Journal of Plant Protection and Pathology

Journal homepage: www.jppp.mans.edu.eg
Available online at: www.jppp.journals.ekb.eg

Efficacy of Some Pesticides and Plant Extracts on Two Spotted Spider Mite *Tetranychus urticae,* (Koch) on Cotton Plant

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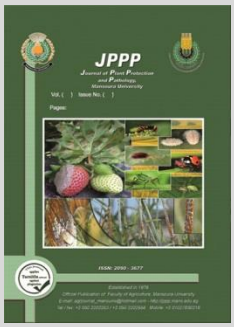

ABSTRACT

The present study, lab and field work was conducted to evaluation of toxic-effect and bio-activity of some newly conventional-pesticides (challenger, oberon, lambda, lant, neem oil and eucalyptus oil) to control of females-adult and stages of eggs for two spotted spider mite *T. urticae*. Addition to, evaluation of side-effects of sub-lethal dose of tested-chemicals on some biology aspects of spider mite *T. urticae*, and evaluates of compounds toxicity tested pest invested cotton-plants in fields. In laboratory and field the results showed that, challenger gave high toxicity to eggs-stages and adult-females of tested pest. The result indicated that, eucalyptus oil and neem oil were the least compound. Challenger and oberon are the most effective compounds tested on egg deposition and the same effective challenger and oberon were the most effective compounds against the motile stages, while lant was of moderate effect of *T. urticae.* Eucalyptus oil and neem-oil gave lower effects to motile-stages of the tested pest. Challenger and oberon exhibited the best results in this respect. All compounds successes in population-density reduction of motile-stages of spider mite, *T. urticae* in lab and field-experiments during the two seasons 2019-2020.

Keywords: Plant-extracts; Two-spotted; spider mite; *Tetranychus urticae*; cotton Plants.

INTRODUCTION

Cottons are one of the major-important cash-crop in Egypt, and considerable more than ½ incomes of 2-millions farmers small-scale. Many insect species attack cottons, i.e., early in season in seedling-stage; mid-season and in late season in fruiting-stage, Salama *et. al.*, 2006. Cotton *Gossypium hirsutum*, major-important cash-crop of the country, where is a 1st-rates contributions for agricultures, foods and textiles industry product. The all component of cotton-plant are very beneficial in daily-life. Seed and fiber (lint) represent cotton most important parts, Sarwar, *et. al*., 2013. Highest share damages to crop of cotton done by cotton sucking pest complex of cotton includes aphid, jassid ,white fly ,thrips ,red cotton bug, mealy bug and dusky cotton bug. Cottons in Egypt occupied an important place in Egyptian-national-economy, Mesbah *et. al.*, 2004. Also, two spotted spider-mite *T. urticae*, concealable an important agricultural-pest in world-wide because, almost resistant development insecticides. Synthetic-pesticides caused major of problems, e.g. environmental pollutions and resistance, we must take many measures, like, more development of selective-pesticides, newly methods of work, no damage to natural-enemies and using of biological-control, Steiner, *et. al*., 2011. Spider-mites mouth-parts are piercing-sucking and inserting their needle inside plant-tissues, they preferred feeds on surface of lower-leaf, Attia *et. al*., 2013. *Tetranychus urticae* Koch., one of important specie belonging to Acari; Tetranychidae, associated with 900 plant-species, which attacks many crops in fields and greenhouses around the world, Jeppson *et. al*., 1975 and Meyer, 1996. The natural-extracts of plants considerable a newly-tools to control like phytophagous-mites specially, *T. urticae*, which caused most economic-losses in agricultures. Akhtar, *et. al*., 2010, the essential-oils of plants are very toxic-effects by ingestion action; contact action and fumigation action "addition to" it's have a highly-significant as a repellent agents and behavioral-effect against pests.

The present study aimed to evaluate the efficacy of some pesticides; challenger, oberon, lambda, lant, neem-oil and eucalyptus-oil to control of females-adult and stages of eggs for two-spotted spider-mite *T. urticae*, on cotton plant.

MATERRIALS AND METHODS

1- Compounds tested:

Four formulated compounds and two plant extracts were used on two-spotted spider mite.

2- Tested compounds:

The tested compounds	Common name	The chemical name (IUPAC)	Source
Challenger 36% SC	Clorofenapyr	4-bromo-2-(4-chlorophenyl)-1-ethoxymethyl-5-trifluoromethyl-1H-pyrrole-3-carbonitrile.	It was supplied by EL-Help Pesticides and Chemicals Company, Egypt
Oberan 24%SC	Spiromesifen	2-oxo-3-(2,4,6-trimethylphenyl) -1-oxaspiro[4.4] non-3-en-4-yl] 3, 3-dimethylbutanoate.	
Lambda-cyhalothrin 5%EC	Pyrethriod	[(R)-cyano-(3-phenoxyphenyl) methyl] (1S,3S)-3-[(Z)-2-chloro-3,3, 3-trifluoroprop-1-enyl]-2,2-dimethylcyclopropane-1-carboxylate.	
Lannate 90% EC	Methomyl	methyl N-(methylcarbamoyloxy) ethanimidothioate	

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DOI: 10.21608/jppp.2021.207635

3- Plants extracts

Plant extracts	Common name	Plant used	Source
Neem oil	Azadirachta indica	oil	It was supplied by EL-Help Pesticides and Chemicals Company, Egyp
Eucalyptus oil	Eucalyptus Globulus	oil	

4- Tested-compound toxicity against adult-females of two spotted spider-mite *T. urticae*.

The evaluated of all tested-chemicals were conducted by dip technique of leaf-discs against two spotted spider-mite *T. urticae* according to (Siegler 1947). The cotton-disc was cutting by cork-borer, whereas they were bisect by midrib and putted lower-surface up on cotton wool bad soaked by water in Petri-dishes. Disc sizes diverse depend on experiment nature. In experiment of predation, the require numbers of tested pest, the eggs laid out in discs, and the discs left 1hr and then they were checked, in case any eggs of preys were invested through transferring. Invested-eggs changed before introduce predators to discs, unless-otherwise-stated, leaf-discs experiment was conduct on (25±2°C) with, photo-period (16hrs).

Chemicals formulation was dilute to some concentrations/ppm, of a.i. "active ingredient", in the all dilutions the distilled-water were used. 4-discs from castor-bean-leaves dipping in each conc., for 5-seconds, then leaved to drying. 10-adults of female-mites transmitted to the disc and disc was putted on filter-paper-moistened rested on moistened-cotton-wool-bad which contained in Petri-dishes kept in breeding room on same conditions. The numbers of mortality counted at 24hrs after treatments. Each-treatment was replicated 4-times.

Corrections of mortality in control were made according-to "Abbott's formula" 1925. Obtained results plotted on log-dosage by using probit-papers and analyzed statistically, according-to "Litchfield, & Wilcoxon, 1949".

5. Compound-residues effects of egg-deposition and egg-hatching, on *T. urticae*:

The residual-compound effects assay for tested-chemicals at (LC_{25} level) on of mite *T. urticae*, adult, and advised technique according (Keratum, *et. al.* 1994).

6- Statistical analysis and equations:

Abbott's formula (1925) was used to correct mortality% according to natural mortality.

$$\text{Mortality \%} = \frac{\text{Mortality\% of treatment - mortality\% of control}}{\text{100 - Mortality\% of control}} \text{ X 100}$$

Egg mortality:

The calculation of % mortality, as follows;

Egg-mortality=(a/b)X100 where;

a = Unhatched-eggs.

b = Total-numbers for eggs calculated before toxicant-treatment.

Toxicity index:

The toxicity-index of tested-chemicals were determine according-to (Sun, 1950), as follows;

$$\text{Toxicity index} = \frac{LC_{50} \text{ of the most effective compound}}{LC_{50} \text{ of the tested compound}} \text{ x 100}$$

Reduction of tested compounds was determined according to Handerson, and Telton (1995)., as follows:

$$\text{\% Reduction} = \frac{\text{Number of control - Number of treatment}}{\text{Number of control}} \text{ x 100}$$

7- Field studies:

The two-experiments conducted in summer seasons (2019-2020) in farm of Sakha-Agricultural-Research-Station at Kafr-El-Sheikh-Egypt, to evaluation the tested-compounds effects against spider-mite *T. urticae* attacks cotton-plants varieties. Each plot 1/100/Feddan in design randomized-blocks-completely, each-treatment was replicated 4-times. The all tested-chemicals applied at their "half-recommended-rates" and a knapsack-sprayer with one-nozzle was used. Water-rates (200L/Fadden), used to compound-diluting. 10-cotton-leaves sample collected "randomly" before and after treatment from each plot at 2-days and one-week later. Calculated of % reductions of infestations for each-treatment according-to equation (Handerson & Tilton 1955).

8- Statistical analysis:

Multiple-range-tests at (5% level) of significant-differences between treatments were used according to (Duncan, 1955).

RESULTS AND DISCUSSION

1- Tested-compound toxicity against adult-females of two spotted spider-mite *T. urticae* on cotton using leaf-discs.

The present investigation was carried out to evaluate some compounds (challenger, oberon, lambda, Lantte, neem oil and eucalyptus oil to control of adult-females of *T. urticae*. Data obtained in (Table 1) showed that, challenger gave more-toxic against adult-females of tested pest with "LC_{50} values" of 2.4ppm, , followed by oberon and lambda with LC_{50} values of 16.7 and 36.2 ppm, respectively. While lannate has a moderately-toxic to adult-females, the "LC_{50} values" of 44.8 ppm. Neem oil and eucalyptus oil appears lower-toxic against adult-females of tested pest, with "LC_{50} values" of 655.44 and 876.15ppm., respectively.

Toxicity-index at, "LC_{50} level", data clarified that in (Table 1), challenger gave most-toxic against adult-females of *T. urticae*, with the toxicity-index 100.0 followed by oberon and lambda with toxicity index of 14.37 and 6.62. While lant has moderately-toxic effects against adult-stage of *T. urticae*, with the toxicity-indexe 5.35. Neem oil and eucalyptus oil appears least-toxic-compounds against adult-females of *T. urticae*, with toxicity-indexe 0.36 and 0.27 respectively.

Table 1. The toxicity of tested-compounds on adult-female of tow spotted spider-mite *T. urticae*, on cotton-plant using leaf-discs

Compound	"LC_{50}" (mg/l)	CL for "LC_{50}"		Toxicity-index
		lower	Upper	
Challenger	2.4	1.02	3.72	100
Oberon	16.7	15.65	22.81	14.37
Lambda	36.2	30.41	40.65	6.62
Lannate	44.8	33.22	52.35	5.35
Neem oil	655.44	597.21	721.57	0.36
Eucalyptus oil	876.15	824.84	926.32	0.27

Tarikul, Islam 2018, reported that, "abamectin" was most-toxic as a acaricides on *T. urticae* at 24hrs., after treatment with "Lc_{50} values" counted 0.432, 0.342 and 0.324 mgl^{-1}, on country-bean, papaya and jute-leaf-discs respectively, followed by "zadirachtin; emamectin; benzoate; spinosad and hexythizox" respectively, and after treatment, increasing of time-duration increased toxicity of all tested-chemicals and can recommend that, using of "abamectin" against *T. urticae.* Tesfay *et. Al.*, 2018, reported that, pesticides "Amitraz; Chlorantroniliprolz; Chlorantrniliprole+cyhalothrin; Spinosad-Flubendiamidenz; Profenofos-Q-720g and Profenofos" were more-effect to adult *T. urticae*, while "Chlorantrniliprole+Lambda-cyhalothrin; Amitraz; Profenofos; Profenofos-Q-720gl-1 and Paraffin-oil" were more-effect to motile-stages and egg-stages of *T. urticae*. Habashy, 2018, in Egypt, concluded that, max-mortality values was (83.33%), after 7-days on *T. urtecae*, when studied (ability and stability) of garlic-aqueous-extract *Allium sativum* linn.

Khairia, *et. al.* 2019, investigated the effect of six-acaricides to control two-spotted spider-mite *T. urticae*, infesting eggplant and pepper plants during the two growing season, 2016 and 2017, under laboratory and field conditions. The tested acaricides namely: abamectin 1.8% EC, buprofezin 25% WP, abamectin 5% EC, chlorfenapyr 24% SC, hexythiazox 5% WP and fenpyroximate 5% EC. The results showed that abamectin 1.8% was the most effective acaricides followed by buprofezin, abamactin 5%, chlorfenapyr, hexythiazox and fenpyroximate, respectively. The tested acaricides indicated significant reduction for population of *T . urticae* under field conditions during the first and second seasons.

2- Tested-compound toxicity against eggs-stages of two spotted spider-mite *T. urticae*.

Toxicity of tested-compounds was investigated on eggs-stages of two spotted spider-mite *T. urticae*, in lab-condition. The mortality was corrected using Abbott's formula (1925). Based on LC_{50} values Table (2) results indicated that challenger was the most toxic compound, followed by oberon and lambda against the egg stage of spider mite *T. urtecae* with LC_{50} values of 22.80 and 43.42 ppm respectively. lannate has moderately-toxic against egg-stage of *T. utricae*, with "LC_{50} values" of 62.51ppm respectively. Neem oil and eucalyptus oil appears least-toxic against egg-stage of *T. urtecae*, with "LC_{50} values" 746.15 and 892.53ppm., respectively.

Concerning the toxicity index at LC_{50} level, the data in Table (2) confirmed that challenger was the most toxic compound to egg stage of *T. urticae* with toxicity index of 100.00 followed by oberon and lambda with toxicity index of 18.64 and 9.78, while lant has a moderate toxic effect to egg stage of *T. urticae* with toxicity indexes 6.80 respectively. . Neem oil and eucalyptus oil has lower-toxic effects against egg-stage of *T. urticae*, of toxicity-index 0.569 and 0.476, respectively.

Table 2. Toxicity of tested compounds on eggs of two-spotted spider mite *T. urticae*

Compounds	LC_{50} (PPM)	C.L.forLC_{50}		Toxicity index
		Lower	Upper	
Challenger	4.25	3.14	5.23	100
Oberon	22.80	19.77	30.18	18.64
Lambda	43.42	38.57	50.10	9.78
Lant	62.51	48.33	81.72	6.80
Neem oil	746.15	680.57	821.24	0.569
Eucalyptus oil	892.53	820.61	980.45	0.476

These results can be supported with those obtained by several investigators Derbalah, *et. al.* 2013, mentioned that, "cyhalothrin" and "fenpynoximate" gave more-toxic against egg-stage of *T. urticae* while, wormseed-extract gave low-toxic against egg-stage of tested pest. Laila E.M. Seliman, & Hamedy, 2015, studied relative-toxicity on six-chemicals, mode-of-action; four-pesticides, "fenpyroximate - ethion - chlorfenapyr - cyhalothin"; one-mineral-oil "Nat-1" and one-plant-extract "wormseed extract", against egg-stage of *T. urticae*, by use of standardized-method, and data obtained concluded that, "cyhalothrin" gave more-toxic followed by "fenpyroximate". Lubna, *et. al.* 2017, evaluated the effect of various botanical products on population of sucking complex on cotton crop. Five bio-pesticides neem oil (500ml), cooking oil (750 ml), linseed oil (750ml) hing (290gm) and cotton oil (750ml/acre) were applied twice against sucking complex (whitefly). The result showed that, neem oil (63.27%) and cotton oil (62.01%) were found to be superior in reducing sucking pest, followed by hing (58.25%), cooking oil (57.18%) and linseed oil (55.24%) respectively.

3- Effect of compounds residue on biology of two-spotted spider mite *T. urticae:*

The compound-residues effect against egg-deposit of adult-females *T. urticae.*

Sub-lethal effect of tested-compounds conc., and studied, the LC_{25} on egg-deposit of adult-female-mites *T. urticae*. Five adult female mites were allowed to oviposite on different compounds-treated discs for a period of 5 days. The deposited eggs were counted daily for five days. Each treatment was replicated four times. The data shown in Table (3 and 4).

Table 3. Effect of different compounds residues on egg deposition of *T. urticae*

Compounds	No. of eggs deposited /5 adults					Mean
	1st day	2nd day	3rd day	4th day	5th day	
Control	18.00±0.50^{a}	20.50±0.82^{a}	24.25±1.41^{a}	26.50±0.50^{a}	30.00±1.26^{a}	26.85±0.35^{a}
Challenger	3.75±0.50^{d}	5.00±0.50^{d}	6.25±0.58^{d}	9.75±0.96^{d}	12.50±0.96^{d}	8.70±0.35^{d}
Oberon	4.00±0.82^{cd}	5.75±0.50^{c}	7.25±0.82^{d}	11.50±0.82^{c}	14.75±0.82^{d}	12.55±0.53^{e}
Lambda	6.50±0.86^{d}	7.25±0.86^{d}	9.00±1.53^{d}	12.50±1.35^{c}	16.00±1.35^{b}	9.86±0.48^{d}
Lant	8.00±0.96^{c}	9.25±0.5^{d}	12.75±0.96^{cd}	14.50±1.41^{c}	20.25±1.41^{c}	12.85±0.85^{c}
Neem oil	12.75±0.50^{c}	14.00±0.96^{c}	16.50±0.58^{c}	19.25±0.82^{bc}	25.75±0.82^{b}	14.50±0.48^{c}
Eucalyptus oil	14.50±0.50^{c}	16.00±0.58^{b}	18..50±0.82^{b}	23.00±0.50^{b}	27.25±0.82^{b}	21.40±0.16^{b}

Table 4. Reduction percentage in eggs laying capacity of *T. urticae* 5 female due to compounds

Compounds	Reduction%					Mean
	1st day	2nd day	3rd day	4th day	5th day	
Challenger	79.16	75.60	74.22	63.20	58.33	70.10
Oberon	77.7	71.95	70.10	56.60	50.83	65.43
Lambda	63.8	64.63	62.88	52.83	46.66	55.32
Lant	55.5	54.87	47.42	45.28	32.50	47.11
Neem oil	29.16	31.70	31.95	27.35	14.16	26.86
Eucalyptus oil	19.44	21.95	23.71	13.20	9.16	17.49

The integrated-pest-management was studied, the effect of some chemicals and biological-agents against mite-egg-deposit and some sensitivities for the agents. The accumulated eggs deposited by the adult females of mite *T. urticae* through the first to fifth day exhibited about the same trend. From the mean number of eggs deposited by adult female mites *T. urticae* treated by different compounds Table (6), result suggested that challenger was more-effect against egg-deposit with 70.10%, followed-by oberon, lambda, and lant were moderately-effects with, 65.43, 55.32 and 47.11%, respectively. Neem oil and eucalyptus oil appears lower-effects on characters and similarly-effect on mite-fecundity reduction, 26.86% and 17.49, respectively.

Some of searches were conducted to evaluate the effects of some chemicals against mite-biology and data showed that, the chemicals gave positively-effect on egg deposition of the prey.

There is no doubt that low levels of chemicals which donor cause mortality can influence this character. The present laboratory treatments simulate field conditions where the mites will exposed to chemical residues on plant leaves by contact or as stomach action through feeding on contaminated cell contents. Premalatha *et. al.* 2017, evaluated the acaricidal activity of aqueous extract of 20 plant species at 10 percent concentration on red spider mite, *T. urticae* under laboratory condition by using the leaf disc method. Among the plants, the aqueous extract of sesbania grand flora caused the highest mortality of 94.43 percent of *T. urtecae* at 72 hours after treatment which was statistically superior to all other treatments. Mariam, G. Habashy, 2018, studied effects of garlic, *Allium sativum*, Linn., aqueous-extract against two spotted spider-mite *T. urticae*. The obtained result concluded that, the garlic-aqueous-extract was significant in egg-deposition reduction and egg-hatching of tested pest, these experiment demonstrate that, garlic-aqueous-extract was moderately-effect against *T. urticae.*

Effect of compound's residues on eggs hatchability of two-spotted spider mite *T. urticae*:

This experiment was carried out to determine the toxic effect of the tested compounds at LC_{25} level on mite eggs of *T. urticae.* In other words to determine the ovicidal action of these compounds on the egg stage. As mentioned before in materials and methods, the chemical treatments were applied for the discs before egg laying of the prey mite. Then five adult female mites were placed on each disc for 24 hours, then they were removed. Hatchability was counted 72 hours after egg laying for successive five days. Each treatment was replicated four times.

From the percentage of hatching clarified in (Table 5), and the data obtained showed that, "challenger" gave more-effect against egg-hatching of 30.6%, followed-by "oberon" with 33.2%, while "lambda" and "lant" appears moderately-effects on that character with 35.0 and 35.8, respectively. Neem oil and Eucalyptus oil gave least-effect on egg-hatching with 39.0 and 45.2, respectively.

Tabel 5. The effect of tested-compounds-residues on egg-hatching of *T. urticae*.

Compound	Unhatched-eggs/indicated day					The mean	% hatching
	1st day	2rd day	3nd day	4th day	5th day		
Control	15.25±0.5^{e}	12.75±1.83^{d}	9.00±0.96^{e}	5.50±0.96^{f}	2.25±0.50^{e}	8.95±0.73^{g}	64.2
Challenger	24.75±0.0^{a}	21.00±0.82^{a}	17.5±0.82^{a}	13.50±0.00^{a}	10.00±1.29^{a}	17.35±0.20^{a}	30.6
Oberon	24.00±0.00^{c}	20.25±0.74^{bc}	15.50±0.74^{c}	12.00±0.0^{c}	11.75±1.16^{c}	16.70±0.18^{d}	33.2
Lambda	20.00±0.50^{a}	19.50±2.99^{a}	18.25±1.83^{b}	13.50±1.50^{b}	10.00±1.26^{b}	16.25±1.14^{b}	35.0
Lant	21.00±0.82^{c}	17.25±0.58^{bc}	16.75±0.82^{c}	14.00±0.96^{c}	11.25±0.58^{c}	16.05±0.53^{d}	35.8
Neem oil	23.00±1.5^{a}	19.25±1.82^{ab}	13.50±1.26^{b}	11.50±0.96^{a}	9.00±2.63^{bc}	15.25±0.59^{b}	39.0
Eucalyptus oil	20.25±2.08^{b}	16.50±1.83^{b}	13.00±0.96^{b}	10.75±1.15^{c}	8.00±0.58^{c}	13.70±0.41^{c}	45.2

El-Kasser, *et. al.* 2015, studied, sub-lethal-doses effects of six-chemicals; three-chemicals, "abamectin", "fenpyroximate" and chlorfenapyr" known as acaricides and one-pyrethroid "cyhalothrin", one-mineral-oil "Supermasrona" and one-plant-extract "*Nigella sativa"* on biological-aspect and behavioral-aspect for spider-mite *T. urticae*. The results indicated that cyhalothrin was the most effective compound tested on egg deposition of *T. urticae* which is beneficial for some IPM programs predators while *Nigella sativa* extract have the least effect on egg deposition. Cyhalothrin Fenpyroximate and Supermasrona were highly toxic compounds that caused the highest decrease in egg hatchability of *T. urticae* on different host plants.

From our result some nanoemulsion preparations may be enhance the resistance of *T. urticae* .Toward the insecticides, these results is in agreement with (Nehaah *et al.*,(2015) whose showed that preparation of essential oils at the nano scale represents an efficient approach to increase the physical stability of their bnioactive compound ,protecting them because of the subcellular size and their bioactivity is increased through the activation of passive mechanisms of cell absorption. Kumari *et al.* (2017) studied ovicidal and nymphicidal effects of different acaricides against *Tetranychus urticae*. There was no egg hatching when eggs were sprayed with one third of the recommended concentration of spiromesifen.This was statistically significantly different from all other treatments

(fenpyroximate, chlorfenapyr ,propargite, dicofol and hexythiazox) which were, however, at par with each other. Based on the 10th day observations, the ovicidal activity of spiromesifen (100%) was followed by dicofol(7.78% egg mortality) and hexythiazox (6.67%). Almost no effect on hatching was observed in both abamectin and chlorfenapyr treatment (0.54%). Keratum, and Ibrahim, 2016, studied, effect of sub-lethal dose of six-chemicals "abamectin; ethion; chlorfenapyn; cyhalothin; Nat-1 and black-cumin-extract" on biological-aspect of spider-mite *T. urticae*, and obtained result showed that, "cyhalothrin" gave most-effective against egg-deposition by adult-female followed-by "ethion" and "abamectin", while black-cumin-extract gave least-effective. On the other hand, they found that, "cyhalothrin" and "abamectin" were highest-effective caused decreasing of egg-hatching followed-by "ethion" while black-cumin-extract appears least-effective against egg-hatching. Habashy, 2018, evaluated storage-periods effects on six-concentrations of aqueous-garlic-extract on spider-mite *T. urticae*, obtained data concluded that, decreasing of acaricidal-activity throughout times of all-tested-concentrations, recorded losing (30%), from it's activity after four-weeks. The garlic-aqueous-extract was significant in egg-deposit and egg-hatching reduction of tested pest. Hosam, *et. al.* 2019, studied the direct residual-effects of two-natural-plant-extracts, aerial-parts of *Artemisia vuglaris*, L., and seeds of *Acacia concinna*, willd., on *T. urticae* in lab condition. The two-concentrations (0.25 and 0.5%) were used for studying it's biological-aspects effect. Data obtained concluded that, effective-influence for extracts on life-aspects of spider-mite, where, the life-cycle altered and prolonged; generation-numbers/year was reduced and caused highly percentage of mortalities.

The tested-compounds effect on motile-stages of spider-mite *T. urticae.*

Data recorded in Tables 6 and 7, showed that, in 1st season (2019), "challenger" gave most-effective on population-density-reduction of motile-stages of spider-mite *T. urticae*, recorded 64.64% followed-by "oberon" and "lambda" recoded 56.78 and 52.28% respectively, while "lant" gave moderate-effects while. Eucalyptus-oil and neem-oil was least-effective compounds on population-density-reduction of motile-stages of tested pest.

Table 6. The tested-compounds effect on motile-stages of spider-mite *T. urticae* on cotton-plants in field-condition.

Compounds	Mites numbers pre-treatment	Mites numbers post-treatment/weeks			
		1st week	2nd weeck	3rd weeck	4th weeck
		Season "2019"			
Challenger	186.63	13.54	38.29	67.81	73.64
Oberon	183.77	34.72	46.70	72.92	83.82
Lambda	188.43	53.93	60.93	78.37	91.47
Lant	186.61	71.28	81.47	98.16	102.36
Neem oil	211.73	128.47	143.38	175.42	166.52
Eucalyptus oil	231.36	134.52	146.79	191.38	178.63
Control	262.73	258.81	216.72	185.48	177.91
		Season "2020"			
Challenger	190.76	14.32	36.86	66.51	80.53
Oberon	187.46	36.21	50.63	68.75	81.72
Lambda	185.77	48.55	63.85	75.45	94.63
Lannate	192.23	76.57	84.74	96.45	105.64
Neem oil	201.84	121.64	138.13	172.73	162.53
Eucalyptus oil	220.54	137.63	152.45	187.58	180.58
Control	265.92	248.74	225.65	182.63	173.57

Table 7. The reductions effect of tested-compounds on motile-stages of spider-mite *T. urticae*, on cotton-plant in field condition.

Compounds	%reduction				General mean
	1st week	2st weeck	3st weeck	4st weeck	
	Season "2019"				
Challenger	92.67	75.17	48.76	41.99	64.64
Oberon	80.91	69.25	44.05	32.95	56.78
Lambda	73.77	65.36	41.35	28.64	52.28
Lant	61.42	47.17	25.49	19.36	38.36
Neem oil	39.67	18.06	16.81	15.81	22.58
Eucalyptus oil	41.27	23.22	16.63	13.49	23.65
	Season "2020"				
Challenger	92.04	77.39	49.44	37.52	64.09
Oberon	79.51	68.40	46.81	35.48	57.55
Lambda	72.29	59.78	41.10	24.60	49.44
Lant	57.77	48.42	27.24	18.66	38.02
Neem oil	36.11	19.93	24.08	19.17	24.82
Eucalyptus oil	33.82	19.12	23.32	21.18	24.36

In the 2nd season (2020), "challenger" was most-effective on population-density-reduction of motile-stages of spider-mite *T. urticae*, recorded 64.09%, followed-by "oberon" and "lambda" recorded 57.55 and 49.44%

repectively, while "lannate" was moderately-effect while, eucalyptus-oil and neem-oil appears lowest-effective compounds on population-density-reduction of motile-stages of spider-mite *T. urticae*, recorded 24.36 and 24.82% respectively. After application of one-week, observed that, decreasing in population-density of motile-stages of *T. urticae*. Generally, all-treatments were most-effective in population-density-reduction, based-on of this reduction; the all-compounds were effective in population-density-reduction of motile-stages of mite, *T. urticae.*

Asmae *et al.*(2019) evaluate the toxicity of essential oil chemical composition of Salvia officinalis and eucalyptus globulus, against the adults of two spotted spider mite, *T. urticae.* The results showed that the two oils showed increased mortality of spider mite on adults. *S. officinalis* and *E. globulushave* the potential to be developed as botanical acaricides for eco-friendly management of T. *urticae.* Khairia *et al* (2017) investigated the effect of six-acaricides to control two-spotted spider-mite *T . urticae*, infesting eggplant and pepper plants during the two growing season, 2016 and 2017, under laboratory and field conditions. The tested acaricides namel; abamectin 1.8% EC, buprofezin 25% WP, abamectin 5% EC, chlorfenapyr 24% SC , hexythiazox 5% WP and fenpyroximate 5% EC. The results showed that abamactin was the most effective acaricides followed by buprofezin, abamactin, chlorfenapyr, hexythiazox and fenpyroximate respectively. The tested acaricides indicated significant reduction for population of *T. urticae* under field condi tions during the first and second seasons.Wafaa M. Gaber and Heba M. Nasr(2020) evaluated the effect of neem essential oil and the aqueous neem extract against adult females of *Tetranychus urticae* under laboratory conditions. The results revealed that the active essential oil of neem was more effective than the aqueous neem extract. Wawdhane *et.al.* (2020) evaluate the efficacy of different treatments plant extracts, Neem oil 2%, Neem seed extract 5%, *Tetranychus urticae* Tobacco leaf extract 10%, Metarhizium anisoplie 1x108 CFU/ml, Verticillium lecanii 1x108 CFU/ml and Beauveria bassiana 1x108 CFU/ml) against sucking pest whitefly of cotton. The result showed that Neem oil 2 per cent, Neem seed extract 5 per cent and Tobacco leaf extract 10 per cent were found effective towards reduction of sucking pests.

CONCLUSION

From the present study it is concluded that Challenger was high effective against *Tetranychus urticae*, while other pesticides were least infestation. Plant extracts was very effective on eggs of *Tetranychus urticae***.** On the other hand the plots which treated with these pesticides also produced comparatively more seed cotton yield than other treated plots and also out yielded the control treatment.

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كفاءة بعض المبيدات والمستخلصات النباتية ضد اكاروس العنكبوت الاحمر على نبات القطن

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الدراسه الحاليه تمت لدراسة وتقييم الكفاءه لسته مركبات ، إثنين من المبيدات الأكاروسيه (شالنجر و أوبرون) وإثنين مبيدات (لمبادا و لانت) ومستخلصين نباتيين (مستخلص الكافور والنيم) ضد البيض والاناث البالغة للاكاروس النباتى (تترانيكس اورتيكا) بإستخدام الغمر للقطاعات النباتيه . وتم التقييم للتاثيرات الجانبية على بعض الصفات البيولوجيه للأكاروس لتلك المركبات . بجانب تقييم التأثير السام على الأكاروس النباتى لهذه المركبات أيضا على القطن فى الظروف المعملية والحقلية . وقد اظهرت النتائج أن مركب الشالنجر كان الأفضل في التأثير السام على البيض والحيوان الكامل لأكاروس العنكبوت الأحمر . وكان مركب الشالنجر والأوبرون الأعلى سمية لوضع البيض ، ويمكن التوصيه بإستخدامهما في برامج المكافحه المتكامله . من ناحية أخرى ، أظهرت المركبات المختبره فى معظمها على نبات القطن خفضا عاليا في أعداد الأطوار المتحركة بينما كان المستخلصين النباتيين (مستخلص الكافور ومستخلص النيم) أقل تأثيرا علي كلا من طور البيض والحيوان الكامل لأكاروس العنكبوت الأحمر(تترانيكس اورتيكا) .