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VERTICAL DISTRIBUTION OF THE IMMATURE STAGES OF COTTON AND TOMATO WHITEFLY, *BEMISIA TABACI* (GENN.) AND THE COTTON APHID, *APHIS GOSSYPII* GLOV. ON EGGPLANT, *SOLANUM MELONGENA* VAR. *ESCULENTUM* NESS. AT MENOFYIA AND QALYOUBIA GOVERNORATES

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ABSTRACT

This study was conducted at Menofyia and Qalyoubia governorates in two successive seasons 2005 and 2006 to study the most suitable vertical plant Levels that, *A. gossypii* and *B. tabac*i prefer to infest the eggplant. The obtained results could be focused as follows:-

- At both governorates; the most preferable level for *A. gossypii* (nymphs) was the lower where the relative humidity was high followed by middle and upper.
- *B. tabaci* (eggs) was found mostly in the upper and middle levels, vice-versa nymphs at Menoufyia and Qalyoubia governorates, the lower and middle levels were the most infested which means that they are more suitable for development.
- *A. gossypii* (nymphs) population densities were higher at both Qalyoubia than Menofyia governorate during 2006 than 2005 seasons.
- *B. tabaci* (eggs and nymphs) population were higher at Qalyoubia governorate than Menofyia in both seasons 2005; 2006. In general the population densities of the two studied insects were higher in 2006 season.

INTRODUCTION

Eggplant (*Solanum melongena* var. *esculentum* Ness.) is considered as one of the major and important crops in Egypt and many countries of the world, It is highly productive crop and consumed as a cooked vegetable in various ways. It is a hardly annual herbaceous plant. There is a lot of variability exists in the nature in colour, shape, and size. A number of cultivars are grown across the globe depending on the market needs and consumer preference (Sidhu,*et al.*, 2004).Aubergine is attacked by many insect pests such as cotton and tomato whitefly, cotton aphid, jassids ....etc., brinjal was considered the major host plants of whitefly, *Bemisia tabaci* (Genn.), during summer season in Egypt (El-Sayed, *et al.*, 1989). It is normally appears as pest on eggplants at mid to late season (August – November).When the plant canopy is fully developed the insects are covering the plant where the majority of whiteflies and aphids

infestation occurred (Hindy, *et al.*,1997).The aphid *A. gossypii* was the highest on Aubergine which was recorded during the second week of September to the fourth week of October in Meerut, Uttar Pradesh, India (Anil Kumar, *et al.*, 2004).During the Kharif season aphids were observed from the 3rd. week of August, and the population of this pest peaked on the 3rd week of November. During the peak period, the leaves of infested plant were yellowish, curly and covered with sooty moulds (Sarvendra Singh, *et al.*, 2005). This study was aim to:-

Studying the population densities of *A.gossypii* (nymphs) and *B.tabaci* (eggs and nymphs) on aubergine throughout two successive seasons at Menofyia and Qalyoubia Governorates in relation of the three plant levels.

MATERIALS AND METHODS

The experiment was carried out in grower fields during two successive seasons (2005/ 006 and 2006/ 007) in Meet El-Mooze village, Menofyia governorate and Seriaquos village, Qalyoubia governorate on white long variety Eggplant, (*Solanum melongena* var. *esculentum* Ness.), (Solanaceae) cultivated in one feddan area in each village. All the experimental plots received the normal agricultural practices of fertilizers, but all the area of experiment was kept free of any pesticidal application. Three weeks after sowing, population study of *B. tabaci* and *A. gosypii* started under field conditions by weekly samples. The experimental design used was the complete randomized block with four replicates, where each area was divided into three equal locations (fields) approximately of about 1/3 feddan each, divided into four replicates, each one about 350 m^2, seedlings of eggplant were transplanted at half of May. The weekly samples consisted of 40 random leaves /level (Top, Middle and Lower), respectively (10 leaves x4replicates/level) were taken weekly, put in a paper bags and transferred to the laboratory. By the aid of a sterioebinocular, the numbers of *B. tabaci* and *A. gossypii* immatures were counted per leaf for aphids and per $inch^2$ for whitefly from the beginning of August 1st until the end of October during the two tested seasons, to study the population density and determine the most preferable level to the insect infestation as insect preferal distribution of *A. gossypii* (nymphs) and *B. tabaci* (eggs and nymphs). Data were summarized as mean for three locations/(village) and four replicates for each governorate. The results obtained in each population were exposed to the proper statistical analysis applying the analysis of variance (ANOVA), and the least significant differences (L.S.D) as described by Snedecor (1970) by the aid of computer.

RESULTS AND DISCUSSION

I. Distribution of cotton aphid *A. gossypii* and cotton and tomato whitefly *B. tabaci* on eggplant:-

This experiment was conducted at Menofyia and Qalyoubia governorates throughout two successive seasons (2005 and 2006) on eggplant to determine the most preferred level (upper or medium or lower) for the insects to infest the plant during three months.

Effect of different plant vertical levels of *S. Melongena* var.*esculenatum* on the population of *A. gossypii* and *B. tabaci*:-

The overall mean numbers of *A. gossypii* (nymphs) population and *B. tabaci* (eggs and nymphs) per 40 leaves were evaluated weekly for each level (upper; middle and lower) of eggplant. Sampling started from the beginning of August till the end of October throughout two successive seasons of investigation.

1- *Aphis gossypii* (nymphs):-

1.A- At Menofyia governorate:-

In the first season 2005, data presented in Table (1) and illustrated in Fig. (1) showed that, the preference of *A. gssypii* for the different plant levels could be arrange as follows; The lower followed by middle then the upper level with overall mean of 19.9±2.7±;7.7±1.1 and 3.7±0.7 nymphs/40 leaves, respectively. The lower level was infested mostly in August, September and October with 11.4±3.5; 41.0±3.1 and 7.2±1.6 nymphs/40 leaves, respectively. While the medium level harbored the highest population of aphids during September with 15.2±1.0 nymphs/40 leaves. The highest population was found on the upper level also in September with 6.5±0.9 nymphs/ 40 leaves compared to other two months.

Table (1): Effect of plant vertical levels on the population of *Aphis gossypii* (Glov.) nymphal stage represented as mean numbers on brinjal at Menofyia governorate during 2005 and 2006 years.

Date of inspection (week)	Mean population density of aphids/ 40 leaves at indicated inspection dates (±s.e.)					
	2005			2006		
	Upper Nymphs	Medium Nymphs	Lower Nymphs	Upper Nymphs	Medium Nymphs	Lower Nymphs
Aug. 1st	1.3 ±0.2	1.8±0. 6	2.8±0. 6	7.3±0. 5	18.3±2.3	13.8±4.2
2nd	2.8±0.3	5.5±1. 0	9.5±2.0	7.0±1.7	13.5±1.4	28.0±2.4
3rd	4.0±0.9	7.5±0. 8	14.3±1.3	7.5±1.6	15.8±2.8	33.8±4.0
4th	3.5±0. 4	9.5±1.4	18.8±1.3	9.8±1.3	19.5±0.8	49.0±4.5
x̄±s.e.	2.9±0.6	6.1±1.7	11.4±3.5	7.9±0.7	16.8±1.4	31.2±7.4
Sep. 1st	8.0±0.9	17.8±0.8	32.0±1.1	19.5±3.8	57.3±5.4	97.3±3.9
2nd	7.8±0.8	14.0±1.0	42.5±1.3	19.0±4.1	44.5±6.1	86.3±3.2
3rd	5.8±1.6	15.8±0.8	44.8±1.1	14.8±0.5	37.3±2.7	112.3±4.8
4th	4.5±0.4	13.3±1.5	44.5±0.9	19.3±2.6	41.5±6.8	105.0±7.4
x̄±s.e.	6.5±0.9	15.2±1.0	41.0±3.1	18.2±1.1	45.2±4.4	100.2±5.7
Oct. 1st	0.5±0.3	3.3±1.2	4.5±0.7	1.5±0.5	23.5±6.8	37.8±6.5
2nd	1.0±0.3	2.3±0.5	5.5±0.7	3.0±0.2	14.0±2.5	33.5±2.9
3rd	2.5±0.6	1.0±0.2	7.3±0.3	6.3±0.6	8.3±1.3	25.3±3.0
4th	2.8±0.8	0.8±0.1	11.5±1.0	4.8±1.0	45.8±7.8	53.3±8.4
x̄±s.e.	1.7±0.6	1.9±0.6	7.2±1.6	3.9±1.1	22.9±8.4	37.5±6.0
Total	44.5	92.6	238.0	119.8	339.3	675.4
Overall mean	3.7^{b}±0.7	7.7^{a}±1.1	19.9^{a}±2.7	10.0^{b}±1.0	28.3^{a}±4.7	56.3^{a}±6.4
F.0.05 %	23.1***			26.1***		
Probability	.0013			.0014		
L.S.D. 0.05%	4.3			10.7		

Overall mean with the same letter are not significantly different. (P>0.05) *** highly significant

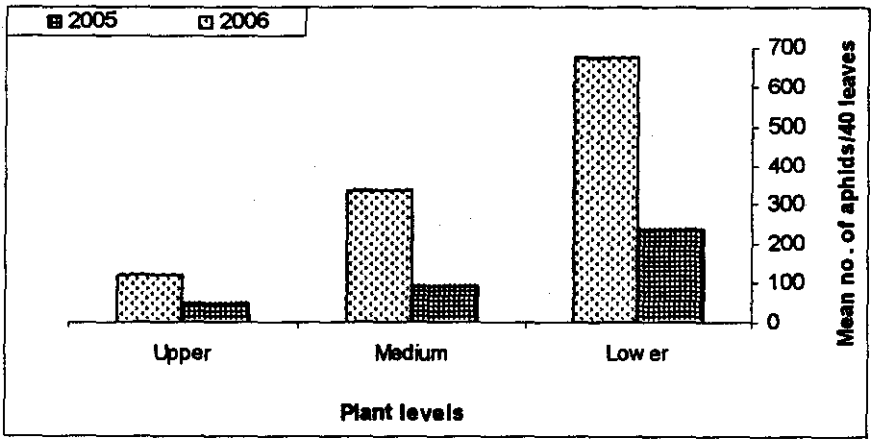

Fig. (1): Effect of plant levels on the population density of *A.gossypii* (nymphs) on eggplant at Menofyia during 2005 and 2006 seasons.

Statistical analysis of data in Table (1) revealed that, there was significant differences between *A. gossypii* population on the different levels with L.S.D.= 4.3.

In the second season 2006, at Menofyia governorate, data presented in Table(1) and Fig.(1)showed that, the cotton aphid *A. gossypii* preferred also the lower level with 56.3±6.4 nymphs/40 leaves, that may be due to the high humidity and escaping away from the direct sunlight. The medium level came next with overall mean 28.3±4.7 nymphs/40 leaves. It was observed that, *A. gossypii* population concentrated in September and October on the two plant levels (lower and medium),when the moderate temperature and relative humidity were suitable for insect to develop. The monthly averages of *A. gossypii* on the middle level were 45.2±4.4 and 22.9±8.4 nymphs/40 leaves in September and October, respectively. While the lower level was 100.2±5.7 and 37.5±6.0 nymphs/40 leaves, in case of the upper level the averages were 18.2±1.1; 7.9±0.7 and 3.9±1.1 nymphs/40 leaves in the September, August and October, respectively.

Statistical analysis of *A. gossypii* population on the three levels showed that, there was also, significant differences between plant levels with L.S.D. =10.7. This means that the distribution of this insect was not homogenous on the three levels.

1.B- At Qalyoubia governorate:-

In the first season 2005, the population of *A. gossypii* on the three plant levels which presented in Table (2) and Fig. (2) showed that, in general the insect were found more on the Lower level followed by middle then upper level with overall mean 37.7±11.2; 18.4±4.9 and 12.6±3.8 nymphs/40 leaves, respectively. That may be attributed to the moderate temperature and high relative humidity that aphids preferred on the lower level. The lower level was the most infested level especially in September; August and October with monthly averages of 64.4±9.9; 26.2±11.5 and 22.4±9.7 nymph/40 leaves, respectively. The second

level was the middle which was infested heavily in the months of September, October and August with 21.7±5.7; 7.9±1.7 and 8.3±1.8 nymphs/40 leaves, respectively. At last, came the upper level where the major population of *A. gossypii* was found in September with an average of 30.1±7.1 nymphs/40 leaves.

Statistical analysis of data in the same Table showed that's there was a significant relation between the different plant levels with L.S.D.= 8.4.

In the second season 2006, at Qalyoubia governorate, data in Table (2) and Fig.(2) showed that, *A. gossypii* proffered the lower level with an overall mean of 33.3 ±10.6 nymphs/40 leaves, that was clear in September and October with monthly average of 58.2±6.8 and 25.7±12.2 nymphs/40 leaves, respectively. The middle level ranked the second grade with overall mean 15.2±5.7 nymphs/40 leaves, and the aphids were mostly abundant in September and November with 28.4±6.5 and 11.3±3.4 nymphs/40 leaves, respectively. Ultimately, the upper level with overall mean 9.6±4.1 nymphs/40 leaves, the aphid was found mostly in September and October on the upper level with monthly averages of 19.4±4.6 and 5.7±0.6 nymphs/40 leaves, respectively

Table (2): Effect of plant vertical levels on the population of *Aphis gossypii* (Glov.) nymphal stage represented as mean numbers on brinjal at Qalyoubia governorate during 2005 and 2006 years.

Date of inspection (week)	Mean population density of aphids/ 40 leaves at indicated inspection dates (±s.e.)					
	2005			2006		
	Upper Nymphs	Medium Nymphs	Lower Nymphs	Upper Nymphs	Medium Nymphs	Lower Nymphs
Aug. 1st	3.8±0. 5	5.5±1.4	9.0±0. 7	2.8±0.5	3.3±0.9	6.0±2.2
2nd	7.5±0. 5	12.8±1.9	16.8±1.3	4.0±0.6	5.0±0.7	10.3±1.5
3rd	9.3±2.3	12.5±1.3	19.8±2.5	3.5±0.6	7.0±0.6	8.8±3.0
4th	12.5±2.4	21.3±1.9	59.3±5.4	4.5±1.2	8.0±1.1	39.0±3.4
x̄ ±s.e.	8.3±1.8	13.0±3.3	26.2±11.5	3.7±0.4	5.8±1.1	16.0±7.9
Sep. 1st	29.0±3.3	49.3±6.5	67.5±4.6	21.0±1.7	46.0±3.1	58.5±3.5
2nd	9.0±1.3	16.0±1.0	53.3±4.7	7.8±0.7	15.8±1.1	49.7±2.1
3rd	32.8±3.1	27.0±5.2	90.3±3.5	29.8±1.5	24.3±1.5	77.0±2.2
4th	16.0±3.3	28.0±6.3	46.5±2.3	18.8±2.0	27.3±3.0	47.5±7.0
x̄ ±s.e.	21.7±5.7	30.1±7.1	64.4±9.9	19.4±4.6	28.4±6.5	58.2±6.8
Oct. 1st 2nd	4.3±1.4	5.2±1.0	7.8±1.4	4.3±0.9	4.8±0. 9	7.8±0. 7
3rd	7.3±1.4	11.5±1.3	14.3±1.2	5.8±1.0	9.8±1.1	15.3±0. 9
4th	7.6±1.8	10.0±1.2	17.3±1.6	5.5±0.3	9.8±0.8	18.8±0. 6
	12.3±1.5	21.3±1.5	50.3±4.3	7.0±0.6	20.8±1.1	61.0±1. 8
x̄ ±s.e.	7.9±1.7	12.0±3.4	22.4±9.7	5.7±0.6	11.3±3.4	25.7±12.2
Total	151.4	220.4	452.2	114.8	181.9	399.7
Overall mean	12.6[b] ±3.8	18.4[a] ±4.9	37.7[a]±11.2	9.6[b]±4.1	15.2[a]±5.7	33.3[a]±10.6
F.0.05 %	33.8***			36.8***		
Probability	.0002			.0036		
L.S.D. 0.05%	8.4			7.2		

Overall mean with the same letter are not significantly different. (P>0.05) *** highly significant

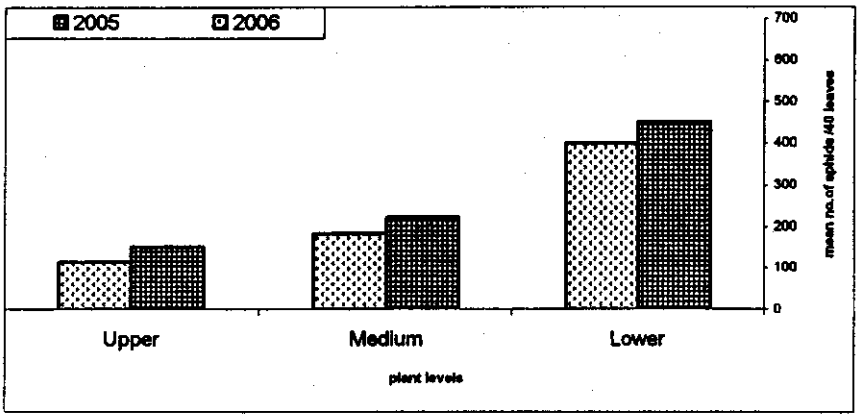

Fig. (2): Effect of plant levels on the population density of *A.gossypii* (nymphs) on eggplant at Qalyoubia during 2005 and 2006 seasons.

Statistical analysis of data clearly showed that, there was significant differences between *A. gossypii* population in the three plant levels with L.S.D.= 7.2. Such result has been mentioned by Singh, *et al.*, (1990) who reported that, the mean population of apterous *A. gossypii* on upland cotton in India, was high in the middle level of canopy especially in August – early September, they were 26.45 – 196.75 insects, respectively. The obtained results also agree with Ghukar (1991) in Africa and Ismail (2001) in Egypt and disagree with Pun and Sabitha (1995).

2- *Bemisia tabaci* (Eggs and Nymphs):-

2.A – At Menofyia governorate:-

2.A.1- Egg stage:-

In the first season 2005, data presented in Table (3) and Fig. (3) revealed that, the abundance of *B. tabaci* eggs on the vertical three levels could be arranged as follows; the upper followed by the middle then the lower level with overall mean 15.1±5.1; 5.4±1.5 and 2.3±0.4 eggs/40 inch^2. The upper level was mostly infested allover the season in August, September and October with monthly averages of 7.3±1.7; 27.1±7.1 and 10.8±2.9 eggs/40 inch^2, respectively. The middle level was mostly infested in September and October with 9.1±0.5 and 3.7±0.8 eggs/40 inch^2, respectively. Finally came the lower level, which was moderately infested especially in September and October with an averages 3.3±0.1 and 2.3±0.4 eggs/40 inch^2, respectively.

Statistical analysis for *B. tabaci* (eggs) proved the presence of significant differences between the three levels with L.S.D.=3.0

In the second season 2006, at Menofyia governorate, data in the same Table and Figure clearly revealed that, *B. tabaci* eggs mostly preferred the upper level followed by the middle then the lower level with general averages of37.4± 9.5;14.0±4.5 and 6.0 ± 1.3 eggs /40 inch^2, respectively. The highest population of eggs recorded in the three level occured in September and October. Where, the

upper level harboured most of eggs population with averages of 59.5±12.3 and 31.3±4.8 eggs/40 inch^2, respectively. While the next level was the middle, with monthly averages of 24.9±1.5 and 14.0±4.5 eggs/40 inch^2, respectively. The lower level was the lowest infested with averages of 9.1±0.8 and 6.0±1.3 eggs/40 inch^2 in September and October, respectively.

In general, *B. tabaci* (eggs) population preferred the upper and the middle levels more than the lower one in the two tested seasons at Menofyia that because of the moderate temperature and relative humidity which the insect prefer to develop.

Statistical analysis of data revealed that, there was high significant differences between population in the Upper and the other levels with L.S.D.= 6.6.

2.A.2- Nymph stage:-

In the first season 2005, data revealed that, the abundance of *B. tabaci* (nymphs) on the three vertical levels could be arranged as follow:-

The lower level followed by the middle then the upper levels with overall mean of 13.1±3.0; 9.2±2.4 and 8.3±2.2 nymphs/40 inch^2, respectively. The lower level was heavily infested allover the season in August; September and October with monthly averages 3.6±1.2;17.5±3.3 and 18.3±1.8 nymphs/40 inch^2, respectively. The second one was the middle level which was infested in September and October with averages of 10.7±1.6 and 13.5±1.2 nymphs/40 inch^2, respectively. The upper level was the least infested one with the lowest numbers in September and October with averages of 10.4±1.9 and 11.6±1.6 nymphs/40 inch^2, respectively.

Statistical analysis of *B. tabaci* (nymphs) showed significant differences between three levels with L.S.D.= 4.5.

In the second season 2006, at Menofyia governorate, in the same Table and Figure, it is clearly shown that *B. tabaci* (nymphs) proffered the lower then the middle and finally upper levels with overall means of 33.8±9.6 27.2±8.5; and 24.4±6.2 nymphs/40 inch^2, respectively. The condensed population of nymphs was recorded in the three levels presented during September and October. Where, the lower level harboured most of nymphs population with averages 44.7±9.4; 45.9±7.8 nymphs/40 inch^2, respectively. The next level was the middle, with monthly averages in September and October of 29.2±6.8 and 43.9±5.1 nymphs /40 inch^2, respectively. The last one was the Upper level which harboured the lowest infestation with monthly averages of 30.4± 7.2 and 33.2± 5.0 nymphs/40 inch^2, respectively.

Statistical analysis proved that, there was highly significant differences between nymphal population in the upper, middle and lower levels with L.S.D. = 8.8

Table (3): Effect of plant vertical levels on the population of *Bemisia tabaci* (Genn.) immature stages represented as mean number on eggplant at Menofyia Governorate during 2005 and 2006 years.

Date of inspection (week)	Mean population density of whitefly (eggs and nymphs)/ 40 inch^2 at indicated inspection dates (±s.e.)					
	2005					
	Upper		Medium		Lower	
	Egg	Nymph	Egg	Nymph	Egg	Nymph
Aug. 1st	4.0±0.9	1.8±0.4	3.5±0.6	1.8±0.3	1.0±0.3	3.0±0.5
2nd	5.5±1.2	2.0±0.3	5.6±0.5	2.3±0.2	1.8±0.5	3.8±0.4
3rd	8.5±1.3	3.5±0.7	1.7±0.2	4.5±0.6	1.8±0.5	6.5±1.8
4th	11.3±1.4	4.5±0.3	3.2±0.4	5.3±3.0	3.0±0.2	11.0±1.1
x̄ ±s.e.	7.3±1.7	3.0±0.7	3.5±0.8	3.5±0.9	1.9±0.4	3.6±1.2
Sep. 1st 2nd	8.8±1.6	6.0±1.1	7.8±0.2	6.5±0.6	3.5±0.8	12.5±1.2
3rd	24.0±2.6	8.5±0.4	9.3±1.6	11.0±0.9	3.0±0.9	11.8±1.2
4th	35.5±2.5	12.8±1.2	9.3±0.6	14.3±0.8	3.5±0.6	20.8±1.4
	40.0±3.0	14.3±1.1	10.0±0.6	10.8±0.9	3.3±0.2	25.0±1.6
x̄ ±s.e.	27.1±7.1	10.4±1.9	9.1±0.5	10.7±1.6	3.3±0.1	17.5±3.3
Oct. 1st	19.1±2.5	7.8±2.0	1.8±0.4	11.6±1.7	1.5±0.4	16.0±3.4
2nd	8.3±0.9	15.4±4.2	3.0±0.1	16.0±2.0	1.0±0.2	18.1±3.2
3rd	9.6±1.8	10.7±1.6	4.3±0.4	15.0±3.0	1.6±0.4	23.2±1.6
4th	6.2±1.2	12.3±0.9	5.5±1.0	11.3±1.3	2.1±0.4	15.7±1.0
x̄ ±s.e.	10.8^a±2.9	11.6^b±1.6	3.7^a±0.8	13.5^a±1.2	1.6^b±0.2	18.3^a±1.8
Total	180.8	99.6	65.0	110.4	27.1	167.4
Overall mean	15.1±5.1	8.3±2.2	5.4±1.5	9.2±2.4	2.3±0.4	13.1±3.0
F.0.05 %	For eggs 21.2***			For nymphs 13.2***		
Probability	.0016			.0003		
L.S.D. 0.05%	3.0			4.5		
	2006					
Aug. 1st	16.5±4.9	6.0±0.9	7.0±1.3	6.3±2.1	3.0±0.6	6.5±1.6
2nd	18.3±1.5	8.0±2.4	9.0±1.8	7.8±0.9	5.5±0.6	10.0±1.4
3rd	22.3±1.2	11.0±0.8	9.0±1.3	10.0±1.5	5.3±0.8	10.8±2.1
4th	29.0±3.7	13.5±3.8	10.5±0.9	10.0±3.5	5.3±0.8	15.5±2.5
x̄ ±s.e.	21.5±2.8	9.6±1.7	8.9±0.7	8.5±0.9	4.8±0.6	10.7±1.9
Sep. 1st	38.8±3.5	19.8±2.6	26.5±4.2	17.3±2.2	10.8±1.7	32.5±5.1
2nd	47.3±3.7	18.3±6.2	22.0±3.9	21.0±3.1	7.3±0.5	27.8±2.7
3rd	58.0±7.0	35.3±7.0	22.8±2.8	31.3±3.8	8.5±1.3	50.5±4.1
4th	93.7±8.1	48.0±4.6	28.3±2.1	47.0±6.4	9.8±1.0	68.0±2.3
x̄ ±s.e.	59.5±12.3	30.4±7.2	24.9±1.5	29.2±6.8	9.1±0.8	44.7±9.4
Oct. 1st	45.4±2.0	20.8±2.0	6.5±0.5	31.4±3.2	2.2±0.5	29.6±1.2
2nd	25.1±1.5	31.6±2.8	9.1±1.8	42.0±1.3	3.5±0.5	43.4±2.7
3rd	28.0±3.0	44.5±1.7	8.0±0.9	55.3±3.0	4.7±1.1	66.6±2.2
4th	26.8±2.5	35.9±5.5	9.0±1.1	46.8±3.4	5.5±0.5	44.1±3.2
x̄ ±s.e.	31.3^a±4.8	33.2^a±5.0	8.2^a±0.6	43.9^b±5.1	4.0 ^{b} ±0.7	45.9^a ±7.8
Total	449.2	292.7	167.7	326.2	71.4	405.3
Overall mean	37.4±9.5	24.4±6.2	14.0±4.5	27.2±8.5	6.0±1.3	33.8±9.6
F.0.05 %	For eggs 18.9***			For nymphs 26.9***		
Probability	.0011			.0004		
L.S.D. 0.05%	6.6			8.8		

Overall mean with the same letter are not significantly different. (P>0.05)
*** highly significant

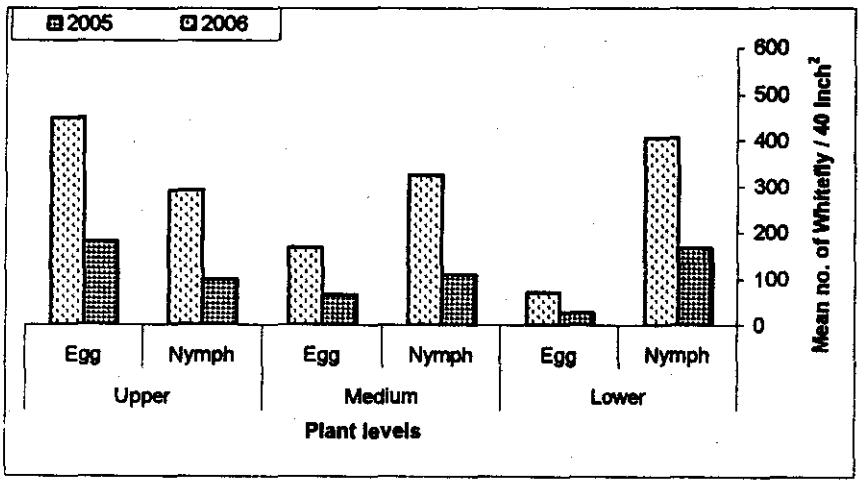

Fig. (3): Effect of plant levels on the population density of *B. tabaci* (eggs and nymphs) on eggplant at Menofyia Governorate during 2005 and 2006 seasons.

B - At Qalyoubia governorate:-

3.B.1 - Egg stage:-

In the first season 2005, data in Table (4) and Fig. (4) revealed that, the population of *B. tabaci* on the three levels could be arranged descendingly as follows, upper; middle and the lower level with overall mean 22.1±7.5; 8.0±2.1 and 3.5±0.8 eggs/40 inch^2, respectively. It was clear that, *B. tabaci* eggs infested eggplant heavily in September and October in the three levels; in upper level the monthly averages of eggs were 39.8±6.5 and 22.1±7.5 eggs/40 inch^2, respectively. The mean eggs population in the Middle level were 13.0±1.7 and 8.0±2.1 eggs/40 inch^2, respectively.

Statistical analysis showed significant differences between overall means of *B. tabaci* eggs population on the three plant levels with L.S.D. = 4.9.

Data of the second season 2006 in the same Table and Figure showed that, the same trend of results in the second season, where the preference of *B. tabaci* eggs to the three levels were the same; the upper followed by the middle then the lower level with overall means of 46.7±11.3; 15.8±4.5 and 8.4±2.9 eggs/40 inch^2, respectively.

Also, it was obvious that, the infestation in the three levels concentrated in September and October; for upper level, the monthly averages of the former months were 71.3±11.0 and 46.7±11.3 eggs/40 inch^2, respectively. While in the Middle level were 26.5±5.3 and 15.8±4.5 eggs/40 inch^2, respectively. Finally the lower level recorded 15.4±3.9 and 8.4±2.9 eggs/40 inch^2 in the two months, respectively. The previous results, showed that *B. tabaci* infested eggplant leaves at Qalyoubia governorate preferred laying its eggs on the upper and middle levels, those leaves may be more suitable for the insect eggs development.

Table (4): Effect of plant vertical levels on the population of *Bemisia tabaci* (Genn.) immature stages represented as mean number on eggplant at Qalyoubia Governorate during 2005 and 2006 years.

Date of inspection (week)	Mean population density of whitefly (eggs and nymphs)/ 40 inch² at indicated inspection dates (±s.e.)					
	2005					
	Upper		Medium		Lower	
	Egg	Nymph	Egg	Nymph	Egg	Nymph
Aug. 1st	7.0±1.9	4.5±0.6	3.5±0.7	3.0±1.1	2.0±0.3	9.5±1.1
2nd	6.5±0.5	3.0±1.0	4.0±1.4	4.6±0.4	2.0±0.8	7.0±0.9
3rd	11.3±1.2	7.5±1.3	6.1±0.5	5.0±1.2	3.5±0.6	8.6±0.2
4th	17.2±0.7	3.8±0.6	8.7±1.0	9.0±1.6	5.0±1.0	7.3±0.9
x̄ ±s.e.	10.5±2.5	4.7±1.0	5.6±1.2	5.4±1.3	3.1±0.7	8.1±0.6
Sep. 1st	41.0±2.6	11.3±1.4	16.4±4.0	7.5±0.5	6.5±1.6	15.5±3.7
2nd	27.3±6.6	13.7±1.5	15.0±2.1	17.0±1.2	2.1±0.6	26.5±5.0
3rd	34.0±3.1	14.3±1.6	9.3±2.5	15.5±1.0	5.5±1.7	14.3±0.9
4th	57.0±5.3	19.9±2.4	11.4±1.8	21.4±1.8	7.1±0.6	32.9±4.5
x̄ ±s.e.	39.8±6.5	14.8±1.9	13.0±1.7	15.4±3.0	5.3±1.1	22.3±4.6
Oct. 1st	23.8±2.0	13.5±2.9	4.4±0.8	15.0±2.1	2.0±0.5	19.1±0.4
2nd	15.8±0.8	11.1±1.5	6.0±0.6	19.9±2.3	1.8±0.5	20.3±3.4
3rd	10.4±1.2	14.9±1.5	2.1±0.4	17.2±1.1	1.7±0.2	21.9±2.0
4th	13.7±2.0	22.2±2.7	8.8±1.1	25.2±1.1	2.4±0.7	30.2±6.7
x̄ ±s.e.	15.9 a±2.9	15.4 b±2.4	5.3 a±1.4	19.3 a±2.2	2.0 b±0.2	22.9a±2.0
Total	265.0	139.7	95.7	160.3	41.6	213.1
Overall mean	22.1±7.5	11.6±2.9	8.0±2.1	13.4±3.4	3.5±0.8	17.8±4.0
F.0.05 %	For eggs 14.7***			For nymphs 17.1***		
Probability	.0034			.0052		
L.S.D. 0.05%	4.9			6.0		
	2006					
Aug. 1st	12.3±1.2	6.0±1.3	7.7±0.7	5.7±0.4	2.5±0.4	9.8±0.9
2nd	18.8±2.7	8.5±1.0	8.8±1.3	11.0±2.9	4.3±0.6	9.8±2.1
3rd	25.5±2.7	10.5±1.6	9.5±1.6	10.3±2.7	5.4±0.7	10.8±1.8
4th	40.3±3.2	11.0±2.4	17.0±0.6	11.0±1.9	8.0±1.7	17.0±2.0
x̄ ±s.e.	24.2±6.1	9.0±1.2	10.8±2.1	9.5±1.3	5.1±1.2	11.9±1.8
Sep. 1st	51.4±9.6	20.5±2.8	33.0±4.9	14.3±1.8	24.5±2.7	22.0±5.0
2nd	57.3±1.3	28.3±1.0	17.8±2.6	16.3±1.0	8.5±0.4	26.0±1.8
3rd	77.6±6.3	36.0±1.7	17.5±1.8	26.5±1.2	9.5±1.5	80.8±3.3
4th	99.0±6.4	46.5±3.0	37.5±5.7	78.8±5.4	19.0±1.1	83.0±11.4
x̄ ±s.e.	71.3±11.0	32.8±5.7	26.5±5.3	44.0±15.5	15.4±3.9	53.0±17.0
Oct. 1st	35.8±7.6	21.6±2.5	8.0±0.8	26.9±3.9	3.0±0.5	25.9±4.6
2nd	47.3±2.4	25.4±1.9	12.1±1.1	44.3±3.0	4.0±1.4	44.1±1.5
3rd	36.1±3.1	35.0±3.8	10.0±1.2	50.6±7.4	5.1±0.9	53.5±2.5
4th	59.2±4.4	40.4±5.6	10.3±1.5	60.3±4.7	6.5±0.7	77.8±14.2
x̄ ±s.e.	44.6 a±5.7	30.6 a±4.4	10.1 a±0.9	45.5 b±7.2	4.7 b±0.8	50.3a±11.0
Total	560.6	289.7	189.2	356.0	100.3	460.5
Overall mean	46.7±11.3	24.1±6.3	15.8±4.5	33.0±9.8	8.4±2.9	38.4±11.0
F.0.05 %	For eggs 18.3***			For nymphs 32.3***		
Probability	.0019			.0026		
L.S.D. 0.05%	7.7			11.3		

Overall mean with the same letter are not significantly different. (P>0.05)
*** highly significant

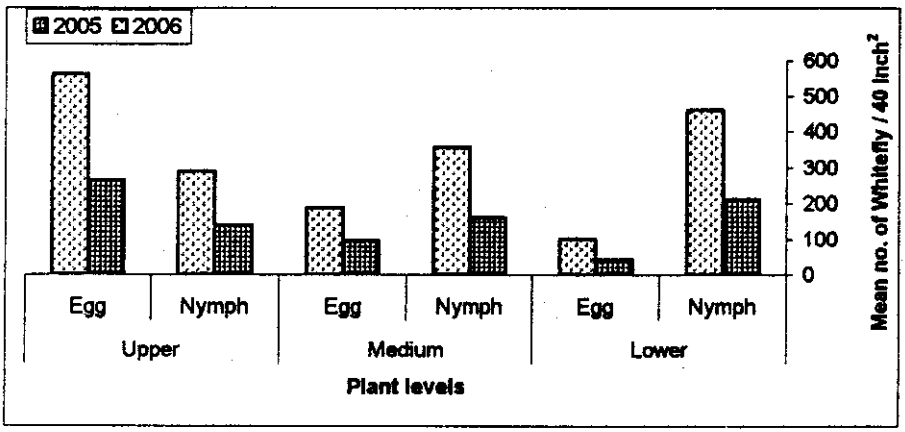

Fig. (4): Effect of plant levels on the population density of *B. tabaci* (eggs and nymphs) on eggplant at Qalyoubia Governorate during 2005 and 2006 seasons.

Statistical analysis revealed that, there were significant differences between *B. tabaci* eggs population at Qalyoubia governorate in the upper level and other levels with L.S.D. = 7.7. The obtained mentioned data before agree with the findings of Daoud, *et al.* (1999).

3.B.2- Nymph stage:-

In the first season 2005, data presented in Table (4) and Figure (4)revealed that, the population of *B. tabaci* nymphs proffered the lower followed by middle then upper levels descendingly with overall means of 17.8±4.0;13.4±3.4 and 11.6±2.9 nymphs/40 inch^2, respectively. The lower level was heavily infested with averages of 22.3±4.6 and 22.9±2.0 nymphs/40 inch^2, respectively during September and October.

The second level were the Middle during months September and October harboring averages of 15.4±3.0 and 19.3±2.2 nymphs/40 inch^2, respectively. Finally the Upper level occupied the last one with averages 14.8±1.9 and 15.4± 2.4 nymphs/40 inch^2 during the previous months, respectively.

Statistical analysis of *B.tabaci*(nymphs) show significant differences between the levels with L.S.D.= 6.0.

In the second season 2006, at Qalyoubia governorate, data indicate that *B. tabaci* (nymphs) was found concentrated in three levels descendingly with overall mean as follows:- lower; middle and upper (38.4±11.0; 33.0± 9.8 and 24.1± 6.3) nymphs/40 inch^2, respectively. The lower level was the most infested especially in September and October with averages of 53.0±17.0 and 50.3±11.0 nymphs/40 inch^2, respectively. The middle level was moderately infested in the previous months with averages of 44.0 ± 15.5 and 45.5± 7.2 nymphs/40 inch^2, respectively. The least level infested with *B. tabaci* (nymphs) were the upper

level with averages of 15.4±3.9 and 4.7± 0.8 nymphs/40 inch^2 also in September and October 2006, respectively.

Statistical analysis of the obtained results revealed significant differences between the three levels with L.S.D.= 11.3.

Finally, it may be conclude that, the *B. tabaci* (nymphal stage) proffered the lower, middle and upper levels descendingly. That may be attributed to being the suitability for sheltering, feeding and development. These results agree with the findings Naik and Lingappa (1992);Singh, *et al.* (1995);Pun and Sabitha (1995); Kira (1997); Ismail (2001). and Abdel- Baky (2001), who stated that, the vertical distribution of the whitefly, *Bemisia argentifolii* nymphs was similar on the four hosts (cotton; cucumber; cantaloupe and cabbage), where the high population densities per sample were recorded on the lower levels.

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دراسة التوزيع والانتشار الرأسي للأطوار الناقصة لكل من ذبابة القطن والطماطم البيضاء.(Genn) *Bemisia tabaci* ومن القطن Glov *Aphis gossypii* على نبات الباذنجان *Solanum melongena* var. esculentum Ness

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أجريت هذه الدراسة في محافظتي المنوفية والقليوبية ، وذلك خلال موسمين متتاليين ٢٠٠٥ ، ٢٠٠٦ على نبات الباذنجان (صنف أبيض طويل) لمعرفة أكثر المستويات الرأسية للنبات (علوي ، وسطي ، سفلي) والتي تفضلها حشرتي الذبابة البيضاء ومن القطن لإصابة الباذنجان على مدار الموسم . حيث أخذت العينات أسبوعيا بمعدل ٤٠ ورقة لكل مستوى من المستويات الثلاث في قريتي ميت الموز (محافظة المنوفية) و سرياقوس (محافظة القليوبية) بمعدل ٣ حقول لكل قرية منهما. وتتلخص النتائج المتحصل عليها كما يلي:-

١- في محافظة المنوفية والقليوبية كانت أكثر المستويات تفضيلا لحوريات من القطن هو المستوى السفلي ثم الوسطي حيث الرطوبة النسبية المرتفعة وكان هناك فرق معنوي بين المستويات الثلاث للإصابة بمتوسط عام ٣,٧ ، ٧,٧ ، ١٩,٩ حشرة /٤٠ ورقة لموسم ٢٠٠٥ ، ١٠,٠ ، ٢٨,٣ ، ٥٦,٣ في موسم ٢٠٠٦ على المستويات العلوي ، والوسطي والسفلي على التوالي بمحافظة المنوفية وتماثلت النتائج في محافظة القليوبية بنظيرتها في المنوفية مسجلة ١٢,٦ ، ١٨,٤ ، ٣٧,٧ في موسم ٢٠٠٥ وكانت ٩,٦ ، ١٥,٢ ، ٣٣,٣ حشرة/٤٠ ورقة في موسم ٢٠٠٦ على التوالي.

٢- أما بالنسبة لحشرة الذبابة البيضاء فقد إختلفت مستويات الإصابة تبعا للطور المدروس كما يلي:

ففي حالة البيض: كان معدل وضع البيض أعلى في المستوى العلوي للنبات حيث سجل ١٥,١ ثم ٥,٤ ثم ٢,٣ بيضه/٤٠ بوصة مربعه على المستويات العلوي

والوسطي والسفلي على التوالي بمحافظة المنوفية موسم ٢٠٠٥ وجاءت نتائج موسم ٢٠٠٦ مشابهه لهذه النتائج في الثلاث مستويات محل الدراسة ، وكانت النتائج بمحافظة القليوبية خلال عامي الدراسة مشابهه للنتائج المتحصل عليها بمحافظة المنوفية.

اختلف تعداد حوريات الذبابة البيضاء عن البيض حيث كان تعداد الحوريات أعلى في المستوى السفلي للنبات تلاه الوسطي ثم العلوي خلال عامي الدراسة بالمحافظتين مسجلة ٨,٣ ، ٩,٢ ، ١٣,١ حوريه/٤٠ بوصة مربعه في موسم ٢٠٠٥ ، ٢٤,٤ ، ٢٧,٢ ، ٣٣,٨ حورية/٤٠ بوصة مربعه في موسم ٢٠٠٦ على المستويات العلوي والوسطي والسفلي على التوالي بمحافظة المنوفية. وكانت النتائج بالقليوبية مشابهة مسجلة ١١,٦ ، ١٣,٤ ، ١٧,٨ في موسم ٢٠٠٥ ، ٢٤,١ ، ٣٣,٠ ، ٣٨,٤ حوريه/٤٠ بوصة مربعه على المستويات العلوي والوسطي والسفلي على التوالي.

٣- كانت الكثافة العددية لحوريات من القطن وطوري البيض والحوريات للذبابة البيضاء أعلى في موسم ٢٠٠٦ عن ٢٠٠٥ في كلا المحافظتين (المنوفية والقليوبية) ، بينما لوحظ أن الإصابة بحشرة الذبابة البيضاء كانت في القليوبية أعلى منها في المنوفية.