Provided for non-commercial research and education use.
Not for reproduction, distribution or commercial use.

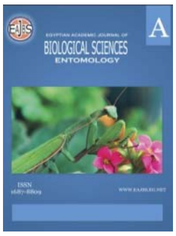
Egyptian Academic Journal of Biological Sciences is the official English language journal of the Egyptian Society for Biological Sciences, Department of Entomology, Faculty of Sciences Ain Shams University.
Entomology Journal publishes original research papers and reviews from any entomological discipline or from directly allied fields in ecology, behavioral biology, physiology, biochemistry, development, genetics, systematics, morphology, evolution, control of insects, arachnids, and general entomology.
www.eajbs.eg.net

Citation: *Egypt. Acad. J. Biolog. Sci. (A. Entomology) Vol. 10(3)pp: 9- 16 (2017)*

Egypt. Acad. J. Biolog. Sci., 10(3): 9–16 (2017)

Egyptian Academic Journal of Biological Sciences
A. Entomology

ISSN 1687- 8809
www.eajbs.eg.net



Temperature-Based Life History and Life Table Parameters of the Two Spotted-Spider Mite (Acari: Tetranychidae) on White Frangipani

Reham I. A. Abo-Shnaf
Vegetable and Aromatic Plant Mites Department, Plant Protection Research Institute, Agricultural Research Centre, Dokii, Giza, Egypt
E-mail: riamaboshnaf@yahoo.com

ARTICLE INFO
Article History
Received:10/3/2017
Accepted:20/4/2017

Keywords:
Tetranychus urticae
Developmental rate
Survivorship
Reproduction
Plumeria alba
Egypt

ABSTRACT

The effect of three constant temperatures on life history and life table parameters of the two spotted-spider mite, *Tetranychus urticae* Koch on White Frangipani (*Plumeria alba*) leaves was estimated under laboratory conditions. The two spotted-spider mite was reared on units made of *P. alba* leaves at 20, 25 and 30±2 °C and 70±5% relative humidity. Mites successfully completed their development and reproduced at all tested temperatures, where the developmental time, oviposition period, adult longevity and life span decreased with increasing temperatures, while daily oviposition rate and fecundity increased with increasing temperatures. The high reproduction rate of 106.00 eggs/ female suggested that the high temperature degree (30ºC) was assessed to be one of the best degrees to help the individuals to perform and oviposit faster in regard to the acceleration of life cycle period to 6.03 and 4.63 days respectively in female and male. The results indicated that *T. urticae* had a wide range of temperature for its development, however, the highest intrinsic rate of natural increase (r_m = 0.3057) occurred at 30 ºC, where the population increased fastest at this temperature.

INTRODUCTION

White Frangipani or Milk Tree, *Plumeria alba* L. (Family: Apocynaceae) is well-known for its intensely fragrant, lovely, spiral-shaped blooms as white flowers with yellow centers. It is an important plant for many medicine usages (Radha *et al*., 2008). The leaves are attacked by the two-spotted spider mite, *Tetranychus urticae* Koch (Acari: Tetranychidae), in early season and the plant growth shows deformed leaves, abnormally formed bloom clusters, blistered tissue, necrotic spots on leaves, leaf drop, or shoot tip dieback. If left unchecked, spider mites will damage and stunt plant growth. Members of the family Tetranychidae are plant feeders that cause considerable injury to agricultural crops. They infest field and truck crops, fruit trees, ornamentals, wild plants and weeds (Zaher, 1984).

The two-spotted spider mite is one of the most important pests of many crops worldwide. It attacks more than 1,000 economically important plant species of agricultural and ornamental plants (Gallo *et al*., 2002; Baptiste *et al*., 2003; Fasulo and Denmark, 2004).

Before any control measure against a pest have to be taken, the thorough knowledge about biology of the pest is necessary.

Some biological aspects were done on different plant materials (Patil *et al*., 2005; Mondal and Ara, 2006; Romeih and Abo-Shnaf, 2007; Silva *et al*., 2009; Shah and Shukla, 2014).

This experiment was designed to evaluate the effect of different temperatures on the development, survival, reproduction and life table parameters of *T. urticae* infesting white frangipani leaves under laboratory conditions. This will be an indicator to find the way for useful biological control for that pest, to be evaluated in following studies.

MATERIALS AND METHODS

Rearing of *Tetranychus urticae*

A stock colony of this species was maintained in the laboratory on the upper surface of leaves of white frangipani (*Plumeria alba*) under 25°C in Giza governorate. The leaves were placed on a piece of cotton pad maintained permanently wet in Petri- dishes (12 cm in diameter).

Experimental design

Twenty-five newly-laid eggs of *T. urticae* were singly transferred using a fine brush on fresh leaf discs of white frangipani (each one inch in diameter) placed lower side-down on moisten cotton pad (10cm in diameter and 1cm thick) in Petri-dishes (12 cm in diameter). The borders of the leave discs were covered by a band of cotton wool to avoid leaf dehydration and to prevent mite escaping. Leaves were replaced every five days. All experiments were conducted at three temperature degrees (20, 25 and 30±2 °C) and 70±5% relative humidity. Immatures were observed twice a day to determine the duration of every stage. Recently emerged adult females were paired with new males for copulation. Observations on oviposition were conducted twice a day.

Statistical analysis

Data were subjected to One-way ANOVA (F-test) using a computer programme (SAS Institute, 1988) which runs under WIN. The difference between means was determined by the help of Duncan's multiple range tests (Duncan, 1955) in this programme.

Life table parameters were calculated according to Birch (1948) using Life 48: A BASIC computer program (Abou-Setta *et al*., 1986).

RESULTS AND DISCUSSION

Development and oviposition

Egg hatchability and survival rates of the immature stages ranged from 64–96 %. The egg stage for both sexes was the longest at all temperatures, corresponding to about 56–84% of the total immature duration. The values of egg incubation period for females averaged respectively from 5.38–2.75 days at 20 and 30 °C (Table 1).

There were a significant relationship between duration and temperature and also between the rate of development and temperature. For immature and life cycle phases, the time to develop progressively decreased with increasing temperature, where it was slightly shorter for males than females. Ranging from 9.63 days for the development of the total immature phase at 20 °C to 3.28 days at 30 °C. However, significant differences existed between 20 and 30°C for both females and males in relation to duration of the life cycle. For females, duration at 20°C (15.01 days) was significantly different from duration at 30°C (6.03). For males, the significant difference was between 20°C (13.32) and 30°C (4.63) (Table 1).

Table 1: Duration of *T. urticae* immature stages in days reared on *P. alba* leaves at three constant temperatures and 70±5% RH.

Stage	**Sex**		**Temperature**		
			20 °C	**25 °C**	**30 °C**
Egg	♀		5.38±0.74 a	4.00±0.43 b	2.75±0.46 c
	♂		4.13±0.64 a	3.33±0.49 b	1.63±0.52 c
Larva	♀	A[1]	1.53±0.34 a	0.77±0.23 b	0.50±0.13 c
		Q[2]	1.47±0.34 a	0.73±0.29 b	0.47±0.21 c
	♂	**A**	1.47±0.34 a	0.71±0.10 b	0.47±0.09 c
		Q	1.41±0.27 a	0.69±0.16 b	0.44±0.12 c
Protonymph	♀	**A**	1.66±0.38 a	0.83±0.33 b	0.56±0.44 c
		Q	1.56±0.18 a	0.79±0.18 b	0.53±0.09 c
	♂	**A**	1.56±0.37 a	0.79±0.35 b	0.50±0.23 c
		Q	1.50±0.27 a	0.77±0.33 b	0.47±0.25 c
Deutonymph	♀	**A**	1.72±0.57 a	0.85±0.33 b	0.63±0.13 b
		Q	1.69±0.29 a	0.81±0.11 b	0.59±0.13 c
	♂	**A**	1.66±0.33 a	0.83±0.31 b	0.59±0.19 c
		Q	1.59±0.35 a	0.79±0.18 b	0.53±0.09 c
Total immatures	♀		9.63±0.65 a	4.78±0.49 b	3.28±0.54 c
	♂		9.19±0.61 a	4.58±0.51 b	3.00±0.38 c
Egg-Adult	♀		15.01±0.67 a	8.78±0.71 b	6.03±0.16 c
	♂		13.32±0.76 a	7.91±0.67 b	4.63±0.44 c

[1]Active; [2]Quiescent

Means in a row followed by different letters are significantly different (*P*> 0.05; Duncan's Multiple Range Test)

The influence of several factors to mites, temperature among others, may explain the differences encountered by the authors. However, similarly to was reported in other previous studies for *T. urticae* life cycle, i.e., Sabelis (1981) reported approximately 6.5 days for female at 30°C; Deciyanto *et al*. (1989) recorded an average of 10.6 to 14.4 days on six cultivars of *Mentha piperita* and *M. arvensis*; Patil *et al*. (2005) demonstrated 10.7±0.45 days for male and 12.36±0.68 days for female on jasmine; Mondal and Ara (2006) reported 10.15±0.16 days on leaves of bean (*Lablab purpureus* L.); Romeih and Abo-Shnaf (2007) reported 9.93±1.23 days at 30°C on Arabian jasmine (*Jasminum sambac*).

The pre-oviposition, oviposition, and post-oviposition durations of *T. urticae* females at the three temperature degrees are shown in Table (2). The narrow range of the pre-oviposition and post-oviposition periods of *T. urticae* females resulted in a slightly significant differences among the temperature degrees. The pre-oviposition and post-oviposition periods ranged respectively between (1.09 & 1.69) and (1.22 & 1.75) days. The pre-oviposition period result of this work coincides with that of Patil *et al*. (2005) who reported the pre-oviposition period of *T. urticae* lasted for an average of 1.82±0.4 days on jasmine.

The oviposition period of *T. urticae* was significantly influenced by temperature. Mites at 20°C had the longest oviposition period (23 days), which was significantly different from those at 25 and 30°C.

Similarly to what observed for the duration of immature development, the longevity differed significantly among temperature degrees, where it was also progressively shorter with increasing temperatures, ranging from a maximum of

26.44 days at 20 °C to a minimum of 11.56 days at 30°C, with life span, ranged from 41.45 days at 20°C to 17.59 days at 30°C. Also for males, duration decreased with increasing temperature. This result agrees Patil *et al*. (2005) who reported that *T. urticae* females lived for 18.7±0.74 days, while male longevity lasted for 12.1±0.74 days on jasmine.

Table 2: Longevity, life span and fecundity of *T. urticae*, reared on *P. alba* leaves at three constant temperatures and 70±5% RH.

	Sex	Temperature		
		20°C	**25°C**	**30°C**
Pre-oviposition		1.69±0.56 a	1.44±0.47 a	1.09±0.27 b
Generation		16.70±0.50 a	10.22±0.84 b	7.12±0.33 c
Oviposition		23.00±0.76 a	15.83±0.83 b	9.25±0.71 c
Post-oviposition		1.75±0.27 a	1.29±0.33 b	1.22±0.21 b
Longevity	♀	26.44±0.75 a	18.56±0.82 b	11.56±0.73 c
	♂	22.97±0.77 a	13.69±0.78 b	8.28±0.84 c
Life span	♀	41.45±0.62 a	27.34±0.89 b	17.59±0.77 c
	♂	36.29±0.67 a	21.60±0.62 b	12.91±0.69 c
Fecundity		81.63±0.74 c	97.83±0.83 b	106.00±0.76 a
Eggs/ female/ day		3.55±0.11 c	6.19±0.31 b	11.52±0.88 a

Means in a row followed by different letters are significantly different ($P > 0.05$; Duncan's Multiple Range Test)

Shih (1999) observed the two-spotted spider mite laid maximum 100 eggs in 10 days. Patil *et al*. (2005) reported that female of *T. urticae* on average laid 104±3.19 eggs in their ovipositional period of 14.5±2.55 days when reared on jasmine. Mondal and Ara (2006) documented that the total number of eggs laid per female *T. urticae* on bean leaves in its lifetime averaged 108.3 ± 3.23 eggs in 16 days. In the present investigation, fecundity was lower at 20°C (81.63) and highest at 30°C (106.00). Daily oviposition rates were significantly different at the tested temperatures, where it increased progressively with increasing temperature (Table 2) ranging from 3.55 to 11.52 eggs/ female/ day at 20 and 30°C. These results are in agreement with the above findings. On the contrast, it is not in harmony with other previous studies, i.e., 60 eggs on *Gerbera* (Van de Vrie, 1985), 25.13±1.64 eggs at 20°C and 30.9±0.74 eggs at 30°C on Arabian jasmine (Romeih and Abo-Shnaf, 2007). Maybe, it is regarding to the texture of plant material used which can affect mite feeding and consequently reproduction.

As expected, the effect of temperature degrees on adults was even more marked in the present study which was compared with different temperature degrees. It was not surprising that high temperature could enhance the mite species to reproduce higher than other less temperature. Shih (1999) observed that the temperature degrees 23–30°C are the optimal for spider mite development.

Life table parameters

Sex ratio was similar at all tested temperatures as were three females per male, with the highest proportion of females occurring at 30°C. Similar observation was reported by Van de Vrie (1985) who mentioned that the normal sex ratio for the Tetranychidae is 1 : 3 male : female. Moreover, he pointed out that *T. urticae* and related species showed a female-biased sex ratio, in addition, life time progeny sex ratios averaged around three times as many daughters than sons.

The net reproductive rate (R_o), the intrinsic rate of natural increase (rm), the mean generation time (T), and the finite rate of increase (λ) were significantly affected by temperatures (Table 3). Although, the highest net reproductive rate, R_o = 70.44 female/ generation as estimated at 25°C (corresponding to a daily population growth of about 56%), the fastest population growth was observed at 30°C with *rm* = 0.3057 female/ female/ day. This could be to the much longer mean generation time at 25°C. These findings indicate that temperature will affect how fast the spider mite populations reach damaging levels. Thus, doubling time was also considerably shorter at 30 than at 25°C. Therefore, the population of this mite, increased with increasing temperature.

Table 3: Life table parameters of *T. urticae* at three constant temperatures.

Temperature	Parameters				
	R_o	T	r_m	λ	T_D
20°C	39.18	26.9840	0.1359	1.1456	5.10
25°C	70.44	17.9490	0.2370	1.2675	2.92
30°C	50.88	12.8537	0.3057	1.3576	2.27

The values of intrinsic rate of natural increase (r_m) were lower as observed by Riahi *et al*. (2013) on peach (0.144) at 25°C and (0.108) at 30°C, in comparison with the present study, but in agreement with other studies reporting values of 0.240 on apple (Kasap, 2004) at 25°C, (0.242) on cowpea, and (0.230) on bean (Razmjou, 2009) at 25°C. The net reproduction rate was the highest at 25°C; our value was considerably lower than those reported by Kasap (2004) on apple (92.19) at 25°C, but in agreement with that of Pietrosiuk *et al*. (2003) on bean (39.85) at 23°C and higher than those reported by Khanamani *et al*. (2012) on eggplant (25.8) at 25°C, (16.87) on peach at 25°C (Riahi *et al*., 2013). Karimi *et al*. (2006) reported the finite rate of increase (λ) to be 1.229 on green bean at 25°C, which is close to ours (1.2675), Pietrosiuk *et al*. (2003) reported (1.20) on bean at 23°C, but lower as observed in another study (Riahi *et al*., 2013) (1.157) at 25°C and (1.114) at 30°C on peach in comparison with the present study. Kasap (2004) estimated that the mean generation times of *T. urticae* were respectively 22.09 and 16.58 days at 25 and 30°C, which were considerably higher than our values at the same temperatures. These differences could be in regards to host plant differences and different experimental conditions.

The highest levels of oviposition at 30°C occurred on 12th day after the beginning of oviposition which is considered earlier than at other temperatures. At that temperature, peak of oviposition was quicker than at other temperatures. Survivorship reduced slowly over almost the entire duration of the adult stage, except for the last few days, when it dropped quickly where the survival curve indicated a significant difference between the tested temperatures, as it was decreased much more quickly at 30°C (Fig. 1).

Females *T. urticae* deposited more eggs at 30°C, the highest intrinsic rate of natural increase, finite rate of increase, and population doubling time were also occurred, where the highest values for net reproductive rate of increase was at 25°C. Shortest life cycle also occurred at 30°C, which reflected the effect of shorter developmental time and generation times occurring at that temperature on the intrinsic rate of natural increase. This may suggest different temperature preference for high reproduction and population increase in *T. urticae*. Otherwise, White Frangipani as a tropical plant can grow within temperature 18-27°C, it tolerate high temperatures as well. Thus it is expected to suffer highest damage because of the attack of *T. urticae* during those temperatures.

The present results indicate that temperature is a strong factor affecting the reproduction and survival of *T. urticae*. It can be useful in IPM strategies in developing biological control programs against *T. urticae*, as providing the optimum rearing temperature for developmental time, survival, fecundity, and population growth parameters. Moreover, this can help in the construction of computer simulation models to predict *T. urticae* populations. Under field conditions, population increase could be smaller, because of the effect of natural enemies. Thus, further field studies are needed to complement laboratory studies to obtain practical information for possibility of controlling this pest with reducing pesticides on *P. alba* shrubs.

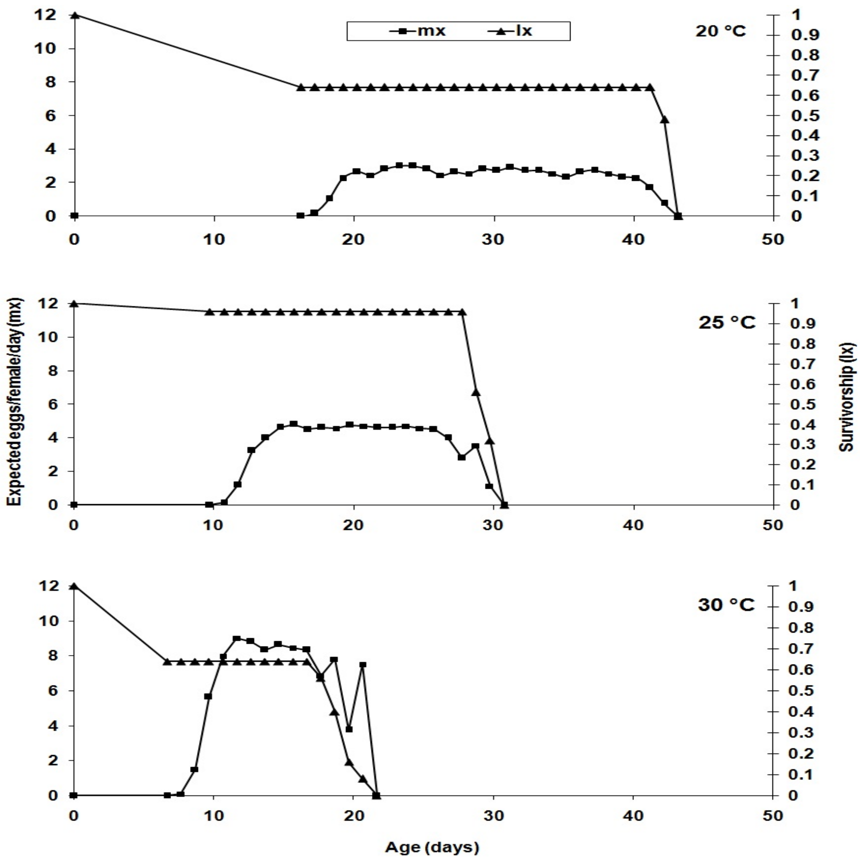


Fig. 1: Survivorship (lx) and daily oviposition rate (mx) of ***T. urticae*** **at three constant temperatures.**

ACKNOWLEDGEMENTS

Deepest gratitude to Dr. M.A. Zaher (Zoology and Agricultural Nematology Department, Faculty of Agriculture, Cairo University; Egypt) for his revision of the manuscript. Many thanks to Dr. M.M. Abou-Setta (Scale Insects and Mealy Bugs Department, Plant Protection Research Institute, Agricultural Research Centre; Egypt) for helping with data statistical analysis.

REFERENCES

Abou-Setta, M. M., Sorrell, R. W. and Childers, C. C. (1986). Life 48: A BASIC computer program to calculate life table parameters for an insect or mite species. Florida Entomol., 69(4): 690-697.

Baptiste, S. J., Bloem, K., Reitz, R. and Mizell, R. (2003). Use of radiation to sterilize two-spotted spider mite (Acari: Tetranychidae) eggs used as a food source for predatory mites. Florida Entomol., 86(4): 389-394.

Birch, L. C. (1948). The intrinsic rate of natural increase of an insect population. J. Anim. Ecol., 17(1): 15-26.

Deciyanto, S., Amir, M., Trisawa, I. and Harijanto, M. (1989). Study on biology and population development of *Tetranychus* sp. (Tetranychidae: Acarina) on *Mentha* spp. Pembaritaan Penilitian Taneman Industri, 15(10): 9-14.

Duncan, D. B. (1955). Multiple range and multiple F-test. Biometrics, 11(1): 1-42.

Fasulo, T. R. and Denmark, H. A. (2004). Two-spotted Spider Mite, *Tetranychus urticae* Koch. (Arachnida: Acari: Tetranychidae). Entomology and Nematology Department publication No. EENY-150, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida.

Gallo, D., Nakano, O., Silveira-Neto, S., Carvalho, R. P. L., Baptista, G. C., Berti-Filho, E., Parra, J. R. P., Zucchi, R. A., Alves, S. B., Vendramim, J. D., Marchini, L. C., Lopes, J. R. S. and Omoto, C. (2002). Entomologia Agrícola. Piracicaba: FEALQ, p. 920.

Karimi, A., Ashouri, A. and Noii, S. (2006). Life Table of *Tetranychus urticae* on Sweet Pepper and Green Bean. 17th Iran. Plant Prot. Cong. Karaj, Iran, p 204.

Kasap, I. (2004). Effect of apple cultivar and of temperature on the biology and life table parameters of the two spotted spider mite *Tetranychus urticae*. Phytoparasitica, 32(1): 73-82.

Khanamani, M., Fathipour, Y., Hajiqanbar, H. and Sedaratian, A. (2012). Reproductive performance and life expectancy of *Tetranychus urticae* (Acari: Tetranychidae) on seven eggplant cultivars. J. Crop. Prot., 1(1): 57-66.

Mondal, M. and Ara, N. (2006). Biology and fecundity of the two-spotted spider mite, *Tetranychus urticae* Koch (Acari: Tetranychidae) under laboratory condition. J. Life Earth Sci., 1(2): 43-47.

Patil, B. V., Hugar, P. S. and Rajakumar, E. (2005). Biology of red spider mite, *Tetranychus urticae* Koch (Acari: Tetranychidae) on jasmine. Karnataka J. Agric. Sci., 18(1): 147-149.

Pietrosiuk, A., Furmanowa, M., Kropczynska, D., Kawka, B. and Wiedenfeld, H. (2003). Life history parameters of the two-spotted spider mite (*Tetranychus urticae* Koch) feeding on bean leaves treated with pyrrolizidine alkaloids. J. Appl. Toxicol., 23: 187-190.

Radha, R., Sivakumar, T. and Arokiyaraj, S. (2008). Pharmacognostical evaluation of *Plumeria alba* Linn. Res. J. Pharm. Technol., 1(4): 496-501.

Razmjou, J., Tavakkoli, H. and Nemati, M. (2009). Life history traits of *Tetranychus urticae* on three legumes (Acari: Tetanychidae). Munis Entomol. Zool., 4(1): 204-211.

Riahi, E., Shishehbor, P., Nemati, A. R. and Saeidi, Z. (2013). Temperature effects on development and life table parameters of *Tetranychus urticae* (Acari: Tetranychidae). J. Agr. Sci. Tech., 15: 661-672.

Romeih, Amal H. M. and Abo-Shnaf, Reham I. A. (2007). Biology of *Tetranychus urticae* Koch (Acari: Tetranychidae) on Arabian jasmine at different temperatures. Egypt. J. Appl. Sci., 22(8B): 637-641.

Sabelis, M. W. (1981). Biological control of two-spotted spider mites using phytoseiid predators. Part 1. Modeling the predator-prey interaction at the individual level. Agricultural Research Reports No. 910. Wageningen.

SAS Institute. (1988). SAS/STAT User's Guide, Ver. 6.03. SAS Inst Inc, Cary, North

Carolina, USA.

Shah, D. R. and Shukla, A. (2014). Biology of spider mite, *Tetranychus urticae* (Koch) (Acari: Tetranychidae) on gerbera. Pest Manag. Hort. Ecosys., 20(2): 162-169.

Shih, C. I. T. (1999). Population ecology and its application on tetranychid and phytoseiid mite. Chinese J. Entomol., 12: 25-48.

Silva, E. A., Reis, P. R., Carvalho, T. M. B. and Altoé, B. F. (2009). Biology of *Tetranychus urticae* (Acari: Tetranychidae) on *Gerbera jamesonii* Bolus and Hook (Asteraceae). Braz. J. Biol., 69(4): 1121-1125.

Van de Vrie, M. (1985). Control of Tetranychidae in Crops: Greenhouse Ornamentals. In: Helle, W. and Sabelis, M. W. (Eds.) World Crop Pests: Spider Mite: Their Biology, Natural Enemies and Control, Volume 1B. Elsevier, Amsterdam, p 273-283.

Zaher, M. A. (1984). Survey and Ecological Studies on Phytophagous, Predaceous and Soil Mites in Egypt. 1. Phytophagous Mites in Egypt (Nile Valley and Delta). PL. 480 programme, USA., Project No. EG-ARS-30, Grant No. FG-EG-139, p. 228.

ARABIC SUMMERY

تاريخ الحياة وجداول الحياة القائمة على درجات الحرارة للحلم العنكبوتي ذي البقعتين على نبات الياسمين الهندي

ريهام إبراهيم أحمد أبوشناف
قسم بحوث أكاروس نباتات الخضر والزينة، معهد بحوث وقاية النباتات، مركز البحوث الزراعية

تم تقدير تأثير ثلاثة درجات حرارة مختلفة على تاريخ الحياة وجداول الحياة للحلم العنكبوتي ذي البقعتين على أوراق نبات الياسمين الهندي تحت الظروف المعملية. حيث تم تربية الحلم العنكبوتي ذي البقعتين على وحدات من أوراق نبات الياسمين الهندي على درجة حرارة ٢٠ و ٢٥ و ٣٠ ± ٢ درجة مئوية و ٧٠ ± ٥٪ رطوبة نسبية. ولقد نجحت أفراد الحلم العنكبوتي ذي البقعتين في التطور ووضع البيض على جميع درجات الحرارة التي تم إختبارها، حيث قصرت فترة حياة الأفراد وفترة وضع البيض وفترة حياة الطور البالغ مع إرتفاع درجات الحرارة، في حين ارتفع المعدل اليومي لوضع البيض وكمية وضع البيض مع زيادة درجات الحرارة أيضاً.

ولقد أظهرت النتائج أن درجة الحرارة العالية (٣٠ درجة مئوية) من أفضل الدرجات المستخدمة حيث ساعدت الأفراد على التطور والنمو السريع مما أدى إلى تقصير فترة دورة الحياة إلى ٦.٠٣ و ٤.٦٣ يوم في الإناث والذكور على التوالي وأدي أيضاً إلى أعلى معدل لوضع البيض (١٠٦ بيضة/ أنثى). ولقد أشارت النتائج إلى أن الحلم العنكبوتي ذي البقعتين يمكنه التطور على مجموعة واسعة من درجات الحرارة، حيث كان أعلى معدل جوهري من الزيادة الطبيعية (٠.٣٠٥٧) عند درجة حرارة ٣٠ درجة مئوية، مما أدى إلى زيادة التعداد سريعا على هذه الدرجة.