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Article

Biology and life table analysis of *Tetranychus urticae* (Acari: Tetranychidae) on different common pea and bean cultivars

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ABSTRACT
The quality of the important host plants affects the survival, development, and reproduction of the two-spotted spider mite, *Tetranychus urticae* Koch. The biology and life table parameters of *T. urticae*, on four cultivars of common Regular and Sweet pea and Polesta & G6 bean, were examined under laboratory conditions of 27 ± 1 °C, 60–80% R.H. and photoperiod 16L: 8D h. Both males and females of *T. urticae* successfully developed from egg to adult on different host plants. Results revealed that the survival rate varied from 53% on Regular pea to 99% on G6 bean cultivars. The developmental time from egg to adult was significantly influenced among the tested host plant cultivars and ranged from 9.75 days on G6 bean to 20.42 days on Regular pea (p = 0.00). Female longevity was significantly longer on Regular and Sweet pea than on Polesta and G6 bean. The highest fecundity per female was recorded on G6 bean, but the lowest was on Regular pea cultivars. Consequently, population growth parameters were also significantly influenced by different host plants. The net reproductive rate (R_0), the intrinsic rate of natural increase (r), and the finite rate of increase (λ) of *T. urticae* were significantly higher on G6 bean than the other three cultivars. Also, the longest mean generation time (T) and doubling time (DT) were noted on Regular pea, but the shortest value on G6 and Polesta bean cultivars. Obtained results based on the intrinsic rate of natural increase revealed that G6 and Polesta bean were more suitable than the two pea cultivars as hosts for *T. urticae.* Therefore, the lower population growth rate of the *T. urticae* could be the result of antibiotic resistance in the cultivars Regular and Sweet pea.

KEY WORDS: Bean cultivars; biology; two-spotted spider mite; growth parameters; pea cultivars.

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INTRODUCTION

The most common spider mite, *Tetranychus urticae* Koch has a cosmopolitan distribution and is recorded on more than 300 species of plants, including common bean, soybean, cowpea, cucumber, sweet potato, etc. (Bolland *et al*. 1998; Razmjou *et al*. 2009; Migeon and Dorkeld 2013; Islam *et al*. 2017). Based on reports by the Egyptian Ministry of Agriculture, Common bean and pea cultivars are economically important vegetable crops and widely grown in different areas in Egypt. Furthermore, they are used as a protein source with nutritive value for human nutrition. The importance of *T. urticae* is not only due to its direct effects on host plants including, defoliation, chlorophyll depletion, bronzing, webbing, necrosis in young leaves and even in excessive outbreaks plant death but also indirect effects through decreases in photosynthesis and transpiration of the host plants (Brandenburg and Kennedy 1987; Meyer 1996). Furthermore, the short generation time and high reproductive

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potential of *T. urticae* cause a fast-growing population of the mite that allows achieving damaging population levels very quickly, when environmental conditions are favorable, resulting in a rapid decline in the quality of host plant yield (Fathipour *et al.* 2006). On the other hand, the biological parameters of *T. urticae* such as survival, developmental duration, fecundity, and longevity may differ in response to different kinds of cultivars, host plant nutrition, temperature, relative humidity, volatile chemicals and exposure to pesticides (Sabelis 1981; Marcic 2003; Skorupska 2004). Life table analyses have been used to evaluate the susceptibility or resistance of many host plants to various herbivores; among these parameters, the intrinsic rate of natural increase (*r*) is the most appropriate biological index to examine the suitability or resistance of different host plants to spider mite (Razmjou *et al*. 2006; Sedaratian *et al*. 2009; Gotoh *et al.* 2010). Knowledge about susceptibility or resistance for cultivar kind might be a fundamental component of an integrated pest management program for any crop. The present study aimed to evaluate the susceptibility of four pea and bean cultivars as host plants to *T. urticae.* The information on biology and life table parameters are necessary for management programs. Also, this work will enhance our comprehensive understanding of *T. urticae* population dynamics, which help to develop management and control strategies for this mite.

MATERIALS AND METHODS

This study was conducted in the laboratories of Pest and Plant Protection at the National Research Centre, Egypt. All the experiments were carried out in a climate chamber at 27 ± 1 °C and 60–80% R.H. and a photoperiod of 16L:8 D h.

Pea and bean cultivars

Pea (Regular and Sweet) and bean (Polesta and G6) seedlings were obtained from El-Behaira governorate, Egypt and established in a greenhouse. No acaricides or insecticides had been applied. Leaves at the same age of each variety were carefully checked, then placed on water-saturated cotton in a Petri dish with the underside facing upwards. These leaves were replaced every five days or as they became heavily damaged by the mites.

Mite colony

The two-spotted spider mite was collected from pea and bean plants and reared on the two peas (Regular and Sweet) and bean (Polesta and G6) seedlings for three months (several generations) before the beginning of experiments.

Experiment 1

To evaluate the hatchability of eggs, survivorship of immature mites and the sex ratio of the offspring, for each cultivar, one newly emerged female and one adult male from the stock culture were transferred to a fresh leaf disc (3 cm in diameter) placed on a water-saturated cotton in a Petri dish (6 cm in diameter). The females deposit eggs for five days after the preoviposition period. All eggs laid by each female were reared through all stages to adulthood. From this data, we calculated the hatchability of mite eggs, the immature mite's survivorship and the sex ratio of the appearing mites (Gotoh and Nagata 2001). Non-mated females, i.e. producing only males, were not considered.

Experiment 2

To evaluate developmental times, longevity, and fecundity of *T. urticae* on tested host plants, one newly emerged female and one male were randomly selected from the stock culture and transferred to fresh leaf discs for each cultivar (for mating). Thirty-five eggs were tested for each of the regular and sweet peas. For Polesta and G6 bean, 37 eggs were tested for each of them. Female mites laid eggs for 24 hours, after which the mites and all eggs were removed from the leaf disc except one egg. Developmental times of immature stages and quiescent stages were monitored and recorded daily. As the mites reach teleiochrysalis (the last quiescent stage), the females were differentiated by their round ends and they were provided with males which were kept on the disc for the total experimental period. When females began to lay eggs, their eggs were counted and removed daily until all experimental females died. The ovipositing females were transferred to the new leaf discs every five days or as the leaves were damaged by mite infestation.

Data analysis

Data for the immature developmental times, duration of pre-oviposition, oviposition and post-oviposition periods, adult life span, fecundity, daily reproduction were analyzed using the one-way analysis of variance (ANOVA), differences between means were compared using the Tukey test at ($p < 0.05$).

Developmental times of all individuals, including females and those dying before the adult stage, and female daily fecundity were analyzed according to the age-stage, two-sex life table (Chi and Liu 1985; Chi 1988) using the computer program TWOSEX-MSChart (Chi 2015). The following parameters were calculated using methods developed by Chi and Liu (1985): intrinsic rate of natural increase (r), finite rate of increase (λ), net reproductive rate (R_0) and mean generation time (T).

$$\sum_{x=0}^{\omega} e^{-r(x+1)} lxmx = 1$$

where, (l_x) the age-specific survival rate, and (m_x) the age-specific fecundity.

The doubling time (DT) = ln2/r (Birch 1948; Andrewartha and Birch 1954; Southwood 1978); (ARI) annual rate of increase $=2^{365/DT}$.

The bootstrap method was used to estimate the standard errors of the population parameters (Meyer *et al*. 1986; Huang and Chi 2012); the differences of the bootstrap-values between treatments were compared using the paired bootstrap test based on the confidence interval of difference (Efron and Tibshirani 1993). Means followed by a different letter are significantly different between treatments using the paired bootstrap test at the 5% significance level (Smucker *et al*. 2007). The bootstrap subroutine is included in the TWOSEX-MSChart.

RESULTS

Hatchability, sex ratio, and survivorship

The percentage of egg hatchability on different host plants varied from 89% on Regular pea to 100% on G6 bean cultivar. The sex ratio (male: female) of offspring on four host plants was significantly female-biased. The greatest (1: 1.48) and the lowest (1: 1.43) on Regular pea and G6 bean cultivars, respectively. The survivorship of immature stages ranged from 53 to 99 % on Regular pea and G6 bean, respectively (Table 1).

Developmental time of immature stages

Both female and male of *Tetranychus urticae* completed their life cycles on the four different host plants and the results of their biological attributes, including survival rate of immature and developmental periods are given in table 2. The immature developmental time of *T. urticae* including, the incubation period, larval period, and nymphal period was influenced by the different cultivars. Moreover, the total developmental time from egg to adult for males and females was significantly affected by different host plants ($p = 0.000$) and ranged from 9.75 to 20.42 days for females and from 9.25 to 17.92 days for males on G6 bean and Regular pea cultivars, respectively. Based on the developmental durations, females and males developed faster on both bean cultivars than on Regular pea ones.

Table 1. Life span (mean ± SE), egg hatchability, immature survivorship, and sex ratio of *Tetranychus urticae* on four pea and bean cultivars.

Host plants	Life span (day)		Egg hatchability (%)	Immature survivorship (%)	Sex ratio ♂♀
	female	male			
Regular pea	40.08 ± 0.61a	36.67 ± 0.53a	89	53	1: 1.48
Sweet pea	30.58 ± 0.26b	27.50 ± 0.34b	98	97	1: 1.45
Polesta bean	26.17 ± 0.27c	24.58 ± 0.26c	97	95	1: 1.43
G6 bean	25.42 ± 0.26c	23.25 ± 0.35c	100	99	1: 1.43

Means followed by different letters in each column are significantly different (Tukey-HSD test: $P \leq 0.05$).

Table 2. Developmental time (mean ± SE) of *Tetranychus urticae* reared on four pea and bean cultivars.

Developmental stages (day)		Host plants			
		Regular pea (35)	Sweet pea (35)	Polesta bean (37)	G6 bean (37)
Egg	Female	4.42 ± 0.15a	4.58 ± 0.15a	3.50 ± 0.15b	3.00 ± 0.00c
	Male	3.58 ± 0.15a	3.50 ± 0.15a	3.25 ± 0.13a	2.67 ± 0.14b
Larva	Female	4.58 ± 0.15a	3.25 ± 0.13b	1.25 ± 0.13c	1.33 ± 0.14c
	Male	3.67 ± 0.14a	2.33 ± 0.14b	1.17 ± 0.11c	1.17 ± 0.11c
Protochrysalis	Female	2.50 ± 0.15a	1.25 ± 0.13b	1.25 ± 0.13b	1.00 ± 0.00b
	Male	2.25 ± 0.13a	1.25 ± 0.13b	1.17 ± 0.11b	1.08 ± 0.08b
Protonymph	Female	2.42 ± 0.15a	1.50 ± 0.15b	1.25 ± 0.13bc	1.00 ± 0.00c
	Male	2.33 ± 0.14a	1.33 ± 0.14b	1.17 ± 0.11b	1.00 ± 0.00b
Deutochrysalis	Female	1.75 ± 0.13a	1.33 ± 0.14ab	1.25 ± 0.13b	1.00 ± 0.00b
	Male	1.58 ± 0.15a	1.17 ± 0.11b	1.17 ± 0.11b	1.00 ± 0.00b
Deutonymph	Female	2.33 ± 0.14a	1.58 ± 0.15b	1.75 ± 0.13b	1.42 ± 0.15b
	Male	2.25 ± 0.13a	1.42 ± 0.15b	1.50 ± 0.15b	1.33 ± 0.14b
Teliochrysalis	Female	2.42 ± 0.15a	1.58 ± 0.15b	1.00 ± 0.00c	1.00 ± 0.00c
	Male	2.25 ± 0.13a	1.33 ± 0.14b	1.00 ± 0.00b	1.00 ± 0.00b
Life cycle	Female	20.42 ± 0.36a	15.08 ± 0.19b	11.25 ± 0.25c	9.75 ± 0.13d
	Male	17.92 ± 0.36a	12.33 ± 0.31b	10.42 ± 0.23c	9.25 ± 0.28d

Means followed by different letters in each row are significantly different (Tukey-HSD test: $P \leq 0.05$).

Adult longevity and fecundity

Female longevity of *T. urticae* feeding on different host plants was significantly different ($p < 0.05$), just as male longevity, varied significantly among the four host plants ($p < 0.05$) (Table 3). Female and male longevities of *T. urticae* were longest on Regular pea, but shortest on Polesta bean cultivars. The adult females that lived their immaturity period on Regular pea lived for a long time compared to the ones completing this stage on the other host plants. Similarly, a significant difference was observed for the duration of pre-oviposition, oviposition and post-oviposition periods on the different host plants; the oviposition period was significantly shorter on Polesta bean cultivar ($p < 0.05$) and it was longer on Regular pea cultivar and ranged from 11.42 days to 14.92 days on Polesta bean and Regular pea cultivars, respectively. So, based on the previous results, the shortest and longest female longevities were observed on Polesta bean and Regular pea cultivars, respectively.

There was a significant difference in the total fecundity and daily rate of egg production ($p < 0.05$) of *T. urticae* among tested cultivars (Table 3). The daily egg production and total reproduction of *T. urticae* were highest on G6 bean, compared with other cultivars. Age-specific survival (l_x) and age-specific fecundity (m_x) of two spider mite *T. urticae* on four tested host plants are represented in figure 1. The results indicated that *T. urticae* completed its developmental time and reproduced on all pea and bean cultivars. The highest and lowest survival rates of immature stages were observed on G6 bean and Regular pea cultivars, respectively. The highest daily fecundity of *T. urticae* on Regular pea, Sweet pea, Polesta bean, and G6 bean was 2.20, 5.33, 5.07, and 6.33 female offspring, respectively, at ages of 25, 19, 15, and 14 days, respectively.

Table 3. Reproduction parameters and adult longevity (mean ± SE) of *Tetranychus urticae* on four pea and bean cultivars.

Biological parameters (day)		Host plants			
		Regular pea	Sweet pea	Polesta bean	G6 bean
Pre-oviposition		2.33 ± 0.14a	2.00 ± 0.00a	2.00 ± 0.00a	1.50 ± 0.15b
Oviposition		14.92 ± 0.39a	11.92 ± 0.23b	11.42 ± 0.15b	12.17 ± 0.24b
Post-oviposition		2.42 ± 0.31a	1.58 ± 0.15b	1.50 ± 0.15b	2.00 ± 0.00ab
Adult longevity	female	19.67 ± 0.41a	15.50 ± 0.20b	14.92 ± 0.15b	15.67 ± 0.26b
	male	18.75 ± 0.33a	15.17 ± 0.24b	14.17 ± 0.21c	14.00 ± 0.25c
Total fecundity		29.67 ± 0.74c	58.58 ± 1.15b	59.83 ± 0.51b	67.42 ± 1.09a
Daily fecundity		1.99 ± 0.01c	4.92 ± 0.04b	5.24 ± 0.10ab	5.57 ± 0.18a

Means followed by different letters in each row are significantly different (Tukey-HSD test: $P \leq 0.05$).

Table 4. Population growth parameters of *Tetranychus urticae* reared on leaflets of four pea and bean cultivars at 27 ± 1 °C (mean ± SE).

Life table parameters	Host plants			
	Regular pea	Sweet pea	Polesta bean	G6 bean
T	26.56 ± 0.36a	20.27 ± 0.17b	15.57 ± 0.28c	14.57 ± 0.13d
R_0	23.93 ± 2.47b	46.87 ± 4.84a	47.87 ± 6.20a	54.07 ± 5.56a
R	0.12 ± 0.004d	0.19 ± 0.01c	0.25 ± 0.01b	0.27 ± 0.01a
Λ	1.13 ± 0.005d	1.21 ± 0.01c	1.28 ± 0.01b	1.32 ± 0.01a
GRR	27.16 ± 2.74b	49.24 ± 5.19a	49.14 ± 6.67a	54.79 ± 5.76a
T_c	26.53	20.08	16.50	14.62
DT	5.78	3.65	2.77	2.57
ARI	9.13×10^{36}	1.22×10^{30}	2.40×10^{39}	2.57×10^{43}

Means in the same row followed by different letters denote significant differences among different host plants based on at 5% significance level.

Population growth analysis

The net reproductive rate (R_0) was the highest on G6 bean and the lowest on Regular pea cultivars. The intrinsic rate of natural increase (r) and the finite rate of increase (λ) showed a similar pattern as (R_0); it was highest on G6 bean and lowest on Regular pea. The mean generation time of *T. urticae* was multiplied as (R_0) and ranged from 14.57 to 26.55 days on G6 bean and Regular pea, respectively. Also, the lowest and greatest values of doubling times (DT) varied from 2.57 to 5.78 days on G6 bean and Regular pea cultivars. Results obtained from life table parameters showed the best performance of *T. urticae* to be on G6 and Polesta beans, which was compatible with significantly slower immature development and lower reproduction rates on Regular pea cultivar (Table 4, Fig. 2).

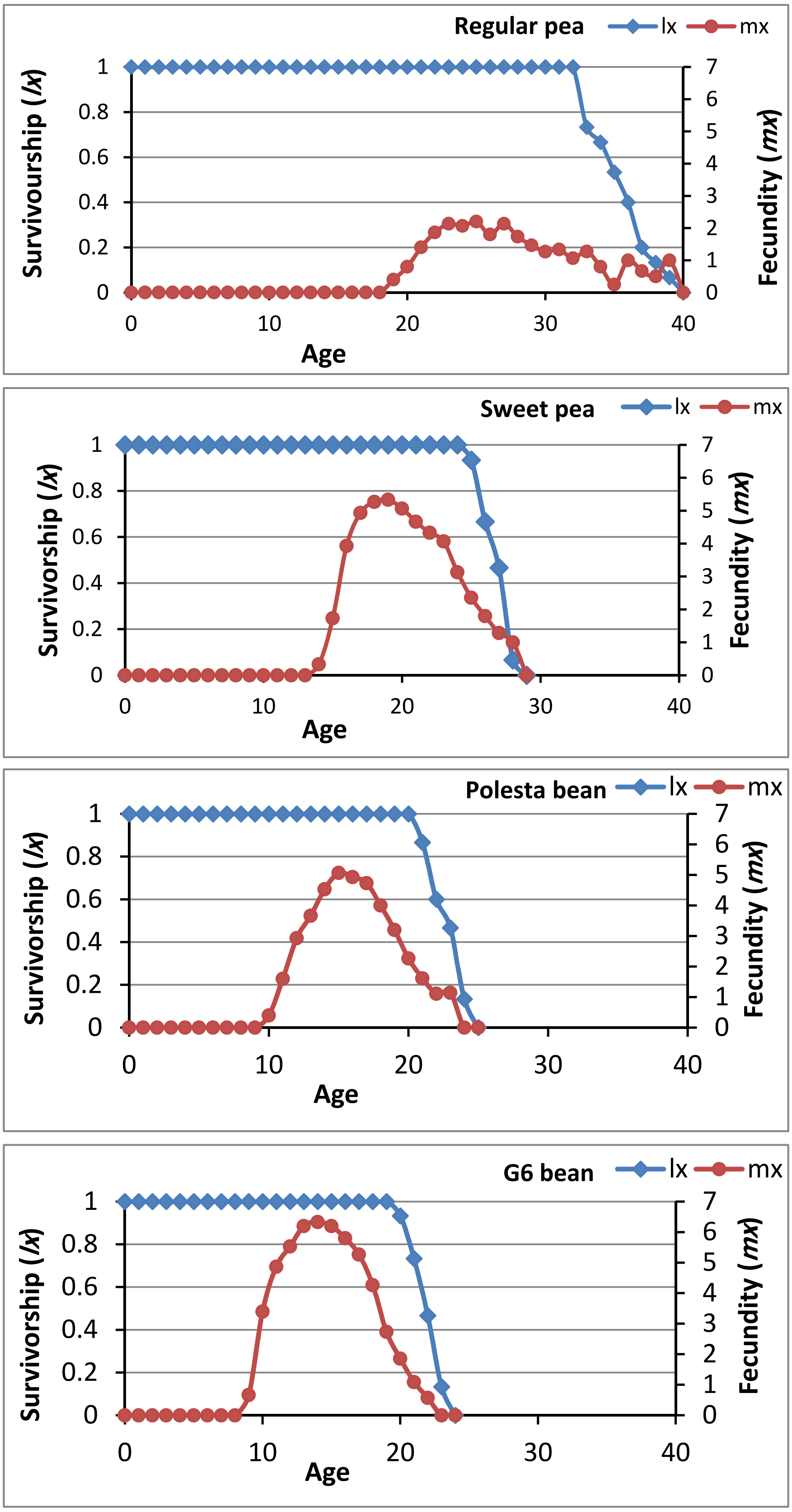

Figure 1. Age-specific fecundity (m_x) and survivorship (l_x) of *Tetranychus urticae* reared on four pea and bean cultivars at 27 + 1 °C.

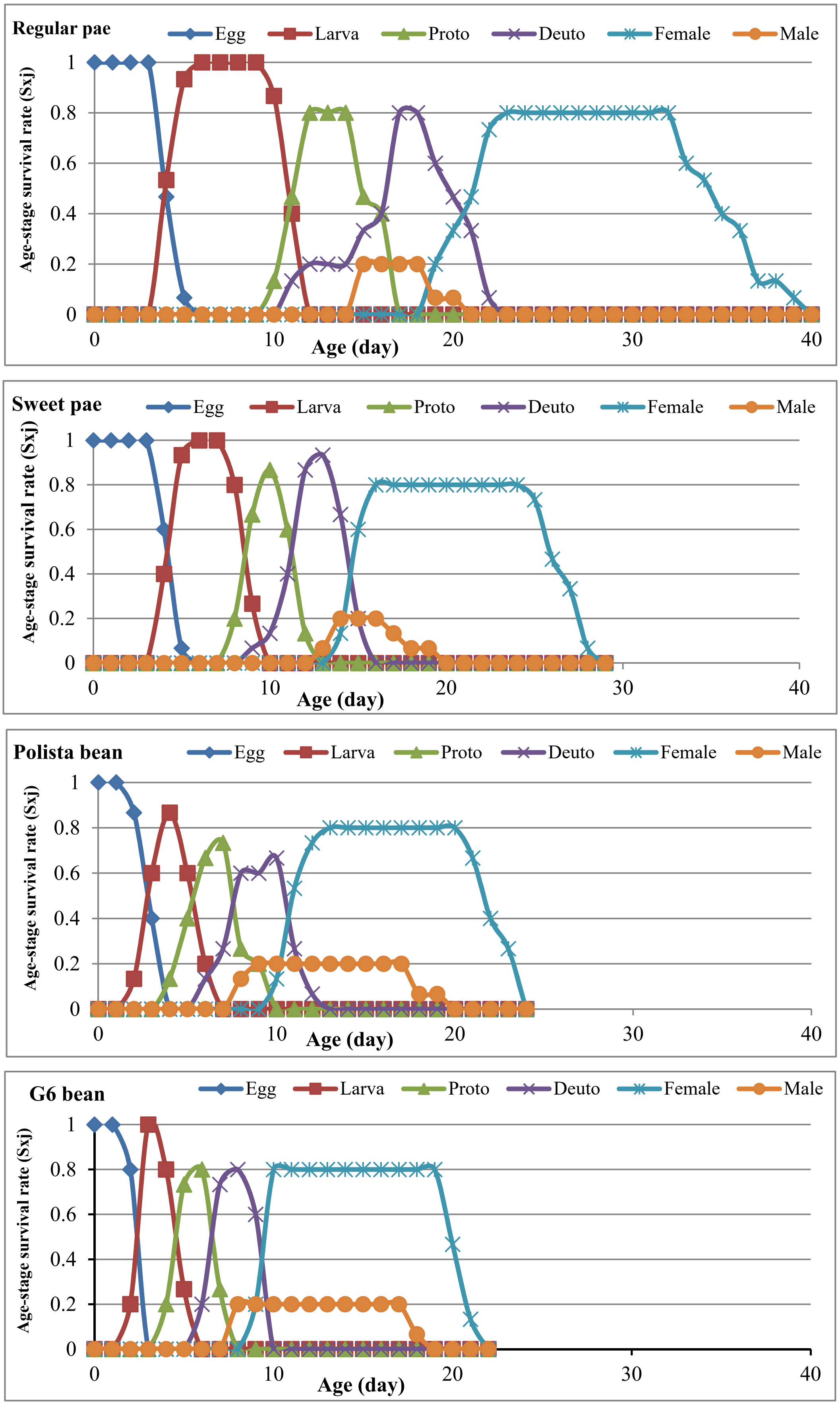

Figure 2. Age-stage survival rate (S_{xj}) of *Tetranychus urticae* reared on two pea and two bean cultivars.

DISCUSSION

Our study showed that *T. urticae* could survive successfully and complete its development on four vegetable crops, pea and bean cultivars, and these plants significantly affected its development, reproduction and life table parameters ($p < 0.05$). In this work, the required time for immature development for adult female *T. urticae* varied from 9.75 to 20.42 days at 27 °C on pea and bean cultivars, which are similar to those obtained by other authors (Krips *et al*. 1998; Razmjou *et al*. 2009; Golizadeh *et al*. 2017) while with the same spider mite species, mean duration of developmental stages of *T. urticae* were 9.12 days on bean leaves at 25 °C (Razmjou *et al*. 2009); 10.00 days at 25 °C on pear leaves (Abdel-Wahed and El-Halawany 2012); 27.25 to 38.90 days at 24 °C on different rose cultivars (Golizadeh *et al*. 2017). Also, developmental times of females of *T. urticae* were 12.00 to 24.74 days on six bean cultivars at 27 °C (Modarres Najafabadi and Zamani 2013); 11.40 to 17.00 days on eight cultivars of ornamental Gerbera crops at 20–30 °C (Krips *et al*. 1998) and 9.20, 9.40 and 9.10 days at 25 °C on soybean, cowpea and bean cultivars, respectively (Razmjou *et al.* 2009). It was recognized that the different host plant quality, maybe due to its chemical composition such as nitrogen, phosphorus, and potassium, can affect biological aspects and life table parameters of their herbivores through, impairing growth, increasing mortality and reducing reproduction rate (Price *et al*. 1980; Crooker 1985). For example, the presence of peroxides and polyphenol induced by leaf injury has been recorded to provide resistance of host plant against the phytophagous mite *T. urticae* (Steinite and Ievinsh 2002). Also, volatile chemicals produced from trichomes of the host plants are reported to play an important role in the protection of host plants against herbivores, which ultimately affects the survival and other parameters of herbivores (Bensoussan *et al.* 2016). Adult longevity and daily rate of oviposition of *T. urticae* were significantly influenced by the four pea and bean host plants, and were close to those recorded for the same mite species on rose cultivars (Golizadeh *et al*. 2017). In this study, the females of *T. urticae* reared on bean cultivars showed the highest fecundity, and this suggests that their quality of nutritional content was more adequate for *T. urticae* than pea cultivars. Different reproduction rates have been reported for *T. urticae* on various soybean cultivars (Sedaratian *et al*. 2010), eggplant cultivars (Khanamani *et al*. 2012), cucumber (Maleknia *et al.* 2016) various rose cultivars (Golizadeh *et al.* 2017), ornamental crop Gerbera (Krips *et al*. 1998), bean varieties (Fathipour *et al*. 2006; Ahmadi *et al.* 2007), various leguminous plants (Razmjou *et al.* 2009) and bean cultivars (Modarres Najafabadi and Zamani 2013). Presumably, movable stages of *T. urticae* feeding on nutritionally poor plants can reflect lower fecundity (Verkerk and Wright 1996; Sarfraz *et al*. 2007). However, total fecundity was higher on bean than pea cultivars. The larger quantity of eggs and shorter developmental times were noted on G6 bean, maybe due to its higher nitrogen content in comparison with Regular pea cultivars; similarly, higher nitrogen content induces faster development and higher egg production in the phytophagous mite *Panonychus ulmi* (Crooker 1985). Besides, the type of the host plant rearing method, morphological characters as well as the source of *T. urticae* may affect the survival and reproduction of this mite. The net reproductive rate (R_0) and the intrinsic rate of natural increase (r_m) are important factors to estimate the level of plant resistance and tetranychid population dynamics (Sabelis 1985; Krips *et al*. 1998; Golizadeh *et al*. 2017). In the present work, pea and bean cultivars greatly affected fecundity and life table parameters of *T. urticae* (Tables 2, 3). Furthermore, the (r_m) value is an important factor to evaluate the performance of herbivores on various host plants, because it reflects many parameters such as survival, development, and reproduction (Southwood 1978). The significant differences in (r_m) values showed extensive variation among pea and bean cultivars maybe due to the suitability of its host plants for rearing *T. urticae*. Our results showed that (r_m) value was highest ($r_m = 0.27$ on G6 bean, but it was lowest on ($r_m = 0.12$) on Regular pea cultivars. This difference is due to short developmental time, high egg production for *T. urticae* on G6 bean cultivars. So, it is suggested that Regular pea cultivars are less suitable for *T. urticae*. These values are close to Modarres Najafabadi and Zamani (2013) who reported that the Red Akhtar bean cultivar was the most suitable host plant ($r_m = 0.269$), but the White Pak bean was not a suitable host ($r_m = 0.129$) for *T. urticae*. The r_m value for *T. urticae* ranged from 0.129 to 0.33 on various host plants, and on common bean cultivars, (r_m) value varied from 0.038 to 0.142, (Sabelis 1985, 1991). Additionally, the r_m values on soybean, cowpea and bean cultivars were 0.296, 0.242 and 0.230 for *T. urticae*, respectively (Razmjou *et al*. 2009), 0.159 to 0.235 on whole bean cultivars (Kavousi *et al*. 2009) and 0.423 on bean leaves (Bayu *et al*. 2017). These differences among different cultivars may be related to feeding inhibitions, such as nutritional value, morphological and physiological characters of host plants (Kafil *et al*. 2007). The same situation may affect the mean generation time (T), where Golizadeh *et al.* (2017) found values varied from 14.39 to 21.20 days on various rose cultivars; similar to our results. The higher net reproductive rate (R_0) and shorter doubling time (DT) of *T. urticae* on G6 and Polesta bean cultivars may explain why this mite achieved the highest reproduction on bean than other host plants. The variations in life table parameters were probably a function of different host plants taken up at the movable stages of the adult females. The lower performance of some host cultivars may be affected by the absence of primary essential nutrients for survival and development of *T. urticae* or the presence of secondary metabolites that affect the development and fecundity of the mite (Sabelis 1985; Khanamani *et al*. 2012). In conclusion, population density and fecundity of *T. urticae* depend on the type of host plants. Life table parameters of this mite were higher on G6 and Polesta bean than on the two pea cultivars, which indicated that G6 and Polesta beans are more suitable for *T. urticae* than Regular and Sweet pea cultivars suggesting that they are more resistant to the two-spotted spider mites. This differential suitability of different host plants to *T. urticae* is an important factor to consider while exploring management solutions for *T. urticae*. Furthermore, experiments on the effects of biotic and abiotic factors, such as environmental conditions, secondary metabolites of *T. urticae*, should be conducted to evaluate the main factors responsible for changes in growth parameters. Therefore, this mite may be able to quickly create a large and damaging population on bean cultivars, and this feature must be considered by growers in implementing IPM programs for *T. urticae*.

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زیست‌شناسی و تجزیه و تحلیل جدول زیستی *Tetranychus urticae* (Acari: Tetranychidae) روی رقم‌های مختلف معمولی نخود فرنگی و لوبیا

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چکیده

کیفیت گیاهان میزبان مهم بر زنده‌مانی، رشد، و تکثیر کنهٔ تارتن دو لکه‌ای، *Tetranychus urticae* Koch تأثیر می‌گذارد. زیست‌شناسی و آماره‌های جدول زیستی *T. urticae* روی چهار رقم معمولی نخود فرنگی و گل نخود و لوبیای پولستا و جی۶ در شرایط آزمایشگاهی ۲۷ ± ۱ درجهٔ سلسیوس و رطوبت نسبی ۶۰–۸۰ درصد و دورهٔ نوری ۱۶ ساعت تاریکی: ۸ ساعت روشنایی بررسی شدند. نرها و ماده‌های *T. urticae* به طور موفقیت‌آمیزی از تخم تا کنهٔ کامل روی گیاهان میزبان مختلف رشد کردند. نتایج نشان داد که میزان زنده‌مانی از ۵۳٪ روی نخود فرنگی تا ۹۹٪ روی لوبیای رقم جی۶ متفاوت بود. زمان رشد از تخم تا کنهٔ کامل به طورمعنی‌داری تحت تأثیر رقم‌های گیاهان میزبان مورد آزمایش بود و از ۹/۷۵ روز روی رقم لوبیای جی۶ تا ۲۰/۴۲ روز روی نخود فرنگی متغیر بود ($p = 0.00$). طول عمر ماده‌ها روی نخود فرنگی و گل نخود از لوبیای پولستا و جی۶ به طور معنی‌داری بیشتر بود. بیشترین بارآوری به ازای هر ماده روی لوبیای جی۶ اما کمترین بارآوری روی نخود فرنگی ثبت شد. در نتیجه، آماره‌های رشد جمعیت نیز به طور معنی‌داری تحت تأثیر گیاهان میزبان مختلف قرار گرفتند. میزان خالص تولیدمثل (R_0)، میزان ذاتی افزایش طبیعی (r)، میزان متناهی رشد (λ) کنهٔ تارتن دو لکه‌ای روی لوبیای جی۶ به طور معنی‌داری از سه رقم دیگر بیشتر بود. همچنین بیشترین میانگین طول نسل (T) و زمان دو برابر شدن جمعیت (DT) روی نخود فرنگی ثبت شد اما کمترین آنها روی رقم‌های جی۶ و پولستای لوبیا دیده شد. نتایج به دست آمده بر اساس میزان ذاتی افزایش طبیعی نشان داد که لوبیای جی۶ و پولستا به عنوان میزبان نسبت به دو رقم نخود برای *T. urticae* مناسب‌ترند. بنابراین، رشد کمتر *T. urticae* در نتیجهٔ مقاومت آنتی‌بیوزی رقم‌های نخود فرنگی و گل نخود است.

واژگان کلیدی: رقم‌های لوبیا؛ زیست‌شناسی؛ کنهٔ تارتن دولکه‌ای؛ آرایه‌های رشد؛ رقم‌های نخود.

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