) produced good results in the summer plantation against mite population.

Results of Cascade 10 % EC on the moving stages of *T. arabicus* of the two year of study agree with those of Mothes and Seitz (1982), Perugia *et al.* (1986), Inglesfield *et al.* (1987), El-Atrouzy *et al.* (1989) and Lee *et al.* (1989) who declared that Cascade 10 % DC gave high efficiency on the immature stages of mite species.

From the abovementioned results, it could be useful to recommend the use of these materials as alternatives for the chemical recommended acaricides to avoid their harmful results on the environment

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# كفاءة بعض المركبات ضد العنكبوت الأحمر *Tetranychus arabicus* Attiah كبدائل للمبيدات الأكاروسية

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تم إجراء تجارب لمدة سنتين متتاليتين على نباتات الفلفل الأخضر (صنف الفلفل الحلو "بولو ووندر") فى محافظة الفيوم لتقييم كفاءة بعض المركبات التى يمكن إستخدامها كبدائل امنه للمبيدات الأكاروسية ضد أكاروس العنكبوت الأحمر *Tetranychus arabicus* Attiah.

أوضحت النتائج المتحصل عليها خلال العامين أنه من بين المواد السبعة المختبرة كبدائل، أعطى مركبى فيرتيميك ١,٨ % (أبامكتين) و فابكوميك ١,٨ % (أبامكتين) بمعدل ٤٠ سم٣/١٠٠ لتر ماء أعلى متوسط لنسبة الخفض فى تعداد الأطوار المتحركة للأكاروس أكثر من ٨٥ % (٩٢,٩٣ و ٨٨,٦٤ %) و (٨٧,٨٠ و ٨٦,٢٤ %) لكلا المركبين خلال عامى ٢٠٠١ و ٢٠٠٢ على الترتيب. بينما أعطى التعفير بمركب السلفوفاين (مركب كبريتى) بمعدل ١٠ كجم/فدان أقل متوسط فى نسبة الخفض بلغت ٧٠,١٥ و ٦٩,٩١ % خلال نفس العامين على الترتيب. وقد أعطت المواد الأربعة المتبقية تأثيرا متوسطا فى خفض تعداد الأطوار المتحركة للعنكبوت الأحمر وهى الكاسكيد ١٠ % بمعدل ٥٠ سم٣/١٠٠ لتر ماء، بيوسكت (مبيد فطرى) بمعدل ٢٠٠ جم/١٠٠ لتر ماء، تريولوجى (زيت مستخلص نبات النيم) بمعدل ٢ لتر/١٠٠ لتر ماء، أدميرال ١٠ % (أحد منظمات النمو الحشرية) بمعدل ٧٥ سم٣/١٠٠ لتر ماء.