

## **PRELIMINARY STUDIES ON SPIDER POPULATIONS ASSOCIATED WITH CERTAIN CUCUMBER VARIETIES IN MENOFIYA GOVERNORATE, Egypt**

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### **ABSTRACT**

Field experiment was carried out at Sadat city, Menoufiya Governorate, Egypt, during 2005 autumn season to study the population density of spider mite, *Tetranychus cucurbitacearum* (Sayed) and associated predatory mites on five cucumber varieties (Madena Perins, Hoyland hybrid, Marmar-RS and Beita alpha hybrid) under field conditions. The results revealed that, the Beita-alpha hybrid significantly received the highest number of *T. cucurbitacearum*, while Perins variety harbored the least one. The rest varieties (Madena, Hoyland hybrid and Marmar-RS) harbored a moderate number. The predatory mites and true spiders indicated the same trend for all varieties. On the other hand, highly positive significant correlation was found between the true spiders and both eggs and moving stages of *T. cucurbitacearum* on Hoyland hybrid, Marmar-RS and Beita-alpha hybrid. The combined effect of predatory mites and true spiders on the eggs of *T. cucurbitacearum* was 92.19%; 80.57%; 78.66%; 75.51% and 66.33% for Beita-alpha hybrid, Madena, Marmar-RS, Hoyland hybrid and Perins, respectively, while it was 94.49%; 83.25%; 78.94%; 77.91% and 62.81% on the moving stages, respectively.

### **INTRODUCTION**

Cucumber, *Cucumis sativus* L. is one of the most important vegetables crops as its fruits have high nutritional value; proteins, carbohydrates, fats, vitamins, calcium, phosphorus contain and many essential amino acids (Tomezyk and Kiekiewicz, 2001). The spider mites, *Tetranychus* spp. represent one of the main pests causing destruction and severe damage to the vegetative growth and consequently reduce the yield (Megali Magda *et al.*, 1995 and Gamieh & El-Basuony, 2001). The role of the predaceous mites in suppressing the population of cucumber pests has been reported by many investigators (Rasmy *et al.*, 1990; Szwejd, 1993; Watanabe *et al.*, 1994; Kilany, 1997, Farrage *et al.* 1998, El-Heneidy *et al.*, 2004 and Kiekiewicz *et al.*, 2006) In general, the chemical control of the pests creates several problems i.e. environmental pollution, destruction of beneficial insects and pest resistance to many pesticides (John *et al.*, 1986). Therefore, it is a necessary to select tolerant or resistant varieties as one of the simplest and useful tactics in the integrated pest management programs (Dent, 1991). Also, the varieties of cucumber exhibit variable reactions to sucking pests infestation depending on chemical components of plant leaves (Hildebrand *et al.*, 1986).

The present work was conducted to evaluate the population density of spider mites, *Tetranychus cucurbitacearum* (Sayed) as well as the associated predatory mites on five cucumber varieties.

## MATERIALS AND METHODS

The experiment was conducted at Sadat city, Menoufiya Governorate, Egypt, during 2005 autumn season. An area was divided into 20 plots, each of 42 m<sup>2</sup>. Five cucumber varieties (Madena, Perins, Hoyland, Marmar-Rs and Beita-alpha hybrid) were distributed in a completely randomized blocks design and every variety was replicated four times. Cucumber varieties were sown in 2nd August, 2004 and the regular agricultural practices were applied without pesticidal treatments during the growing season. To count phytophagous mite, *T. cucurbitacearum* (moving stages and eggs) and moving stages of total predatory mites, which involved, ten leaves of cucumber were weekly collected from each plot randomly from 20th September and continued till 7th December during 2005 season. The samples were picked up from the three levels of plant in the early morning and transferred to laboratory in paper bags to examined. The number of the phytophagous mite, *T. cucurbitacearum* and associated predatory mites was counted at the lower surface of the leaves by the aid of binocular microscope. As for the True spiders, pitfall traps (10 cm diameter and 15 cm depth) were used. One trap/week was regularly applied for each plot and were directly counted in the field from 20th September to 7th December. Populations of each mite species were counted and statistically analyzed according to Duncan's multiple range test (1955). The partial correlation and regression coefficients for the relationship between the pest population and each of predatory mites and true spiders were calculated (Fisher, 1950).

## RESULTS AND DISCUSSION

### 1. Population density of *T. cucurbitacearum*, predatory mites and true spiders on five cucumber varieties:

Data in Table (1) show the population density of eggs and moving stages of *T. cucurbitacearum* and predatory mites/10 leaves and true spiders/trap tin on Madena cucumber variety during 2005 season. Eggs and moving stages of *T. cucurbitacearum* started to appear with low numbers in seedlings stage with means of 1.13 and 0.38 individuals/10 leaves, respectively. After that, the population increased to record the highest number at the end of vegetative stage and beginning of flowering and fruiting stage. The population, then, decreased at the end of the season. It was observed that the predatory mites were *Tydeus* spp., *Amblyseius* spp., *Agistemus exsertus* and *Cunaxa* spp. and they were taken in consideration as a total. As for the predatory mites and true spiders, the population started to appear at the beginning of vegetative stage and the end of seedling stages. The population increased to reach the highest number at the end of vegetative stage and the beginning of flowering and fruiting stages. Then, the population declined till the end of the season. From the mentioned results, it can be concluded that the highest population of the predatory mites and true spiders were coincided with the high population of spider mites.

As for, the rest varieties; Perins, Hoyland, Marmar-Rs and Beita-alpha hybrid, the same trend of results was obtained as for the Madena variety (Tables 2, 3, 4 and 5).

**Table (1): Mean number of spider mite, *T. cucurbitacearum* eggs /10 leaves on the five cucumber varieties during 2005 season.**

Development stage	Sampling date	Mean number of spider mite eggs /10 leaves				
		Madena	Perins	Hoyland hybrid	Marmar - Rs	Beita - alpha hybrid
Seedling stage	20/9	0.25	0.25	0.00	0.00	0.00
	28/9	2.00	1.00	0.50	0.75	0.00
	Mean	1.13	0.63	0.25	0.37	0.00
Vegetative stage	9/10	2.25	7.25	9.50	8.00	9.50
	17/10	5.75	6.75	9.00	8.00	12.25
	24/10	15.00	4.00	8.75	10.50	25.75
	Mean	7.66	6.00	9.08	8.83	15.83
Flowering and fruiting stage	30/10	14.75	6.00	13.75	12.25	22.50
	7/11	14.75	12.25	19.00	18.00	22.75
	21/11	5.75	6.75	8.75	7.25	8.50
	28/11	1.00	0.25	2.25	3.25	1.50
	7/12	1.00	0.00	0.00	0.00	0.00
	Mean	7.45	5.05	8.75	8.15	11.05
General mean		6.25	4.45	7.15	6.80	10.28

**Table (2): Mean number of spider mite, *T. cucurbitacearum* , moving stages /10 leaves on the five cucumber varieties during 2005 season.**

Development stage	Sampling date	Mean number of spider mite moving stages /10 leaves				
		Madena	Perins	Hoyland hybrid	Marmar - Rs	Beita - alpha hybrid
Seedling stage	20/9	0.00	0.00	0.00	0.25	0.00
	28/9	0.75	0.25	0.25	0.75	0.00
	Mean	0.38	0.13	0.13	0.50	0.00
Vegetative stage	9/10	4.00	6.00	6.25	6.75	6.50
	17/10	3.75	4.00	6.00	6.50	9.00
	24/10	10.25	2.50	6.00	8.75	20.25
	Mean	6.00	4.17	6.08	7.33	11.92
Flowering and fruiting stage	30/10	7.25	4.00	11.25	11.00	16.50
	7/11	7.00	6.00	15.75	17.25	18.25
	21/11	5.75	3.50	5.25	6.25	5.00
	28/11	1.25	0.50	1.00	0.25	0.50
	7/12	0.25	0.00	0.75	0.25	0.25
	Mean	4.30	2.8	6.80	7.00	8.10
General mean		4.03	2.68	5.25	5.80	7.63

**2- Population density of spider mite ,*T.cucurbitacearum*, moving stage on the different cucumber varieties :**

Data in table (2) show the population density of moving stages of *T.cucurbitacearum* /10 leaves on Madena cucumber variety during 2005 season .moving stages of *T.cucurbitacearum* started to appear with low

numbers in seedling stage with means of 0,38 individuals /10 leaves ,respectively .After that ,the population increased to record the highest number at the end of vegetative stage and beginning of flowering and fruiting stage. The population, then ,decreased at the end of the season .

As for, the rest varieties :Perins ,hoyland hybrid ,Marmar-rs and Beita –alpha hybrid ,the same trend of results was obtained as for the Madena variety.

**3-Population density of predatory mite on the different cucumber varieties:**

Data in table (3) show the population density of predatory mite /10 leaves on Madena cucumber variety during 2005 season . predatory mite started to appear with high numbers in vegetative stage with means of 8,92 individuals /10 leaves , respectively . after that , the population increased to record the highest number at the end of vegetative stage and beginning of flowering and fruiting stage .the population , then , decreased at the end of the season .it was observed that the predatory mites were Tydeus spp.,Amblyseius spp., Agistemus exsertus and Cunaxa spp. And they were taken in consideration as a total . As for the predatory mites ,the population started to appear at the beginning of vegetative stage and the end of seedling stages .the population increased to reach the highest number at the end of vegetative stage and the beginning of flowering and fruiting stages . then ,the population declined till the end of the season . from the mentioned results ,it can be concluded that the highest population of the predatory mites were coincided with the high population of spider mites .

**Table (3): Mean number of predatory mites /10 leaves on the five cucumber varieties during 2005 season.**

Development stage	Sampling date	Mean number of predatory mite /10 leaves				
		Madena	Perins	Hoyland hybrid	Marmar - Rs	Beita – alpha hybrid
Seedling stage	20/9	0.00	0.00	0.00	0.00	0.00
	28/9	0.00	0.00	0.00	0.00	0.00
	Mean	0.00	0.00	0.00	0.00	0.00
Vegetative stage	9/10	2.25	0.75	1.75	3.00	4.75
	17/10	12.25	9.25	10.75	13.50	17.75
	24/10	12.25	11.75	29.75	44.75	66.50
	Mean	8.92	7.25	14.07	20.40	29.67
Flowering and fruiting stage	30/10	14.00	16.75	29.75	23.00	18.00
	7/11	9.75	10.50	11.00	11.25	11.75
	21/11	11.00	13.50	9.50	15.75	12.50
	28/11	1.50	1.25	2.00	2.25	3.00
	7/12	0.75	0.25	1.00	0.50	1.50
Mean	7.40	8.45	10.65	10.55	9.35	
General mean		6.38	6.40	9.55	11.40	13.58

As for, the rest varieties :Perins ,hoyland hybrid ,Marmar-rs and Beita –alpha hybrid ,the same trend of results was obtained as for the Madena variety

**4- Population density of true spider on the different cucumber varieties:**

Data in table (4) show the population density of true spider / trap on Madena cucumber variety during 2005 season .true spider started to appear with low numbers in seedling stage with means of 0,25 individuals / trap .after that ,the population increased to record the highest number at the end of vegetative and beginning of flowering and fruiting stage . the population , then decreased at the end of the season

As for, the rest varieties :Perins ,hoyland hybrid ,Marmar-rs and Beita –alpha hybrid ,the same trend of results was obtained as for the Madena variety

**Table (4):Mean number of true spider / trap on the five cucumber varieties during 2005 season.**

Development stage	Sampling date	Mean number of true spider / trap				
		Madena	Perins	Hoyland hybrid	Marmar - Rs	Beita – alpha hybrid
Seedling stage	20/9	0.00	0.00	0.00	0.00	0.00
	28/9	0.50	0.75	1.00	0.25	0.75
	Mean	0.25	0.38	0.50	0.12	0.37
Vegetative stage	9/10	1.50	2.50	2.25	1.25	1.50
	17/10	3.50	3.25	6.25	6.00	7.25
	24/10	5.25	5.00	9.25	7.25	14.75
	Mean	3.42	3.58	5.92	4.83	7.83
Flowering and fruiting stage	30/10	4.50	4.50	9.00	6.50	8.75
	7/11	5.25	5.00	8.00	6.50	10.75
	21/11	4.00	4.00	3.00	3.75	3.50
	28/11	2.50	1.50	0.75	0.25	0.50
	7/12	1.00	1.00	1.50	0.50	0.75
	Mean	3.45	3.20	4.45	3.50	4.85
	General mean		2.80	2.75	4.10	3.23

Based on the general mean of the population, the results in Table (5) indicated that, the Beita-alpha hybrid variety significantly harbored the highest number of both eggs and moving stages of *T. cucurbitacearum*, while Perins variety received the least one. The rest varieties; Madena, Hoyland hybrid and Marmar-RS harbored a moderate number. Also, the same trend of results was observed for the predatory mites and true spider on all varieties except Beita-alpha hybrid variety that received the highest number of predatory mite and true spiders ( Ghabbour *et al.*, 1999 and kiekiewicz *et al.*, 2006 )

**5-Effect of predatory mites and true spiders on the population density of *T. cucurbitacearum*:**

The results in Table (6) revealed insignificant correlation between the number of *T. cucurbitacearum* eggs and the number of predatory mites on all the tested varieties. Also, the same result was obtained between *T. cucurbitacearum* eggs and the true spiders population: only on Madena variety.

Table (5): General mean of eggs and moving stages of *Tetranychus cucurbitacearum* (Sayed), predatory mites and true spiders on five cucumber varieties during 2005 season.

Variety	<i>T. cucurbitacearum</i>		Predatory mites	True spiders
	Eggs	Moving stages		
Madena	6.25 b	4.03 bc	6.38 c	2.80 b
Perins	4.45 b	2.68 c	6.40 c	2.75 b
Hoyland hybrid	7.15 b	5.25 abc	9.55 b	4.10 ab
Marmar-Rs	6.80 b	5.80 ab	11.40 b	3.23 ab
Beita-alpha hybrid	10.28 a	7.63 a	13.58 a	4.85M a

Means in the same column followed by a common letter are not significantly different at the 5% level by DMRT.

Table (6): Correlation (r), partial regression (b) coefficients and explained variance (EV.) for egg stage of *Tetranychus cucurbitacearum* (Sayed) on five cucumber varieties under mean number of predatory mites and true spiders during 2005 season.

Variety	Factor	(r)	(b)	(EV) %
Madena	Predatory mites	0.1534	0.1687	80.57
	True spiders	0.5866	2.3610	
Perins	Predatory mites	-0.3062	-0.2588	66.33
	True spiders	0.6682*	2.5474	
Hoyland hybrid	Predatory mites	-0.5414	-0.4184	75.51
	True spiders	0.7864**	2.6190	
Marmar-Rs	Predatory mites	-0.4540	-0.1751	78.66
	True spiders	0.8250**	2.3086	
Beita-alpha hybrid	Predatory mites	-0.4025	-0.1202	92.19
	True spiders	0.9083**	2.2693	

\* Significant at 5% level

\*\* Significant at 1%

On the other hand, highly positive significant correlation was observed between population of true spiders and the eggs of *T. cucurbitacearum* on Hoyland, Marmar-Rs and Beita-alpha varieties. The combined effect (expressed as percentage of explained variance) of both predatory mites and true spiders on *T. cucurbitacearum* population was 80.57%, 66.33%, 75.51%, 78.66% and 92.19% on Madena, Perins, Hoyland, Marmar-Rs and Beita-alpha hybrid, respectively. Also, the same trend of results was obtained in case correlation between the moving stages of *T. cucurbitacearum* and both of predatory mites and true spiders (Table 7). The combined effect was 83.75%, 62.81%, 77.91%, 78.94% and 94.49%, on Madena, Perins, Hoyland, Marmar-Rs and Beita-alpha hybrid, respectively (Ghabbour et al., 1999 and kiekiewicz et al., 2006)

Finally, it can be concluded that Beita-alpha variety was more susceptible to infestation with the spider mite, *T. cucurbitacearum* although it harbored the highest number of the predatory mites and the true spiders while, Madena and Perins received the lowest number of the considered pests. Also, highly positive significant correlation was found between the true spiders and both eggs and moving stage of *T. cucurbitacearum*. The collective effect of predatory mites and true spiders on *T. cucurbitacearum*

(eggs and moving stages) was more pronounced on Beita-alpha variety than the other tested varieties. However, the obtained results should be taken very cautiously since they are based on one seasonal of experimentation.

**Table (7): Correlation (r), partial regression (b) coefficients and explained variance (EV.) for moving stages of *Tetranychus cucurbitacearum* (Sayed) on five cucumber varieties under mean number of predatory mites and true spiders during 2005 season.**

Variety	Factor	(r)	(b)	(EV) %
Madena	Predatory mites	0.1887	0.1102	83.25
	True spiders	0.6098	1.3130	
Perins	Predatory mites	-0.4013	-0.2164	62.81
	True spiders	0.6841*	1.6393	
Hoyland hybrid	Predatory mites	-0.5974	-0.3709	77.91
	True spiders	0.8147**	2.2094	
Marmar-Rs	Predatory mites	-0.5291	-0.2031	78.94
	True spiders	0.8396**	2.3171	
Beita-alpha hybrid	Predatory mites	-0.4841	-0.0996	94.49
	True spiders	0.9352**	1.8153	

\* Significant at 5% level

\*\* Significant at 1%

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## دراسات اولية على عشائر العنكب المرتبطة ببعض اصناف الخيار بمحافظة المنوفية .

محسن عطية محمد أبو طايش ، رفعت ابراهيم السيد معجوز و وفاء عبد المجيد شهاوى  
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اجريت هذه التجربة فى مدينة السادات بمحافظة المنوفية بمصر خلال موسم 2005 وذلك لدراسة الكثافة العددية للعنكبوت الاحمر العادى T. cucurbitacearum والعنكب المفترسة المصاحبة له على خمسة اصناف من الخيار هى (مدينة – بيرنس – هولندا هجين ، مرمر أر أس) تحت الظروف الحقلية وقد اوضحت النتائج ان الصنف بيتا – الفا هجين قد اعطى اعلى تعداد للعنكبوت الاحمر العادى وبدرجة معنوية وكان الصنف بيرنس اقلهم تعدادا بينما كان التعداد بدرجة متوسطة على الاصناف الاخرى (مدينة – هولندا هجين – مرمر أر أس) كما اوضحت النتائج ان كل من العنكب المفترسة والحقيقية اظهرت نفس الاتجاه على كل الاصناف المختبرة.

من جهة اخرى وجد من النتائج ان هناك ارتباط موجب على المعنوية بين العنكب الحقيقية وكل من البيض والاطوار المتحركة للعنكبوت الاحمر العادى على الاصناف هولندا هجين ، مرمر أر – أس ، بيتا – الفا هجين وكان التأثير المشترك لكل من العنكب المفترسة والحقيقية على بيض العنكبوت الاحمر 92.19% ، 80.57% ، 78.66% ، 75.51% ، 66.33% لكل من الاصناف بيتا الفا هجين ، مدينة ، مرمر أر – أس ، هولندا هجين ، بيرنس على الترتيب ، بينما كان التأثير على الاطوار المتحركة هى 94.49% ، 83.25% ، 78.94% ، 77.91% ، 62.81% على الترتيب.