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A FIELD EXPERIMENT ON THE CONTROL OF PHYTOPHAGUS MITES INFESTED TWO ORANGE VARIETIES AT MINUFIYA GOVERNORATE

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ABSTRACT: ***The effect of three compounds(Agrin 6.5% , Micronized sulfur 70%Wp , K.Z. oil EC 95%) under field condition to deteremine the toxicity effect on Brevipalpus obovatus and Tetranychus urticae , infested Naval orange and Seefi orange trees . The reduction percentages of, Tetranychus urticae infested leaves of Naval orange was recorded, Micronized sulfur gave 89.4 % followed by KZ oil resulting 79.7 %, and Agrin treatment which gave 76.9 %. As for the grand mean of the reduction percentages of Brevipalpus obovatus population , the highest grand mean reduction was recorded with the treatment of Agrin giving 97.4 % followed by Micronized sulfur resulting 93.4 %, while KZ oil treatment gave 85.8 % . To study the effect of these compounds on Amblyseius swirski results indicated that , the highest grand mean reduction was recorded with the treatment of Agrin giving 93.6 % followed by Micronized sulfur resulting 93.1%, while KZ oil treatment gave 68.1 % .Tetranychus urticae infested leaves of Seefi orange were lower , where the highest grand mean reduction was recorded with the treatment of Agrin giving 85%, followed by Micronized sulfur resulting (84.6 %) , while KZ oil treatment gave the least one, (76.4%) . As for Brevipalpus obovatus infested leaves of Seefi orange, the reduction percentages were for 82.8% for Agrin followed by Micronized sulfur (71.5%) and KZ oil (71.44%) treatments. The reduction percentages of Amblyseius swirsk, recorded the highest mean in the treatment of Agrin (92.5%) followed by Micronized sulfur (87.3%) and KZ oil (78.6%)***

Key words: ***Tetranychus urticae, Brevipalpus obovatus, Amblyseius swirski , citrus varieties, mite control.***

INTRODUCTION

Citrus is one of the most important fruits in Egypt. According to statistic of FAO in(2002), Egypt is ranked the seventh among the world products states (2.496 million Mt)of citrus fruit. But ranked the eight among exporter states (260.000Mt).

Citrus cultivationis centred in two large geographic regions: the fertile Delta area and the newly reclaimed land .Menoufia governorate was chosen for conducting these experiments for the large area cultivated by citrus varieties. One of the major problems that frequently faces citrus trees in

Egypt is how to control phyophagous mites, however the most injurios mites on citrus trees. At Minufiya governorate are the two spotted spider mite, *Tetranychus urticae*; the citrus rust mite, *Phyllocoptruta oleivora* (Ashmead); and the citrus flat mite, *Brevipalpus phoenics* (Geijskes) Mohamed (1953), Attiah (1956), Attiah *et. al* (1971) and Ibrahim(1988).

The goal of this study is to determine the effect of three pesticides in the control of phytophogous mites in relation to the side effect on one predatory mite on Naval orange , and Seefi orange trees under field conditions .

MATERIALS AND METHODS

Under field conditions, three pesticides were applied as spray treatment, each compound was treated at one concentration (Agrin 6.5%, Micronized sulfur 70%Wp, K.Z. oil EC 95%); each compound was represented by three trees of Naval orange and three trees of Seefi orange. Three trees of each orange varieties were sprayed with water and left without any applications which served as control treatment. Pesticide applications were done in the beginning of the growth season of citrus (15 March 2009), samples were taken before treatments and 2, 7, 14, 21, and 28 days after applications. Numbers of the two spotted red spider mite *Tetranychus urticae*, and the citrus flat mite *Brevipalpus obovatus*, in addition to the predatory mite, *Amblyseius swirski* were counted, then the reduction percentages of the mentioned mites were computed for all tested pesticides using Henderson and Tilton formula (Fleming and Retnakaran,1985), as follow .

$$\text{Reduction \%} = \left[1 - \left(\frac{\text{Treatment after}}{\text{Treatment before}} \times \frac{\text{Control before}}{\text{Control after}}\right)\right] \times 100$$

RESULTS AND DISCUSSION

Under field conditions, three pesticides were applied each compound was treated at one concentration and each concentration was represented by three trees of Naval orange and Seefi orange. Three trees were left without any applications which sprayed with water and served as control treatment. Pesticide application were done in the beginning of the growth season of citrus (15 March 2009), where sampling process were done before treatments and 2, 7, 14, 21, and 28 days after applications. Numbers of the red spider mite *Tetranychus urticae*, and the citrus flat mite *Brevipalpus obovatus*, in addition to the predatory mite, *Amblyseius swirski* were counted, then the reduction percentages of the mentioned mites were computed for all tested pesticides.

Data presented in Table (1) show the average numbers of different mite species on Naval orange leaves, before treatment and 2, 7, 14, 21, and 28 days after treatments of the three tested compounds in comparison to

control treatment. Results indicated that the average numbers of *Tetranychus urticae* were sharply decreased after spraying of the tested pesticides from 2 days of treatment and to 28 days after treatment in comparison with control treatment, where *Tetranychus urticae* numbers were increased .The number of *Tetranychus urticae* decreased from 3.2 individuals /10 leaves before application to 1.1 individuals /10 leaves two days after application when Agrin was used, more decrease was observed until 21days after application when average number reach 0.3 individuals /10 leaves, then began to increse 28 days after application reach 0.8 individuals /10 leaves. The same trend was observed when Micronized sulfur or K .Z oil were used , where numbers increased from 2.7 and 2.9 individuals /10 leaves to 0.7 and 1.0 individuals /10 leaves two days after application and reach 0.3 and 0.4 individuals /10 leaves 21days after application for both compounds respectively.

Table (1): Effect of three compounds on mites associated with *Citrus sinensis* Var. Naval during 2009 season under field conditions.

Treatment	Rate of application	Average numbers of mites / 10 leaves						
		Before spray	Days after spray					Grand mean
			2	7	14	21	28	
			Tetranychus urticae					
Agrin	1.25g / 1 Liter water	3.2	1.1	0.8	0.4	0.3	0.8	0.7
Micronized sulfur	2.5 g / 1 Liter water	2.7	0.7	0.2	0.3	0.3	0.4	0.4
KZ oil	1cm^3/ 100 cm^3 water	2.9	1.0	0.8	0.7	0.4	0.4	0.7
Control	-	2.9	3.1	3.4	3.2	3.5	3.2	3.3
			Brevipalpus obovatus					
Agrin	1.25g / 1 Liter water	1.2	0.2	0.1	0.0	0.0	0.1	0.1
Micronized sulfur	2.5 g / 1 Liter water	0.9	0.5	0.3	0.1	0.2	0.3	0.3
KZ oil	1cm^3/ 100 cm^3 water	1.1	0.8	0.6	0.3	0.3	0.7	0.5
Control	-	1.2	2.5	4.7	3.6	3.8	3.9	3.7
			Amblyseius swirski					
Agrin	1.25g / 1 Liter water	0.4	0.1	0.0	0.0	0.0	0.1	0.04
Micronized sulfur	2.5 g / 1 Liter water	0.3	0.1	0.1	0.0	0.0	0.0	0.04
KZ oil	1cm^3/ 100 cm^3 water	0.5	0.1	0.3	0.2	0.2	0.1	0.2
Control	-	0.3	0.5	0.7	0.7	0.9	1.1	0.8

Regarding to the reduction percentages of the three mite species under investigation , results in Table (2) indicated that , *Tetranychus urticae* infested leaves of Naval orange were decreased , where the highest grand mean reduction was recorded with the treatment of Micronized sulfur giving 89.4 % followed by KZ oil resulting 79.7 %, and Agrin treatment which gave 76.9 % .

As for *Brevipalpus obovatus* numbers data in Table (1) indicated that the average numbers of mites were sharply decreased after spraying of the three tested pesticides from 2 days of treatment (0.2, 0.5, 0.8 individuals /10 leaves) and to 21 days the average numbers were 0.02 and 0.3 individuals /10 leaves, in comparison with , 2.5 and 3.8 individuals /10 leaves in control treatment where *Brevipalpus obovatus* numbers were increased

As for the grand mean of the reduction percentages of *Brevipalpus obovatus* infested leaves of Naval orange, results in Table (2) indicated that, the highest grand mean reduction of the mentioned mite, was recorded with the treatment of Agrin giving 97.4 % followed by Micronized sulfur resulting 93.4 %, while KZ oil treatment gave only 85.8 % . As for *Amblyseius swirski* numbers data tabulated Table (1) showed that the average numbers of mite were sharply decreased after spraying of the tested pesticides from 2 days of treatment and to 28 days, in comparison with control treatment, where *Amblyseius swirski* average numbers were increased, the grand mean was 0.04 individuals /10 leaves for Agrin and Micronized sulfur, 0.2 individuals /10 leaves. For K. Z oil, while it was 0.8 individuals /10 leaves for control.

Table (2): Reduction percentages of mites as affected by spraying three compounds on *Citrus sinensis* Var. Naval trees under field conditions.

Treatment	Reduction% Days after spray 2	7	14	21	28	Grand mean reduction%
	Tetranychus urticae					
Agrin	60.9	74.1	86.3	90.6	72.5	76.9
Micronized sulfur	79.7	94.7	91.6	92.3	88.6	89.4
KZ oil	67.7	76.5	78.1	88.6	87.5	79.7
	Brevipalpus obovatus					
Agrin	92	97.8	100	100	97.4	97.4
Micronized sulfur	85	95.2	96.3	96.1	94.2	93.4
KZ oil	71.2	88.5	92.5	92.9	83.8	85.8
	Amblyseius swirski					
Agrin	78	100	100	100	90	93.6
Micronized sulfur	80	85.7	100	100	100	93.1
KZ oil	68	68.6	54.3	64.4	85.4	68.1

In addition, as for the grand mean of the reduction percentages of *Amblyseius swirski* associated with the leaves of Naval orange, results in Table (2) indicated that , the highest grand mean reduction of the mentioned mite, was recorded with the treatment of Agrin giving 93.6 % followed by Micronized sulfur resulting 93.1%, while KZ oil treatment gave only 68.1 %

As for Seefi Orange :data presented in Table (3) show the numbers of different mite species on Seefi orange leaves, before treatments and 2, 7, 14, 21, and 28 days after treatments of the three tested compounds in comparison to control treatment. Results indicated that the average numbers of *Tetranychus urticae* were sharply decreased from 2.9 before treatment to 1.2 individuals /10 leaves for control two days after application and continuoslydecrease reach to zero after 28 days when Agrin was sprayed . While *Tetranychus urticae* numbers decreased form 2.7 individuals /10 leaves before spray Micronized sulfur to 1.1 individuals /10 leaves two days after application, until it reach 0.2 individuals /10 leaves 28 days after spray , when K. Z oil was used ,the numbers of the *Tetranychus urticae* decreased form 3.1 individuals /10 leaves before spray to 0.1 individuals /10 leaves after 28 days from spray.

Table (3): Effect of three compounds on mites associated with *Citrus sinensis* Var. Seefi during 2009 season under field conditions.

Treatment	Rate of application	Average numbers of mites / 10 leaves						
		Before spray	Days after spray 2	7	14	21	28	Grand mean
			Tetranychus urticae					
Agrin	1.25g / 1 Liter water	2.9	1.2	0.8	0.4	0.2	0.0	0.5
Micronized sulfur	2.5 g / 1 Liter water	2.7	1.1	0.8	0.3	0.5	0.2	0.6
KZ oil	1cm^3/ 100 cm^3 water	3.1	1.7	1.2	0.8	0.3	0.1	0.8
Control	-	2.7	3.5	4.6	3.8	3.4	3.6	3.8
			Brevipalpus obovatus					
Agrin	1.25g / 1 Liter water	2.5	0.9	0.7	0.3	0.1	0.3	0.5
Micronized sulfur	2.5 g / 1 Liter water	2.3	1.2	0.9	0.7	0.6	0.8	0.8
KZ oil	1cm^3/ 100 cm^3 water	2.6	1.2	0.8	0.9	0.6	0.5	0.8
Control	-	2.3	2.7	3.2	3.6	2.8	2.8	3.02
			Amblyseius swirski					
Agrin	1.25g / 1 Liter water	0.6	0.2	0.0	0.0	0.0	0.1	0.1
Micronized sulfur	2.5 g / 1 Liter water	0.5	0.3	0.0	0.1	0.2	0.0	0.1
KZ oil	1cm^3/ 100 cm^3 water	0.6	0.2	0.1	0.1	0.3	0.2	0.2
Control	-	0.6	0.7	0.8	0.7	0.9	1.1	0.8

Regarding to the reduction percentages of the three mite species under investigation, results in Table (4) indicated that , *Tetranychus urticae* infested leaves of Seefi orange were decreased , where the highest grand mean reduction was recorded with the treatment of Agrin giving 85%, followed by Micronized sulfur resulting 84.6 %, while KZ oil treatment gave the least one, 76.4 % .

As for *Brevipalpus obovatus* numbers data presented in Table (3) indicated that the average numbers decreased after spray all compound and reach 0.9, 1.2, and 1.2 individuals /10 leaves two days after spay for Agrin ,

Micronized sulfur and K .Z oil , while average number *B. obovatus* was 2.7 individuals /10 leaves control respectively .The numbers of *B. obovatus* gradually decreased reach 0.3, 0.8, and 0.5 individuals /10 leaves 28 days after spray when Agrin, Micronized sulfur and K .Z oil, used in comparison with 2.8 individuals /10 leaves in control.

Table (4): Reduction percentages of mites as affected by spraying three compounds on *Citrus sinensis* Var. Seefi trees under field conditions.

Treatment	Reduction% Days after spray					Grand Mean Reduction%
	2	7	14	21	28	
	Tetranychus urticae					
Agrin	62.3	80.8	88.4	93.5	100	85
Micronized sulfur	68.3	82.6	92.1	85.3	94.4	84.6
KZ oil	46.3	71.3	76.8	90.3	96.9	76.4
	Brevipalpus obovatus					
Agrin	63	75.9	90.8	96.1	88.2	82.8
Micronized sulfur	55.5	71.8	80.5	78.1	71.4	71.5
KZ oil	55.5	72.5	72.5	76.4	80.3	71.4
	Amblyseius swirski					
Agrin	71.4	100	100	100	90.9	92.5
Micronized sulfur	65.7	100	88.6	82.2	100	87.3
KZ oil	71.4	87.5	85.7	66.6	81.8	78.6

As for the grand mean of the reduction percentages of *Brevipalpus obovatus* infested leaves of Seefi orange, results in Table (4) indicated that, the highest grand mean reduction of the mentioned mite, was recorded with the treatment of Agrin giving 82.8 % followed by Micronized sulfur and KZ oil treatments resulting 71.5 %, and 71.4 %.

As for *Amblyseius swirski* numbers data Table (3) indicated that the average numbers of mites were sharply decreased after spraying of the tested pesticides from 2 days of treatment and to 28 days, in comparison with control treatment, where *Amblyseius swirski* average numbers were increased.

In addition, as for the grand mean of the reduction percentages of *Amblyseius swirski* associated with the leaves of Seefi orange, results in Table (4) indicated that , the highest grand mean reduction of the mentioned mite, was recorded with the treatment of Agrin giving 92.5 % followed by Micronized sulfur resulting 87.3 %, while KZ oil treatment gave 78.6 % . These result are in agreement of that obtained by Hanna and Abdel Hafez (1975) , Burts (1984) , Iskander and El-Atrouzy (1988) , Ibrahim (1992) , El-Ghobashy (1993) , Iskander (1993) , Hosny *et al.* (2001) , Petra *et al.* (2001) , Mani and Chattopadhaya (2003) and Imran and Janardan (2006) .

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دراسات حقلية على مكافحة الحلم المتطفل على نوعين من الموالح في محافظة المنوفية

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الملخص العربي

أجريت دراسة حقلية علي ثلاث مركبات من المبيدات وهي اجرين ٨٢% بتركيز ١,٢٥ % جرام / لتر ماء ، الكبريت الميكروني ٧١,٥ % تركيز ٢,٥ جرام / لتر ماء ، زيت المصرونا ٧١,٤٤ % بتركيز ١ سم ٣ / ١٠٠ سم ٣ وذلك علي كلاً من الأكاروسات الموالح المبطط و اكاروس العنكبوت الأحمر ذو البقعتين والمفترس Amblyseius Swirski وذلك للنوعين من أشجار الموالح وهي البرتقال أبو سرة والبرتقال الصيفي حيث أظهرت النتائج وجود نسبة نقص عالية في أكاروس العنكبوت الأحمر وذلك عند استخدام الكبريت الميكروني يليه زيت المصرونا ثم الاجرين وكان متوسط النقص ٨٩,٤ – ٧٩,٧ – ٧٦,٩ % علي التوالي . أما بالنسبة لحلم الموالح المبطط كان متوسط النقص ٩٧,٤ – ٩٣,٤ – ٨٥,٨ % عند استخدام كل من الاجرين ، الكبريت الميكروني ، وزيت المصرونا علي التوالي . أما بالنسبة Amblyseius Swirski كانت نسبة النقص ٩٣,٦ – ٩٣,١ – ٦٨,١ % علي التوالي وذلك في البرتقال أبو سره . أما بالنسبة للبرتقال الصيفي فكان التأثير علي اكاروس العنكبوت الأحمر فكان متوسط النقص ٨٥ – ٨٤,٦ – ٧٦,٤ % . أما الموالح المبطط فكان النقص بمتوسط ٨٢,٨ – ٧١,٥ – ٧١,٤ % علي الترتيب .أما المفترس Amblyseius Swirski فكان النقص بمتوسط ٩٢,٥ – ٨٧,٣ – ٧٨,٣ علي التوالي .