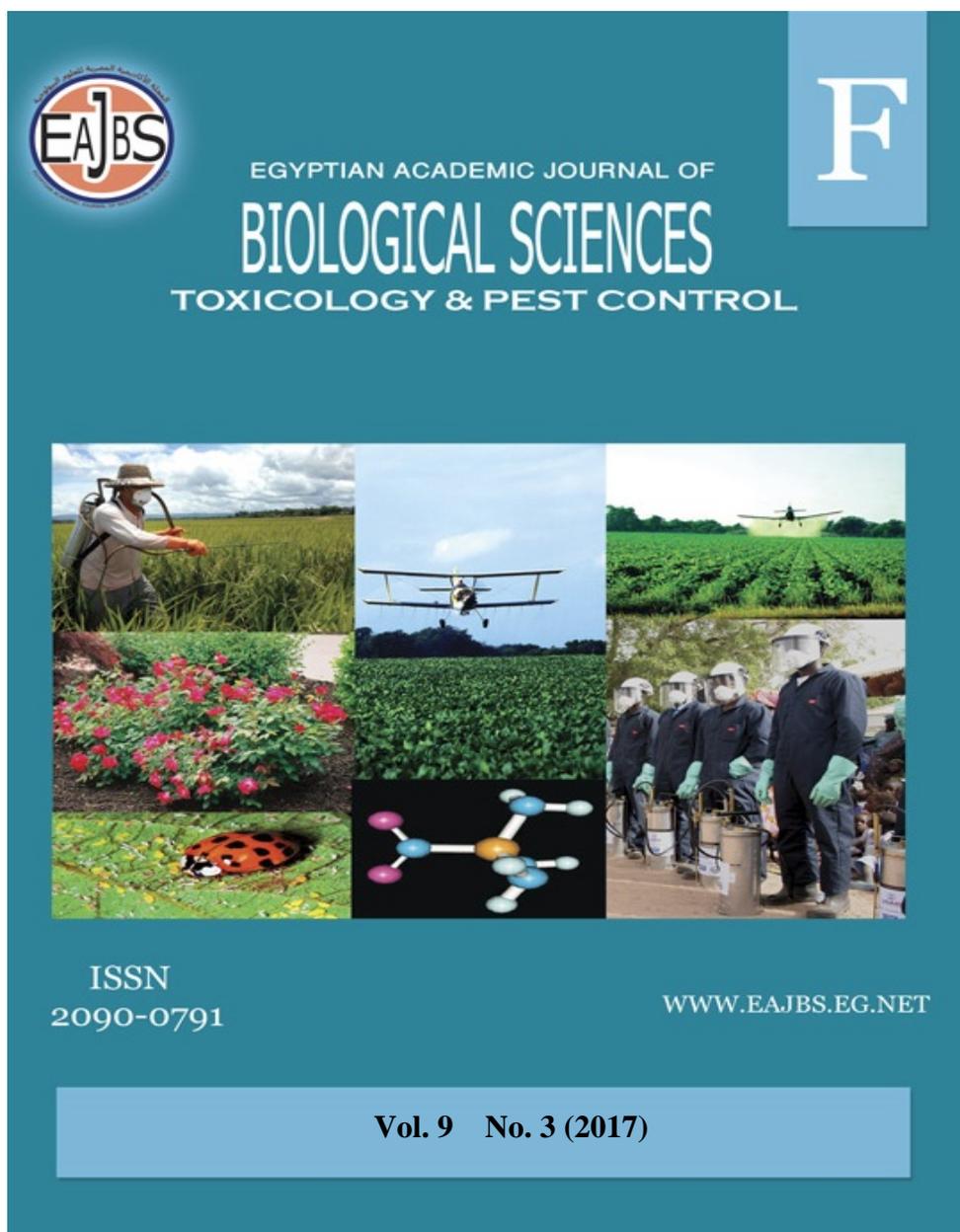


**Provided for non-commercial research and education use.
Not for reproduction, distribution or commercial use.**



The journal of Toxicology and pest control is one of the series issued twice by the Egyptian Academic Journal of Biological Sciences, and is devoted to publication of original papers related to the interaction between insects and their environment.

The goal of the journal is to advance the scientific understanding of mechanisms of toxicity. Emphasis will be placed on toxic effects observed at relevant exposures, which have direct impact on safety evaluation and risk assessment. The journal therefore welcomes papers on biology ranging from molecular and cell biology, biochemistry and physiology to ecology and environment, also systematics, microbiology, toxicology, hydrobiology, radiobiology and biotechnology.

www.eajbs.eg.net



Field Evaluation of Date Palm Dust Mite, *Oligonychus afrasiaticus* (McGregor) Control on Date Palm Trees in New Valley Governorate of Egypt

Ashraf S. El-halawany, Ahmed S. Sanad and Mohammed A. Rakha

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

E-mail: dr_ashraf_said@yahoo.com; a_sanad74@yahoo.com

ARTICLE INFO

Article History

Received: 3/9/2017

Accepted: 10/11/2017

Key words:

Acaricides

dust mite

Tetranychidae

fruit trees

date palm

ABSTRACT

The old world date mite (dust mite) *Oligonychus afrasiaticus* (McGregor) is one of the major pests of date fruit in the New Valley Governorate of Egypt. This pest mite affects the fruits of palm trees during the growth and ripening stages as they sucking the fruit juice, leading to stop fruit growth and destroying the crop. This research was carried out in Sharq El-Owainat province for evaluating the effects of biochemical acaricide (Vertimec 1.8% EC as 40 ml/100 liter of water), four acaricides (i.e. Abroch 5% SC as 50 ml/100 L of water, Challenger Super 24% SC as 60 ml/100 L of water, Envidor 24% SC as 30 ml /100 L of water and Ortus Super 5% EC as 50 ml/100 L of water), one insecticide (Tafaban 48% EC as 300 ml/ 100 L of water), a mineral oil (KZ oil 95% EC as 1L/100 L of water), sulfur (Micronite 80% WP as 500 g/100 L of water) and water for *O. afrasiaticus* in two date palm cultivars Barhi and Bartmoda. Results indicated that in date palm cultivar Barhi, Challenger Super and Vertimec were the most effective ones in reducing date palm mite population reaching 91.93% and 91.60%, respectively, followed by Abroch, Ortus Super, Tafaban and Envidor which gave reduction ranged between 85.07% to 87.74%. Micronite, KZ oil and water gave reduction between 71.77 and 82.82% after two weeks of application. Challenger Super, Vertimec, Ortus Super and Envidor were the most effective ones in reducing *O. afrasiaticus* population reaching 95.37%, 94.18%, 91.05% and 90.34%, respectively in date palm cultivar Bartmoda. Abroch, KZ oil, Tafaban, and Micronite was gave reductions between 77.79% and 82.74%. The lowest was water (61.93%) after two weeks of application. We suggest that use Challenger Super, Vertimec, Ortus Super and Envidor were the most effective ones in reducing *O. afrasiaticus* populations.

INTRODUCTION

All parts of the date palm yield products are of economic value. Palm trees in Egypt are tree of economic, environmental, food, medical, social and industrial values. Their role cannot be ignored for the life of the farmer and the ordinary citizen in the country.

Due to the fact that Egypt is at the head of the date-producing countries in the world (FAOSTAT 2012), this tree deserves more attention to increase the quantity and type of main products including dates and by-products to maximize the benefit of this green treasure.

The environmental role of date palms includes the purification of gases, heavy metals, salinity and drought, as well as non-competition of other crops in the area.

Also the validity to be cultivated in the poorest and the lowest quality land makes it not competed by any other crop (Bekheet and El-Sharabasy 2015).

Diseases and pests are serious threat to date palm plantations, causing great economic loss to the growers in Egypt. They reduce about 52% of the total yield (Central Administration for Agricultural Extension Services, Egypt 2001).

Dust mites, *Oligonychus afrasiaticus* McGregor and *Oligonychus pratensis* Banks are very damaging to dates in the early stages of fruit development. Unless treated by a protective spray before date palm flowering and as soon as the symptoms of attack are detected, the damage could be extremely severe (Al-Khayri *et al.* 2015).

Aldosari (2009) evaluated the efficiency of the botanical compound (Baico) in comparison to other acaricides (Amitraz, Vertimec, Perpol and Salocide). Baico appeared to be the most effective. Ethanolic extracts of *Demsisa*, *Ambrosia maritima* L. (Asteraceae), *Duranta*, *Duranta plumeria* (Verbenaceae) and Cumin, *Cuminum cyminum* L. (Apiaceae) were recommended for the control of *O. afrasiaticus* (Fetoh and Al-Shammery 2011).

Different cultural management factors including intercropping, chemical control, weed control, tillage, bunch covering and bunch -remained pruning had suitable effects on decreasing of the date spider mite infestation (Latifian *et al.* 2014).

Field efficacy of nine different insecticides and miticides with various mode of action was evaluated against dust mite nymphs *O. afrasiaticus* infested date fruits in middle and South Iraq. Efficiency ranged between 83.3% and 99.6% after two days of treatment and

increased to 91.2% to 100% after seven days (Alrubeai *et al.* 2015).

Rainfall has been reported to limit the populations of this pest by destroying the webbing (Negm 2015).

Different control strategies were proposed by (Negm *et al.* 2015) gave the hope in the control of this serious pest only to the integrated work (i.e. host plant resistance, agriculture control, chemical control and biological control).

The spreading of dust mite in four different locations in Giza, Assiut, Matruh and the New Valley governorates in Egypt was recorded (Sanad *et al.* 2017).

This work was carried out in Sharq El-Owainat region to evaluate field application of different types of sprays for controlling *O. afrasiaticus* in two date palm cultivars Barhi (soft) and Bartmoda (dry).

MATERIALS AND METHODS

An 8-years old orchard of date palm cultivar Barhi (soft) and 20-years old Bartmoda cultivar (dry) at Al-Ain Village, Sharq El-Owainat Province, New Valley Governorate highly infested with dust mite *O. afrasiaticus* during season 2017 were selected for this evaluation.

The experimental area was divided into ten treatments including control. Eight acaricides were evaluated. They were the biochemical acaricides (Vertimec 1.8% EC), four chemical acaricides (Abroch 5% SC, Challenger Super 24% SC, Envidor 24% SC and Ortus Super 5% EC), one insecticide (Tafaban 48% EC), a mineral oil (KZ oil 95% EC), sulfur (Micronite 80% WP) and water (Table 1).

The two experiments were randomized incomplete block design. There were 40 rows in the orchard containing 10 trees in each row, and one row was used for each replicate. The two orchards were divided into ten treatments

including control. Each sample included 20 fruit per replicate. Totally 80 fruits per treatment after 3, 7 and 14 days of each treatment to determine the reduction percentages. Materials were sprayed using a highly volume motor sprayer of 600 liters capacity. Pre-count was conducted before spraying. Percentage reduction in population was estimated

using Henderson & Tilton (1955) equation.

% population reduction = $100 * (1 - (Ta * Cb) / (Tb * Ca))$, where:

Ta = number of mite after spray; Tb = number of mite before spray;

Ca = number of mite in the control after spray; Cb = number of mite in the control before spray.

Chemical acaricides:

Table 1: Treatments and their application rates.

Trade name	Common name	Chemical name	Rate of application/ 100 liter of water
Envidor 24% SC	Spirodiclofen	3-(2,4- dichloropheyl) -2-oxo-1-oxaspiro (4,5) dec-3-en-4-yl 2,2-dimethyl butyrate	30 ml
Concor 24% SC	Spirodiclofen	3-(2,4- dichloropheyl) -2-oxo-1-oxaspiro (4,5) dec-3-en-4-yl 2,2-dimethyl butyrate	30 ml
Challenger Super 24% SC	Chlorfenapyr	4-bromo-2-(4-chlorophenyl) -1-ethoxymethyl)-5-trifluoromethylpyrrole-3-carbonitrile	60 ml
Vertimec 1.8% EC	Abamactin	5-O-demethylavermectin A1a(i) mixture with 5-O-demethyl-25-de (1-methylpropyl) -25- (1-methylethyl) avermectin A1a(ii)	40 ml
Ortus Super 5% EC	Fenopyroximate	1,1-dimethylethyl (E)-4-(((1,3-dimethyl-5-Phenoxy-1 H- pyrazol-4-yl) methylen) amino) methyl) benzoate	50 ml
Abroch 5% SC	Fenopyroximate	1,1-dimethylethyl (E)-4-(((1,3-dimethyl-5-Phenoxy-1 H- pyrazol-4-yl) methylen) amino) methyl) benzoate	50 ml
Tafaban 48% EC	Chlorpyrifos	O,O- diethyl- O-(3,5,6-trichloro-2-pyridyl) phosphorothioate	300 ml
KZ Oil 95% EC	Mineral Oil		1 L
Micronite 80% WP	Sulfer		500 g

Statistical analysis:

Percent reduction of date palm dust mite was analyzed by one-way ANOVA and means were compared by using student's least significant difference. Significance level was $P < 0.05$. Analysis was conducted using SAS statistical software (SAS Institute, 2010).

RESULTS AND DISCUSSION

On Barhi cultivar:

Efficiency of the acaricides Envidor 24% SC at the recommended

concentration of 30 ml /100 liter of water, Concor 24% SC at 30 ml/100 liter of water, Challenger Super 24% SC at 60 ml/100 liter of water, Vertimec 1.8% EC at 40 ml/100 liter of water, Ortus 5% SC at 50 ml/100 liter of water, Abroch 5% SC at 50 ml/100 liter of water, Tafaban 48% EC at 300 ml/ 100 liter of water, KZ oil 95% EC at 1L/100 liter of water and Micronite 80% WP at 500 g/100 liter of water against the motile stages of dust mite infesting date palm was evaluated under field conditions. Results indicated

that the motile stages of *O. afrasiaticus* on 80 fruits after spray where they decreased gradually till the end of the test. Obtained results showed that Vertimec 1.8% EC and Challenger Super 24% SC gave highest reductions as 91.93 and 91.60%, respectively. Abroch, Ortus, Tafaban and Envidor application resulted

in 87.74, 87.32, 86.69 and 85.07% reduction after two weeks of treatment. KZ oil and Micronite come in the third order (i.e. 82.82% and 81.69% reduction, respectively). Water occupied the lowest order in mite reduction, as 71.77% (Table 2).

Table 2: Populations and percentage reduction of *Oligonychus afrasiaticus* on fruits as a result of pesticides treatments in Barhi date palm cultivar under field conditions.

Trade name	Rate of application/ 100 L. of water	No. of Individuals before treatment	Number and % reduction of individuals/ 80 fruits after treatment					
			3 days		7 days		14 days	
			Number	% R.	Number	% R.	Number	% R.
Challenger Super 24% SC	60 ml	3753	633	88.10 ^a	509	91.37 ^a	568	91.60 ^{ab}
Vertimec 1.8% EC	40 ml	4229	550	90.78 ^a	551	91.66 ^a	610	91.93 ^a
Ortus Super 5% EC	50 ml	3139	808	80.95 ^{bc}	537	88.65 ^a	699	87.32 ^c
Envidor 24% SC	30 ml	2620	841	77.19 ^c	720	82.52 ^b	707	85.07 ^{cde}
Abroch 5% SC	30 ml	4683	1169	82.13 ^b	1249	82.91 ^b	1030	87.74 ^{bc}
Tafaban 48% EC	50 ml	3246	913	79.95 ^{bc}	833	83.33 ^b	766	86.69 ^{cd}
KZ oil 95% EC	300 ml	2839	1167	70.45 ^d	1117	74.47 ^c	842	82.82 ^{de}
Micronite 80% WP	1 L.	3236	956	78.48 ^{bc}	828	83.14 ^b	1060	81.69 ^e
water	-	3588	1576	68.95 ^d	1794	67.99 ^d	1816	71.77 ^f
Control	-	4660	6543	-	7244	-	8324	-
F			17.12		35.05		20.85	
LSD at level 5%			5.05		3.80		3.89	

% R. = % Percentage reduction, Different letters in same column denote significant difference (P < 0.05).

No significant difference occurred between Challenger and Vertimec. Also no significant difference between Abroch, Ortus Super, Tabafan and Envidor.

On Bartmoda cultivar:

The present study revealed that all tested acaricides were sufficient to control the date palm dust mite, *O. afrasiaticus* (Table 3). There were

significant differences between acaricides efficiency. Challenger Super 24% SC, Vertimec 1.8% EC, Ortus Super 5% EC and Envidor 24% SC gave the highest reduction percentage (over 90%). Abroch 5% SC, Tafaban 48% EC, KZ oil 95% EC and Micronite 80% WP gave reduction over 77%. Lowest reduction of population occurred for water as 59.21% after 14 days.

Table 3. Populations and percentage reduction of *Oligonychus afrasiaticus* on fruits as a result of pesticides treatments in Bartmoda date palm cultivar under field conditions.

Trade name	Rate of application/ 100 L. of water	No. of Individuals before treatment	Number and % reduction of individuals/ 80 fruits after treatment					
			3 days		7 days		14 days	
			Number	% R.	Number	% R.	Number	% R.
Challenger Super 24% SC	60 ml	5433	904	86.77 ^a	632	91.86 ^a	409	95.37 ^a
Vertimec 1.8% EC	40 ml	5909	1168	84.12 ^a	786	90.64 ^a	556	94.18 ^a
Ortus Super 5% EC	50 ml	4819	1451	75.72 ^{bc}	1014	85.11 ^b	702	91.05 ^a
Envidor 24% SC	30 ml	4300	1457	73.18 ^{cd}	842	85.99 ^b	673	90.34 ^a
Abroch 5% SC	30 ml	4519	1579	76.74 ^b	1300	82.82 ^{bc}	1540	82.74 ^b
Tafaban 48% EC	50 ml	4926	1732	71.74 ^d	1410	79.66 ^{cd}	1650	79.30 ^b
KZ oil 95% EC	300 ml	6363	1833	72.27 ^d	1539	79.35 ^{cd}	1779	79.75 ^b
Micronite 80% WP	1 L.	4916	1651	73.23 ^{cd}	1531	77.95 ^d	1771	77.79 ^b
water	-	5268	2763	57.29 ^e	3004	59.42 ^e	3244	61.93 ^c
Control	-	6340	7700	-	8841	-	10192	-
F			57.43		58.87		24.69	
LSD at level 5%			3.23		3.64		6.22	

% R. = % Percentage reduction, Different letters in same column denote significant difference (P < 0.05).

Similar results were obtained by El-Ghobashy and El-Sayed (2002). They noticed that Challenger 36% SC and GC-mite 20% EC gave reduction in the population density of the mite *Tetranychus arabicus* Attiah as 92.60 and 83.07%. The effect of eight acaricides against *O. afrasiaticus* reduction were 96.8, 96.3, 95.2, 83.8, 81.7, 80.6, 79.0 and 30.2%, for Transact, Kelthane, Neoron, Peropal, Tedion, Microthiol, Top Cop and Ekatin, respectively Al-Doghairi (2004).

Allam (2011) indicated that percent reduction in population of *Tetranychus urticae* after three weeks of application was 94.22, 91.4 and 85.99 % for Indo 50% EC, Challenger 36% SC and Ortus 5% SC, respectively. Elhalawany and El-Sayed (2013) indicated that Ortus, Menova, Agromic and Baroq were the most effective compounds in reducing guava rust mite *Tegolophus guavae* population. Reduction percentage was 96.47, 93.94, 92.22 and 91.47%, respectively. While reduction percentage of tenuipalpid mite *Brevipalpus phoenicis*, Ortus, Agromic, Deva, Berfect, Nest, Baroq, and Koncor gave 91.98, 87.95, 85.79, 89.31, 89.75, 89.36 and 87.38% reduction after 21 days, respectively.

Abou El-Ela (2014) showed that the average reduction of Challenger, Ortus, Vertimec, Delmite and Bioca was 81.55, 80.62, 75.94, 65.35 and 54.57% in the population of *T. urticae* during the 2007 season. Reduction was 79.72, 77.92, 72.54, 60.05 and 47.97% during the 2008 season, respectively for the same treatments tested.

CONCLUSION

There is a possibility to use any of the tested pesticides in the control of the dust mite *O. afrasiaticus* according to concentration. Spray process should be done at the beginning of the appearance

of the damage. We concluded from the previously mentioned results, to suggest that use Challenger Super, Vertimec, Ortus Super and Envidor were the most effective ones in reducing *O. afrasiaticus* populations.

REFERENCES

- Abou El-Ela, A. A. (2014). Efficacy of five acaricides against the two-spotted spider mite *Tetranychus urticae* Koch and their side effects on some natural enemies. *J. Basic & Appl. Zool.*, 67: 13–18.
- Aldosari, S. and Ali, A. G. (2007). Susceptibility of date palm fruit cultivars to the natural infestation by *Oligonychus afrasiaticus* (Mcg.) (Acari: Tetranychidea) in relation to their chemical composition. *Assiout University Bulletin Environment Research*, 10(2):1-7.
- Al-Khayri, M.J; Jain, S.M. and Johnson, V. D. (2015). Date palm genetic resources and utilization-Volume 1- Africa and the Americas 545 pp. Springer, Netherlands.
- Allam, S. A. (2011). Evaluation of some acaricides against the two spotted spider mite, *Tetranychus urticae* Koch and its predacious mites on kidney bean plants at El-Gharbia Governorate, Egypt. *J. Plant Prot. and Pathol.*, Mansoura Univ., 2(6): 637–643.
- Alrubeai, H. F; Khalaf, M. Z; Al-Zedawi, J. B. and Naher, F. H. (2015). Field efficacy of some pesticides in controlling dust mite nymphs *Oligonychus afrasiaticus*. *Iraqi J. Biotechnology*, 14(2): 381-387.
- Bekheet S. A. and El-Sharabasy, S. F. (2015). Date palm status and perspective in Egypt. In: *Date Palm Genetic Resources and Utilization*, Vol. 1: Africa and the Americas edited by Al-Khayri, Shri Mohan and Jain Dennis V. Johnson 545 pp Springer, Dordrecht, Heidelberg New York, London.
- Central Administration for Agricultural Extension, Egypt (2001). Date palm. Bulletin No. 710, 2001, Ministry of Agriculture and Land Reclamation (in Arabic). Cairo, Egypt.
- Elhalawany, A. S. and El-Sayed, K. M. (2013). Efficacy of certain acaricides

- against *Tegolophus guavae* and *Brevipalpus phoenicis* on guava trees. Egypt. J. Agric. Res., 91 (4): 1459- 1460.
- El-Ghobashy, M. S. and El-Sayed, K. M. (2002). Efficacy of some biopesticides against the spider mite, *Tetranychus arabicus* Attiah, and the predator mite, *Euseius scutalis* (A.-H.) on apple trees in Egypt. Proceedings 2nd Int. Conf., Plant Protection Res. Inst., Cairo, Egypt, pp. 34–36.
- FAO STAT (2012). Food and agricultural organization corporate statistical database. FAO, Rome.
- Fetoh, B. E. and Al-Shammery, K. A. (2011). Acaricidal ovicidal and repellent activities of some plant extracts on the date palm dust mite, *Oligonychus afrasiaticus* Meg. (Acari: Tetranychidae). Int. J. Environ. Sci. and Engin. (IJESE), 2: 45-52.
- Henderson, C. and Tilton, E. (1955). Test with acaricides against the brown wheat mite. J. Econ. Entomol., 84:157-161.
- Latifian, M.; Rahnama N. and Amani. M. (2014). The effects of cultural management on the date spider mite (*Oligonychus afrasiaticus* McG) infestation. Int. J Farm & Alli Sci., 3(9): 1009-1014.
- Negm, M. W. (2015). Biological control of phytophagous mites in the New Valley. Ecological Newsletter, Faculty of Agriculture, Assiut Univ. 12: 1-2. (in Arabic).
- Negm, M. W., De Moraes, G. J. and Perring, T. M. (2015). Mite pests of date palms. In: Wakil *et al.*, (eds.), Sustainable pest management in date palm: Current status and emerging challenges, sustainability in plant and crop protection, pp 347– 390. Springer International Publishing Switzerland.
- Sanad, A. S; Elhalawany, A. S.; Abou-Setta, M. M. and El-khateeb, H. M. (2017). Partial survey of date palm dust mite, *Oligonychus afrasiaticus* (McGregor) in Egypt including historical trait. Acarines (In press).
- SAS Institute (2010). SAS Statistics and graphics guide, release 9.1. SAS Institute, Cary, North Carolina 27513, USA.

ARABIC SUMMERY

الفعالية الحقلية لمكافحة أكاروس الغبار *Oligonychus afrasiaticus* على أشجار النخيل في محافظة الوادي الجديد بمصر

أشرف سعيد الحلواني، أحمد سعيد سند، محمد عبد الوهاب رخا
معهد بحوث وقاية النباتات، مركز البحوث الزراعية، الدقي، الجيزة، مصر.

أكاروس نخيل العالم القديم (أكاروس الغبار) *Oligonychus afrasiaticus* أحد أهم الآفات الرئيسية على ثمار النخيل بمحافظة الوادي الجديد بمصر. هذه الآفة الأكاروسية تؤثر على ثمار أشجار النخيل خلال مراحل النمو والنضج لأنها تمتص عصير الفاكهة، مما يؤدي إلى وقف نموها ويدمر المحصول. تم إجراء هذا البحث في منطقة شرق العوينات لتقييم تأثير المركب الحيوي (فيرتيميك 1.8% EC بمعدل 40 مل/100 لتر ماء) وأربعة مبيدات أكاروسية (أبروش 5% SC بمعدل 50 مل/100 لتر ماء، شالنجر سوبر 24% SC بمعدل 60 مل/100 لتر ماء، أنفيديور 24% SC بمعدل 30 مل/100 لتر ماء، أورتنس سوبر 5% EC بمعدل 50 مل/100 لتر ماء) ومبيد حشري (تافابان 48% EC بمعدل 300 مل/100 لتر ماء)، وزيت معدني (KZ 95% بمعدل 100 لتر ماء) وكبريت ميكروني (ميكرونايت 80% WP بمعدل 500 مل/100 لتر ماء) والماء على صنفين من نخيل التمر البرحي وبارتمودا. أشارت النتائج المتحصل عليها أن مركب فيرتيميك و شالنجر سوبر أكثر فاعلية في نسبة الإبادة في تعداد أكاروس الغبار وصلت إلى 91.93% و 91.60% على صنف التمر البرحي. يليها أبروش، أورتنس سوبر، تافابان، أنفيديور التي أعطت نسبة خفض بين 85.07% إلى 87.74%. بينما أعطى ميكرونايت والزيت المعدني والماء أقل نسبة خفض تراوحت بين 71.77% إلى 82.82% بعد أسبوعين من الرش. وعلى صنف نخيل تمر بارتمودا أعطى مركب شالنجر، فيرتيميك، أورتنس سوبر، أنفيديور أعلى نسبة خفض في تعداد أكاروس الغبار حيث كانت 95.37% و 84.18% و 77.79% إلى 82.74% بينما أعطى المعاملة بالماء أقل نسبة خفض 61.93% بعد أسبوعين من الرش.

الكلمات المفتاحية: مبيدات أكاروسية، حلم الغبار، العناكب الحمراء، أشجار الفاكهة، نخيل التمر.