

SEMI FIELD AND LABORATORY TRIALS TO STUDY THE SUSCEPTIBILITY OF DIFFERENT FABA BEAN VARIETIES TO *Tetranychus urticae* KOCH INFESTATION

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ABSTRACT

A semi field trial was done to estimate the population numbers of the different stages of the two spotted spider mite, *Tetranychus urticae* on six different varieties of *Faba bean*, which are Giza 40, Giza 3, Nubaria 4, Masr 2, Masr 1, and Giza 2. Two levels of artificial infestation, 2 and 4 adult females of about the same age per plant beside control were noticed and recorded. Obtained results revealed that, there are significant differences in number of eggs, adult females and males. On the other hand, no-significant differences in the number of moving immature stages were noticed. This study showed a variable significant difference in the average numbers for all stages for the tested six faba bean varieties when infested with *T. urticae*. Observation of inspection showed significant differences of the average numbers and abundance of the mite *T. urticae*. The laboratory studies estimate the influence of the six faba bean varieties. On developmental stages of mite *T. urticae*, results revealed that incubation period, total immature stages and life cycle have low significant differences. On the other hand, the average durations of life span, longevity and fecundity have significant differences.

INTRODUCTION

Faba bean is considered one of the most economic important leguminous crops in Egypt. It is the main food of all Egyptian as well as farm animals. This crop is usually attacked by several insect and mite pests during its growth. Mites are considered one of the major pests attacking faba bean crop, which it cause a great damage and sever losses, therefore different studies on faba bean varieties, biological and ecological on the two spotted spider mite, *T. urticae* showed be carried to avoid using pesticides.

Sherif *et al.* (1994), Megali (1997), Farrag *et al* (1998), Kasim and Younes (2000) found that Tetranychid mite, *Tetranychus urticae* was the most dominant phytophagous species infesting faba bean plants.

Amer (2003) evaluated six faba bean varieties for their relative susceptibility, to spider mites, *T. urticae*. He showed that the level infestation of spider mites during second season 2000 was higher than the first on 1999. The present work aims to study the effect of different faba bean varieties on developmental stages and fecundity of the two spotted spider mite condition and semi field trails.

MATERIALS AND METHODS

Agricultural soil was taken from an area of one Kirate and was greatly mixed and an equally limited amount was put in fifty four pots.

Seeds of six faba bean varieties were planted on the 3rd of November, 2004. After emergence only three plants were lefted, while the remainder plants were carefully discarded. Each faba bean variety was

infested by two levels of *T. urticae* infestation and each was repeated two times.

The stock culture of the two-spotted spider mite, *T. urticae* was maintained at the laboratory as a source of infestation. Artificial infestation with *T. urticae* adult females was done two times on the 2nd, and 4th December 2004. Two levels of artificial infestation were done with 2 and 4 adult females per each pot and without equally of eighteen pots for each treatment.

Examination was taken place weekly from 15 Jan. 2005 till the 26th Feb. 2005 by taking 12 leaflets per each treatment (4 pots). Number of eggs, moving larvae, quiescent larvae, moving protonymphs, quiescent protonymphs, moving deutonymphs, quiescent deutonymphs, adult males and adult females were recorded by examining the whole leaflets.

Biological studies were carried out under laboratory conditions. Petri-dishes with cotton pad moist and leaflets were kept on the cotton pads. Six faba bean varieties were investigated. New emergence adult female and male were transferred on each leaflet of Petri-dish. The adult male and female were transferred daily on a new leaflet and so on till the end of egg laying. Eggs of each Petri-dish were examined daily to count egg hatching and moving and quiescent stages until the emergence of adult males and females to estimate fertility of females.

RESULTS AND DISCUSSION

Table (1) shows the duration of the different stages of *Tetranychus urticae* Koch when reared on six different faba bean varieties under laboratory conditions. Data revealed that the short incubation period was found when mites reared on Giza 40 variety followed by Masr 1, while the longest incubation period was found when mites reared on Masr 2 and Nubaria (1) varieties.

Obtained data revealed that moving and quiescent of larval and protonymphal stages lasted on six different faba bean varieties.

On the other hand, total immature stages durated 6.0 days with Masr (2), Masr (1) and Giza (2) while, this period differ with other varieties.

Total immature stages have the same duration in Giza (3), Nubaria (1), Masr (2), Masr (1) and Giza (2) varieties, while this period lasted 6.8 days in Giza (40) variety.

Table (2) shows the effect of six different faba bean varieties on pre-oviposition, oviposition and post-oviposition periods as well as longevity period and sex-ratio of *T. urticae*.

Pre-oviposition period varied greatly according to faba bean varieties. The longest pre-oviposition period was found in case of Giza (40) with a mean of 3.00 days, while the longest pre-oviposition period was found with Masr (2) variety.

Oviposition period varied greatly, it was noticed that the longest period with Giza (40), Giza (3) and Giza (2) with a mean of 11.4, 11.0 and 9 days. The lowest periods were 7.8, 7.0 and 7.6 days in the remainder three varieties.

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Also, post-oviposition period varied according to faba bean varieties. It lasted from 0.6 days (Giza 40) to 1.8 days (Giza 3).

Number of eggs per female was about the same in case of Giza (40), Giza (3), Nubaria (1), Masr (2) and Masr (1), while the greater number of eggs per female was found in case of Giza (2) with a mean of 36.4 eggs.

Adult female longevity could be arranged in two categories, the first group of Giza (40) and Giza (3) with the mean of 15.2 and 14.8 days, respectively. While the rest of four varieties the mean ranged between 9.6 to 12.0 days.

There is no significant difference between the six faba bean varieties on female/male sex ratio, which is about 1:1.

Obtained results shown in Table (3) revealed that no significant between the number of eggs, number of immature stages and six different faba bean varieties with low level of artificial infestation.

On the other hand, there are significant between different immature stages, laid eggs per female and different faba bean varieties with high level artificial infestation.

According to faba bean varieties, the greater number of eggs laid per female was noticed in Masr (3) variety (46.7) followed by Nubaria (1) (33.6), then Masr (1) (25.9), Giza (2) (18.5), Giza (3) (10.45) and finally Giza (40) (9.20) eggs per female.

Moving larvae has the greater numbers in varieties Masr (1), Masr (2), and Nubaria (1), while the least numbers was noticed in variety Giza 40.

The previous same trend was noticed in quiescent larvae, moving proto and deutonymphs, quiescent proto and deutonymphs, adult female as well as adult male.

The first 3 inspections were about the same in all stages moving nymphs (1,2), quiescent nymphs (1&2), female and male, while the latter 3 inspections were about the same but differs from that of the first one.

The results are agreement with those obtained by Kasim and Younes (2000), they found that three bean cultivars (502/785/84, 812/84, 812/824/92 and 814/767/92) were considered tolerant to mite infestation. Mohamed (2004) studied the population dynamics of phytophagous mite, *Tetranychus cucurbitacearum* on different growth stages of faba bean. He recorded two-peaks during the season. Ahmed (2005) studied the population dynamics of phytophagous and predaceous mites associated with faba bean (*Vicia faba*). The predaceous mite reached to the highest level of abundance in March, while the population phytophagous mites reached it is peak in April. Azouz (2005) studied the population fluctuation of spider mite, *Tetranychus arabicus* (*T. urticae*) and *T. cucurbitacearum* on faba bean (*V. faba*). He found that *T. urticae* increased to exhibit a peak during the first week of April, whereas the infestation of *T. cucurbitacearum* started in few number early in February and still low number until the end of season. Also, Gahzi (2006) studied the infestation of spider mites on faba bean plant at Gharbia Governorate.

Table (2)

Table (3)

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تجارب نصف حقليّة ومعملية لدراسة قابليّة بعض أصناف الفول البلدي للإصابة بالعنكبوت الأحمر ذو البقعتين *Tetranychus urticae* Koch سهير إبراهيم عبد الرحمن ، عبلة عبد الوهاب إبراهيم و سليمان مسعود سليمان معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي - جيزة

أجريت هذه التجارب لدراسة مدي قابلية ٦ أصناف من الفول البلدي للإصابة بالعنكبوت الأحمر ذو البقعتين وذلك عن طريق العدوي الصناعية لنباتات زرعت في أصص (semi-field) حيث أجريت العدوي الصناعية عند مستويين للإصابة ٢، ٤ إناث بالغة لكل إصيص به ثلاث نباتات. كما أجريت دراسات بيولوجية معمليّة للعنكبوت الأحمر علي الستة أصناف من الفول البلدي. أوضحت الدراسات البيولوجية أن فترة الأطوار الغير كاملة لكل من الأنثي والذكر إستغرقت ٦ أيام عند التربية علي الأصناف مصر (١)، مصر (٢)، جيزة (٢) ولكنها إختلفت عند التربية علي الأصناف الأخرى جيزة (٤٠)، جيزة (٣)، نوبارية (١). كما أن مرحلة وضع البيض تأثرت بوضوح تبعاً لنوع العائل حيث كانت طويلة مع جيزة (٤٠)، جيزة (٣)، جيزة (٢) وذلك بمتوسط ١١،٤، ١١،٠، ٩،٠ أيام علي الترتيب وكانت قصيره مع الأصناف نوبارية (١) (٧،٨ يوم)، مصر (١) (٧،٦ يوم) وأخيراً مصر (٢) (٧،٠ أيام). وكانت خصوبة الإناث متقاربه مع جميع الأصناف عدا الصنف جيزة (٢) حيث كان معدل وضع البيض عاليًا مما يدل علي حساسية الصنف الشديدة للإصابة. ومن التجارب النصف حقليّة أوضحت الدراسة أنه لا توجد فروق معنوية بين عدد البيض وعدد الأطوار الغير كاملة علي جميع الأصناف بالنسبة لمستوي الإصابة الأقل ولكن كان هناك فرق معنوي علي مستوي العدوي الصناعية الأعلى بالنسبة لتعداد البيض والأطوار الغير كاملة.

Table (1): Durations (in days) of different stages of *Tetranychus urticae* Koch when reared on faba bean varieties under laboratory conditions.

Stages	Varieties					
	Giza (40)	Giza (3)	Nobariah (1)	Masr (2)	Masr (1)	Giza (2)
Incubation period	3.8±0.44 ^a	4.054±0.087 ^a	4.248±0.624 ^a	4.4±0.548 ^a	4.0±0.0 ^a	4.4±0.548 ^a
Moving larva	1.0±0.0 ^a	1.054±0.121 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a
Quiescent larva	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a
Moving protonymphs	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a
Quiescent protonymphs	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a
Moving deutonymphs	1.8±0.447 ^a	1.0±0.0 ^b	1.2±0.447 ^b	1.0±0.0 ^b	1.0±0.0 ^b	1.0±0.0 ^b
Quiescent deutonymphs	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a	1.0±0.0 ^a
Total immature	6.8±0.447 ^a	6.054±0.121 ^b	6.2±0.447 ^b	6.0±0.0 ^b	6.0±0.0 ^b	6.0±0.0 ^b
Life cycle	10.6±0.894 ^a	10.108±0.156 ^a	10.452±0.684 ^a	10.4±0.548 ^a	10.0±0.0 ^a	10.0±0.548 ^a
Life span	25.8±1.789 ^a	24.908±1.734 ^a	21.252±1.526 ^{cb}	19.4±1.577 ^c	20.6±0.894 ^{cb}	22.4±0.548 ^{cb}
Generation	13.6±0.894 ^a	12.108±0.156 ^b	12.052±1.210 ^b	11.4±0.548 ^b	12.0±0.0 ^b	12.4±0.548 ^b

Some figures means not significant

Table (2): Female longevity and fecundity of the spider mite, *T. urticae* Koch when fed on different faba bean varieties under laboratory conditions.

Period	Varieties						LSD
	Giza (40)	Giza (3)	Nobariah (1)	Masr (2)	Masr (1)	Giza (2)	
Pre-oviposition	3.0±0.00 ^a	2.0±0.0 ^b	1.6±0.548 ^b	1.0±0.0 ^d	2.0±0.0 ^b	2.0±0.0 ^b	0.292
Oviposition	11.4±3.286 ^a	11.0±1.732 ^a	7.8±2.168 ^b	7.0±0.0 ^b	7.6±0.894 ^b	9.0±0.0 ^{ab}	2.401

Post-oviposition	0.6±0.894 ^c	1.8±0.447 ^a	1.4±0.548 ^{ab}	1.6±0.458 ^{ab}	1.0±0.0 ^{cb}	1.0±0.0 ^{cb}	0.674
No. of eggs/female	29.0±4.583 ^b	26.8±2.775 ^b	28.0±7.348 ^b	31.8±6.099 ^{ab}	30.4±4.159 ^{ab}	36.4±3.286 ^a	6.483
No. of eggs/female/day	1.992±0.644 ^{cd}	1.835±0.310 ^d	2.590±0.473 ^{bc}	3.353±0.794 ^a	2.895±0.520 ^{ab}	3.033±0.274 ^{ab}	0.6968
Longevity	15.2±3.194 ^a	14.8±1.789 ^a	10.8±2.168 ^b	9.6±1.342 ^b	10.6±0.894 ^b	12.0±0.0 ^b	2.425
Sex-ratio ♀/♂	0.63404	0.60117 ^a	0.54358	0.49433	0.56563	0.54620	0.56415632

Each data = X̄±SD

Table (3): Effect of two levels of artificial infestation with *Tetranychus urticae* Koch on faba bean varieties on population density and developmental stages of spider mites in semi-field trails

Numbers	Levels			Varieties						Inspection					
	2/plant	4/plant	control	Giza (40)	Giza (3)	Nobariah (1)	Masr (2)	Masr (1)	Giza (2)	1	2	3	4	5	6
NE	23.664 _{ab}	20.528 ^b _{6.817}	28.1239 _a	9.208 _d	10.449 _d	33.625 _b	46.796 ^a _{9.64}	25.972 _{bc}	18.579 _{cd}	33.505 _a	20.324 _{bc}	24.083 _{abc}	30.505 ^{ab} _{9.641}	20.083 _{bc}	16.13 _{cd}
L	3.764 _a	3.456 ^a _{0.8009}	4.25 _a	1.907 _c	1.977 _c	4.315 _b	4.889 ^{ab} _{1.733}	5.895 _a	3.958 _b	4.986 _a	4.102 _{abc}	4.468 _{ab}	3.593 ^{bcd} _{1.133}	3.0232 _{cd}	2.769 _d
QL	1.178 _a	1.595 ^a _{0.4826}	1.914 _a	1.468 _b	0.713 _c	1.639 _b	1.861 ^b _{0.683}	3.380 _a	1.394 _{cb}	2.4072 _a	2.167 _{ab}	2.162 _{ab}	1.482 ^{bc} _{0.683}	1.245 _c	0.911 _c
N1, 2	4.938 _a	4.447 ^a _{1.098}	4.324 _a	2.324 _c	2.25 _c	4.037 _b	3.884 ^{bc} _{1.553}	7.866 _a	7.056 _b	5.310 _a	4.889 _a	5.917 _a	4.982 ^a _{1.553}	3.139 _b	3.181 _b
QN1,2	2.762 _{ab}	2.563 ^b _{0.667}	3.389 _a	1.565 _d	1.458 _d	2.551 _c	2.972 ^{bc} _{0.943}	5.162 _a	3.718 _b	3.579 _a	3.134 _{ab}	3.505 _a	2.949 ^{ab} _{0.943}	1.815 _c	2.444 _{bc}

♀	1.734 ab	2.014 ^a 0.544	1.264 b	0.537 c	1.736 ab	2.148 ab	2.394 ^a 0.769	1.139 b	1.889	2.741 a	1.824 b	2.056 ab	1.264 ^{bc} 0.769	1.29 bcd	8.843 c
♂	0.838 b	0.845 ^b 0.269	1.206 c	0.296 b	0.778 b	1.037 b	1.093 ^b 0.38	1.00 b	1.574 a	1.398 a	1.315 ab	0.972 bc	0.824 ^{cd} 0.300	0.546 d	0.722 cd

Same figures means not significant

NE = Number of eggs

L= Larva

QL= Quiescent larvae

N1,2= Proto and deutonymphs moving stages

QN1,2= Proto and deutonymphs quiescent stages ♀ = Female ♂ = Male