

**EFFECT OF DIFFERENT CONSTANT TEMPERATURES AND TWO
 PREFERRED VEGETABLE HOST PLANTS ON CERTAIN
 BIOLOGICAL ASPECTS OF COTTON APHID, *Aphis gossypii* GLOVER,
 (HOMOPTERA, APHIDIDAE)**

BY

El-Dessouki, S.A.; El-Awady, S.M. and Ata, T.E.

Dept. of Plant Protection, Fac Of Agric Al-Azhar University, Cairo, Egypt.

ABSTRACT

The present work dealt with the effect of three different degrees of constant temperatures, 20, 25 and 31±0.5°C and two different preferred host plants, cucumber and squash plants on certain biological aspects of the insect development and the insect productive potential. The obtained data showed that the effective degree of temperature (the optimum) for development and reproductive was the 25 °C and squash plants encourage the productive potential of *A. gossypii* females than the other tested food and host plants (cucumber).

INTRODUCTION

The cotton aphid or melon aphid, *Aphis gossypii* Glov. is one of serious insect pests attack cotton, vegetables and other different plants i.e. it is one of polyphagous insect pests in Egypt. (Khalifa and Sharaf El-Din, 1964; Attia & El-Hamaky, 1985; Hussey and Scopes, 1985; Abdallah, 1997; El-Khawass and Al-Ansary 1999) Therefore, the insect is wide spread either in different parts of the world on cucurbitaceae specially on cucumber and squash (Goff and Tissot, 1932, El-Khawass, 1995 and Omar *et al* 2001). The damage done by this key pest either in open field or under protected cultivation is very important and needs a control for this pest. *A. gossypii* Glov. with chemical and other control methods. The study of biological potential of cotton aphids under different ecological factors and different hosts has been investigated by (El-Khawass and Al-Ansari, 1999) Detailed studies or investigation about this point of view are very necessary and specially for controlling this serious pest. That is the aim of this present work or investigation specially by the intensive vegetables production for export or local consumption

MATERIAL AND METHODS

Insect culture of *Aphis gossypii* Glov was collected from cucumber plants, *Cucumis sativus* under plastic greenhouse conditions in the Fac of Agric Al-Azhar University at Nassr-City Cairo

To get idea about the biology of *A. gossypii* Glov under different degree of temperatures, three temperatures were selected 20, 25, 31 °C Also to test the

effect of plant hosts on the biology of the insect. cucumber (Var. Hybrid select) & squash (Var. Skandarany) were selected for that investigation. The biological data of different stages or instars of the insect were observed and recorded. A newly hatched nymphs of *A. gossypii* with 10 replicates were used and observed daily. The moulting, the immature stages duration, adult stage, the pre-viviparous, viviparous post-viviparous and generation periods were observed and recorded under the three constant room temperature, 20, 25 and 31 °C \pm 0.5 °C and R.H. of 30%; 42 and 50% \pm 4% throughout the investigation period respectively.

RESULTS AND DISCUSSION

The obtained results represented in Tables (1 and 2). The duration periods of different instars and stages didn't affected by the different degrees of constant temperatures as shown in (table 1), when the insect reared on cucumber plants, inspite of a small effect could be observed as decrease in the periods of pre-viviparous, viviparous periods of adults. These biological aspects were decreased by increasing of the degrees of temperatures (Table 1). The pre-viviparous and viviparous periods were 1.0 ± 0.1 , 0.9 ± 0.0 ; 0.9 ± 0.0 and 10.7 ± 0.4 , 10.6 ± 0.5 , 9.1 ± 0.9 days under 20 °C, 25 °C and 31 °C \pm 0.5 °C, respectively. Generally the duration of nymphal, adult longevity and generation periods were obviously influenced by the tested high temperature (31 °C \pm 0.5 °C.). This influence could be seen as a decrease in the periods. These periods were 5.0 ± 0.3 , 12.9 ± 0.4 and 6.0 ± 0.4 days under the temperature of 20 ± 0.5 °C, but the same periods were shorter by the degree of 31 °C \pm 0.5 °C. They were 4.9 ± 0.3 , 11.3 ± 0.7 and 5.8 ± 0.2 days respectively i.e. the whole stage period of nymph and adult of *Aphis gossypii* Glov. can be decreased by increasing the degree of temperatures from 20 °C to 31 °C. That range of temperatures seem's to be the optimum range of temperature for *A. gossypii* and in agreement with the finding of El-Khawass and Al-Ansari, 1999

From the whole data of the three tested constant degrees of 20, 25 and 31 °C. it could be concluded, that the temperature of 25 °C was the optimum temperature for the development and the reproductive potential of *A. gossypii*, whereas the average number of aphids offsprings per adult was 44.9 ± 4.8 nymphs by that degree (25 \pm 0.5°C), while was 31.3 ± 1.5 and 25.4 ± 4.0 offsprings in average by the degrees of 20°C and 31°C, respectively. Also, the present data showed that the optimum temperature for maximum daily numbers of offsprings per female was by 25°C on cucumber plants. It was 4.2 ± 0.4 offsprings per female and it was 2.9 ± 0.4 and 2.7 ± 0.2 offsprings per day/female by 20°C and 31°C, respectively (Table 1). The above results are in agreement with those obtained by El-Khawass and Van Steens, 1994

The effect of different constant temperatures of 20, 25 and 31 °C \pm 0.5 and R.H. 39%, 42%, 50%, \pm 0.4% were investigated, when the *A. gossypii* reared on squash *Cucurbita pepo* (var Skandarany) and the obtained results represented in (Table 2).

Table (1): Certain biological aspects of *A. gossypii* feeding on cucumber *Cucumis sativus* variety (Hybridselect) under three constant temperatures of 20, 25, 31±0.5 °C and R.H. of 39%, 42% and 50% +4% respectively.

Biol. Aspects.	Temp.	20 °C	25 °C	31 °C	Total	Mean
1 st instar duration		1.4±0.2	1.3±0.2	1.3±0.1	4.0	1.3±0.2
2 nd instar duration		1.3±0.2	1.5±0.2	1.2±0.1	4.0	1.3±0.2
3 rd instar duration		1.2±0.1	1.3±0.2	1.3±0.1	3.8	1.3±0.1
4 th instar duration		1.1±0.1	1.1±0.1	1.1±0.1	3.2	1.1±0.1
Nymphal period		5.0±0.3	5.1±0.3	4.9±0.3	15.0	5.0±0.3
Pre. Viviparous period		1.1±0.1	0.9±0.0	0.9±0.0	2.8	0.9±0.0
Viviparous period		10.7±0.4	10.6±0.5	9.1±0.9	30.4	10.1±0.6
Post. Viviparous period		1.2±0.1	1.4±0.2	1.3±0.2	3.8	1.3±0.2
Adult longevity.		12.9±0.4	12.9±0.6	11.3±0.7	37.0	12.3±0.6
Generation period		6.0±0.4	6.0±0.3	5.8±0.2	17.8	5.9±0.3
Fecundity		31.3±1.5	44.9±4.8	25.4±4.0	101.6	33.9±3.4
Daily reproduction/female		2.9±0.4	4.2±0.4	2.7±0.2	9.8	3.3±0.3

Table (2): Certain biological aspects of *A. gossypii* feeding on squash *Cucurbita pepo* variety (Skandarany) under three constant temperatures of 20, 25, 31±0.5 °C and R.H. of 39%, 42% and 50% +4% respectively.

Biol. Aspects.	Temp.	20 °C	25 °C	31 °C	Total	Mean
1 st instar duration		2.1±0.1	2.0±0.2	2.1±0.1	6.2	2.1±0.1
2 nd instar duration		1.7±0.2	1.2±0.2	1.0±0.2	3.9	1.3±0.2
3 rd instar duration		1.9±0.2	1.3±0.2	1.1±0.1	4.2	1.4±0.2
4 th instar duration		1.1±0.0	1.2±0.2	1.1±0.1	3.3	1.1±0.1
Nymphal period		6.7±0.2	5.7±0.2	5.3±0.3	17.7	5.9±0.2
Pre. Viviparous period		0.8±0.3	0.3±0.2	1.0±0.2	2.2	0.7±0.2
Viviparous period		12.3±0.5	11.0±0.9	9.1±1.4	32.4	10.8±0.9
Post. Viviparous period		0.9±0.3	0.6±0.2	3.1±0.2	4.6	1.5±0.2
Adult longevity.		14.1±0.5	11.9±0.9	13.2±1.3	39.2	13.0±0.9
Generation period		7.6±0.2	6.0±0.3	6.3±1.7	19.9	6.6±0.7
Fecundity		41.6±5.9	59.0±5.8	24.3±5.5	124.8	41.6±5.7
Daily reproduction/female		3.3±0.5	5.2±0.2	2.5±0.4	11.0	3.7±0.4

From that Table it could be concluded, that a similar trend was found by the effect of the different tested temperatures on the tested biological data of *A. gossypii*. Generally the results showed that, the fecundity of the female was higher (59.0 ± 5.8 offsprings per female) on squash than in the case of cucumber plant (44.9 ± 4.8 offsprings per female) under the constant degree of 25 °C ± 0.5 °C. The daily reproductive potential per female revealed the same trend (see Tables 1 & 2). These results of *A. gossypii* developmental aspects on squash plants assure the previous discussed results by cucumber plants under the different degrees of

temperatures. The present investigation indicated also, that the host plant has an obvious effect on the biology of *A. gossypii* specially on the life cycle and on the productive potential without respect to the different conditions of temperature and R.H. It can be concluded from Tables (1 & 2), that the nymphal stage period, the adult longevity, the generation period of *A. gossypii* was longer by about one day by each mentioned biological aspects on the squash than on cucumber plant, respectively. These data were 5.9 ± 0.2 , 13.0 ± 0.9 & 6.6 ± 0.7 days on squash in average and were 5.0 ± 0.3 , 12.3 ± 0.6 , 5.9 ± 0.3 days on cucumber plants in average. The viviparous period was longer (10.8 ± 0.9 days) on squash than on cucumber (10.1 ± 0.6 days) and reflected on the fecundity of *A. gossypii* female in general. It was 41.6 ± 5.7 offsprings per female (3.7 ± 0.4 offsprings per day) by squash plants, but it was about 33.9 ± 3.4 offsprings per female (3.3 ± 0.3 offsprings per day) on cucumber plants. This finding about different host plants effect has been studied by some authors, El-Khawass and Al-Ansari, 1999. They found that, the reproductive potential of the insect pest, *A. gossypii*, was lower on cantaloupe than on cucumber plants. The present data about the effect of some climatic factors as different temperatures and different hosts as food and host plants for the *Aphis gossypii* serve the estimation of the insect population, when planning an integrated pest control program for this serious polyphthogous piercing-sucking insects.

REFERENCES

- Abdallah, Y.E.Y. (1997): Damage and damage loss assessments of certain insect pests attacking cotton in Egypt. Ph.D. Thesis, Faculty of Agriculture, Ain Shams University, Cairo, Egypt, 194pp.
- Attia, A.A. and El-Hamaky, M.A. (1985): The biology of the cotton aphid, *Aphis gossypii* Glover in Egypt (Homoptera Aphisidae). Bull Soc Ent Egypte, 66: 359-371.
- El-Khawass, K.A.M. (1995): Ecological and biological Aspects of *Aphis gossypii* and its Biological control under greenhouse's condition. Ph.D Thesis, Fac. Agric., Al-Azhar University, Nassr-City, Cairo, Egypt.
- El-Khawass, K.A.M. and Al-Ansari, M.K.E (1999): Relative suitability of two cucurbit species as host plants for *Aphis gossypii* Glover (Homoptera Aphisidae), Plant Protection Dept., Fac. of Agric. Al-Azhar University, Nassr-City, Cairo, Egypt.
- Goff, C.C. and Tissot, A.V. (1932): The melon aphid, *Aphis gossypii*, Bull. Florida Agric. Exp. Stn., 252-323.
- Hussey, N.W. and Scopes, N. (1985): Biological pest control, the glasshouse experience, Cornell Univ. Press, Ithaca, New York. 240pp.
- Khalifa, A. and Sharaf El-Din, N. (1964): Biological and ecological study on *Aphis gossypii* Glover (Homoptera Aphisidae), Bull Soc. Ent Egypte, 38: 131-153.
- Omar, B.A.I., Zedan, M.A and Al-Ansari, M.K.E (2001) The Aphid-predators relationship in squash field influenced by using insecticides. 26: 2363-2372.

تأثير درجات الحرارة المختلفة ونوعين من نباتات الخضر المفضلة على بعض
النواهي البيولوجية لمن القطن *Aphis gossypii*

سامى عبدالحميد النمواقي، شلهي محمد العوضى، طارق السيد عطا
قسم وقاية النبات - كلية الزراعة جامعة الأزهر .

تم دراسة تأثير ثلاث درجات حراره مختلفه ثابتة، ٢٠م، ٢٥م، ٣١م+٠.٥م وتأثير نوعين من نباتات الخضر المفضلة لتلك الحشرة "الخيار والكوسه" على مراحل تطور الحشرة وكذلك على القدرة التكاثرية لها. وأظهرت النتائج أن درجة الحرارة المثلى للحشرة ٢٥م وأن نبات الكوسه يشجع القدرة التكاثرية لهذه الآفة. وهذه الدراسة تفيد في وضع تأثير تلك العوامل في الإعتبار عند تقييم تعدادها لوضع برنامج مكافحة لها.