

**IMPACT OF ANTI STRESS PLUS AGAINST THE TWO- SPOTTED SPIDER MITE *TETRANYCHUS URTICAE* KOCH. UNDER LABORATORY AND FIELD CONDITIONS ON COTTON PLANTS.**

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**Abstract**

The study was conducted to study the side effect of (Fatty acids derivatives from jojoba oil) Antis tress plus on moving stages of *Tetranychus urticae* Koch. under laboratory and field conditions. Different Concentrations (5, 3, 1.5, 0.75, 0.35) ml/ L were used. All mite discs were sprayed with the previous concentrations and kept in an incubator at (26±2°C and 90 ± 5% R.H.). Obtained results, indicated that, Antis tress plus was highly effective on immature and adult stages as well as immature stages were highly susceptible after 6 days. The mortality percentage was 98.05% at tested concentration of 5ml/L. while the adult stages after 6 days, mortality percentage was 91.81% at the same tested concentrations in laboratory while, the mortality percentage was 99.2 after 7 days under field condition at the same concentrations .

**Introduction**

The spider mites *Tetranychus urticae* Koch are considerable economic importance pest as plant feeders, attacking field crops, orchard trees, ornamental and medicinal plants and vegetable crops. It usually feeds on the leaves injuring the epidermis and resulting in yellow, brown blotch and accompanied by dry and leaf fall. Sever mite-feeding result in economic reduction in the quality and quantity of crop production. Continuous use of acute acaricides has caused serious suppression in natural enemies' population, residual contamination of human foods, mammalian toxicity and environmental pollution. Therefore, new approaches in pest control were followed, particularly the use of fermentation and natural plant extract pesticides that have received recently a considerable attention. Many trials all-over the world have been succeeded by the use of bio-pesticides in controlling mite pests in different fruit orchards and field crops. Such as the studies of, Mansour and Ascher 1983, Abo-El-Ghar et al. 1986, Amer et al. 1988 & 1989, Dimetry et al. 1988, El-Halawany et al. 1989,

Ibrahimet al.1993, Ibrahimet al. 1994, Kim et al. 1999, El-Ghobashy and El-Sayed 2002, Sato et al.2002 and Aucejio et al. 2003..

Therefore, the aim of this investigation was carried out to broaden the scope upon the following study the impact of (Anti stress plus) against motel stages of *Tetranychus urticae* Koch. under laboratory and field conditions.

## MATERIAL AND METHODES

### 1) - Culture of mite pest *Tetranychus urticae* Koch. :

The samples of the two-spotted spider mite, *T. urticae* were collected from heavily infested cotton plant leaves at Giza region and brought to the laboratory in polyethylene bags, then the adults were isolated and reared on sweet potato (*Ipomoea batata*) cuttings (20 cm. long) with leaves and stems that were partially inserted in bottles filled with water and kept under room conditions ( $26 \pm 2^{\circ}\text{C}$  and  $70 \pm 5\%$  R.H.). Fluorescent tubes (40 watt) were used to maintain continuous illumination. Potato cuttings and water were changed as needed.

### 2)- Laboratory experiment:

Discs of leaf (5 cm. in diameter) each were carefully cleaned by a brush, sterilized by rubbing each of them with a small piece of cotton, previously soaked in chlorine solution. Sterilized leaf discs were placed on cotton wool in Petri dishes where few drops of water were added daily to maintain suitable moisture.

Ten individuals of homogenous sensitive immature and adult stage of *T. urticae* were transferred to sterilized leaf discs of two replicates of Petri-dishes containing 5 discs / each one were used from each stage. These leaf discs were sprayed with the solution of the Anti stress plus and the other discs were sprayed with water and kept as control.

The concentrations used were 5, 3, 1.5, 0.75 and 0.35 ml/L. All discs were kept in an incubator ( $26 \pm 2^{\circ}\text{C}$  and  $90 \pm 5\%$  R.H.). The percentage of mortality was calculated after 5 days and 7 days after treatment (Abbott, 1925). Toxicological data were statistically analyzed to estimate  $LC_{50}$ ,  $LC_{90}$ , Slope and Intercept according to the method described by Finney (1952).

### 3)- Field experiment

Field experimental was designed as complete randomized blocks. Three treatments and one control were carried out, with 4 replicates for each one. The only recommended concentration, 5ml/L. which applied under field conditions. Samples of 20 leaves/replicate

(80 leaves / treatment) were examined just before spraying and after 3, 7, 14 and 21 days from application. The reduction percentages of mite *T. urticae* population in relation to the insect population was determined according to "Henderson and Tilton (1955)".

Statistical analysis of data using Population fluctuation data were subjected to one - way. Analysis of variance and means were separated by Duncan's multiple range test (Duncan, 1955). Field data were statistically analyzed for least significant different (L.S.D.) according to Steel and Torrie (1968).

## RESULTS AND DISCUSSION

### 1- Laboratory Experiment

#### A- Efficacy of Antis tress plus on immature stages of *T. urticae*.

Data in Table (1) showed that the mortality percentages in *T. urticae* which ranged between (0.19 - 36.02 %) after one day of the treatment with concentrations 0.35 and 5ml/L respectively. After 3 days, the mortality % was recorded 3.32% and 87.03% with concentration 0.35 and 5 ml/L respectively. After 6 days, the mortality percentages were (98.05, 96.44, 39.92, 27.73 and 12.23 %) with concentration 5, 3, 1.5, 0.75 and 0.35ml/L respectively after treatment. On the other hand, data in Table 2 illustrated that the  $LT_{50}$  for the immature stages were 1.30, 1.90, 10.2, 18.09 and 19.92days with concentration 5, 3, 1.5, 0.75 and 0.35 ml/L respectively. While the  $LT_{90}$  were (3.36, 4.30, 148.01, 198.23 and 74.69 days) respectively using the same concentrations.

There were slight differences in slope values (b) between the five concentrations. The (b) values were  $3.11 \pm 0.37$ ,  $3.62 \pm 0.37$ ,  $1.11 \pm 0.37$ ,  $1.23 \pm 0.37$  and  $2.23 \pm 0.80$  respectively. The intercept (a) in this treatment were  $4.64 \pm 0.16$ ,  $3.98 \pm 0.18$ ,  $3.88 \pm 0.18$ ,  $3.45 \pm 0.22$  and  $2.09 \pm 0.53$  for the same concentrations.

The fucidal limit lower ranged from 1.04 to 10.26 but the fucidal limit upper ranged from 1.54 to 794.04 for the previous five concentrations.

**Table (1): Cumulative mortality percentages of *T. urticae* immature stages after application with different concentrations of (Anti stress plus) under Laboratory conditions.**

Concentrations ml/L.	Mortality % at indicated days (after-treatment)		
	1	3	6
5 ml/L.	36.02	87.03	98.05
3 ml/L.	15.55	76.24	96.44
1.5 ml/L.	13.25	27.84	39.92
0.75 ml/L.	6.05	16.80	27.73
0.35 ml/L.	0.19	3.32	12.23
Control	2.44	7.52	12.26

**Table (2): Effect of different concentrations of (Anti stress plus) on immature stages of *T. urticae* under laboratory conditions.**

Concentrations Ml/L.	LT <sub>50</sub>	Fucidal limit		LT <sub>90</sub>	Intercept (a)	Slope (b)
		Lower	Upper			
5ml/L.	1.30	1.04	1.54	3.36	4.64±0.16	3.11±0.37
3ml/L.	1.90	1.65	2.15	4.30	3.98±0.18	3.62±0.37
1.5ml/L.	10.21	6.27	48.39	148.01	3.88±0.18	1.11±0.31
0.75ml/L.	18.09	9.29	210.31	198.23	3.45±0.22	1.23±0.37
0.35ml/L.	19.92	10.26	794.04	74.69	2.09±0.53	2.23±0.80

The results immature stages (Table 3) showed that the affects of anti stress plus (LC<sub>50</sub>) against were 6.86, 2.20 and 1.10 after 1, 3 and 6 days after application. On the same concentrations while, the LC<sub>90</sub> was 34.72, 5.55 and 3.02 ml/L., respectively. The slight different in slope values (b) were 1.82±0.33, 3.19±0.34 and 2.96±0.87 for 5, 3, 1.5, 0.75 and 0.35ml/L concentrations. Also the intercept (a) in the same concentrations were 3.47±0.17, 3.90±0.15 and 4.85±0.30 after on, three and six days, respectively.

**Table (3): Toxicity line parameters of *T. urticae* after application of immature stages with different concentration of (Anti stress plus) under laboratory conditions.**

Days after-treatment.	LC <sub>50</sub>	Fucidal limit		LC <sub>90</sub>	Intercept (a)	Slope (b)
		Lower	Upper			
1 day	6.86	4.81	13.25	34.72	3.47±0.17	1.82±0.33
3 day	2.20	1.89	2.56	5.55	3.90±0.15	3.19±0.34
6 day	1.10	0.06	4.73	3.02	4.85±0.30	2.96±0.87

**B- Efficacy of anti stress plus on adult stage of *T. urticae***

After the first day of application, data in Table (4) show that the adult mortality percentages were (20.38, 27.52, 17.20, 5.16, 4. 67 %) then, it increased with increasing the time elapsed after treatment.

After three days, mortality percentage ranged between 18.60-72.73 %, for 0.35 and 3ml/L., respectively while after six days the results were 91.81, 91.80, 80.19, 41.92 and 34.54 for 5ml/L, 3ml/L, 1.5ml/L, 0.75ml/L and 0. 35ml/L. Concentrations respectively compared with individual untreated, 12.26 %.

**Table (4): Cumulative mortality percentage of *T. urticae* adult stage after application with different concentration of (Anti stress plus) under laboratory conditions.**

Concentrations Ml/L.	Mortality % at indicated days post-treatment		
	1	3	6
5 ml/L.	20.38	70.31	91.81
3 ml/L.	27.52	72.73	91.80
1.5 ml/L.	17.20	56.13	80.19
0.75 ml/L.	5.16	22.50	41.92
0.35 ml/L.	4.67	18.60	34.54
Control	2.44	7.52	12.26

Data in Table5 showed the lethal timesLT<sub>50</sub> for the adult stage of *T. urticae* was 1.95, 1.72, 2.57, 7.75 and 10.47 days when 5ml/L., 3ml/L., 1.5ml/L., 0.75ml/L. and 0.35ml/L., respectively were used. While, the LT<sub>90</sub>were 5.48, 5.57, 9.25, 38.80 and 62.99 days for the same concentrations mentioned before, respectively.

There were slight differences in slope values (b) between the five concentrations. The (b) values were  $2.85 \pm 0.63$ ,  $2.52 \pm 0.36$ ,  $2.31 \pm 0.23$ ,  $1.83 \pm 0.37$  and  $1.64 \pm 0.38$  respectively. Also, the intercept (a) in this treatment were  $4.17 \pm 0.31$ ,  $4.40 \pm 0.16$ ,  $4.05 \pm 0.14$ ,  $3.37 \pm 0.22$  and  $3.32 \pm 0.23$  for the same concentrations. The fucidal limit lower ranged between (0.91 to 7.08) but the fucidal limit upper ranged between (2.78 to 27.34) for the previous five concentrations.

**Table (5): Effect of different concentrations of (Anti stress plus) on adult stages of *T. urticae* under laboratory conditions.**

Concentrations ml/L.	LT <sub>50</sub>	Fucidal		LT <sub>90</sub>	Intercept (a)	Slope (b)
		Lower	Upper			
5 ml/L.	1.95	0.91	2.78	5.48	$4.17 \pm 0.32$	$2.85 \pm 0.63$
3 ml/L.	1.72	1.37	2.036	5.57	$4.4 \pm 0.16$	$2.52 \pm 0.36$
1.5 ml/L.	2.57	2.18	2.99	9.25	$4.05 \pm 0.14$	$2.31 \pm 0.23$
0.75 ml/L.	7.75	5.83	13.79	38.80	$3.37 \pm 0.22$	$1.83 \pm 0.37$
0.35 ml/L.	10.47	7.08	27.34	62.99	$3.32 \pm 0.23$	$1.64 \pm 0.38$

The affect adult stage, table 6 showed that the concentrations 5ml/L., 3ml/L., 1.5ml/L., 0.75ml/L. and 0.35ml/L. resulted LC<sub>50</sub> 11.62, 1.82 and 0.61. after first, three and six days, respectively. While, the LC<sub>90</sub> in the same concentrations showed 158.39, 18.84 and 2.07ml/L.

There were slight differences in slop values (b) between the five concentrations. The (b) values were  $1.14 \pm 0.26$ ,  $1.26 \pm 0.46$  and  $2.42 \pm 0.62$  while, the intercept (a)  $3.77 \pm 0.13$ ,  $4.67 \pm 0.19$  and  $5.5 \pm 0.21$ .

**Table (6): Toxicity line parameters of *T. urticae* after application of adult stage with different concentrations of (Anti stress plus) under laboratory conditions.**

Days post -treatment	LC <sub>50</sub> ppm	Fucidal limit		LC <sub>90</sub> ppm	Intercept (a)	Slope (b)
		Lower	Upper			
1 day	11.62	6.23	58.29	158.39	$3.77 \pm 0.13$	$1.14 \pm 0.26$
3 day	1.82	ND	ND	18.84	$4.67 \pm 0.19$	$1.26 \pm 0.46$
6 day	0.61	1.22	1.22	2.07	$5.5 \pm 0.21$	$2.42 \pm 0.62$

ND: Not detected

Generally, these results indicated that, the fatty acids Anti stress plus which extracted from jojoba oil with different concentrations, which was highly effective on immature and

adult stages especially the immature stage was highly susceptible after six days. Mortality percentage was 98.05% at tested concentration of 5 ml/L. While the adult stage after six days mortality percentage was 91.81% at the same concentration.

These results are in agreement with El-Halawany and El-Naggar (1984) who evaluated the effect of Albluim, Cidial, Kelthane and the mineral oil against adults and eggs of the mite, *T. urticae*. They found that Kelthane proved to be highly effective against *T. urticae*, followed by Albulium, while Cidial was the least effective and El-Safty (2003) evaluated the effect of mineral oils KZ oil 95% EC, Nathional oil 75% EC, Kemisol oil 95% EC, Shokrona Super oil 95% EC and Shokrona 95% EC against eggs and adult females of *E. orientalis*, *P. ulmi*, *T. urticae* and *E. scutalis*. All mineral oils gave a good result after 72 hr. against adult females and KZ oil was the most effective compound against eggs and adult females of *E. orientalis*, *P. ulmi* and *T. urticae* than the other mineral oils. Also, *E. orientalis* was high sensitive against these compounds than *P. ulmi* and *T. urticae*, respectively. Moreover, all mineral oils were slightly harmful to *E. scutalis*.

### 2-2-Field Experiment:

**Evaluation of Anti stress plus in controlling the two spotted spider mite *Tetranychus urticae* Koch on cotton plants: -**

The field experiment was carried out at Giza experimental station during the season 2012 to evaluate Anti stress plus (natural product) in controlling spider mite *T. urticae* on cotton plants. The data tabulated in Table 7 clearly indicated that the reduction ratio of *T. urticae* population after spraying was 93.4, 99.2, 93.4, 90.7 % after 3, 7, 14 and 21 days, respectively. The average mean of the percentage mortality was 94.2 % of the population. These results are in agreement with those obtained by Botha *et al.* (1994) and Omar *et al.* (2000).

**Table (7) Effect of Anti stress plus on *T. urticae* population on cotton plants at Giza during season 2012.**

Treatment	No. of pre-treatment spider mites	The number and reduction ratio % of <i>T. urticae</i> population after treatment								
		3 days		7 days		14 days		21 days		Mean
		N.P.T	R.r	N.P.T	R. r	N.P.T	R. r	N.P.T	R. r	
Anti stress plus	1952	65	93.4	4	99.2	7	93.4	15	90.7	94.2
Control	3445	1741	-	979	-	187	-	284	-	-

N.P.T = the number post treatment.

R. r = Reduction ratio

From the previous results, it is concluded that. Anti- stress plus as new natural product extracted from jojoba oil (potassium salt of fatty acids) is promising in controlling mites *T. urticae*. In addition, the product is fortified with potassium citrate 10%, sulfur, boron and surfactant 20%, which result in plant vigor growth. Therefore, beside its efficacy against spider mites it increases the production of cotton yield and help in boll opening. It is recommended the compound showed be used against different sucking insect is it is cheap, highly effective and environmentally safe.

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## تأثير مركب أنتي ستريس علي العنكبوت الأحمر العادي تحت ظروف المعمل و الحقل على نباتات القطن.

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تم استخدام المواد الطبيعية كمصدر حيوى لأنواع جديدة من مواد مكافحة الافات بهدف تقليل التأثيرات الجانبية الخطيرة للمبيدات التقليدية على البيئة لذلك فأنه من المرغوب فيه بدرجة عالية استخدام مواد جديدة صديقة للبيئة تملك نشاط حيوى واسع ضد الافات الضارة للنباتات ونستطيع بها التغلب على ظاهرة استخدام المبيدات الكيماوية فى مكافحة وذلك للمساهمة فى تنفيذ برامج مكافحة المتكاملة للآفات وحماية البيئة من التلوث.

يهدف هذا البحث الى دراسة تأثير مركب Anti stress plus على الافراد الغير الكاملة و الكاملة للعنكبوت الأحمر العادى *T. urticae* وقد تم استخدام تركيزات ٥ و ٣ و ١,٥ و ٠,٧٥ و ٠,٣٥ و ٠,١ مللى / لتر. رشت التركيزات السابقة على مكررات مختلفة من افراد العنكبوت الاحمر العادى على درجة حرارة ٢٦ درجة مئوية و رطوبة نسبية ٩٠ % وقد أظهرت النتائج ان تأثير Anti stress plus كان عاليا على كلا من الافراد الكاملة و غير كاملة للعنكبوت الاحمر، وكان التأثير الاعلى للمركب على الافراد الغير كاملة بعد ستة ايام بنسبة ٩٨.٠٥% عند تركيز ٥ مللى / لتر بينما الافراد الكاملة كانت نسبة الموت ٩١.٨١% عند نفس التركيز وبعد ستة ايام.

وقد أجريت التجارب الحقلية فى محطة التجارب بالجيزة على نبات القطن خلال موسم ٢٠١٢ وقد استخدم التركيز الموصى به وهو ٥ مللى / لتر وقد أظهرت النتائج ان الاعداد قبل الرش كانت ١٩٥٢ بينما بعد الرش كانت الاعداد ٩٠,٧ و ٩٣,٤ و ٩٩,٢ و ٩٣,٤ وذلك بعد ٣ و ٧ و ١٤ و ٢١ على التوالى.

ولذلك نوصى باستخدام هذا المركب فى برامج مكافحة المتكاملة للآفات الاكاروسية لما له من دور فعال فى القضاء على الآفات الاكاروسية .



