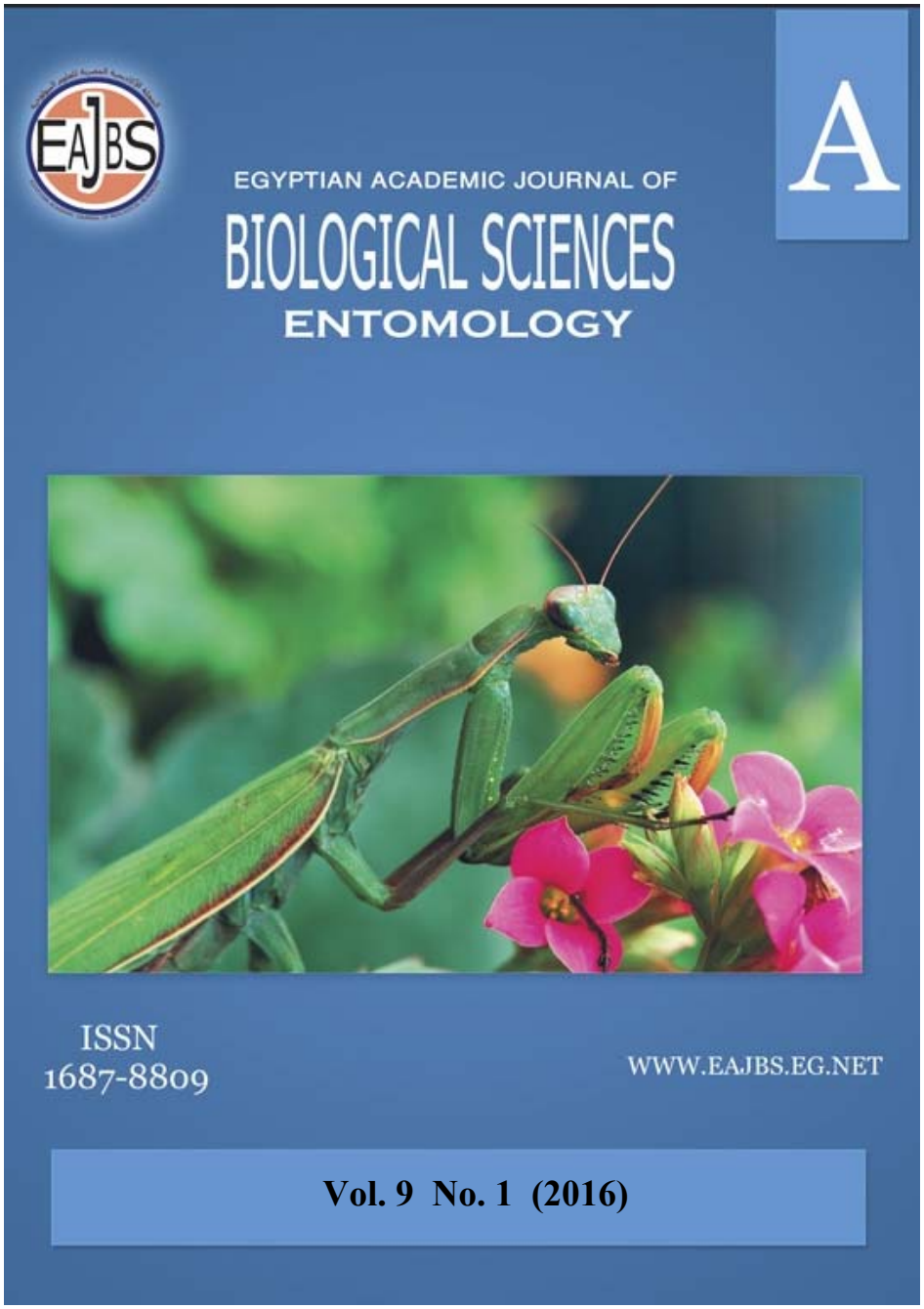

Egyptian Academic Journal of Biological Sciences is the official English language journal of the Egyptian Society for Biological Sciences, Department of Entomology, Faculty of Sciences Ain Shams University.
Entomology Journal publishes original research papers and reviews from any entomological discipline 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.9(1)pp. 25-32 (2016)*

Egypt. Acad. J. Biolog. Sci., 9(1): 25-32 (2016)

Egyptian Academic Journal of Biological Sciences
A. Entomology

ISSN 1687- 8809
www.eajbs.eg.net

Implications of Some Constant Temperatures on Certain Biological Aspects of the Grapevine Aphid, *Aphis illinoisensis* Shimer (Homoptera:Aphididae)

El-Gantiry, Aziza M.; Asmaa A. A. Fadl and S. F. M. Moussa
Plant Protection Research Institute, Agricultural Research Center, Giza, Egypt.

ARTICLE INFO
Article History
Received:28/12/2015
Accepted:22/1/2016

Keywords:
Grapevine Aphid,
Aphis illinoisensis,
biological aspects,
life cycle, Temperature,
day-degrees.

ABSTRACT

The effect of temperature on certain biological aspects and fertility life table of the grapevine aphid as a key of abiotic factor has been investigated. The experiments were conducted at four constant temperatures 17, 21, 24 and 27°C, 65 ± 5 % R.H. and 14 hrs. photophase. The tested individuals were reared and observed on young shoots of *Vitis vinifera* (Superior variety). The data revealed that aphids developed faster with increasing temperatures within the 17 - 27 °C range. The grapevine aphid passed through four instars before reaching maturity. The nymphal development period varied significantly between temperatures, they lasted 15.5, 12.2, 7.3 and 5.4 days at 17, 21, 24 and 27°C, respectively. The theoretical lower developmental threshold (t_0) was 12.4 °C and 80.73 day-degrees were required for aphids to reach adulthood. The life table parameters differed at the tested temperatures. These parameters clarified the temperature effect on *A. illinoisensis* biology, where the largest R_o, λ and r_m were 6.30, 1.155 and 1.088 at 24, 24 and 21 °C, respectively. The range of generation time values (GT) recorded 27.39-10.53 days at the tested temperatures. As a result from the aspect of development and fecundity, *A. illinoisensis* had the best performance on 24°C and the worst on 17 and 27°C.

INTRODUCTION

Aphids are considered of greater economic importance because of their role as virus vectors, but high aphid densities can also cause direct plant injury and significant yield losses (Adams and Kelley, 1950; Kolbe, 1970; Shands *et al*., 1972). The grapevine aphid, *Aphis illinoisensis* (Shimer), is a North American species (Blackman and Eastop, 2006) that has recently invaded Mediterranean regions. Remaudiere *et al*. 2003, reported the occurrence of *A. illinoisensis* for the first time in South Turkey in 2002. In Egypt, A. *illinoisensis* was first recorded during 2012, (El-Gantiry *et al*., 2012).

It causes damage by feeding on leaves on young terminal shoots, shoots and stems, but more serious injury results from the infestation of the developing fruit clusters, causing some grape berries to drop (Pfeiffer and Schultz, 1986). Aphids are also a nuisance indirectly because of the production of sweet honeydew. This secretion serves as a substrate for a black fungal growth, the sooty mould, which greatly depreciates the quality of table grapes.

The grapevine aphid is capable of transmitting Watermelon Mosaic Virus-2 (WMV-2) (Adlerz, 1987 and Webb *et al*., 1994).

A. illinoisensis has many hosts including: *Carica papaya* (pawpaw); *Cissus sicyoides*; *Cucumis sativus* (cucumber); *Mangifera indica* (mango); *Viburnum* sp. (black haw); *Vitis tiliaefolia*; *Vitis vinifera* (grape) (CABI, 2002). In Egypt, there have not been yet recorded alternative hosts during the winter period when grapevines do not possess any foliage in which the aphids feed on. The developmental period of *A. illinoisensis* was shorter as temperature increased within the 17 - 26 °C range on 'Soultanina' and 'Agiorgitiko' cultivars (Moraiti *et al*., 2012). Up to now, there is few published data both on thermal requirements for the grapevine aphid development and on life table parameters on grapevine (*Vitis vinifera* L.). In Egypt, this study is considered the first one conducted with the development and population growth of *A. illinoisensis* related to temperature and the results contribute to utmost grasp biology of this aphid and hence provide solutions to pest control management.

MATERIAL AND METHODS

Preliminary experiments were conducted for biological studies at several temperatures of 15-30 °C. It was excluded temperatures of 15, 29 and 30 °C, where at these temperatures the majority of nymphs grapevine aphid, *Aphis illinoisensis* Shimer failed to complete the life cycle, as well as adults died immediately after the emergence.

The present experiments were conducted to study the development and some biological aspects of the grapevine aphid at four constant temperatures (17, 21, 24 and 27 °C), 65 ± 5 % R. H. and 14 photophase.

The stock colony of *A. illinoisensis* was maintained under controlled conditions, 24 ± 1 °C, 65 ± 5 % R. H. and a photoperiod of 14 L:10 D. The adults were randomly selected from the stock colonies and placed on young shoots of *Vitis vinifera* L. (Superior variety) by a fine camel's hair brush. They were permitted to reproduce for 24h and then all adults and their newborn nymphs were removed from each experimental plant, except one nymph was remained. Forty plants (replicates) were used per each tested temperature. The grape seedlings were incubated at each of the aforementioned temperatures. Nymphs in each temperature regime were maintained by placing plastic rearing cages on young shoots to prevent the escape of aphid or parasitism (Adly and El-Gantiry, 2014). Nymphs were examined daily to determine moulting and mortality rate. The developmental time from birth to the onset of reproduction, the adult longevity and the number of female offspring was recorded for each temperature. The obtained data were statistically analyzed using costat computer program for comparing the different between means. The lower developmental threshold (t_0), the thermal constant (K) in Degree-Day Units (DDC) parameters were estimated for *A. illinoisensis* maintained under four constant temperature regimes (*i.e.* 17, 21, 24 and 27 °C). These parameters were estimated by linear regression of the developmental rates over different tested temperatures (Campbell *et al*., 1974). Life table parameters (Birch, 1948), were calculated using Life 48 Basic Computer Program (Abou -Setta *et al*., 1986).

RESULT AND DISSOCIATION

Table (1) depicts the developmental time values of nymphal instars of *Aphis*

illinoisensis Shimer. The results indicated significant differences between the four examined constant temperatures (17, 21, 24 and 27 °C). The 1st instar had the shortest duration period overall the different treatments, whereas the 4th instar at 17°C lasted the longest duration (4.40 days). The mean time required by the nymphs to reach maturity significantly decreased with increasing temperature, the nymphs reared on 27°C had the shortest developmental time (5.4 days) than those on any other temperatures, while the offspring living on 17°C demonstrated the longest value of development (15.5 days). Thus the mean developmental rate (1/day) increased to about 2.72 fold between these two temperatures.

Table 1: The Temperature Effect on the Developmental Period of *Aphis illinoisensis* Shimer

Temps. (° C)	**Mean ± SD (Days)***					**Developmental Rate/day (%)**
	Nymphal Instars				**Total**	
	1st	**2nd**	**3rd**	**4th**		
17	**3.20±0.42 a**	**3.90±0.73 a**	**4.00±0.47 a**	**4.40±0.69 a**	**15.5±0.97 a**	**6.45**
21	**2.60±0.51 b**	**3.1±0.56 b**	**3.00±0.47 b**	**3.50±0.52 b**	**12.2±0.63 b**	**8.20**
24	**1.60±0.84 c**	**2.30±0.67 c**	**1.60±0.51 c**	**1.80±0.63 c**	**7.30±1.25 c**	**13.70**
27	**1.10±0.31 c**	**1.50±0.52 d**	**1.50±0.63 c**	**1.30±0.48 c**	**5.40±1.15 d**	**17.54**
L.S.D	**0.50**	**0.57**	**0.47**	**0.53**	**0.93**	**--------**

*Means within columns followed by the same letters are not significantly different (P < 0.05)

The results in the present study revealed that temperature affected significantly aphid development and found a negative relation with temperature. These findings are consistent with those provided by many researchers. In Egypt, Abdel-Rahman, (1997), El-Gantiry *et al.*, (1999) and El-Sheikh *et al*., (2009) found that the life cycle of the greenbug aphid, *Schizaphis graminum* (Rond.), the cowpea aphid, *A. craccivora* (Koch); *S. graminum* and the corn leaf aphid, *Rhopalosiphum maidis* was shorter as temperature increased from 15 to 29°C. In Turkey, Satar *et al*., (2008) added that the cotton aphid, *A. gossypii* Glover and the green peach aphid, *Myzus persicae* (Sulzer) were separately evaluated on detached pepper leaves at eight constant temperatures in temperature cabinets. The cotton aphid developmental time ranging from 13.0 days at 15.0 °C to 4.0 days at 30.0 °C. Similarly, the green peach aphid developed with the longest developmental time at 15.0 °C (11.6 days) and the shortest at 25.0 °C with 5.1 days. In Greece, Moraiti *et al*., (2012) stated that the *A. illinoisensis* developed faster on some grape cultivars as temperature increased from 17–26 °C and the life cycle was evaluated 5.03 and 8.90 days on 26 and 17 °C, respectively. Also, in Egypt, Adly and El-Gantiry, (2014) recorded that the life cycle of *A. illinoisensis* on grape attained 7.1 and 14.7 days at 25 and 20°C (70 ± 5 % R.H. and a photoperiod of 14 L: 10 D), respectively. The present obtained developmental period are close to those obtained by Adly and El-Gantiry, (2014); on the contrary, our results at 17°C (15.5 days) not in accordance with those (8.90 days) given by Moraiti *et al*., (2012). This difference may be due to aphid biotype, grape varieties used and different other conditions of experiment.

Table (2) lists the adult longevity, which showed significant differences between the examined temperatures, the longest adult life span was 14.91 days at 24°C, whereas sharp decrease recording 4.83 days at 27°C. Temperature affected significantly viviparity periods with the longest period observed at 24 °C (8.33 days), the opposite was recorded at 27 °C (2.66 days).

Based on the findings of this study, longevity of the grapevine aphid adults is shown to be influenced by temperatures. These results go on line with those obtained by EL-Gantiry *et al.*, (1999) who calculated that the value of adult female, *A.*

craccivora longevity varied 20.1, 15.5, 8.6 and 7.4 days at 15, 20, 25 and 28°C, respectively, while for *S. graminum* was 12.73, 10.65, 7.33 and 4.88 days at 17, 20, 25 and 28°C, respectively. El-Sheikh *et al*., (2009) recorded that the shortest female longevity for the corn leaf aphid (7.8±2.3 days) at 15°C, while the longest one (19.9±7.3 days) was at 20 °C. In our study, longevity of adult is 14.91 days at 24°C, whereas Moraiti *et al*., (2012), reported that adult longevity period mean of *A. illinoisensis* reared on six grapevine cultivars ranged between 19.33 - 23.83 days at 23 °C and L:D 16:8h..

Table 2: The Temperature Effect on the Adult Longevity of *Aphis illinoisensis* Shimer

Temps. (° C)	Adult Longevity Mean ± SD*				Life cycle	Life Span
	pre-viviparous	viviparous	Post-viviparous	Total	Mean ± SD	Mean ± SD
17	3.14±1.46 ^{a}	7.71±3.30 ^{a}	1.71±1.60 ^{b}	12.50±4.68 ^{a}	15.5±0.97 ^{a}	28.00±4.61 ^{a}
21	2.71±0.75 ^{a}	7.14±0.89 ^{a}	2.14±0.89 ^{b}	12.0 ±1.41 ^{a}	12.2±0.63 ^{b}	24.14±1.77 ^{ab}
24	2.08±1.56 ^{ab}	8.33±4.36 ^{a}	4.50±3.14 ^{a}	14.91±6.00 ^{a}	7.30±1.25 ^{c}	22.25±6.95 ^{b}
27	1.00±0.54 ^{b}	2.66±1.50 ^{b}	1.16±0.40 ^{b}	4.83±1.29 ^{b}	5.40±1.15 ^{d}	10.66±1.50 ^{c}
L.S.D	1.50	3.29	2.24	4.46	0.93	5.26

*Means within columns followed by the same letters are not significantly different (P < 0.05)

All the authors demonstrate that temperature has a great influence on the life cycle of aphids. Thermal requirements of some aphids differ from place to place for the same species and from species to species.

The estimated developmental thresholds (t_0) and thermal requirements (K) of grapevine aphid reared on Superior variety are 12.72 °C and 80.73 DDC, respectively, (Table 3).

El-Sheikh *et al*., (2009) estimated (t_0) of 6.84 °C and (K) as 87.31 DDC for *R. maidis* on barley seedlings food plant. Also, Berberet *et al*., (2009) recorded the previous parameters (t_0 = 7.1 °C) and (K=100 DDC) for *A. craccivor* on alfalfa. On two grape cultivars, Soultanina and Agiorgitiko, Moraiti *et al*., (2012) found that (t_0) and (K) values were 4.2 °C and 5.4 °C and 110.9 and 104.1 DDC were required for *A. illinoisensis* to reach adulthood, respectively.

Table (3): Linear Regression Parameter estimated of *Aphis illinoisensis* Shimer Developmental Rate (1/d) in Relation to Temperature

Grapevine Variety	Aphid species	Regression values			Developmental threshold, t_0 (°C)	Thermal requirements in day-degrees, K
		a	b	R^2		
Superior	*A. illinoisensis*	-0.15845	0.012387	0.9685	12.72	80.73

Commonly, life table parameters have been used to compare insect fitness on different temperatures. In present work, temperature caused variation in net reproductive (R_o = 1.30 – 6.30 females/female), mean generation time (GT = 10.53 - 27.39 days) and mean intrinsic rate of increase (r_m = 0.026 - 0.144 females /female/ day), where r_m on 21°C (1.088 females/female/d) was higher than that on other temperatures, (Table 4). The finite rates of increase (λ) differed on the different temperatures. Grapevine aphid populations on Superior variety showed the highest finite rate of increase (1.155) on 24 °C. As a result, from the aspect of development and fecundity, *A. illinoisensis* had the best performance on 24 °C and the worst on 17 and 27 °C, (Table, 4). The net reproductive rates (R_o) indicated low reproductive

ability (1.30 – 6.30) and effective individuals within the generation of aphids on Superior, grapevine variety.

Table 4: The Life Table Parameters of *Aphis illinoisensis* Shimer at Different Temperatures

Temps. (^{o} C)	The Net Reproductive Rate (Ro)	The Generation Time (Days) (GT)	The Intrinsic Rate of Natural Increase (r_m)	The Finite Rate of Increase (λ)
17	**2.04**	**27.39**	**0.026**	**1.026**
21	**1.30**	**24.11**	**1.088**	**1.011**
24	**6.30**	**12.78**	**0.144**	**1.155**
27	**1.32**	**10.53**	**0.026**	**1.027**

El-Gantiry *et al*., (1999) stated that the highest reproductive rate (R_o) being 52.75 nymphs/female for *A. craccivora* occurred at 20 ^{o}C and 26.77 nymphs/female for *S. graminum* at 17 ^{o}C. The intrinsic rate of increase per day (r_m) and finite rate of increase (λ) were greater as temperature increased in case of *A. craccivora* (*i.e.* 0.42 females/female /day and 1.52 times/day, respectively at 28 ^{o}C). These values recorded 0.251 and 1.29 at 20^{o}C, whereas they were lowest (0.164 and 1.18) at 28^{o}C for *S. graminum*. Fathipour *et al.* (2005) reported that the values of (r_m) of *Brevicoryne brassica* on cabbage were equal to 0.187, 0.226, and 0.042 at 20, 25, and 30°C, respectively. Other researchers found that the net reproductive rate (R_o) of the cotton aphid was highest at 22.5°C (68.38 aphids/aphid) and lowest at 32.5 °C with as less as 0.22 aphids/aphid. The lowest intrinsic rate of increase for the cotton aphid (0.162 aphids/aphid /day) occurred at 15.0 °C and at 30.0 °C for the green peach aphid (0.143 aphids/aphid/day). Satar *et al*., (2008) stated that *A. gossypii* populations kept at warmer temperatures showed higher per capita growth rates, being highest at 30 °C (0.504 aphids/aphid /day). In contrary El-Sheikh *et al*., (2009) reported that R_o value of *R. maidis* on barley seedlings food plant was higher at 20^{o}C (37.75) then decreased to 21.52 and 12.13 by the increase of temperature to 25 and 29 ^{o}C. The least value of R_o (3.25) was at 15^{o}C. For many grape variety, Moraiti *et al*., (2012) calculated the net reproductive rate of *A. illinoisensis* (R_o=49.6-60.5 females/female/generation), mean generation time (GT = 8.2 - 8.6 days), and mean intrinsic rate of increase (r_m = 0.468 – 0.498 females /female/day)**.**

Many researchers registered that the differences of life table parameters of numerous aphid species under laboratory or field conditions in different regions (Bhatt and Singh, 1991; Force and Messenger, 1964; Cohen and Mackauer, 1987). Previous and present results suggest that, the R_o values vary according to the aphid species and biotypes, temperature degrees and / or cultivars & experimental methods. These differences in the net reproductive rate may have been caused by host plant effect as well as possibly aphid species and biotype (Tsai and Wanga, 2001; Özgökçe and Atlihan, 2005; Razmjou *et al*., 2006; Mirmohammadi *et al*., 2009; Taheri *et al*., 2010 and Jahan *et al*., 2014). Our results show that R_o and r_m of the grapevine aphid on "Superior" grape variety ranged from 1.30 to 6.30 and 0.144 to 0.026, respectively, confirming the resistance of the noted variety to the aphid. Statistical variables, including net reproductive rate and intrinsic rate of natural increase, are valid criteria to determine aphid performance. Plants on which aphid populations have a lower intrinsic rate of increase and a lower rate of reproductively are more resistant than plants on which aphid populations show a higher rate of increase (Zarpas *et al*. 2006). In general, our results in accordance with those provided by Adly and El-Gantiry, (2014), who stated that the total mortality percentage of *A. illinoisensis* was high (75.0%) at 20 and 25^{o}C on the grape variety (Superior). Hemeida *et al*., (2013) revealed that Superior variety has resistance tissues against piercing-sucking insects, those tissues preventing or decreasing piercing-sucking

insect damage to plants. Also, Metawa, (2014) stated that the grape varieties (Superior, Flame and Tompson) varied in their infestation by *B. tabaci* and *Empoasca lybica* (de Berg), which demonstrated that "Superior" was more resistant to infestation than other varieties. It's found that the levels of total phenols, total lipids, total protein and total ash in leaves of Superior variety were higher than those recorded in leaves of other varieties, and vice versa for total carbohydrate and moisture. The most abundant amino acids in Superior were Aspartic, Serine and Threonine that increase resistance to insects.

In order to realize the development and fecundity, *A. illinoisensis*, more accurate studies are needed, including much grape varieties and different photoperiod. However, because the present research was conducted under laboratory conditions, it is important to occur that for achieve more reliable results; further studies need to be applying in field conditions.

REFERENCES

Abdel-Rahman, M. A. A. (1997). Biological and ecological studies on cereal aphids and their control in Upper Egypt. Ph. D thesis. Plant Prot. Dept. Fac. Agric., Assuit Univ., 230 pp.

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

Adams. B. and Kelley, R.A. (1950). Potato aphid control studies, 1946-1949, at Woodstock, N.B., Canada American Potato Journal 27:175-182.

Adlerz, W. C. (1987). Cucurbit potyvirus transmission by alatae aphids (Homoptera: Aphididae) trapped alive. Journal of Economic Entomology, 80: 87-92.

Adly, Dalia and El-Gantiry, Aziza M.(2014). Defense reactions of the grape aphid, *Aphis illinoisensis* (Hemiptera: Aphididae) to parasitoid species *Lysiphlebus testaceipes* (Hymenoptera: Braconidae) and *Aphelinus albipodus* (Hymenoptera: Aphelinidae). J. Crop Prot., 3 (Supplementary): 683-690.

Berberet, R. C.; Giles, K. L.; Zarrabi, A. A. and Payton, M. E. (2009). Development, reproduction, and within-plant infestation patterns of *Aphis craccivora* (Homoptera: Aphididae) on alfalfa. Environ. Entomol. ; 38 (6): 1765 -71.

Bhatt, N. and Singh, R.(1991). Bionomics of an aphidiid parasitoid *Trioxys indicus* Subba Rao & Sharma (Hym., Aphidiidae). J. Appl. Entomol. 111: 263–269.

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

Blackman, R. L. and Eastop V. F. (2006). Aphids on the herbaceous plants and shrubs: the Natural History Museum. Wiley, New York, USA.

CABI (2002). Crop Protection Compendium. CAB International, Wallingford, UK.

Campbell, A. B.; Frazer, B.; Gilbert, N.; Gutierrez, P. and Mackauer, Nt. (1974). Temperature requirements of some aphids and their parasites. J. Appl. Ecol., 431- 438.

Cohen, M. B. and Mackauer. M. (1987). Intrinsic rate of increase and temperature coefficients of the aphid parasite *Ephedrus californicus* Baker (Hymenoptera: Aphidiidae). Can. Entomol. 119: 231–237.

El-Gantiry, Aziza M.; Abou-Setta, M. M. and Moussa, S. F. M. (1999). Certain biological studies on *Aphis craccivora* and *Schizaphis graminum* (Homoptera: Aphididae) under different constant temperatures. J. Egypt. Ger. Soc. Zool., 30: 123-132.

El-Gantiry, A. M.; El-Heneidy, A. H.; Moussa, S. F. and Adly D. (2012). *Aphis illinoisensis* Shimer (Hemiptera: Aphididae) a Recent Invasive Aphid Species in Egypt. (SCIENTIFIC NOTE), Egyp. J. Biol. P. Cont., 22(2), 2012, 225-226.

El-Sheikh, M. A. K.; Elnagar, S.; El-Hariry, M. A. and El-Fatih M. M. (2009). Life Table-Parameters and Heat Units for The Corn Leaf Aphid**,** *Rhopalosiphum maidis* (Fitch), Reared on Barley Host Plant. The 4th Conference on Recent Technologies in Agriculture, 3rd to 5th November, Faculty of Agriculture - Cairo University, Giza, Egypt.

Fathipour, Y.; Hosseini, A.; Talebi, A. A.; Moharramipour, S. and Asgari, S. (2005). Effects of different temperatures on biological parameters of cabbage aphid, *Brevicoryne brassicae* (Hom.: Aphididae). J. Sci. Technol. Agric. Nat. Resour. Water Soil Sci. 9: 185–194.

Force, D. C. and Messenger P. S. (1964). Fecundity, reproductive rates and innate capacity of increase of three parasites of *Therioaphis maculata* (Buckton). Ecology 45: 706–715.

Hemeida, Ibtisam A.; EL-Gantiry, Aziza M.; EL-Shabrawy, H. A. and Metwaa, Basma M. S. (2013). Studies on certain insects infesting four grapevine varieties. Bull. Ent. Soc. Egypt, 90:47-62.

Jahan, F.; Abbasipour, H.; Askarianzadeh, A.; Hassanshahi, G. and Saeedizadeh, A. (2014). Biology and Life Table Parameters of *Brevicoryne brassicae* (Hemiptera: Aphididae) on Cauliflower Cultivars. J. Insect Sci., 1(14): 284-294.

Kolbe, W.(1970). Influence of direct feeding damage on yields of heavily aphid-infested potato crops. Pfanzenschutz-Nachr, 23:273-282.

Metawa, Basma M. S. (2014). Studies on some insect pests infesting grape trees. M. Sc. thesis. Economic Entomology and Pesticides Dept. Fac. Agric., Cairo Univ., 130 pp.

Mirmohammadi, S.; Allahyari, H.; Nematolahi, M.; Sabouri, A.; Zarghami, S. and Khaghni S. (2009). Effect of four oil seed rape cultivars on biological parameters and intrinsic rate of increase of cabbage aphid, *Brevicoryne brassicae* L. (Hemiptera: Aphididae). J. Sci. Technol. Agric. Nat. Resour. Water Soil Sci., 13: 749–755.

Moraiti , Cleopatra A.; Margaritopoulos, J. T.; Zarpas, K. D. and Tsitsipis J. A. (2012). The grapevine aphid, *Aphis illinoisensis*: thermal requirements for development and its performance on six grapevine cultivars. Bull. Inse., 65 (1): 1-7.

Özgökçe, M.S. and Atlihan, R. (2005). Biological features and life table parameters of the mealy plum aphid, *Hyalopterus pruni* on different apricot cultivars. Phytoparasitica, 33(1): 7-14.

Pfeiffer, D. G. and Schultz, P. B. (1986). Major insect and mite pests of grape in Virginia, pp. 444-567. In: Virginia Cooperative Extension Service Bulletin.

Razmjou, J.; Moharramipour, S.; Fathipour, Y. and Mirhoseini, S.Z. (2006). Effect of cotton cultivar on performance of *Aphis gossypii* (Hom.: Aphididae) in Iran. J. Eco. Entomol., 99: 1820–1825.

Remaudiere G., E. Sertkaya and I. Ozdemir 2003. Alert! Discovery in Turkey of the American aphid, *Aphis illinoisensis,* a grapevine pest (Hemiptera: Aphidiae). Revue Francaise d'Entomologie, 25(4):170.

Satar, S.; Kersting, U. and Uygun, N. (2008). Effect of temperature on population parameters of *Aphis gossypii* Glover and *Myzus persicae* (Sulzer) (Homoptera: Aphididae) on pepper. J. Plant Dis. Protect., 115 (2):69–74.

Shands, W. A ; Simpson, G.W.; Hall, L. M. and Gordon, C.C. (1972). Further

evaluation of entomogenous fungi as a biological agent of aphid control in northeastern Maine. Life Sci. Agric. Exp. Stn, Univ. Maine Tech. Bull 58. 33 pp.

Taheri, S.; Razmjou, J. and Rastegari, N. (2010). Fecundity and Development Rate of the Bird Cherry-oat Aphid, *Rhopalosiphum padi* (L) (Hom. : Aphididae) on Six Wheat Cultivars Plant Protect. Sci., 46 (2): 72–78.

Tsai, J. H. and Wanga, J. J. (2001). Effects of Host Plants on Biology and Life Table Parameters of *Aphis spiraecola* (Homoptera: Aphididae). Environ. Entomol., 30(1): 44-50.

Webb, S. E.; Kok–Yokomi, M. L.; Gray, D. J. and Benton, C. M. (1994). In vitro rearing of grapevine aphid on micropropagated shoot cultures of bunch grape and muscardine plants. *Annals Entomological Society America*, 87:879-885.

Zarpas, K. D.; Margaritopoulos, J. T.; Stathi, L. and Tsitsipis, J. A. (2006). Performance of cotton aphid *Aphis gossypii* (Hemiptera: Aphididae) lineages on cotton varieties. International Journal of Pest Management, 52: 225-232.

ARABIC SUMMERY

الآثار الناجمة عن بعض درجات الحرارة الثابتة على سمات حيوية معينة لمنْ العنب *Aphis illinoisensis* Shimer

عزيزة محمد الجنتيري - أسماء عبد الحميد عبدالله فضل - صابر فهيم محمود موسى
معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الجيزة – مصر

تم دراسة بيولوجي ودورة حياة منْ العنب *Aphis illinoisensis* (Shimer) في أربع درجات حرارة ثابتة على صنف العنب "سبريور". درجات الحرارة الثابتة المستخدمة هي 17، 21، 24 و27º م والرطوبة النسبية 65 ± 5 % وفترة ضوئية 14 ساعة يومياً. أظهرت النتائج أن المنْ ينمو أسرع بزيادة درجات الحرارة في المدى من 17 – 27º م. يمر منْ العنب بأربعة أطوار حورية حتى يصل لطور الحشرة الكاملة. فترة نمو الطور الحوري تتباين معنوياً بين درجات الحرارة ويستغرق 15.5، 12.2، 7.3 و 5.4 يوم عند 17، 21، 24 و27º م ، على التوالي. وكانت قيم الحد الحرج للنمو (**t_0**) والاحتياجات الحرارية (**K**) هي 12.4º م و 80.73 وحدة حرارية، على الترتيب حتى يصل المنْ للطور البالغ. اختلفت قياسات جداول الحياة في درجات الحرارة التي تمت فيها الدراسة. أوضحت هذة القياسات تأثير الحرارة على بيولوجي منْ العنب *A. illinoisensi* حيث وجد أن أكبر قيم لكل من صافى معدل التوالد (**Ro**) ، (**λ**) و لمعدل الزيادة (**r_m**) هي 6.30 ، 1.155 و 1.088 عند درجات حرارة 24 ،24 و21 ºم ، على التوالي. وتراوحت مدة الجيل (**GT**) من 10.53-27.39 يوم في درجات الحرارة الدراسة.