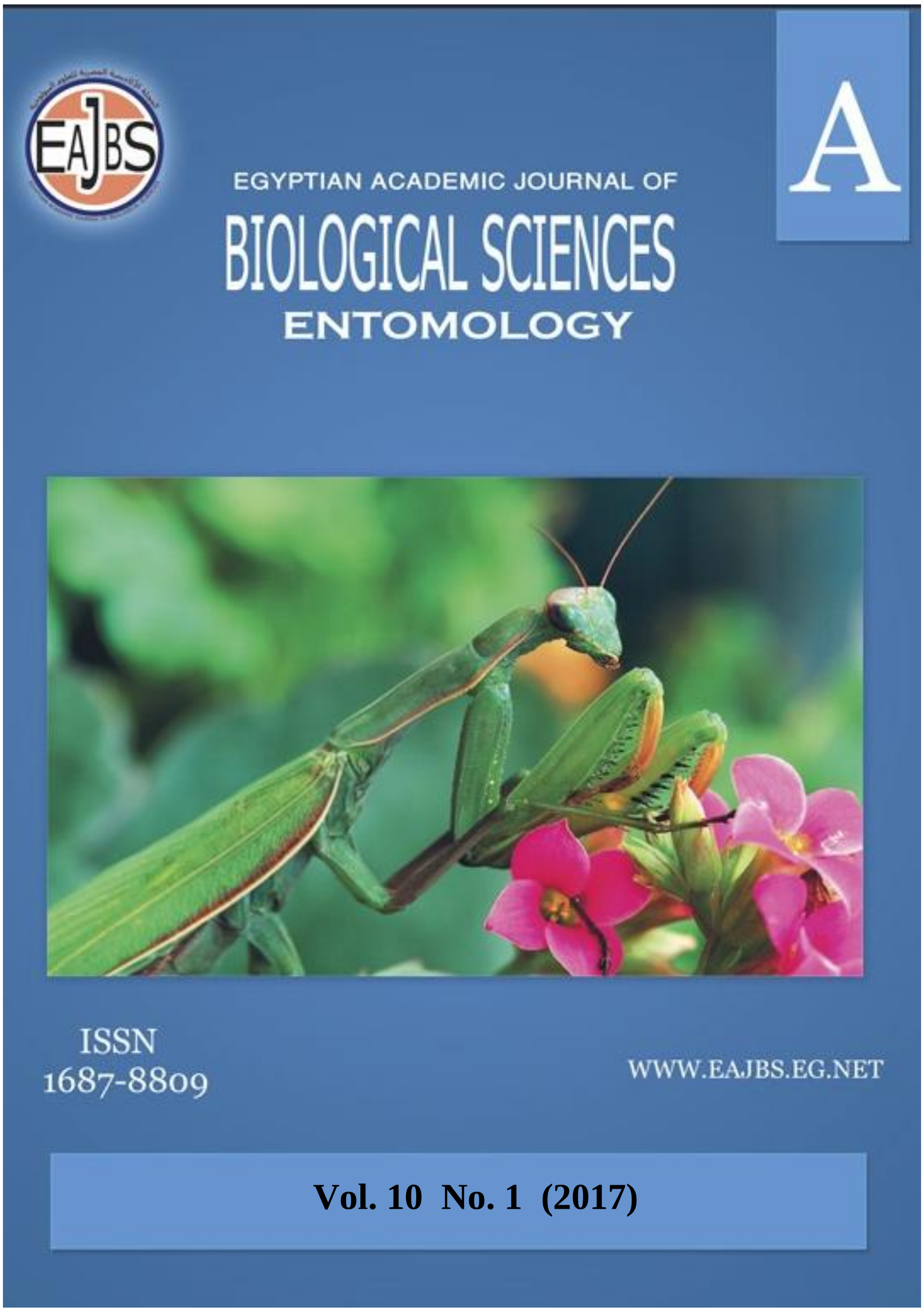

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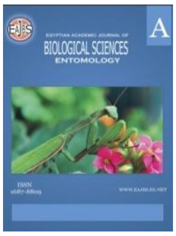

Contact and Residual Effect of Different Acaricides Formulations of Control of *Tetranychus urticae* Koch (Acari: Tetranychidae)

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ABSTRACT

The two-spotted spider mite, *Tetranychus urticae* Koch was considered the major pest of agricultural systems. The diversity of toxicological effect of different acaricide formulations recently recommended for use were done. Behera and Dakahlia populations were tested. Results showed thatthe individual LC_{50}s were not significantly different but Dakahlia population was considered more tolerant than Behera in hexythiazox, propargit, spirodiclofen, sulfur, abamectin and chlorfenapyr. The ratio between the LC_{90}values of all bioassays and the high recommended field dose were relatively higher for only abamectin in Dakahlia. The lowest adult survival percentage was recorded with chlorfenapyr, 15.66%, in Beheraan detoxazole, in Dakahlia15.0%recorded by contact treatment after 72h. The percentage of the eggs that not hatched was higher for clofentezine andetoxazole in both regions about 84%, but abamectin and spirodiclofen was the lowest reduction reached 67%.The residual effect at their recommended field rate, acaricides were non-significant to each other but significantly different from control. The estimated mortality percentages in Behera ranged between 94.0 to 74.6 % for pyridaben and abamectin respectively at1 day after application, while, mortality at 12 days after application was ranged between 52.6 to 30.6 % for spirodiclofen and abamectin respectively. The total effect of the acaricide tested in the two populations was ranged between 81.69 to 64.3 % in Behera and 80.7 to 65.3% in Dakahlia.

INTRODUCTION

The two-spotted spider mite, *Tetranychus urticae* Koch, is a very vigorous pest of most common worldwide crops and considered the major pest of agricultural systems, therefore, it requires control measure to be initiated as quickly as possible. The genetic system is arrhenotoky means the ability to complete several generations each growing season. Unfertilized eggs are haploid and develop into males, while fertilized eggs develop into females, and males only have one set of chromosomes and every gene is expressed as a dominant trait provide mutations chance ability to confer resistance to miticides Navajas *et al.*, 2002. Ability to complete a life cycle in as little as 7 days at 26ºC (Morris *et al.*, 1996) and acceleration of development rate through high temperature, also females overwintering in the soil and emerging from in the spring, for feeding by suck out the cells' contents and laying eggs, only three molts to 6 and then 8-legged stages nymphs before attaining adulthood producing silk protecting themselves from predators.

Damage is briefly including chlorophyll removed from each feeding site, leaving tiny chlorotic spots or leaf depletion, and the plant can be stunted at the exceedingly mite feeding (Tehri *et al.*, 2014; Gonzalez-Dominiguez *et al.*, 2015). The previously designates makes resistance management of two spotted spider mites more difficult. Although resistance research in acaricides were more developed, through studies of the molecular mechanisms and resistant phenotype. A custom and considerable attention stay must be taken around insecticide resistance evolutionary paradigm in this pest (Van Leeuwen *et al.*, 2010). Even much number of a new generation recently produced acaricide compounds were introduced to the Egyptian markets, furthermore, must be studied. This study will carry a traditional survey using diversity of toxicological method on the acaricide formulations recently recommended for control use and have particular variety of chemical classes (Dekeyser, 2005) and specific mode of action as Mite growth inhibitor, Mitochondrial electron transport inhibitors, inhibitors of acetyl CoA carboxylase, chloride channel activator, and uncouples of oxidative phosphorylation.

MATERIALS AND METHODS

Sources of insect and plant:

Two *T. urticae* populations on unsprayed eggplant plant leaf were collected from Behera and Dakahlia governorates. These regions are considered the main area for vegetable production. Bean (*Phaseolus vulgaris* L.) was used for the toxicological tests of the *T. urticae*. Seeds of bean were sowed inside 10 cm. pots and filled with Peat-moss and Perlite 3:1 ratio and grown under conditions 30-35°c, 45 to 60% RH and a photoperiod of light 16: D8in rearing room. Plants were well-maintained to be free of any mite before application of the treatments visually. These plants were irrigated and replaced as needed. No pesticides were applied on the plants except for the acaricide tests.

Tested acaricides:

Ten common recommended acaricides from different groups of actions (IRAC, 2010) were evaluated for its residual and contact effects against *T. urticae* to determine the appropriate length of the evaluation period for mortality and the effect of different miticide formulations on fecundity and fertility (all were contact and stomach activity). All information about the acaricides used is shown in Table (1).

Table 1: Properties of theacaricides used to evaluate their residual and contact effect.

Active ingredient	Commercial name	Formulation	Rate of application	Chemical classes	Group
Clofentezine	Exclar	50% SC	30m/100L	Tetrazines	10A
Etoxazole	Baroque	10% SC	25m/100L	Oxazoline	10B
Hexythiazox	Minova	10% EC	50m/100L	Thiazolidinones	10A
Fenproxymat	Ortis	5% SC	50m 100L	pyrazole	21A
Pyridaben	Sanmite	20% WP	100gm/100L	METI	21A
Propargit	Omite	73%EC	400m/600L	sulfite ester	12C
Spirodiclofen	Envidor	24% SC	30m/100L	tetronic acid	23
Sulfur	Uthan	80% WP	250gm/100L	unclassified	1B
Abamectin	Atramectin	1.8% EC	50m/100L	Glycoside	6
Chlorfenapyr	Shark	24%SC	60m/100L	Pyrroles	13

Toxicological Methods:

Contact toxicity of acaricides on *T. urticae*

Toxicological contact bioassays were conducted according to the description of

Castagnoli *et al.* (2005). True leaves of Bean were dipped with the acaricide solutions for about four replicates and seven concentrations for each acaricide, then left to dry, and placed, in Petri-dishes lower side up above wetted small piece of cotton. About 25 adult females of *T. urticae* were transferred to each leaf under room temperature using binocular microscope and a fine paintbrush. Mortality assessments were recorded at 48 hours after acaricide application. Controls were sprayed with tab water.

Survivorship, fertility, fecundity and total effects (E) assessments:

In a new experiment Bean leaf was dipped in a solution contains specific field rate concentration of each acaricide to determine effects on egg oviposition and hatching under field conditions at the proper dose, then ten females were placed individually on each dipped leaf placed on moistened cotton wool inside petri dish. Count of egg and percent hatched were recorded and number of females that survived were recorded 72h after application according to Beers *et al.* (2009), Irigaray and Zalom (2006), Duso *et al*. (2008), and Hamby *et al.* (2013).

Total effects of pesticides (E) or (coefficient of toxicity) values were calculated by adjusting fertility-corrected values to the reproductive value using the equation:

$$E\,\% = 100\,\% - (100\,\% - M) \times R$$

Where E is the coefficient of toxicity; M is the percentage of mortality calculated according to Abbott (1925); R is the ratio between the average number of hatched eggs produced by treated females and the average number of hatched eggs produced by females in the control group Duso *et al.* (2008) and Hamby *et al.* (2013).

Residual toxicity of acaricides on *T. urticae*:

The residual effects of different commercial acaricides against the adult females of *T. urticae* were evaluated under laboratory conditions (similar to Al-Antary *et al.*, 2012 and 2013; Shipp *et al*., 2000). The acaricides were prepared as water solutions and applied at their high recommended label rates for each compound (Table 1) sprayed using a hand sprayer to the 30 cm tall of Bean plants grown in plastic pots filled with in a mixture of peat moss and berlit. Plants left untilrun-off then Bean leaves were removed at 1, 3, 6, 9, 12, and 15 days after application. Water was used as a control. Removed leaves of each treatment were placed in Petri dishes lower side up on a small wetted cotton piece. Twenty five adult females of *T. urticae* were added to each dish. All dishes were kept at 25±1°C and a 14-h photoperiod. The number of dead and alive mites for each treatment was estimated 48 hours after addition. Controls were sprayed with tab water.

Statistical analysis

The LC_{50}, and LC_{90} values and their 95% confidence limits were calculated for the contact toxicity from probit regressions using the Ehab-Soft program according to Finney (1971) methods and Abbott (1925) was included. Contact and residual effect obtained data were subjected to analysis using the SPSS statistical programme (2016). Means were separated using the least significant different at 5% level.

RESULTS AND DISCUSSION

Toxicological bioassays:

Contact bioassay: Susceptibilities tests of two field populations of *T. urticae*:

Behera and Dakahlia populations were tested, LC_{50}s from all bioassays of *T. urticae* with all acaricides (Table 2) were not significantly different at *P*=0.001whereas higher values were recorded for propargit in Dakahlia and Behera (49.1 and 45.5ppm respectively). The Behera population was more tolerant than

Dakahlia in clofentezine, etoxazol, fenproxymat, and pyridaben. But Dakahlia population was more tolerant than Behera in hexythiazox, propargit, spirodiclofen, sulfur, abamectin, and chlorfenapyr. The reason may be related to a few acaricide were applied at the site of mite collections or due to the date of mite collection and test. This result agreed with Rathman *et al.* (1990) established the baseline susceptibility of *T. urticae* to hexythiazox and clofentezine and found that both chemicals are similar. Additionally, he found the test on 26 July and 10 August at the same place were different in susceptibility. Insecticide or acaricide resistance may be due to the cross resistance possibilities between pesticides and the dominant level developed by selection pressure. Sato *et al.* (2004) found positive cross-resistance between fenpyroximate and pyridaben but no cross-resistance was detected for propargite, and fenpyroximate selection refers to one major incompletely dominant factor, and frequencies declined rapidly in the absence of selection pressure. Stocco *et al.* (2016) found that the stability of etoxazoleor frequency resistance was affected by the selection pressure between increase or decrease quickly.

The ratio between the LC_{90}values of all bioassays were relatively higher for only one was abamectin in Dakahlia it mean that this region or that population was 1.2 times as high recommended field dose and if any population exceed 1 time mean it begin to develop resistance to that acaricide. Comprising the two populations exhibited very sensitive to all acaricides. R values were about 0.02 for chlorfenapyr in Behera and 0.84 for spirodiclofen in Dakahlia.

There are many groups of chemicals can solve the problem of acaricide resistance as sulfur compounds and mite growth regulator as chlorfenapyr or the group of avermectin as abamectin but all vary in its affectivity. Beers *et al.* (2009) said that the toxic effect of the sulfur products against *T. urticae*, and predators were not related to the concentration only but linked to the compound chemical characteristics. Al-Antary *et al.* (2013) proved that chlorfenapyr toxicity at the highest recommended field dose was (46%-76%) and persisted for 9 days, but abamectin did not display residual effect against the local field that displayed different levels of resistance to both products. Another research stated that Chlorfenapyr displayed consistent toxicity to all species of lepidopterous pests, with LC_{90}values ranging from (1.9 to 4.6 ug/ml) (Argentine *et al.*, 2002). Around *T. urticae* conflicting results, sometimes due to the different route and degree of exposure to insecticides, use of different formulations, pesticide application history of the strain, toxicological assays methodology, escaping, the age of residues, therefore differing levels of resistance (Ako *et al.*, 2006).

Table 2: Susceptibilities of two field populations of *T.urticae* adult to some acaricides.

Acaricide	Behera population			R	Dakahlia population			R
	LC_{50} (95% FL)	Slope ± SE	$\chi 2$(df)		LC_{50} (95% FL)	Slope± SE	$\chi 2$(df)	
Clofentezine	14.03(10.43-18.62)	1.87±0.293	0.55	0.45	9.18(5.9-12.8)	1.57±0.30	0.452	0.39
Etoxazole	3.24(2.35-4.2)	2.2±0.41	0.038	0.49	2.47(1.74-3.17)	2.45±0.45	0.26	0.33
Fenproxymat	0.72(0.55-0.89)	2.8±0.47	0.74	0.08	0.644(0.47-0.81)	2.59±0.40	0.12	0.08
Hexythiazox	6.1(4.8-7.7)	2.48±0.33	1.54	0.40	7.28(5.0-9.71)	1.8±0.29	0.868	0.74
Propargit	45.5(35.7-57.5)	2.39±0.33	0.23	0.31	49.1(37.1-67.85)	1.78±0.28	0.439	0.53
Pyridaben	7.5(5.7-9.6)	2.37±0.41	0.44	0.13	6.44(4.3-8.75)	1.82±0.38	0.439	0.16
Spirodiclofen	10.5(7.7-13.7)	1.99±0.29	1.39	0.64	12.79(9.48-16.94)	1.890.288	0.06	0.84
Sulfur	16.0(12.1-21.0)	1.83±0.24	0.68	0.03	22.1(15.39-31.0)	1.52±0.27	0.21	0.07
Abamectin	0.859(0.660-1.08)	2.18±0.288	0.233	0.36	1.04(0.669-1.6)	1.22±0.26	0.100	1.2
Chlorfenapyr	0.766(0.567-1.01)	1.90±0.290	2.59	0.02	0.778(0.537-1.08)	1.53±0.27	0.38	0.03

Ratio LC90 = LC90 / higher recommended field rate

Survivorship, fertility, fecundity and total effects (E) for *T. urticae* females of two field populations 72 h after each direct contact treatment.

The lowest adult survival percentage were recorded with chlorfenapyr, fenproxymat, hexythiazox and pyridaben (15.66, 16.66, 17.66, 19.0% respectively) in Behera whereas abamectin revealed higher percentage was 34.0%, but survival percentage for etoxazole, clofentezine, fenproxymat, and chlorfenapyr in Dakahlia was 15.0, 17.3, 17.0,17.0% respectively, where as abamectin was 36.66% (Table 3&4). The percentage of the eggs that not hatched was increased after treatments with clofentezine, etoxazole in both regions reach to about 84%, but abamectin and spirodiclofen was the lowest reduction reached 67% (Table 3). A one-way ANOVA using Satterth white's methods was performed for percent survival by each acaricide (F= 1.084, df =1, P =0.374). Means separated by LSD, the test for normality of residual errors, Levene's test for homogeneity of variance and Dunnett's mean comparison versus the control was subsequently performed with Duncan involvement. All of the acaricide applied by direct contact caused a significant decline in survival relative to the control at 72 h post application. The acaricides significantly affected the fecundity of treated females, similarly a one-way ANOVA was performed of total eggs laid in 72h (F = 0.797, df = 1, P = 0.387). Propargit, spirodiclofen and abetment in were significantly reduced hatching about 70%; however, Clofentezine and etoxazol was the most effective as egg mortality exceeded 85% (Table 3). Also one-way ANOVA was performed of percent eggs hatched affected by the acaricides and no significant difference was found between the two populations.

These results agreed with Duso *et al.* (2008) who found that survival, fecundity and fertility of *T. urticae and P. persimilis* were affected by the pyrethrins, imidacloprid, *Beauveria bassiana,* azadirachtin, pymetrozine and rotenone in the laboratory. The causes of reduced egg laid per female and reduced percent hatch may relate to reduce adult longevity and progeny formation. As Irigaray and Zalom (2006) observed reductions in fecundity and fertility, etoxazole and fenpyroximate reduced adult female longevity to more than 24 hand no eggs were laid. While spiromesifen and acequinocyl was reduced to 4 days, and bifenazate did not reduce adult female longevity, but progeny were not produced.

The sub-lethal effects of insecticides on several insect reproductive parameters that may be affected by the action of any acaricide or insecticide were the sexual ratio, fecundity, fertility and longevity (Rumpf *et al.*, 1998). The insecticides may affect differently males and females in population, altering the sexual ratio, when there was a difference in the physiology and behavior (Croft *et al.,* 1993 and Desneux *et al.,* 2007). The fertility could be affected as a result of repellency for feeding and oviposition subsequently decreases number of eggs and population (Fernandes *et al.,* 2010) or females may suffer ovary deformations or by inhibiting the formation of imaginable organs (Williams *et al.*, 2003).

The total effects were verified from all acaricide bioassays in the two populations (Table 3&4), and ranged between 81.69 to 64.3% in Behera and 80.7 to 65.3% in Dakahlia. These results were agreeing with some research results as Hamby *et al.* (2013); the total effects of direct contact of the four pyrethroids ranged from 77.8% for esfenvalerate to 98.8% for bifenthrin.

Table 3: Survivorship, fertility, fecundity and total effects (E) for *T. urticae* females of Behera field populations 72 h after each direct contact treatment.

Treatment	Survival ±SE	Fecundity ±SE	Fertility ±SE	E
Clofentezine	21.66±0.73	8.0±0.48	16.6±1.68	81.69
Etoxazole	21.00±2.1	6.6±0.55	16.6±0.73	81.69
Fenproxymat	16.6±0.28	8.0±0.48	25.6±0.99	71.78
Hexythiazox	17.6±3.27	6.3±0.55	23.6±2.16	73.98
Propargit	22.6±2.37	5.0±1.27	31.6±1.99	65.15
Pyridaben	19.0±0.48	6.3±1.21	23.0±0.48	74.64
Spirodiclofen	22.6±0.99	6.0±1.27	33.33±3.1	74.27
Sulfur	25.6±1.99	5.6±0.99	31.04±.2.2	65.75
Abamectin	34.0±0.96	8.66±0.27	32.33±1.21	64.3
Chlorfenapyr	15.6±1.54	6.66±0.28	23.33±0.73	74.3
Control	91.6±1.68	12.0±0.48	90.0±1.44	----

Table 4: Survivorship, fertility, fecundity and total effects (E) for *T. urticae* females of Dakahlia field populations 72 h after each direct contact treatment.

Treatment	Survival ±SE	Fecundity ±SE	Fertility ±SE	E
Clofentezine	17.3±0.73	5.3±0.27	18.0±1.27	80.732
Etoxazole	15.0±2.20	7.0±0.48	19.0±0.48	79.667
Fenproxymat	17.0±0.48	8.3±0.55	22.6±1.46	75.809
Hexythiazox	23.6±2.21	5.3±1.11	26.6±0.99	71.506
Propargit	24.0±0.48	4.0±0.48	32.3±1.68	65.399
Pyridaben	20.3±0.27	5.6±0.73	29.6±0.73	68.304
Spirodiclofen	22.3±0.99	4.3±0.73	30.6±0.99	67.226
Sulfur	26.0±1.4	5.0±0.48	28.6±0.73	69.356
Abamectin	36.6±0.99	7.6±1.20	30.6±1.21	67.175
Chlorfenapyr	17.1±1.27	8.0±0.96	26.3±0.99	71.848
Control	92.33±0.73	11.0±0.48	92.6±2.73	----

Survival = Percent females alive after 72 h
Fecundity = Eggs laid in 72 h per female
Fertility = Percent of eggs laid in 72 h that hatched

Residual effect of acaricides on *T. urticae* adult of two field-collected populations:

Table (5) shows the residual effect of the ten tested acaricides against *T. urticae* Behera population when used at their recommended field rate. Insecticides were non-significant to each other but significantly different from control. The estimated mortality percentages for clofentezine, etoxazole, fenproxymat, hexythiazox, propargit, pyridaben, spirodiclofen, abamectin, chlorfenapyr, and sulfur were 82, 82, 88, 84, 77.3, 90.6, 85.3, 76, 74.6 and 94.6% respectively at1day after application, while, mortalityat 12days after application was 46.6, 44, 46.6, 42.6, 46.6 30.6, 52, 45.3, 30.6 and 30.6%, respectively. Mortality percentages for chlorfenapyr followed by pyridaben at the first day after applications were the greatest compared to other acaricides. On the other hand, mortality percentages for abamectin on all days after applications were the least from 1 to 12 days. Elmoghazy *et al.* (2011) said that chlorfenapyr more potent than abamectin but both gave highest reduction of *T. urticae* in Behera governorate Faba bean field.

Table 5: Acaricideresiduals toxicity on Behera*T. urticae* adult populations.

Treatment	Conc.(ppm)	Mortality days after treatments				
		1day	3day	6day	9day	12day
Clofentezine	150	82.6±0.9	74.6±1.1	69.6±0.9	58.6±0.9	46.6±0.9
Etoxazole	25	82.6±0.73	77.3±0.27	66.6±0.73	54.6±0.73	44.0±0.48
Fenproxymat	25	88.0±0.48	86.6±1.2	69.3±0.73	53.3±0.73	46.6±0.27
Hexythiazox	50	84.0±1.2	78.6±0.9	65.3±0.73	50.6±0.27	42.6±0.55
Propargit	486.6	77.3±1.46	96.3±0.5	53.3±0.9	49.3±0.55	46.6±0.73
Pyridaben	200	90.6±0.73	76.0±0.48	56.0±0.48	41.3±0.73	30.6±0.27
Spirodiclofen	72	85.3±1.1	77.3±0.9	61.3±1.38	56.0±1.27	52.0±1.27
Sulfur	2000	76.0±0.48	73.0±1.5	68.0±1.7	52.0±0.48	45.3±0.5
Abamectin	9	74.6±0.9	53.3±1.5	46.6±2.27	41.3±1.9	30.6±1.2
Chlorfenapyr	144	94.6±0.27	74.6±0.73	57.3±1.54	36.0±0.96	30.6±0.9
Control	-----	0.05±0.73	0.08±0.96	0.08±0.83	0.06±0.27	0.09±0.9

Table (6) shows the residual effect of the ten tested acaricides against *T. urtica* Dakahlia population when used at their recommended field rate. The highest mortality percentages at the day 1,3,6,9 and 12 were fenproxymat 90.6, 84, 73.3, 64 and 49.3% respectively. But mortality percentages forpyridaben followed by fenproxymat at 1 and 3 days after applications were the greatest compared to other acaricides. On the other hand mortality percentages for abamectin on all days after applications were the least from 1 to 12 days.

Table 6: Acaricideresiduals toxicity on Dakahlia *T. urticae* adult populations.

Treatment	Conc.(ppm)	Mortality days after treatments				
		1day	3day	6day	9day	12day
Clofentezine	150	85.3±1.2	84.0±0.48	68.0±0.48	56..0±0.48	45.3±0.73
Etoxazole	25	84.0±1.27	84.0±1.27	73.3±0.73	64.0±0.83	49.3±1.54
Fenproxymat	25	90.6±0.73	84.0±0.48	73.3±0.27	65.3±0.73	50.6±0.9
Hexythiazox	50	77.3±0.9	70.6±0.73	61.3±0.73	53.3±0.73	48.0±0.9
Propargit	486.6	80.0±0.48	64.0±0.48	57.3±0.27	49.3±0.9	41.3±1.2
Pyridaben	200	96.0±0.48	77.3±0.9	65.3±1.4	46.6±1.4	36.0±1.27
Spirodiclofen	72	88.0±1.27	66.6±0.73	58.6±0.55	50.6±0.73	0.42±0.27
Sulfur	2000	82.6±0.9	80.0±0.48	65.3±0.73	46.6±0.9	44.0±0.96
Abamectin	9	70.6±0.73	60.0±0.48	48.0±0.96	38.6±0.9	30.6±0.9
Chlorfenapyr	144	89.3±0.9	70.6±0.55	57.3±0.73	46.6±0.73	34.6±0.73
Control	-----	0.06±0.99	0.04±0.48	0.08±0.48	0.09±0.99	0.04±0.48

Beers *et al.* (2009) stated that acaricide residues were nontoxic to adult females but highly toxic to hatching larvae of *T. urticae* and highly repellent to adult female *G. occidentalis.* Liburd *et al.* (2007) stated that the result of direct and residual effects of several miticides on *T. urticae* was bifenazate was the highest reduction percentage, but fenbutatin-oxide and castor oil did not, and garlic extract was the least effective.

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ARABIC SUMMERY

التاثير المتبقي والتاثير بالملامسه لعدد من مستحضرات المبيدات الاكاروسيه لمكافحه الاكاروس ذو البقعتين

حنان صلاح الدين طه
قسم سميه المبيدات للافات ـ المعمل المركزي للمبيدات ـ مركز البحوث الزراعيه, دقي ـ جيزه, مصر

يعتبر الأكاروس ذو البقعتين من أهم الآفات التي تصيب المحاصيل الزراعية لذا لزم الأمر دراسة العديد من الدراسات التوكسيكولوجية علي المبيدات الحديثة الموصي بها لمكافحة هذه الآفة. تمت الدراسة علي أكاروس النباتات المصابة وتم جمعها من محافظتى البحيرة والدقهلية. أسفرت نتائج LC_{50} أنه لا توجد فروق معنوية بين المبيدات الأكاروسية المختبرة علي العشيرتين. ولكن الي حد ما تظهرالتنفى محافظة الدقهلية أكثر مقاومة عن التى فى محافظة البحيرة بالنسبة للمبيدات التالية:

هيكسيزيازوكس, بروبارجيت, سبيروديكلوفين, الكبريت, الابامكتين و الكلورفينابير. وعند المقارنة بالمعدل الحقلي لهذه المبيدات يتضح أنها جميعها لا تصل إلي الواحد الصحيح بمعني أن هذه السلالات لاتصل إلي حد المقاومة التي يجب قياسها والتخطيط لها لهذه المبيدات الأكاروسية. وعند المعاملة بطريقة الملامسة المباشرة وعد الأكاروسات الناجية من الإبادة بعد 72 ساعة كانت النتائج أن مبيد كلورفينابير في البحيرة كانت 15.66 بينما ايتوكسازول كان في الدقهلية مشابهاً له 15.0. وكانت النسبة المئوية لأعداد البيض الموضوع من الإناث ولم يفقس عالية لمبيد كلوفنتزينوالايتوكسازول تصل إلي 84% للمنطقتين المختبرتين بينما الابامكتينوالسبيروديكلوفين الأقل تصل إلي 67%. و عند فحص تأثير المتبقي لهذه المبيدات على الآفة نجد أن نسبة الموت تتراوح بين 94% و 74% لمبيد البيريدابنوالابامكتين, علي التوالي وذلك في اليوم الأول للمعاملة بينما اليوم الثاني عشر من المعاملة كانت نسبه الموت تتراوح من 52.6 الي 30.6 لمبيد سبيروديكلوفين و ابامكتين. ويعتبر المجموع الكلي لتأثير هذه المبيدات يتراوح بين 81.69 الي 64.3 في البحيرة و 80.7 الي 65.3% للدقهلية.