

**EFFICACY OF SOME FOLIAR FERTILIZERS AND  
CERTAIN ACARICIDES AGAINST THE TWO  
SPOTTED SPIDER MITES *Tetranychus*  
*Cucurbitacearum* (Sayed) INFESTING  
SOYBEAN PLANTS**

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**ABSTRACT:** A field experiment was conducted at Sakha Agric. Res. Station in 2003 season. Soybean plant (*Glycin max* Merr.) were fertilized with three foliar fertilizers, Agrotop 19-19-19, Pro. sol. 20% iron CAC and Haileaf (16-4-31) applied in two equal doses, at 21 and 36 days after sowing. The three acaricides, Vertimec (1.8% EC), Vapcomic (1.8% EC) and Challenger (36% SC) were applied at the recommended rates of 40 cc/100 Lof water after 42 days of sowing against the two spotted spider mite *Tetranychus cucurbitacearum* (Sayed).

Population density of the spider mite *T. cucurbitacearum* was evaluated. Results indicated that the highest numbers of moving stages was obtained with Agrotop and the lowest numbers was obtained with Haileaf. On the other hand, the treatments of acaricides; Vertimec, Vapcomic and Challenger gave reduction in the population density of the mite pest averaged 90.18, 86.76 and 92.81% respectively. Also, results indicated that the population density of *T. cucurbitacearum* was affected by foliar fertilizers and acaricides. The highest number was recorded at Pro. sol. followed by Agrotop while Haileaf the least. Statistically, significant interaction was recorded between foliar fertilizers acaricides application on population density of spider mite under field condition.

**Key words:** Foliar fertilizers- acaricides – spotted spider mite – *T. cucurbitacearum*

## INTRODUCTION

The spider mite *Tetranychus* spp. is a plant feeder attacking economic plant specially soybean plant. It usually feeds on the leaves sap and causes high damage and complete deterioration to the quality and quantity of different crops (Youssef and Shehata, 1971 and El-Halawany *et al.*, 1989), extensive use of acaricides on the different crops caused resistance strain of the two spotted spider mite in addition to environmental pollution. So, we turned to use safe compounds for pest control. Bio-pesticides and bioacaricides can be used successfully against the mite pest with slightly effect on the predatory mite (Green and Dybas, 1984, El-Monairy *et al.*, 1994, El-Ghobashy and El-Sayed, 2002 and Abd El-Rahman *et al.*, 2005). Nitrogen and trace elements are necessary for growth soybean plants. Increase of plant nitrogen content to certain level was able to induce the severity of infestation with major soybean pests such as the red spider mite *T. cucurbitacearum* (English Loeb, 1990, Yanni *et al.*, 1991, Gamieh and Saadoon, 1995 and Gamieh and Saadoon, 1998a, b).

The present work aims to study the effect of certain foliar fertilizers with trace elements and some

acaricides and interaction between acaricide and foliar fertilizers on population densities of the spider mite *T. cucurbitacearum* under field conditions.

## MATERIALS AND METHODS

### Acaricides Used

**Challenger 36% SC: common name: chlorfenapyr**

It consists of several pyrrolomycins (1,2). Dioxapyrrolomycin isolated from a fermentation culture of *Streptomyces fummanus* by Lederle Laboratories of American Cyanamid Company. It applied at 40 cc/100L water. It was supplied by BASF AGRO. S.A.S., France. Chemical name. 4-Bromo-2-(4-chlorophenyl) - 1 -(ethoxymethyl) -5-(trifluoromethyl)-1G-pyrrole-3-C carbonit rile.

**Vertimec:**The common name is Abamectin (1.8 EC) acaricide

**Vapcomic:**The common name is Abamectin (1.8 EC) acaricide and insecticide.

Chemical name Abamectin: 5-0-demethyl avermectin A<sub>1a</sub>(i) mixture with 5-0-demethyl-25-de (1-methyl propyl-25 -(1-methyl ethyl) avermectin A<sub>1a</sub> (ii).

It was isolated from fermentation of *Streptomyces avermitilis* by Merck sharp & Dohme A gvet. It was supplied by Merck & company Inc, Rohway New Jersey. U.S.A.

### Fertilizers Used

**Agrotop 19-19-19** contained: 57% of components as macro elements and 43% as microelements. The macro elements were divided as 19% N, 19% P, 19% K. The micro elements were 030.0% iron, 020.0% manganese, 020.0% zinc, 020.0% boron, 010.0% copper and 100.0% molybdenum. It was applied at the recommended rate 300 gram/100 litre water.

**Haileaf purple 16-4-31** contained 51% of components as macroelements, and 49% as microelements. The macroelements were divided as 16%  $\text{NH}_2$ , 4%  $\text{P}_2\text{O}_5$  and 31%  $\text{K}_2\text{O}$ . The microelements were divided as 1000 ppm iron, 500 ppm manganese, 250 ppm zinc, 38 ppm copper and 27 ppm molybdenum. It was applied at recommended rate of 500 g/L.

**Pro. sol.** 20% Iron CAC. It was applied at the recommended rate of 100 gram/100 litre water.

A field experiment was conducted at Sakha Agricultural

Research Station, Kafr El-Sheikh, Egypt. Soybean variety Crawford was sown in May, 2003 in clay-loamy alluvial soil in a split plot design with three replications.

The experimental area was divided into main plots. Three plots, each was treated twice with one of the three foliar fertilizers at recommended rate applied in two equal doses, 21 and 36 days after sowing one plot was served as control.

Soybean plants in each subplot were treated with one of the tested acaricides 42 days after sowing at the recommended rates of 40 cc/100 liter of water three replicates for each treatment were used. All moving stages of the spider mite *T. cucurbitacearum* were recorded on the lower surface of 10 leaflets/plots, just before spraying then after 3, 7, 14, 21 and 28 days post treatment. The data were calculated as a split plot design experiment with four main treatments, three subplot treatments and three replicates. Mean differences were compared to their corresponding test significant difference at 95% confidence level (Snedecor and Cochran, 1967). Percentage of reduction in population was assessed to equation of Handerson and Tilton (1955).

$$\left[ 1 - \left( \frac{\text{Population in the control before spraying}}{\text{Population in the control after spraying}} \times \frac{\text{Population in the treatment after spraying}}{\text{Population in the treatment before spraying}} \right) \right] \times 100$$

## RESULTS AND DISCUSSION

### Effect of the Tested Fertilizers on Phytophagous *T. cucurbitacearum* in Soybean Field:

Results obtained in Table 1 indicated that the highest number of adult *T. cucurbitacearum* was obtained with Agrtop (162 individual/10 leaflets) followed by Pro. sol. (152.2 ind./10 leaflets) while the lowest numbers was obtained with Haileaf (135.6 ind./10 leaflets) respectively compared with the control value (175.2 ind./10 leaflets). It is clearly evident that Haileaf fertilizer had the negative effective on *T.*

*cucurbitacearum*. These results were in agreement with Rodriguez (1951), Hennaberry (1963), they recorded a negative influence of nitrogen fertilizers on spider mite population on cucumbers and tomatoes and mite fecundity. Abo-Korah *et al.* (1985) reported that the phytophagous mite species increased with increases instimufol foliage fertilizer, while the contrary occurred with *Stenotarsonemus* sp. Also, Zaher *et al.*, (1980) and Gamieh and El-Basuony, (2001) stated that population density of *T. cucurbitacearum* was positively correlated with phosphorus contents in soybean leaves, while the reverse was found with potassium contents.

Table 1. Effect of some foliar fertilizers on population density of *T. cucurbitacearum* on soybean

Treatment	Rate of application/ 100 liter of water	No. of mite after treatment/10 leaflets after indicated days						
		Pre-sp ray	3 days	7 days	14 days	21 days	28 days	Mean
Agrotop 19-19-19	300 g	180	198	208	122	151	131	162
Pro. sol. 20% iron CAC	100 g	206	243	156	131	111	120	152.2
Haileaf purple 16-4-31	500 g	202	167	179	123	106	103	135.6
Control	-	220	266	214	160	113	123	175.2
L.S.D. at 5%								3.28

Table 2. Effect of some acaricides on motile stage of *T. cucurbitacearum* under field conditions.

Treatments	Rate of Application /100 liter water	Pre-spray No.	Percentage reduction of infestation post-treatment (day)										Mean of reduction %	
			3		7		14		21		28			Mean
			No.	Red. %	No.	Red. %	No.	Red. %	No.	Red. %	No.	Red. %		
Vertimec 1.6 EC	40 cc	204	19	92.85	23	88.41	10	93.20	13	87.58	21	81.6	17.2	90.18
Vapcomic 1.8 EC	40 cc	216	50	81.20	17	91.91	13	91.74	19	82.84	17	85.92	23.2	86.76
Challenger36% SC	40 cc	208	12	95.62	14	93.61	15	90.83	8	93.06	14	88.87	12.6	92.81
Control	-	220	266	-	214	-	160	-	113	-	123	-	175.2	-

\* No = Number of motile stage/10 leaflets

### **Effect of Some Acaricides Against *T. cucurbitacearum* (Sayed) Under Soybean Field**

Data in Table 2, illustrated that the recommended dose of Vertimec, Vapcomic and Challenger 40 cc/100 liter water resulted in 90.18%, 86.76% and 92.81% percentage reduction of two spotted spider mite, respectively. These results were in agreement with El-Monairy *et al.*, (1994) who found that Vertimec under field condition gave 92.8% reduction in population density of *T. urticae* at 40 cc/100 L of water, also Gamieh and Saadoon, (1998a, b) and Gamieh *et al.* (2000) recorded that Vertimec was satisfactory in controlling the mite *T. cucurbitacearum* on soybean plants gave 89.76% reduction in population density. El-Ghobashy and El-Sayed (2002) reported that the bioacaricide Challenger (36% SC) gave reduction in population density of mite averaged 92.6%.

### **Interaction Between Some Foliar Fertilizers and Certain Acaricides**

The statistical analysis of the interaction between foliar fertilizers and application of acaricides (Table 3) indicated that there were significant differences in *T. cucurbitacearum* population in its response to the foliar

fertilizers under study. The highest numbers recorded of spider mite 61.2/10 leaflets was got from Pro. sol., against 57.0, 45.8 ind./10 leaflets of Agrotop and Haileaf, respectively.

Generally, from the mentioned results, it is clearly evident that foliar fertilizers influence on plant physiology and nutrition which affect on mite development. Increase in osmotic pressure in plant sap by two or three times above normal as a result of high fertilizer rates and excess soluble elements such as magnesium, silicon and calcium in plants, tends to favour development of mite population, while phosphorus and zinc inhibit this effect (Habashy, 2000). Also, she stated that chelated zinc and super phosphate foliar fertilizers were considered the best as treated plants had least numbers of all stages of mite.

Also, Yuzbashyan and Khamraev, (1989), stated that application of 1.5 potassium chloride & 2.5 super phosphate solution reduced number of aphids over 60%. The treatment increased the levels of polysaccharides and starch containing hemicellulose and also crude protein and all form of nitrogen, in the plant thus both discouraging infestation and favouring growth.

**Table 3. Population density of spider mite *Tetranychus cucurbitacearum* (Sayed) on soybean leaves as affected by foliar fertilizers and certain application of acaricides.**

Treatments	Average no. of moving stages of spider mite/10 leaflets after indicated days						Mean
	Pre-spraying	3 days	7 days	14 days	21 days	28 days	
<b>Foliar fertilizers</b>							
Agrotop 19-19-19	201	72	60	40	47	66	57.0
Pro. sol. 20% iron CAC	199	109	56	53	42	46	61.2
Haileaf purple	205	56	48	53	34	38	45.8
Without fertilizer	212	87	67	50	39	44	57.4
L.S.D. at 5%	-	7.52	6.50	2.84	3.69	3.68	1.46
<b>Acaricides</b>							
Control	202	219	189	134	120	119	156.2
Vertimec	205	43	18	20	13	27	24.2
Vapcomic	207	54	18	17	14	33	27.2
Challenger	203	9	6	24	14	14	13.4
L.S.D. at 5%	-	5.63	3.91	4.73	4.73	2.95	2.65
<b>Interaction between</b>							
Agro top & control	180	198	208	122	151	131	162
Agro top & Vertimec	208	22	6	9	6	50	18.6
Agro top & Vapcomic	214	60	20	11	9	63	32.6
Agro top & Challenger	200	6	6	16	20	21	13.8
Pro. sol. & control	206	243	156	131	111	120	152.2
Pro. sol. & Vertimec	198	108	36	19	16	18	39.4
Pro. sol. & Vapcomic	203	71	27	25	32	34	37.8
Pro. sol. & Challenger	192	14	3	38	10	11	15.2
Haileaf & control	202	167	179	123	106	103	135.6
Haileaf & Vertimec	210	22	5	42	15	17	20.2
Haileaf & Vapcomic	196	33	7	19	8	24	18.2
Haileaf & Challenger	212	5	2	26	8	8	9.8
L.S.D. at 5%	-	5.63	3.91	4.73	4.73	2.95	2.65

Clear tendency towards the reduction of moving stages of the spider mite was obtained from acaricides application Challenger, Vertimec, and Vapcomec as well as without application (13.4, 24.2, 27.2 and 156.2 ind./10 leaflets), respectively.

The statistical analysis of interaction between foliar fertilizers and application of acaricides indicated that the highest number of spider mite infestation (162.0, 152.2 and 135.6 ind./10 leaflets), respectively, was recorded from untreated plant with acaricides and fertilized by Agrotop, Pro. sol. and Haileaf against 13.8, 15.2, 9.8 ind./10 leaflets treated with Challenger and fertilized by Agrotop, Pro. sol., and Haileaf. It can be stated that the acaricidal application of challenger, decreased the population density of spider mite *T. cucurbitacearum* then Vertimec came second while Vapcomec the lest these results agree with El-Ghobashy and El-Sayed (2002) and Abd El-Rahman *et al.* (2005). Who found that bio-acaricides compounds were more toxic against several phytophagous mites than another chemical compound.

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## تأثير بعض الاسمدة الورقية والمبيدات الاكاروسية على العنكبوت الاحمر ذو البقعتين في حقول فول الصويا

سهير السيد سعدون

معهد بحوث وقاية النباتات محطة البحوث الزراعية - سخا، كفر الشيخ

اجريت هذه التجربة على نباتات فول الصويا صنف كراوفورد بمحطة البحوث الزراعية بسخا محافظة كفر الشيخ وذلك لدراسة تأثير بعض الاسمدة الورقية (أجرونوب بروسول الحديد والهاليف) وكذلك بعض المبيدات الاكاروسية مثل الفيرتميك (1.8% EC) فابكوميك (1.8% EC) والشالنجر (36% SC) على الكثافة العددية للعنكبوت الاحمر.

*T. cucurbitacearum* (Sayed) وقد اوضحت النتائج ان الكثافة العددية للعنكبوت الاحمر على اوراق فول الصويا خلال فترة التجربة قد انخفضت وكان اكثرها تأثير هاليف يليه بروسول الحديد ثم الاجرونوب كما قلت الكثافة العددية باستخدام المبيدات الاكاروسية وكان اكثرها تأثير الشالنجر حيث اعطى نسبة انخفاض قدرها 92.81% يليه الفيرتميك 90.18% ثم الفابكوميك 86.76%.

كما اوضحت النتائج ايضا تفاعلات معنوية بين المبيدات المستخدمة واعداد العنكبوت الاحمر. ويعتبر الشالنجر اكثر هذه المبيدات تأثيرا على افراد العنكبوت الاحمر عند معاملة النباتات بالاسمدة المختبرة.