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Evaluation of Five Recommended Acaricides Against the Old World Date Mite, *Oligonychus afrasiaticus* (McGregor) (Acari: Tetranychidae) Infesting Date Palm Under Field Conditions in the New Valley, Egypt

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Abstract

The date palm, *Phoenix dactylifera* L. (Arecaceae) is one of the most important fruit trees cultivated in the New Valley Governorate, Egypt. The old world date mite, *Oligonychus afrasiaticus* (McGregor, 1939) is considerd as a major pest of date palm orchards in the New Valley Governorate. Herein, the toxicity of five recommended acaricides [abamectin (1.8% EC), chlorfenapyr (36% SC), fenopyroximate (5% EC), cyflumetofen (20% SC) and hexythiazox (10% WP)] were evaluated against the *O. afrasiaticus* in date palm, *P. dactylifera* (cultivar Siwi). Trials were conducted at the field of Plant Protection Department, Faculty of Agriculture, New Valley University. The recommended concentrations of each pesticide were evaluated on *O. afrasiaticus* adults. Results were recorded after 1, 3, 7, 14 and 21 days. Abamectin (1.8 % EC) and chlorfenapyr (36% SC) were considered the most potent pesticides among all the pesticides tested. The reduction percentages were 90.07 and 87.77, followed by fenopyroximate (85.22), cyflumetofen (79.94) and hexythiazox (62.89). These acaricides have been used as the first choice and considered encouraging trends in controlling *O. afrasiaticus* in the New Valley Governorate, Egypt.

Keywords: *Oligonychus afrasiaticus, Acaricides, Date palm, Toxicity, New Valley, Egypt.*

Introduction

The date palm, *Phoenix dactylifera* L. (Arecaceae) is the strategic crop and main source of income for oasis farmers. It is the richest food sources of energy for the people living in southern parts of Iran, Middle East, north of Africa and elsewhere. More than one million palm trees are cultivated for local consumption and exportation in the New Valley Governorate. The Middle East is the source of two thirds of the world dates. The major date producers are: Egypt, Iraq, Iran, and Saudi Arabia. In the New Valley, the date palm trees are liable to be attacked by several pests and disease carriers such as: the spider mite, *Eutetranychus palmatus* Attiah (Tetranychidae), the red palm mite, *Raoiella indica* Hirst, and the red and black flat mite, *Brevipalpus phoenicis* (Geijskes), (Tenuipalpidae) (Negm *et al*., 2015).

The old world date mite, *O. afrasiaticus* is a main pest of date palm (Saleh and Hosny 1979; Elhalawany *et al*., 2017; Palevsky *et al.,* 2004; Palevsky *et al.,* 2003; Baankoud & Basahih, 2000; Gassouma 2005; Al-Zadjali *et al.,* 2006; Aldosari, S.A. 2009; Lakhdari *et al*., 2015). The mites feed on the green date fruit, covering bunches with dense webbing that hinders photosynthesis and accumulates much dust.

Infested fruit become reddish, produce gum-like exudations, shrivel and may split, greatly reducing their market value. Heavy infestations can lead to partial or total yield loss. Chemical pesticides were used for mites control, in addition to the use of the host plant resistance, agricultural and biological control (Negm *et al.,* 2015). Palevsky *et al*., (2004) evaluated six acaricides (i.e., hexythiazox, fenbutatin oxide, abamectin, fenazaquin, Etoxazole and bufenpyrade) on *O. afrasiaticus*.

The works of Arbabi *et al.* (2017) and Aldeghairi (2004) serve as ample guide to this literature. They evaluated the toxicity of certain insecticides and acaricides against *O. afrasiaticus* infested palm trees in different parts of the world. In the present study, the potential toxicity of five selected acarcides [abamectin (1.8% EC), chlorfenapyr (36% SC), fenopyroximate (5% EC), cyflumetofen (20% SC) and hexythiazox (10% WP)] against the old world date mite, *O. afrasiaticus* in palm date (*P. dactylifera* Var. Siwi) in the New Valley was evaluated under field conditions.

Materials and Methods

The toxicity of five recommended acaricides against *O. afrasiaticus* adults was evaluated under field conditions in El-Kharga city (The New Valley Governorate, Egypt).

Acaricides used: The formulations of abamectin (1.8% EC), chlorfenapyr (36% SC), fenopyroximate (5% EC), cyflumetofen (20% SC) and hexythiazox (10% WP) were obtained from the Central Agricultural Pesticides Laboratory (CAPL) in Dokki, Giza, Egypt as gifts (Table 1).

The concentrations used in this study were: abamectin (1.8 %EC) at 50 ml/100 L water, chlorfenapyr 24% SC at 60 ml/100 L water, fenopyroximate 5% EC at 50 ml/100 L water, cyflumetofen (20% SC) at 40 ml/100 L water and hexythiazox 10% WP at 20 g/100 L water (Table 1).

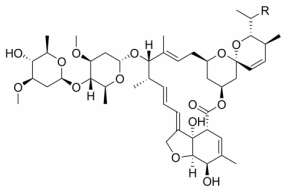
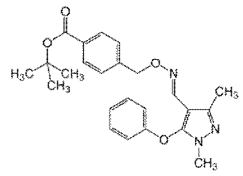
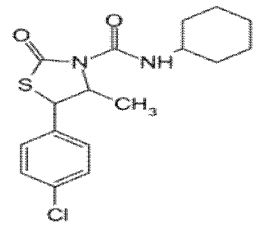
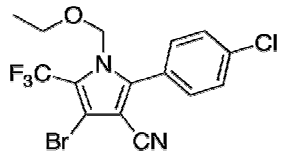
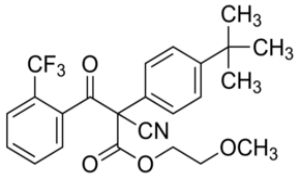
The infected palm was randomly selected and the infected date bunches were divided into three replicates treated with acaricides. The numbers of mites were counted on 20 date fruits of each bunch using a binocular microscope. Records were taken after 1, 3, 7, 14, and 21 days. The pesticides were sprayed using 2-liters sprayer. The experiments were conducted during the period starting from July 15th to August 6th, 2017.

The reduction percentages of mites were counted according to Henderson-Tilton's formula (Henderson and Tilton, 1955).

$$\text{Reduction \%} = 1 - \left(\frac{\text{n in Co before treatment} \times \text{n in T after treatment}}{\text{n in Co after treatment} \times \text{n in T before treatment}} \right) \times 100$$

Where: n = number of mites, T = treated, Co = control

Table 1. The acaricides used in the present study.

No	Common name	Trade name	Group	Chemical	
				Name	structure
1	Abamectin	Agromec 1.8 %EC	Avermectin	5-O-demethylavermectin B1a(i) mixture with 5-O-demethyl-25-de (1-methylpropyl) - 25- (1 methylethyl) avermactin B1a(ii)	
2	Fenopyroximate	Ortus Super 5% EC	Pyrazolium	1,1-dimethylethyl (E)-4- (((1.3-dimethyl-5-Phenoxy-1 H-pyrazol-4-yl) methylen) amino) methyl) Benzoate	
3	Hexythiazox	Maccomite 10% W	Carboxamide	(4RS,5RS)-5-(4-Chlorphenyl)-*N*-cyclohexyl-4-methyl-2-oxo-1,3-thiazolidin-3-carboxamid	
4	Chlorfenapyr	Challenger Super 24% SC	Pyrroles	4-Brom-2-(4-chlorphenyl)-1-ethoxymethyl-5-trifluormethyl-pyrrol-3-carbonitril	
5	Cyflumetofen	Danisaraba (20% SC)	Benzoylacetonitorile	2-Methoxyethyl (RS)-2-(4-tert-butylphenyl)-2-cyano-3-oxo-3-(α,α,α-trifluoro-*o*-tolyl)propionate	

Results and Discussion

Data in (Table 2 and Fig. 1) show the reduction percentages of five selected acaricides: abamectin, chlorfenapyr, fenopyroximate, cyflumetofen and hexythiazox against the *O. afrasiaticus* adults under field conditions.

The reduction percentages of abamectin, chlorfenapyr, fenopyroximate, cyflumetofen and hexythiazox after one day treatment were 90.09, 87.46, 83.76, 81.74 and 62.61%, respectively. While, after 3 days of treatment for the same acaricides were: 92.29, 89.32, 87.40, 84.50 and 65.84%, respectively. Furthermore, after 7 days the reduction percentages were 95.23, 92.20, 89.32, 86.54 and 68.80%, respectively. The

reduction percentages were 93.82, 91.72, 88.40, 84.83 and 65.44%, and 90.07, 87.77, 85.22, 79.94 and 62.89%, after 14 and 21 days, respectively (Table 2). In general abamectin, chlorfenapyr, fenopyroximate, were more effective against the adult stage of the pest, followed by cyflumetofen and hexythiazox.

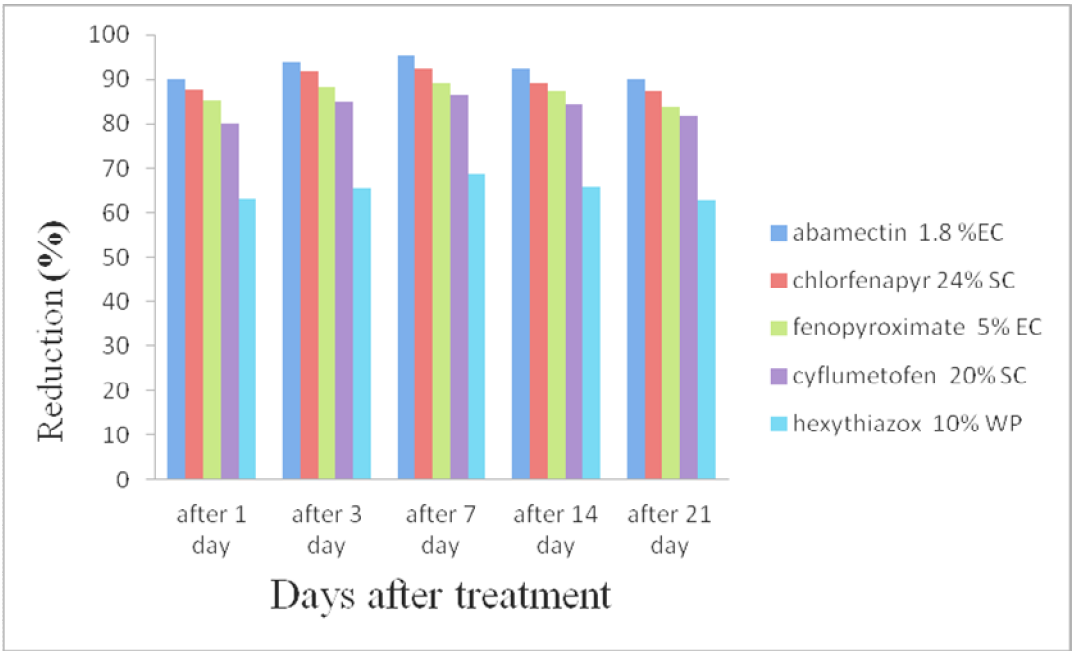


Fig. 1 The reduction percentages of five selected acaricides against the old world date mite, *O. afrasiaticus* on date palm fruits after 1, 3, 7, 14 and 21 days of treatment.

El-halawany, *et al*, (2017) stated that the challenger super and vertimec were very active against *O. afrasiaticus*, the reduction percentages were 91.93% and 91.60%. Whereas, abroch, ortus super, tafaban and envidor gave reduction percentages ranged between 85.07% to 87.74%. micronite, KZ oil and water only gave reduction percentages ranged between 71.77 and 82.82% after two weeks of application.

Table. 2 Effect of five selected acaricides against the old world date mite, *O. afrasiaticus* on date palm fruits after 1, 3, 7, 14 and 21 days of treatment.

Acaricides	Number of mite individuals/ 20 fruits					
	Before treatment	After treatment (days)				
		1	3	7	14	21
Control	2420C±63.57	2840A±57.24	3000A±82.37	3720A±114.5	3930A±106.3	4160A±89.03
Abamectin	3140A±47.26	365D±14.43	300D±5.77	230E±10.41	315D±8.66	500D±5.77
Chlorfenapyr	2380C±96.44	350D±15.28	315D±10.41	285DE±13.23	320D±16.07	500D±15.28
Fenopyroximate	1890D±66.58	360D±20.82	295D±12.58	310DE±15.28	356D±23.35	480D±11.55
Cyflumetofen	2030D±65.06	435D±31.22	390CD±5.77	420CD±10.0	500CD±11.55	700C±5.77
Hexythiazox	1960D±70.24	860B±51.32	830B±40.41	940B±30.55	1100B±125.8	1250B±32.58
Sig. F-test	**	**	**	**	**	**

±SE (Std. Error)

More results were obtained on the toxicity of certain acaricides tested against mite species on date palm such as: Arbabi *et al*, (2017) assessed seven pesticides including amitraz, fenpropathrin, fenpyroximate, fenazaquin, propargite, tetradifon, and hexythiazox on *O. afrasiaticus* in Iran. The results indicated that, low doses of fenpyroximate, fenazaquin and hexythiazox caused high mortality rates. While, Al-Doghairi (2004) evaluated the toxicity of eight acaricides against the same pest in Pakistan. The results showed that Kelthane and Neoron reduced mite infestations after the second week from application and continued until the termination of the experiment. On the other side, the ortus compound was also active on *Panonychus ulmi* on apple trees. While, Abd-Elhady and Heikal (2011) used three acaricides (i.e., flufenoxuron, fenpyroximate and abamectin**)** against *T. urticae* and its predator mite species, *P. persimilis* on apple orchards, a satisfactory results were recorded for *T. urticae* and in contrast with predator (*P. persimilis*), in partially and/ or totally agreement with the present findings.

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تقييم خمسة مبيدات أكاروسية موصى بها ضد حلم الغبار، *Oligonychus afrasiaticus* (McGregor) (Acari: Tetranychidae) والذى يصيب نخيل البلح تحت ظروف الحقل في الوادي الجديد، مصر

محمود فقير محمد على، احمد محمود على سالمان والسيد على محمد السيد العراقى

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الملخص

فى هذه الدراسة تم تقييم فعالية خمسة مبيدات أكاروسية (abamectin (1.8% EC، chlorfenapyr (36% SC)، fenopyroximate (5% EC)، cyflumetofen (20% SC) و hexythiazox (10% WP) ضد حلم الغبار الذى يتواجد على نخيل البلح (الصنف السيوى). وقد اجريت التجارب بمزرعة كلية الزراعة جامعة الوادى الجديد. تم تقييم التركيز الموصى به لكل مبيد على الاطوار البالغة لحلم الغبار. تم تسجيل النتائج بعد ١، ٣، ٧، ١٤ و ٢١ يومًا من المعاملة. يعتبر مبيدات abamectin (1.8% EC)، chlorfenapyr (36% SC) الأكثر فعالية بين جميع المبيدات التي تم اختبارها، حيث كانت النسب المئوية للخفض من مبيدات الاكاروسات المذكورة أعلاه ٩٠,٠٧ و ٨٧,٧٧. تليها fenopyroximate 5% EC ، cyflumetofen 20% SC و hexythiazox 10% WP، كانت النسبة المئوية للخفض: ٨٥,٢٢ و ٧٩,٩٤ و ٦٢,٨٩ على التوالي. وقد استخدمت هذه المبيدات الأكاروسية كخيار أول واعتبرت اتجاهات مشجعة في السيطرة على حلم *O. afrasiaticus* في محافظة الوادي الجديد، مصر.