

UTILIZATION INTERCROPPING IN THE REDUCTION OF THE TWO SPOTTED SPIDER MITE *Tetranychus urticae* KOCH, INFESTING KIDNEY BEAN.

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ABSTRACT

In Menoufiya Governorate, a field experiment was conducted as a completely randomized design, in spring period during the two successive season 2010 and 2011 using Kidney bean plantation. four different treatment were conducted as :Kidney bean plants alone in addition to the same plant intercropped on Mint, Fennel and Black cumin. The main crop, Kidney bean, plants were sown on 4 different spaces i.e.10, 20, 30 and 40cm. Kidney bean plants were investigated for abundance of the different stages of the two spotted spider mite *Tetranychus urticae* Koch :eggs, immatures and adults, as wells their predators *Phytosiulus persimilis* Athias-Henriot *Euseius scutaulis* Athias-Henriot (Family: Phytoseiidae). Inspection and investigation was conducted every two weeks: 15,30,45,60,75 and 90 days from sowing. Results showed that the mean values of *T. urticae* during the growth period clearly increased in the space of 10cm between plants while the reverse trend occurred with the space 40cm. Results showed also, there was a significant difference between the mean numbers of eggs, immatures and adults of *Tetranychus urticae* Koch infesting Kedney bean in different spaces during sowing.

Keywords : Intercropping , mites, Aromatic plants, Kidney bean.

INTRODUCTION

There is a high importance for the vegetable crops in Egypt, especially the Kidney bean *Phaseolus vulgaris* L., as it is one of high protein cntent in addition to an economic importance for the farmers in Delta area, Egypt. Many pests attack this crop in the field e.g. *Tetranychus urticae* koch. There are many evidence on the effect of using *Phytosiulus persimilis* Athias-Henriot (Family: Phytoseiidae) to control the two spotted mite *Tetranychus urticae* Koch in many vegetable crops especially Kidney Bbeans (Conference Proceedings 2004). Intercropping two crop in the same field proved its efficiency to minimize the pest population, in the same time getting additional. In Bulgaria, Mateeva et al (1998) studied the effect of intrcropping in same vegetable crops to control pests. Some Egyptian workers investigated the effect of sowing spacing in some vegetable (Conference Proceeding 2004). The present current study aimed to throw light on role of intercropping in controlling the two spotted spider mite *T. urticae* to achieve safe agriculture environment.

MATERIALS AND METHODS

In Menoufiya Governorate, a field experiment was conducted as a completely randomized design, in spring period during the two successive season 2010 and 2011 in Kidney bean plantation. The 4 different treatment

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were :Kidney bean plants alone addition to the same plant intercropped on Mint, Fennel and Black cumin. The main crop, Kidney bean, plants were sown on 4 different spaces each others: 10, 20, 30 and 40cm. Kidney bean plants were investigated for abundance of the different stages of the two spotted spider mite *Tetranychus urticae* Koch :eggs, immatures and adults, as wellas their predators *Phytosiulus persimilis* Athias-Henriot *Euseius scutaulis* Athias-Henriot (Family: Phytoseiidae). Inspection and investigation was conducted after every two weeks: 15,30,45,60,75 and 90 days from sowing. The first 3 dates of inspections was considered as (growth period), while the last 3 inspection considered as : (fruiting period). Ten (10) leaflets were taken randomly from each replicate and directly transferred to the laboratory and investigated using the stereoscopic binocular microscope. The agricultural practices were done as normal in the similar field crop. The mean values of the different stages of the mites and their predators were tabulated and statistically analyzed.

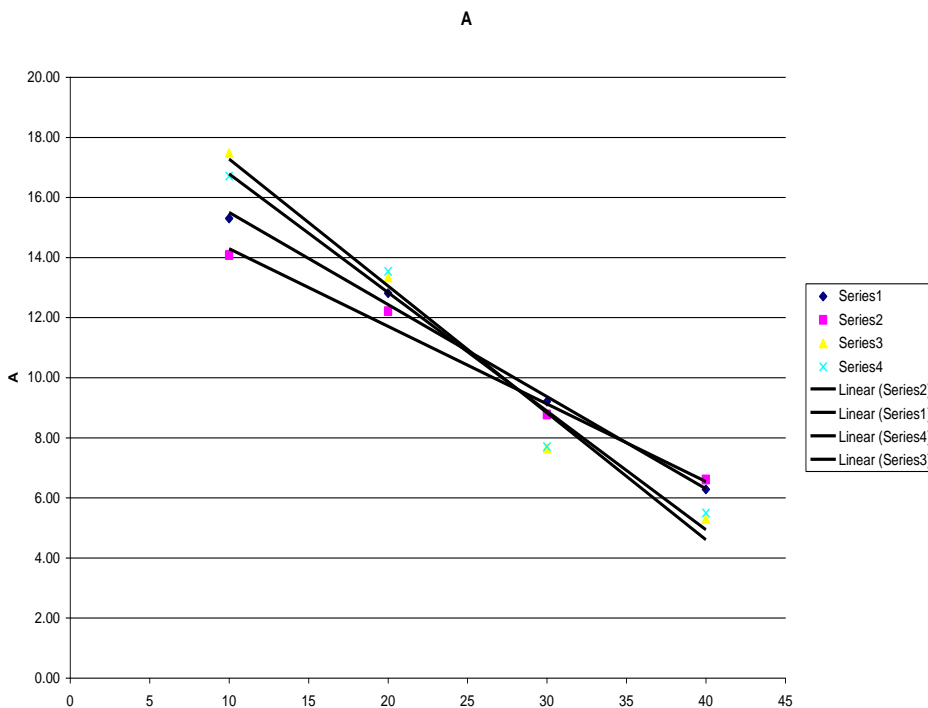
RESULTS AND DISCUSSION

Allam *et al* (2009) studied the effect of intercropping of four Aromatic plants on the population of three main pests and their associated predators with three bean varieties at Fayoum and Gharbia Governorates, Egypt, they proved that each of Mint, Fennel and Black cumin played an important role to reduce population of *T. urticae* on *Phaseolus vulgaris* in Gharbia and Fayom Governorates. Several studies were conducted in and out of Egypt on the intercropping of several crops on pests infestation (Hassan *et al.*, 1989; Omar *et al.*, 1993&1994; Mateeva *et al.*, 1998; Habashi, 2000; Megali *et al.*, 2000; Rizk, 2000; Rizk and Mikhail, 2000, Rizk *et al.*, 2002 Kong *et al.*, 2005 and Abou-zaid (2007). In this study, table (1): showed that the data of the mean values of *T. urticae* during the growth period clearly increased in the space of 10cm between plants, as they recorded 69.37, 47.87 and 48.17 individuals for the eggs, immature and adult respectively, while it were 16.00, 15.20 and 15.87 individuals in case of 40cm between plants in control treatment. This trend was confirmed in the other treatments as it recorded 11.50, 6.92 and 4.04 individuals in 10cm space against 6.21, 6.75 and 5.08 individuals in 40cm space in case of intercropped on mint. These values again recorded 6.54,4.54 and 3.67 against 6.42, 5.17 and 3.04 and 6.88,4.08 and 2.00 against 6.33, 4.08 and 2.88 individuals in 10 and 40cm space for Fennel and Black cumin respectively. Data of statistical analysis in table (3): showed that there was a significant difference between eggs 18.66 and both of the immature stages and adults 12.59 and 11.76 respectively. In the same time, density of both *T. urticae* and predators showed significant difference between the control (26.56) and other treatments, since the density of mites during intercropping mint had (5.60)and each of Fennel and Black cumin 3.67 and 3.86 individual respectively.

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n respect of Fruiting period, table (1) and Fig (1): revealed that the values represent the mites stages showed the same trend in different crops, as the eggs, immature and adult individual recorded 62.07,45.50 &41.6 against 16.60,17.27 & 17.83 and 11.50, 6.92 & 4.04 against 6.21, 6.75 &5.08 and 6.72, 4.56 &3.72 against 6.60,5.32 & 3.08 and 6.88, 4.08 &2.00 against 6.33, 4.08 &2.88 in 10cm against 40cm space between plants in Kidney bean alone (control) and intercropped on Mint, Fennel and Black cumin respectively. Values of 20 and 30cm space showed intermediate and transitional values between the pre-mentioned values of 10 and 40cm.



Figur (1) :Regrrition line between number of *T. urticae* and the sowing spaces during the two investigated seasons.

Regression line (Figure1) showed the linear relationship between mite density and decreasing the space between plants. Data of statistical analysis in table (3): also shows that there was a significant difference between the three components of *T. urticae* :eggs (17.76), immatures (12.50) and adults 10.80 individuals respectively. About intercropping there was no difference between Fennel (3.74) and black cumin (3.86) individuals but the both showed significant difference between each of the control (Kidney bean alone) 25.08 and the mint 5.60 individuals respectively. Table (1) also indicate the abundance of the predators in the first season : *p. persimilis* and *E. scutaulis* together. their mean values show the same trend as of *T. urticae* as their density was approximately 2 folds in the narrow space plantation (10cm space) against the wide space plantations (40cm). Predators mean

value during the growth period 0.83, 0.71, 0.71 and 0.75 against 0.43, 0.46, 0.38 and 0.67 individuals in the plantations of 10cm and 40cm spaces for the control, Mint, Fennel and Black cumin respectively. During the fruiting period, the density of the predators was clearly affected with the spaces between plants, the same table (1), indicated that their abundance under 10cm space were higher than those: of 40cm 1.53, 0.71 and 0.76 against 0.72, 0.46 and 0.44 individuals for the control. Mint and Fennel treatments, while in the Black cumin their was slight increase in the narrow space plantations (10cm) as the density recorded 0.75 individuals against 0.67 under 40cm. Again the same table and figure (1): shows that the mean values of the predators in the plantation of 30 and 20cm were intermediate and transitional values between the above mentioned values in both and fruiting period. In the recent study, it was noticed that the weak abundance of the predators e.g. *Phytoseiulus persimilis*, Jackal and Schmidt in Germany (1999) noticed that mortality of these predators increased as a result of using Fennel extract. The same trend of the result data in table (1) was again confirmed in table (2): as the density of both mites and their predators were higher in the narrow space plantation (10) than those of the wider spaces 20,30 and 40cm. There was a significant differences between the density values under the different treatments :control, Mint, Fennel and Black cumin as appeared in the first season. Also, the different stages of the mites : eggs, immatures and adults were different clearly as appeared in the previous season. Mateeva *et al.* (1998) proved that the density of some pests including *T. urticae* was significantly reduced under intercropping compared with the sole crop. Table (3) shows that there was significant difference between the four treatments during the growth period they recorded 26.12, 6.96, 5.20 and 2.19 individuals for the control, Mint, Fennel and Black cumin.

Table (3): The statistical analysis of the mean values of mites during the two season under the 4 different

Parameter		Season 1		Season 2	
		Growth	Fruiting	Growth	Fruiting
Crop	Control	26.56a	25.08a	26.12a	24.18a
	MINT	5.60b	5.60b	6.96b	7.49b
	FUNL	3.67c	3.74c	5.20c	3.32c
	BLACK	3.86c	3.86c	2.19d	7.82b
INSPC	1	8.81b	9.82b	11.68a	12.15a
	2	11.59a	10.19ab	10.39a	10.24b
	3	12.30a	11.26b	10.76a	10.20b
STAGE	EGGS	18.66a	17.76a	17.40a	16.31a
	IMMATURES	12.59b	12.50b	12.50b	13.75b
	ADULT	11.76b	10.80c	10.80c	12.97b
	PREDETORS	0.59c	0.62d	0.62d	0.42c
SPACE	10cm	15.30a	14.07a	17.48a	16.71a
	20cm	12.81b	12.20b	13.34b	13.53b
	30cm	9.20c	8.77c	7.64c	7.70c
	40cm	6.28d	6.61d	5.30d	5.49d

Also, the same significant difference between the values of both the mites and predators under the different spaces :17.48, 13.34, 7.64 and 5.30 individuals was appeared. The same table individuals that there was no any difference between the inspection each others : 11.86, 10.39 and 10.76 individuals. Different stages of the mites showed a significant difference between each other : 17.40, 12.50 and 10.80 individuals for eggs, immatures and adults respectively. In respect of the fruiting period of the second season the same table (3) showed that, there was significant difference between the control and Fennel from one hand, and between control and both of Mint and Black cumin from the other hand. The values of mean abundance of both mites and predators under the different 4 spaces were significantly different : 16.71, 13.54, 7.71 and 5.49 individuals for 10, 20, 30 and 40cm respectively. Number of eggs 16.31 significantly increased than each of immatures and adults 13.75 and 12.97 individuals respectively.

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استخدام التعميل لتقليل الاصابه بالعنكبوت الأحمر في محاصيل الخضر

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في تجربته ذات تصميم كامل العشوائية بمحافظة المنوفية بمصر وبأحد حقول المزارعين تم اختيار محصول الفاصوليا في العروة الربيعية على مدى موسمي ٢٠١٠ و ٢٠١١ م وتم اختيار ثلاثة محاصيل طبية وعطرية وهي : النعناع والشمر وحب البركة لتزرع محمله على المحصول الرئيسي (الفاصوليا) علاوة على معاملة المقارنة بزراعتها منفردة . وتم التعميل بزراعة المحاصيل الثلاثة المختارة على مسافات مختلفة ١٠ و ٢٠ و ٣٠ و ٤٠ سم من بعضها البعض وكذلك الفاصوليا (المقارنة) منفردة .

أظهرت النتائج (جدول ١ و جدول ٢) أن زيادة مسافات الزراعة إلى ٤٠ سم أدت إلى تقليل أعداد العنكبوت الأحمر بعلاقة خطية وأم التعميل أدى إلى تقليل الإصابة بالمقارنة بالفاصوليا المنفردة وكانت أحسن النباتات قليلا لأعداد العنكبوت الأحمر هي الشمر تلاه النعناع وأخيرا حبة البركة. حيث كان متوسط الأعداد للاكاروسات ومفترساتها (جدول ٣) خلال الموسم الأول (المرحلة الخضرية) (١٥.٣٠ ، ١٢.٨١ ، ٩.٢٠ ، ٦.٢٨ فرد للمسافات ١٠ ، ٢٠ ، ٣٠ ، ٤٠ سم بين النباتات على الترتيب وكانت ذات فرق معنوي وقد تأكد ذلك خلال الموسم الثاني (مرحلة النمو الخضري) أيضا.

قام بتحكيم البحث

كلية الزراعة – جامعة المنصورة
مركز البحوث الزراعية

أ.د / عمر عبد الحميد نصار
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Table (1): Mean number of different stages of *T. urticae* and predators during the first season in *Phasouleus vulgares* intercropped on 3 medicinal crops grown on different spaces.

Stage	Trt	Count	Spacing															
			40				30				20				10			
			Pred	Egg	Imm	Adult	Pred	Egg	Imm	Adult	Pred	Egg	Imm	Adult	Pred	Egg	Imm	Adult
Growth	Control	Mean	0.43	16.00	15.20	15.87	0.33	34.17	20.60	25.13	0.47	61.23	34.57	34.73	0.83	69.37	47.87	48.17
		SD	0.50	4.69	3.48	2.83	0.66	8.29	5.74	7.84	0.73	13.29	13.29	8.72	0.75	16.81	15.46	15.77
	Mint	Mean	0.46	6.21	6.75	5.08	0.46	9.33	6.79	5.38	0.54	12.67	7.29	5.50	0.71	11.50	6.92	4.04
		SD	0.51	2.62	2.47	1.82	0.59	4.07	2.99	2.00	0.66	3.80	1.78	1.89	0.81	2.34	3.30	2.05
	Fennel	Mean	0.38	6.42	5.17	3.04	0.50	6.00	5.38	3.21	0.54	5.46	4.25	2.92	0.71	6.54	4.54	3.67
		SD	0.65	3.45	3.20	1.97	0.59	3.65	3.03	1.72	0.59	3.24	2.31	1.72	0.75	3.50	2.78	2.50
	Black	Mean	0.67	6.33	4.08	2.88	0.88	7.71	6.29	4.25	0.79	6.29	4.67	3.17	0.75	6.88	4.08	2.00
		SD	0.70	2.73	1.93	1.48	0.80	3.86	2.96	2.49	0.93	3.06	2.76	1.49	0.68	2.77	2.30	1.18
Fruiting	Control	Mean	0.27	16.60	17.27	17.83	0.20	32.83	21.90	20.00	0.37	58.10	33.13	32.10	1.53	62.07	45.50	41.60
		SD	0.52	2.87	2.95	2.80	0.41	8.04	5.79	3.32	0.61	12.34	7.95	5.96	1.11	18.12	14.32	17.93
	Mint	Mean	0.46	6.21	6.75	5.08	0.46	9.33	6.79	5.38	0.54	12.67	7.29	5.50	0.71	11.50	6.92	4.04
		SD	0.51	2.62	2.47	1.82	0.59	4.07	2.99	2.00	0.66	3.80	1.78	1.89	0.81	2.34	3.30	2.05
	Fennel	Mean	0.44	6.60	5.32	3.08	0.52	6.00	5.40	3.28	0.56	5.60	4.32	3.00	0.76	6.72	4.56	3.72
		SD	0.71	3.50	3.22	1.93	0.59	3.57	2.97	1.72	0.58	3.25	2.29	1.73	0.78	3.54	2.72	2.46
	Black	Mean	0.67	6.33	4.08	2.88	0.88	7.71	6.29	4.25	0.79	6.29	4.67	3.17	0.75	6.88	4.08	2.00
		SD	0.70	2.73	1.93	1.48	0.80	3.86	2.96	2.49	0.93	3.06	2.76	1.49	0.68	2.77	2.30	1.18

Table (2): Mean number of different stages of *T.urticae* and predators during the second season in *Phasouleus vulgares* intercropped on 3 medicinal crops grown on different spaces.

Stage	Trt	Count	Spacing															
			40				30				20				10			
			Pred	Egg	Imm	Adult	Pred	Egg	Imm	Adult	Pred	Egg	Imm	Adult	Pred	Egg	Imm	Adult
Growth	Control	Mean	0.13	15.17	14.17	13.67	0.33	26.80	19.20	18.27	0.57	55.13	37.67	32.77	0.83	74.90	52.37	56.00
		SD	0.35	3.11	1.91	1.84	0.55	6.09	3.72	4.47	0.73	14.77	7.53	9.68	1.18	17.20	9.89	15.20
	Mint	Mean	0.33	4.63	5.15	4.48	0.11	6.78	6.63	5.26	0.63	13.11	11.30	12.04	0.26	14.78	13.07	12.74
		SD	0.48	1.69	1.92	1.93	0.32	1.60	2.48	1.99	0.79	3.24	1.79	2.72	0.53	3.18	2.46	2.90
	Fennel	Mean	0.63	2.54	2.33	2.00	0.38	3.96	3.92	2.75	0.42	3.00	3.00	1.83	0.50	3.13	2.79	1.92
		SD	0.88	1.35	1.43	1.02	0.65	2.66	2.00	1.59	0.58	1.79	1.82	1.31	0.66	1.54	1.28	1.41
	Black	Mean	0.38	5.79	4.92	3.88	0.33	8.75	6.83	4.96	0.38	11.50	7.50	6.46	0.13	6.67	8.04	6.67
		SD	0.58	1.67	1.44	1.15	0.56	1.82	1.61	1.37	0.58	3.56	2.00	1.77	0.34	2.97	3.00	1.88
Fruiting	Control	Mean	0.47	16.63	12.70	13.83	0.47	24.63	22.27	21.50	0.53	51.07	36.00	34.13	0.87	57.20	47.60	46.93
		SD	0.78	3.74	1.90	2.98	0.63	6.99	4.41	4.22	0.68	16.16	5.27	6.76	0.57	18.54	11.45	16.59
	Mint	Mean	0.81	6.41	5.89	4.81	0.26	6.04	6.15	5.41	0.70	12.52	10.63	11.00	0.22	16.00	15.52	17.48
		SD	0.79	1.74	2.10	1.73	0.53	2.10	1.66	1.82	0.67	4.97	2.22	2.77	0.51	5.36	3.20	3.96
	Fennel	Mean	0.37	1.97	2.90	2.67	0.20	3.03	3.43	3.50	0.33	6.73	5.77	4.13	0.30	6.73	6.07	4.93
		SD	0.61	1.94	1.90	1.37	0.55	1.94	1.94	1.68	0.61	1.66	1.50	1.17	0.53	2.18	1.87	1.62
	Black	Mean	0.37	6.81	6.22	4.15	0.33	7.70	8.63	7.81	0.22	14.11	12.37	13.00	0.30	19.19	14.85	9.07
		SD	0.74	1.88	1.58	1.32	0.62	1.84	1.98	2.15	0.42	3.31	3.30	3.46	0.54	4.29	3.90	2.37