# Bottom-up Effect of Two Host Plants on Life Table Parameters of *Aphis gossypii* (Hemiptera: Aphididae)

Z. Tazerouni<sup>1</sup>, A. A. Talebi<sup>1\*</sup>, Y. Fathipour<sup>1</sup>, and M. Soufbaf<sup>2</sup>

## ABSTRACT

Aphis gossypii Glover is one of the most important pests of greenhouse cucumber and pepper in the world and Iran. In this research, life table and biology of A. gossypii were investigated on cucumber (Cucumis sativus cv. Super Sultan) and pepper (Capsicum annum cv. Marqueza) in a growth chamber at 25±1°C and 60±5% RH and a photoperiod of 14 L: 10 D hour. The results showed that developmental time of A. gossypü on pepper was significantly longer than that on cucumber. The survival rates of A. gossypii on cucumber and pepper were significantly different based on Kolmogrov-Smirnov test results. The survival rates  $(l_x)$  at the beginning of female emergence were 94 and 66% on cucumber and pepper, respectively. Life expectancy  $(e_x)$  of the newly-born nymphs of A. gossypii were obtained as 26.37 and 14.4 days on cucumber and pepper, respectively. The highest age-specific daily fecundity of A. gossypii was at the 5<sup>th</sup> and 6<sup>th</sup> days of female adult age on cucumber and from first to 4th days of female adult life on pepper. Furthermore, two mathematical models (Analytis and Enkegaard) were fitted to agespecific fecundity data (m<sub>x</sub>). Adult longevity of A. gossypii on cucumber was significantly higher than that on pepper. The  $R_0$ ,  $r_m$  and  $\lambda$ -values of A. gossypii on cucumber were significantly higher than those on pepper. The cotton aphid exhibited longer mean generation time (T) on pepper than that on cucumber. According to the growth index and life table statistics, cucumber was the suitable host plant for A. gossypii.

Keywords: Aphid, Cucumber, Demography, Iran, Pepper.

#### INTRODUCTION

Cucumber, Cucumis sativus L. (Cucurbitaceae), and pepper, Capsicum annum L. (Solanaceae) are the most important vegetables in most regions of the world (Trdan et al., 2007; Laznik et al., 2011). Aphids are an extremely successful group of insects which occur throughout the world, with the greatest number of species in the temperate regions (Zanić et al., 2013). Glover (Hemiptera: Aphis gossypii Aphididae) is a major economic pest that attack greenhouse vegetable crops (van Lenteren and Woets, 1988; van Steenis,

1993) throughout the world and Iran (van Steenis, 1992; Baniameri and Nasrollahi, 2003). This aphid damages crop plants directly by sucking plant sap, particularly when its population is high and indirectly by transmission of plant viruses (Dixon, 1973; Agrios, 1988; Matthews, 1991). Several plant viruses transmitted by *A. gossypii* may impart economically important damages on vegetable crops including *Cucumber Mosaic Virus* (CMV), *Potato Virus Y* (PVY), *Tobacco Etch Virus* (TEV), *Papaya Ringspot Virus-Type W* (PRV-W) and *Zucchini Yellow Mosaic Virus* (ZYMV) (Kennedy *et al.*, 1962; Pinto *et al.*, 2008).

<sup>&</sup>lt;sup>1</sup> Deparment of Entomology, College of Agriculture, Tarbiat Modares University, P. O. Box: 14115-336, Tehran, Islamic Republic of Iran.

<sup>\*</sup> Corresponding author; e-mail: talebia@modares.ac.ir

<sup>&</sup>lt;sup>2</sup> Agricultural, Medical and Industrial Research School, P. O. Box: 31485/498, Karaj, Islamic Republic of Iran.

Life table studies provide basic crucial information for population ecology and pest management. Life table gives the most comprehensive description of birth, survival rate, death, reproduction and finally population growth capacity of an insect (Southwood and Henderson, 2000).

The biology of cotton aphid, A. gossypii has been studied on cucumber (Negin variety) (Zamani al., 2006: et Takalloozadeh, 2010) and pepper (Kandil Dolma variety) (Satar et al., 2008). Several studies have also been performed to measure the potential of coccinellid predators in suppressing Α. gossypii populations (Kianpour et al., 2010; Davoodi Dehkordi and Sahragard, 2013). However, the life table parameters of cotton aphid on cucumber (Super Sultan variety) and pepper (Marqueza variety) as newly common varieties of cucumber and pepper in greenhouses in Iran were not studied. Thus, the main objective of this study was to determine the effect of host plant on survival. development, longevity, reproduction and population growth parameters of A. gossypii.

## MATERIAL AND METHODS

## **Insect and Plant Culturing**

A. gossypii was collected on greenhousegrown cucumber in the College of Agriculture, Tarbiat Modares University in Tehran, Iran, in December 2012. Aphids were colonized separately on *Cu. sativus cv.* Super Sultan and *Ca. annum cv.* Marqueza in growth chamber at  $25\pm1^{\circ}$ C, relative humidity of  $60\pm5\%$  and a photoperiod of 14 L: 10 D hour. The cotton aphid clone reared in laboratory conditions for several generations (3 months) was used in the experiments (Kindlmann and Dixon, 1989). Seedlings of cucumber and pepper were planted in a mixture of sand (25%), clay (25%), perlit (25%) and manure (25%) in 25 cm pots.

#### **Experimental Design**

To studyidemographic parameters of cotton aphid on cucumber, a wingless female of A. gossypii was randomly selected from the stock culture transferred individually on cucumber leaf with 50 mm diameter on a layer of wet cotton wool in plastic container (75×60×40 mm). The container was covered with micromesh for ventilation. After 24 hours, adult females of A. gossypii were removed and only one newly-born nymph was maintained in each leaf disc. The nymphs on each leaf disc was checked daily and their survival recorded. The presence of the discarded exuviate was used to determine time of molting. When the immature nymphs changed into adults, they were observed daily for reproduction and survival and all new-born nymphs were counted and removed from each leaf cage. The observations continued until the death of all examined aphids. To reduce the effects of plant age on aphid development and survivorship, the cotton wool in the container was moistened daily and aphids were transferred every 5 days on a new cucumber leaf disc (McCornack et al., 2004). The experiment was replicated 150 times.

Life table parameters of cotton aphid were also investigated on pepper leaf discs similar to method explained earlier.

### Assessment of Trichome

To investigate the presence or absence of trichome on cucumber and pepper leaves, the lower surface of cucumber and pepper leaves was used, because *A. gossypii* preferred to feed on the lower surface of the host plants. Images of the lower of surface of leaves were taken with an Olympus TM SZX9 stereomicroscope equipped with a Sony CCD digital camera.

## **Age-specific Fecundity Models**

Age-specific fecundity  $(m_x)$  was fitted to both Analytis (Analytis, 1977) [Equation (1)] and Enkegaard (Enkegaard, 1993) [Equation (2)] models:

$$m_x = p(x - x_{\min})^n \times (x_{\max} - x)^m$$
(1)  
$$m_x = (a + bx) \times \exp[-(c + dx)]$$
(2)

Where, x is the female age (day). Estimated parameters of non-linear models including  $x_{min}$ ,  $x_{max}$ , p, n, m, a, b, c and d were determined using JMP software (SAS The coefficient Institute, 2007). of determination  $(\mathbf{R}^2)$  and adjusted coefficient of nonlinear regression  $(R^2_{adj})$  were used to assess the goodness of fit of each model. AIC (Akaike Information Criterion) (Akaike, 1974) and BIC (Bayesian Information Criterion) (Schwarz, 1978) are other goodness-of-fit parameters that were calculated by the following equations (Vucetich et al., 2002):

 $AIC = n \times \ln(SSE/n) + 2p$ 

 $BIC = n \times \ln(SSE/n) + (p \times \ln(n))$ 

Where, n is the number of days of female age, p is the number of parameters estimated in each model and the *SSE* is the sum of squared error.

#### **Statistical Analyses**

The life table parameters including the survival rate  $(l_x)$ , life expectancy  $(e_x)$ , entropy parameter (H), net reproductive rate (R<sub>0</sub>), intrinsic rate of increase  $(r_m)$ , finite rate of increase  $(\lambda)$ , mean generation time (T) and Doubling Time (DT) were calculated using the formulas suggested by Birch (1948), Southwood and Henderson (2000) and Carey (1993, 2001) as follows:

$$l_{x} = \frac{N_{x}}{N_{0}}$$

$$e_{x} = \frac{T_{x}}{l_{x}}$$

$$H = \frac{\sum_{x=0}^{\infty} e_{x} d_{x}}{e_{0}}$$

$$d_{x} = l_{x} - l_{x+1}$$

$$R_{0} = \sum_{x=\alpha}^{\beta} l_{x} m_{x}$$

$$1 = \sum_{x=1}^{\omega} e^{-rx} l_x m_x$$
$$\lambda = e^r$$
$$T = \frac{\ln R_0}{r}$$
$$DT = \frac{\ln 2}{r}$$

Where, x is the age in days,  $N_x$  is number alive at age x,  $N_0$  is the initial number of individuals in the cohort,  $T_x$  is the number of time units lived by the cohort from age xuntil the death of all cohort individuals, e is the base of natural logarithm,  $\beta$  is the maximum age among *n* individuals,  $\alpha$  is the pre-imaginal development time and  $m_x$  is the age-specific number of female offspring. If *H* is < 0.5, = 0.5 or > 0.5, the survival schedule would be convex, linear and concave, respectively. If H= 0, then all deaths occur at exactly the same age and if H= 1, then the shape of survival schedule would be exponentially declining. Age specific survival rates  $(l_x)$  of A. gossypii on cucumber and pepper were compared by Kolmogorove-Smirnove test (P< 0.05) (Pyke and Thomson, 1986).

To estimate the variance for  $r_m$  and other population growth parameters, the jackknife method was used (Meyer *et al.*, 1986). In this method, the pseudo-value for each parameter such as  $r_{m(i)}$  was estimated by using the following equation (Maia *et al.*, 2000):

PSV  $r_{m(i)}$ = ]( $n \times r_{m(all)}$ )-(n-1)]× $r_{m(i)}$ 

Where,  $r_{m(i)}$  is the value for (n-1) females. The mean values of Jackknife pseudo-values for two host plants (cucumber and pepper) were subjected to analysis of *t*-test. Similar procedures were used for other population growth parameters.

Statistical analysis was carried out using SAS (SAS Institute, 2003). The differences in population growth parameters of cotton aphid on cucumber and pepper were compared using *t*-test ( $P_{value} < 0.05$ ) using SPSS 18 (SPSS, 2009).

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## RESULTS

#### **Developmental Time**

The duration of the different nymphal instars of A. gossypii on the two host plants are presented in Table 1. Host plant significantly affected aphid nymphal developmental time. The developmental time of A. gossypii on pepper was significantly slower than that on cucumber (t= -5.454, df= 99.118, P< 0.05). Significant differences were found among the duration of first (t= -6.020, df= 269.907, P< 0.05), second (t= -4.589, df= 143.924, P< 0.05), third (t= -4.050, df= 104.151, P< 0.05) and fourth (t= -2.321, df= 100.506, P< 0.05) nymphal instar periods.

## Age-specific Survival Rate, Entropy Parameter and Life Expectancy

The age-specific survival rate of A. gossypii on cucumber and pepper was compared using Kolmogrov-Smirnov test (P < 0.05). The survival rates of A. gossypii on cucumber and pepper were significantly different (Z= 4.761, P< 0.001) (Figure 1-a). The survival of A. gossypii at the time of female emergence was 94 and 66% on cucumber and pepper, respectively. Survivorship of aphid decreased more quickly to zero on pepper. The maximum mortality in immature stages of A. gossypii on cucumber and pepper were observed during second (2.7%) and first (30.7%)nymphal instars, respectively.

The entropy (H) of *A. gossypii* on cucumber and pepper were 0.266 and 0.628,

respectively. These results suggested that the survival schedule of *A. gossypii* was convex (H< 0.5) on cucumber and concave (H> 0.5) on pepper and corresponds to Deevey's type I and III survivorship curves on cucumber and pepper, respectively.

Life expectancy  $(e_x)$  of *A. gossypii* was obtained as 26.37 and 14.4 days on cucumber and pepper, respectively at the beginning of life (Figure 1-b). The life expectancy of newly emerged adults of *A. gossypii* was estimated to be 23.92 and 16.08 days on cucumber and pepper, respectively.

## **Adult Longevity and Fecundity**

The pre-nymphipositional period of A. gossypii was not affected significantly by the host plant (t= -1.948, df= 89.609, P> 0.05) (Table 2). The nymphipositional period is defined as the number of days from the first to last birth per mother aphid and *t*-test showed a difference significant between nymphipositional period of A. gossypii on cucumber and pepper (t= 2.404, df= 187.868, P< 0.05). The values of post-nymphipositional period and adult longevity of A. gossypii on cucumber were higher than those on pepper (t= 11.912, df= 158.929, P< 0.05; t= 8.408, df= 192.105, P< 0.05).

Figure 2 shows the age-specific fecundity  $(m_x)$  curves of *A. gossypii* on cucumber and pepper. These curves revealed that the age-specific fecundity schedule fluctuated throughout the nymphipositional period. The results showed that the highest efficiency of *A. gossypii* to produce offspring on cucumber was at 5<sup>th</sup> and 6<sup>th</sup> days of adult female age, while it was highest from first to 4<sup>th</sup> days of

**Table 1.** The mean  $(\pm SE)$  duration (days) of different nymphal instars of *Aphis gossypii* on two host plants.<sup>*a*</sup>

_	Life stages				
Host plant	1 <sup>st</sup> instar	2 <sup>nd</sup> instar	3 <sup>rd</sup> instar	4 <sup>th</sup> instar	Pre-immaginal period
Cucumber	$1.28 \pm 0.038^{b}$	$1.09 \pm 0.024^{b}$	$1.05 \pm 0.018^{b}$	$1.04 \pm 0.017^{b}$	$4.48 \pm 0.046^{b}$
Pepper	$1.68 \pm 0.054^{a}$	$1.36\pm0.054^{a}$	$1.28\pm0.054^{a}$	$1.15\pm0.044^{a}$	5.20±0.125 <sup>a</sup>

<sup>*a*</sup> Means in the same column followed by the same letters do not differ significantly (P< 0.05) by the *t-test*.



**Figure 1.** Age-specific survival rate  $(l_x)$  (a) and life expectancy  $(e_x)$  (b) of *Aphis gossypii* on cucumber and pepper.

growth parameters of cotton aphid are

listed in Table 4. The net reproductive rate

 $(R_0)$  was obtained to be 80.61 and 13.21

(female offspring) on cucumber and pepper, respectively. The  $R_0$ -value of A.

gossypii on cucumber was significantly

higher than that on pepper (t=31.224, df=

164.068, P< 0.01).

adult life on pepper. Furthermore, Analytis and Enkegaard models fitted well the age-specific fecundity of cotton aphid on cucumber and pepper (Figure 2). The parameters of these models and the values of fitted coefficients of evaluated models for describing cotton aphid age-specific fecundity are shown in Table 3.

#### **Life Table Parameters**

Effects of host plant on population

**Table 2.** Adult longevity and reproductive period (days±SE) for females of *Aphis gossypii* on two host plants.<sup>*a*</sup>

Host plant	Pre-nymphipositional	Nymphipositional	Post-nymphipositional	Adult longevity
	Period	Period	Period	
Cucumber	$0.01 \pm 0.009^{a}$	17.04±0.515 <sup>a</sup>	5.89±0.423 <sup>a</sup>	22.94±0.568 <sup>a</sup>
Pepper	$0.09 \pm 0.003^{a}$	15.19±0.569 <sup>b</sup>	$0.67 \pm 0.112^{b}$	15.95±0.608 <sup>b</sup>

<sup>*a*</sup> Means in the same column followed by the same letters do not differ significantly (P< 0.05) by the *t-test*.



Figure 2. Analytis and Enkegaard models fitted to the age-specific fecundity  $(m_x)$  of *Aphis gossypii* on cucumber (a) and pepper (b).

Table 3. Values of fitted coefficients	s, measurable parameters	and evaluation of t	wo nonlinear models to
describe age-specific fecundity of Aphi.	s gossypii on cucumber a	and pepper.	

Madal	Demomentary <sup>a</sup>	Host	plant
Widdel	Parameters -	Cucumber	Pepper
	р	$186 \times 10^{-14}$	0.0367
	$x_{min}$	4.5234	4.4998
	$x_{max}$	42.5074	40.6928
	m	0.7301	0.0047
Analytis	n	8.0049	1.1404
1 1141 9 015	$R^2$	0.964	0.814
	$R^2_{adj}$	0.960	0.785
	AIC	-35.163	-76.264
	BIC	-26.850	-69.094
	а	-35.8333	-1.9799
	b	16.7868	1.5788
	с	0.9814	0.7460
Enkegaard	d	0.2004	0.1242
-	$R^2$	0.957	0.702
	$R^2_{adj}$	0.953	0.669
	AIC	-30.603	-49.307
-	BIC	-23.949	-49.307

<sup>*a*</sup>  $R^2$ : Coefficient of determination;  $R^2_{adj}$ : Adjusted  $R^2$ ; AIC: Akaike Information Criterion, BIC: Bayesian Information Criterion.

Table 4. Effect of two host pla	lants on life table parameters	(±SE) of Aphis gossypii. <sup>a</sup>
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	Parameters					
Host plant	$R_0$	$r_m$	λ	Т	DT	$GI^{b}$
Cucumber	$80.61 \pm 2.067^{a}$	$0.493 \pm 0.008^{a}$	1.62±0.017a	$9.07 \pm 0.215^{b}$	$1.43 \pm 0.030^{b}$	$0.21\pm0.004^{a}$
Pepper	13.21±0.622 <sup>b</sup>	$0.250 \pm 0.006^{b}$	$1.28 \pm 0.008^{b}$	10.33±0.222 <sup>a</sup>	$2.77 \pm 0.070^{a}$	$0.10 \pm 0.011^{b}$

<sup>&</sup>lt;sup>*a*</sup> Same letters in the columns indicate no significant (P< 0.05) differences between host plants by the *t-test*. <sup>*b*</sup> GI (Growth Index), computed as the ratio between the percentages of adults emerged and the duration of the immature period (Ramasubramanian and Babu, 1989).



Figure 3. The lower surfaces of cucumber (a) and pepper (b) leaves.

The intrinsic rate of natural increase of A. gossypii was found to be 0.493 and 0.250  $(day^{-1})$ cucumber on and pepper, respectively, with a significant difference (t= 23.272, df= 215.967, P< 0.01). The cotton aphid exhibited longer mean generation time (T) on pepper than on cucumber (t = -4.061,df= 196.749, P< 0.01). The Growth Index (GI) on cucumber was about twice as high as on pepper (t=9.250, df= 2.393, P<0.01). Higher  $r_m$ ,  $\lambda$  (finite rate of increase) (1.62) day<sup>-1</sup>) and GI and lower T (9.07 day) and DT (Doubling Time) (1.43 day) on cucumber indicated that cucumber was a suitable host for A. gossypii (Table 4). According to the results (Table 4), the  $R_0$  and  $r_m$  parameters of A. gossypii were significantly higher on cucumber than those on pepper. To some extent, this may be attributed to foliar pubescence (trichome density) in cucumber. The trichomes of lower surfaces of cucumber and pepper leaves are shown in Figure 3.

## DISCUSSION

Host plants and temperature influence growth, survival and reproduction of insects (Bellows et al., 1992; Žnidarčič et al., 2008, 2011). The results of this research showed the obvious effect of host plant on development fecundity of Α. gossypii. and The developmental period of cotton aphid on cucumber (4.48 day) was significantly shorter than that on pepper (5.20 day). Difference in development of A. gossypii on cucumber and pepper could be due to leaf trichome density and secondary metabolites (Dixon, 1998; Zarpas et al., 2006). The results of this study showed that trichomes as a physical factor on cucumber leaves are correlated with higher rates of aphid reproduction. Several studies have shown that the effect of trichomes on herbivores may be positive; for example, McAuslane (1996) reported that Bemisia tabaci (Gennadius) significantly laid more eggs on pubescent soybean than on glabrous soybean. Also the research done by Srinivasan and Uthamasamy (2005) showed that the influence of trichomes in tomato leaves was correlated with the possible resistance to Helicoverpa armigera (Hübner) and B. tabaci. Oriani and Vendramim (2010) explained that ovipositional preference of B. tabaci for tomato can associated with trichomes density on the leaves of different genotypes. The number of aphid [Sipha maydis (Passerini)] on Pishtaz (wheat cultivar) was significantly greater than that on other cultivars at 48 h after infestation, because Pishtaz had the maximum density of trichomes compared to the other cultivars (Gholami Moghadam et al., 2013).

The negative effect of trichomes on ovipositional preference, eggs laid and number of herbivores were reported by Eisner et al., 1998; Khan et al., 2000; Lam and Pedigo, 2001; Pompon et al., 2010 and Žnidarčič et al., 2008, 2011. Differences in the effect of trichomes on herbivores may be related to pest species. The percentage of nymphal mortality of A. gossypii on cucumber in this research was 6%. The survival data of cotton aphid in this study is partially close to Zamani et al. (2006). In the present research, percentage nymphal mortality of A. gossypii on pepper was 34% while Satar et al. (2008) reported that the survival rate of A. gossypii at the beginning of adult emergence on pepper was 100%. In this research, the entropy parameter of A. gossypii was lower and higher than 0.5 on cucumber and pepper, respectively. Our findings showed that maximum death probability of A. gossypii on cucumber was in older ages compared with early ones, while the death probability of cotton aphid on pepper was higher in earlier ages. These findings are in agreement with the survival curves (Figure 1-a). The Analytis and Enkegaard models are frequently fitted to age-specific fecundity (Kontodimas et al., 2007). These models gave a satisfactory fit to observed data on cucumber and pepper indicated by high values of  $R^2_{adi}$ (Table 3). The results showed that the agespecific fecundity data of A. gossypii on the two host plants fitted better with Analytis than

Enkegaard model based on *AIC*, *BIC* and successful convergence (Table 3). However, it seems that the Enkegaard model slightly underestimates the peak of age-specific fecundity of *A. gossypii* on cucumber and pepper (Figure 2). In addition, the end of nymphipositional period of *A. gossypii* on pepper was predicted longer than the observed data by Enkegaard model (Figure 2).

The estimated  $R_0$  value of cotton aphid on cucumber in the current study was 80.61 female offspring. The net reproductive rate of A. gossypii on cucumber (Negin variety) was 57.07 (Zamani et al., 2006), which is lower than that obtained in the current study. Takalloozadeh (2010) obtained net fecundity rate of A. gossypii 61.201 and 46.096 on cucumber and cotton, respectively. In this research, net fecundity rate of A. gossypii on pepper was 13.21 female offspring, while Satar et al. (2008) found 60.76 female offspring. The  $r_m$  is the most important parameter for describing the growth potential of a population under given climatic and food conditions as this parameter reflects an overall effect on development, fecundity and survival (Southwood and Handerson, 2000). Other researchers have reported the  $r_m$  values of A. gossypii from 0.129 to 0.482 depending on temperature and host plant (Komazaki, 1982; Shi, 1985; Satar et al., 1998, 1999, 2008; Kersting et al. 1999; Xia et al. 1999; Razmjou et al. 2006; Zamani et al. 2006; Rahman et al., 2009; Takalloozadeh, 2010). In this study, the  $r_m$  of aphid populations reared on cucumber was (0.493 day<sup>-1</sup>) greater compared with those obtained in other researches. But the  $r_m$ -value of A. gossypii reared on pepper in the current study (0.250 day<sup>-1</sup>) obviously falls within this range.

There are differences between biological characteristics and life table parameters of cotton aphid on cucumber and pepper obtained here and those data reported in other researches (Razmjou *et al.*, 2006; Zamani *et al.*, 2006; Satar *et al.*, 2008; Rahman *et al.*, 2009; Takolloozadeh, 2010). These differences may be related to variations in geographic populations involved, methodology and cultivars used. Plant species

differ greatly in suitability as hosts for specific insects when measured in terms of survival, development and reproductive rates of the pest. Shorter development times and greater total reproduction of insects on a host plant indicate greater suitability (van Lenteren and Noldus 1990). Also, significant differences were observed in the performance of A. gossypii on cucumber and pepper. It can be concluded that cucumber was a suitable host for A. gossypii based on the fast development and the high intrinsic rate of increase. further physiological However, and biochemical investigations are required to better understand bottom-up effects of mentioned host plants on the life history of A. gossypii.

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ز. تازرونی، ع. ا. طالبی، ی. فتحی پور، و م. سوف باف

## چکیدہ

شته Aphis gossypii Glover یکی از مهمترین آفات خیار و فلفل گلخانهای در ایران و جهان است. در این تحقیق ویژگیهای زیستی و یارامترهای جدول زندگی شته A. gossypii روی گیاه خیار، Cucumis sativus، رقم سوپر سلطان و گیاه فلفل، Capsicum annum، رقم مارکوئزا در اتاقک رشد با شرایط دمایی ۱±۲۵درجه سلسیوس، رطوبت نسبی ٪۵±۶۰ و دوره نوری ۱۴: ۱۰ (روشنایی : تاریکی) ساعت انجام شد. نتایج نشان داد طول دوره قبل از بلوغ شته A. gossypii روی گیاه فلفل نسبت به گیاه خیار با اختلاف معنیداری بیشتر است. آزمون Kolmogrov-Smirnov نشان داد، نرخ بقا شته A. gossypii روی دو گیاه خیار و فلفل اختلاف معنی داری دارد. نرخ بقا (l\_x) در زمان ظهور افراد ماده روی گیاه خیار و فلفل به ترتیب ۹۴٪ و ۶۶٪ بود. امید به زندگی (e<sub>x</sub>) یورههای تازه ظاهر شده شته A. gossypii روی گیاه خیار ۲۶/۳۷ روز و روی گیاه فلفل ۱۴/۴ روز به دست آمد. بیشترین میزان نرخ باروری روزانه شته A. gossypii روی گیاه خیار در افراد ماده ۵ و ۶ روزه و روی گیاه فلفل در ماده هایی که بین سنین یک تا ۴ روزه بودند مشاهده شد. همچنین مقادیر نرخ باروری روزانه (m<sub>x</sub>) این شته با دو مدل ریاضی (Analytis و Enkegaard) برازش داده شدند. طول عمر افراد ماده بالغ شته A. gossypii روی گیاه خیار با اختلاف معنی داری نسبت به گیاه فلفل بیشتر بود. مقادیر r<sub>m</sub> ،R<sub>0</sub> و λ شته A. gossypii روی گیاه خیار با اختلاف معنی داری نسبت گیاه فلفل بیشتر بود. ميانگين مدت زمان هر نسل (T) شته جاليز روي گياه فلفل به طور معنى داري نسبت به گياه خيار بیشتر بود. با توجه به شاخص رشد و یارامترهای جدول زندگی، گیاه خیار نسبت به فلفل میزبان مناسب-تری برای شته A. gossypii است.