# EFFECT OF SOYBEAN VARIETIES AND PLANTING DATES ON INFESTATION WITH CERTAIN PESTS AND THEIR ASSOCIATED PARASITOIDS

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## INTRODUCTION

Soybean (*Glycine max* (L.) Merrill) is the dominant world supply for edible vegetable oil, and the dominant supply of high-protein feed supplements for livestock. Other fractions and derivatives of the seed have substantial economic importance in a wide range of industrial, food, pharmaceutical, and agricultural products (Smith and Huyser, 1987). Soybean is attacked by many kinds of insects; their problems are low early in the season, until late July or early August. There are several methods available to control soybean pests such as sowing date, rotation, resistant varieties and biological control (Djuwarso and Harnoto, 1998).

Abdel-Monem *et al.* (1991), Supriyatin *et al.* (1992), Lutfallah *et al.* (1998) and Haile *et al.* (1998) studied the susceptibility of soybean varieties to leaf and pod feeding pests. The species of Agromyzid fly *Melanagromyza sojae* (Zehntner) (Diptera: Agromyzidae) is one of the serious pests that attack the crop soon after germination and its larvae feed inside the plant stem mining into the stalk, causing stunting or death to the young seedlings (Xinchuan and Xuexiang, 1969). Some soybean cultivars affect oviposition of the whitefly, *Bemisia tabaci* (Gennadius) (Homoptera: Aleyrodidae) (Rossetto *et al.* 1977). Several researchers studied the incidence of *M. sojae* or *B. tabaci* and their parasitoids, in different soybean cultivars, as Simmons *et al.* (2002), Salunke *et al.* (2002) and Mesbah *et al.* (2001).

The present work studied the effect of different plantation dates and soybean cultivars, namely Giza 21, 22, 35, 82, 83 & 111, Clark, Crawford, Toano, H1L1, H5L5, H4L10 H15L17, F9H2L12 and Holladay on infestation percentage of leaf or pod feeding pests. The populations of the whitefly, *Bemisia tabaci* adults or the stem soybean fly, *Melanagromyza sojae* and the number of their associated parasitoids were evaluated, during the two successive seasons 2002 and 2003.

## MATERIAL AND METHODS

Studies were carried out in soybean field planted at Sakha Research Station, Kafr El-Sheikh Governorate, through two successive growing seasons 2002 & 2003. In 2002, twelve soybean varieties (Giza 21, 22, 35, 82, 83 & 111, Clark, Crawford, Toano, H1L1, H5L5 and H4L10) were planted on 21$^{st}$ April, 6$^{th}$ & 18$^{th}$ May and 7$^{th}$ June. In 2003, thirteen soybean varieties (Giza 21, 22, 35, 82, 83 & 111, Clark, Crawford, Toano, H5L5, H15L17, F9H2L12 and Holladay) were planted on 17$^{th}$ May and 10$^{th}$ June. The varieties of soybean were sown in a complete randomized block design with three replicates.

After 60 days of sowing dates, one sample of three plants was taken from each plot of each variety for studying the following:

**1. Leaf feeding:** According to the size of eaten part of the leaf (the defoliation is measured as a percentage of the leaf area destroyed by pests), the cumulative damage caused by the defoliator larvae was estimated by scoring damage (0 to 5) of each of 100 randomly chosen leaves. Rate of damage was calculated according to the formula given by Kasopers (1965).

**2. Damage of pods:** Three replicates of thirty pods / plant were investigated in each of the three plots. The number of damaged pods (A) was evaluated in randomly chosen thirty pods (B).

$$\% \text{ of infested pods} = \frac{A}{B} \times 100.$$

**3. Infestation of stems:** The stems of three plants were kept in jars (1 liter) till the emergence of the dipteran pest, *M. sojae* and its parasitoids. The number of stem pores and flies were counted. Also, the emerged parasitoids counted and identified.

**4. Population of *B. tabaci* adults:** The number of whitefly, *B. tabaci* adults were counted in thirty leaves, randomly chosen from three levels. Also, the numbers of

emerged whitefly parasitoids were estimated after their emergence from their host on the leaf samples in jars.

Obtained data were statistically analyzed by ANOVA and Duncan's Multiple range tests.

## RESULTS AND DISCUSSION

**Leaf feeding:**

Table (1) presents the percentage of leaf feeding calculated in the two growing seasons 2002 and 2003, on the tested soybean varieties. Statistical analysis revealed significant differences among planting dates in each of the two successive seasons concerning the leaf feeding of soybean varieties, except at 6th and 18th May 2002 insignificant difference was recorded. In 2002, the rates of leaf feeding ranged between 24.20% and 49.30%; 33.90% and 61.80%; 36.00% and 70.30%; 58.93% and 80.50%, in H5L5 and Clark, after 60 days of sowing dates in April 21, May 6 and 18 and June 7, respectively. H5L5 was the most tolerant variety to leaf feeding followed by Giza 22, H1L1, Giza 82, Giza 83, Toano, Crawford, H4L10, Giza 35, Giza 21, Giza 111 and Clark. In 2003, these rates ranged between 13.00% & 57.00% for H5L5 and 46.67% & 77.33% for Holladay, on May17 & June10, respectively. The most resistant soybean variety to leaf feeding was H5L5 followed by Giza 22, Giza 82, Giza 83, Toano, Crawford, F9H2L12, H15L17, Giza 35, Giza 21, Giza 111 Clark and Holladay. Statistical differences among different soybean varieties were mentioned in (Table I). Lutfallah *et al.* (1998) found that Holladay and Clark suffered more leaf damage as compared to Toano, H15L17, Giza 21 and Crawford.

**Damage of pods:**

Table (2) shows the significant differences in pod damage percentages caused by the feeding of *Etiella zinckenella* and *Spodoptera littoralis* larvae, between the plant samples collected 60 days after the first planting date and the three others in 2002 or among the two sowing dates in 2003. Giza 83 was the most susceptible variety to pod infestation (28.00, 46.00, 54.00 and 60.0%), while H1L1 was the least infested variety (2.00, 8.00, 10.00 and 12.00%), for the four planting dates in 2002, respectively. Holladay, F9H2L12 and Toano were the lowest varieties in infested pods (2.67%) on the sowing date 17th May 2003. While Holladay (9%); F9H2L12, Toano and Crawford (11%) were the least infested ones on 10th June of

the same year. Statistical analysis revealed that there was significant difference between the percentages of damage pods in Giza 83 and the other soybean varieties at each sowing date during the two seasons, except on 7th June 2002, it differed insignificantly with Giza 35 (Table 1). Metwally (1993) revealed highly significant difference in the percentage of pod infestation with the bean pod borer, *E. zinckenella* between the two planting dates of mid June and the first of July.

**TABLE (I)**

Percentages of leaf feeding in various soybean varieties at different planting dates during 2002 and 2003 seasons.

| Soybean varieties | Growing season 2002 | | | | Growing season 2003 | |
|---|---|---|---|---|---|---|
| | After 60 days of planting (90 leaves/ 3plants/ plot) | | | | | |
| | April 21st | May 6th | May 18th | June 7th | May 17th | June 10th |
| Clark | 49.30A | 61.80A | 70.30A | 80.50A | 54.65A | 76.00A |
| Crawford | 43.60C | 54.00C | 58.60 C | 69.40C | 36.00D | 59.20E |
| Giza 21 | 46.20BC | 59.20AB | 65.00B | 75.50B | 45.33C | 67.00C |
| Giza 22 | 30.50G | 43.90G | 44.30E | 61.33D | 14.00F | 48.80GH |
| Giza 35 | 45.20BC | 58.40B | 60.70C | 71.50C | 45.00C | 65.60C |
| Giza 82 | 34.50 EF | 47.00EF | 53.40D | 68.84C | 27.00E | 48.80GH |
| Giza 83 | 37.30 E | 48.00E | 54.20D | 69.00C | 28.00E | 51.00G |
| Giza 111 | 47.50AB | 59.20AB | 69.00A | 80.00A | 51.00B | 73.00B |
| Toano | 40.50D | 51.00D | 54.30D | 69.20C | 29.00E | 54.00F |
| H1L1 | 33.50F | 44.50FG | 53.00D | 68.80C | | |
| H4L10 | 44.80BC | 58.10B | 59.00C | 70.00C | | |
| H5L5 | 24.20H | 33.90H | 36.00F | 58.93D | 13.00F | 46.67H |
| H15L17 | | | | | 38.00D | 64.60CD |
| F9H2L12 | | | | | 37.00D | 62.40D |
| Holladay | | | | | 57.00A | 77.33A |
| F- or T-test | a | b | b | c | a | b |

**In all Tables:**

- Capital letters indicate the variance between each cultivars in each column.
- Small letters without underline indicate the variance between (F-test) at the different planting dates in the first year.
- Small letters with underline indicate the variance between (T-test) at the different planting dates in the second year.
- Similar alphabetical letters small or capital indicate insignificant difference.

**Infestation of stems:**

Table (3) shows that the number of pores in stems of various soybean varieties was affected insignificantly by different sowing dates in each of the two tested years. Giza 35 received the most mean number of pores that varied from 4.00 to 10.00 pores, in the sowing dates on April to June 2002; whereas this number

ranged from 20 to 21 pores for the same soybean variety, between May and June 2003. The statistical differences between different soybean varieties concerning number of pores in stems appeared in (Table 3).

**TABLE (II)**
Percentages of pod damage in various soybean varieties at different planting dates during 2002 and 2003 seasons.

| Soybean varieties | Growing season 2002 | | | | Growing season 2003 | |
|---|---|---|---|---|---|---|
| | After 60 days of planting (90 pods/ 3plants/ plot) | | | | | |
| | April 21st | May 6th | May 18th | June 7th | May 17th | June 10th |
| Clark | 16.00 C | 36.00BC | 42.00C | 50.00B | 12.00B | 26.00C |
| Crawford | 6.00 DE | 16.00F | 24.00F | 30.00D | 5.00DE | 11.00F |
| Giza 21 | 16.00 C | 34.00C | 34.00D | 42.00C | 10.67BC | 25.00C |
| Giza 22 | 8.00 D | 30.00D | 32.00D | 40.00C | 8.00CD | 21.33D |
| Giza 35 | 20.00 B | 38.00B | 50.00B | 57.00A | 12.33B | 40.00B |
| Giza 82 | 8.00 D | 24.00E | 32.00D | 32.00D | 6.67D | 20.00D |
| Giza 83 | 28.00 A | 46.00A | 54.00A | 60.00A | 25.33A | 50.67A |
| Giza 111 | 8.00 D | 22.00E | 28.00E | 32.00D | 6.00D | 15.48E |
| Toano | 0.00 G | 12.00G | 14.00G | 26.00E | 2.67E | 11.00F |
| H1L1 | 2.00 FG | 8.00H | 10.00H | 12.00G | | |
| H4L10 | 4.00 EF | 8.00H | 14.00G | 18.00F | | |
| H5L5 | 6.00 DE | 16.00F | 26.00EF | 30.00D | 5.34DE | 15.00E |
| H15L17 | | | | | 8.00CD | 22.00D |
| F9H2L12 | | | | | 2.67E | 11.00F |
| Holladay | | | | | 2.67E | 9.00F |
| F- or T-test | a | b | bc | c | a | b |

**Number of emerged *M. sojae* adults:**

Data in Table (4) differed significantly between the sowing dates in April, May and June of the first season and in May and June of second one, whereas no significant differences appeared between the data on 6th&18th May 2002. Generally, the mean numbers of *M. sojae* adults emerged from plants sowed in June of the two years, were higher than those collected from May planting dates of the same year. Giza 35 had higher number of emerged *M. sojae* adults than other tested varieties with insignificantly differences as compared to Toano and Clark at the different sowing dates, except on 7th June 2002 and 17th May 2003 where they differed significantly. The lowest mean numbers of *M. sojae* was recorded in H5L5 and varied between (0.00-10.00 emerged adults) from samples collected from plantations of the sowing dates 21st April – 7th June 2002 and (3.00 -10.00 emerged

adults) from those of 17th May – 10th June 2003, respectively. Talekar (1989) found that infestation of soybean by *M. sojae* significantly reduced plant height, leaf area, number of branches / plant, number of pods / plant, number of seeds / pod and pod yield.

**TABLE (III)**

Number of pores caused by *M. sojae* in stems of various soybean varieties at different planting dates during 2002 and 2003 seasons.

| Soybean varieties | Growing season 2002 | | | | Growing season 2003 | |
|---|---|---|---|---|---|---|
| | After 60 days of planting (Infested stems/3 plants/ plot) | | | | | |
| | April 21st | May 6th | May 18th | June 7th | May 17th | June 10th |
| Clark | 3.00AB | 5.00AB | 6.00BC | 8.00AB | 13.00B | 13.00 C |
| Crawford | 1.00BC | 2.00CD | 4.00CD | 4.00CD | 5.0DE | 9.00DEF |
| Giza 21 | 1.00BC | 2.00CD | 3.00D | 4.00CD | 4.00EF | 8.00EFG |
| Giza 22 | 1.00BC | 2.00CD | 3.00D | 0.00E | 4.00EF | 0.00H |
| Giza 35 | 4.00A | 6.00A | 9.00A | 10.00A | 20.00A | 21.00A |
| Giza 82 | 0.00C | 3.00BCD | 6.00BC | 6.00BC | 7.00CD | 10.00DE |
| Giza 83 | 3.00AB | 4.00ABC | 6.00BC | 6.00BC | 8.00C | 10.00DE |
| Giza 111 | 0.00C | 2.00CD | 4.00CD | 5.00CD | 6.00CDE | 10.00DE |
| Toano | 4.00A | 6.00A | 7.00AB | 9.00A | 13.00B | 18.00B |
| H1L1 | 1.00BC | 2.00CD | 3.00D | 4.00CD | | |
| H4L10 | 2.00ABC | 3.00BCD | 4.00CD | 5.00CD | | |
| H5L5 | 1.00BC | 1.00D | 2.00D | 3.00D | 2.00F | 6.00G |
| H15L17 | | | | | 8.00C | 11.00CD |
| F9H2L12 | | | | | 4.00EF | 7.00FG |
| Holladay | | | | | 4.00EF | 9.00DEF |
| F- or T-test | a | ab | bc | c | a | a |

**Population of *B. tabaci* adults:**

Results in Table (5) revealed that numbers of *B. tabaci* adults increased insignificantly at different sowing dates on 6th &18th May, on 18th May and 7th June sowing dates in the first season, 2002 and on 17th May and 10th June in the second season 2003. While there was significant difference between sowing date of April 21 and both May 18 and June 7 in season 2002. It was observed that Giza 83 received significantly superior number of whitefly adults than all soybean varieties (23.00, 33.00, 105.00 and 155.00 or 111.00 individuals/ 90 leaves/ 3plants/ plot) on the sowing dates 21 April, 6 & 18 May and 7 June 2002 or17 May 2003, respectively. Giza 83 (312.00 individuals) differed in significantly with Giza 35 (311.00 individuals) on 10 June 2003. However, H5L5 attracted the least numbers of whitefly adults (4.00, 10.00, 12.00 and 17.00 or 13.00 and 20.00 individuals) on sowing dates 21st April, 6th &18th May and 7th June 2002 or 17th May and 10th June

2003, respectively. These results agree with those of Lambert *et al.* (1997) who found that almost varieties of soybean differed significantly in the infestation with whiteflies. Gamieh and El-Basuony (2001) found that Giza 83 was the most susceptible to the infestation with whitefly adults where their populations were positively correlated with the leaf hair density of the soybean variety. Also, Salman *et al.* (2002) noticed that Giza 35 and Crawford were susceptible varieties, while Giza 111, Giza 21, Giza 82 and Clark were of low resistant varieties.

**TABLE (IV)**

Number of *M. sojae* adults emerged from stems of various soybean varieties at different planting dates during 2002 and 2003 seasons.

| Soybean varieties | Growing season 2002 | | | | Growing season 2003 | |
|---|---|---|---|---|---|---|
| | After 60 days of planting (Infested stems/ 3plants/ plot) | | | | | |
| | April 21st | May 6th | May 18th | June 7th | May 17th | June 10th |
| Clark | 6.00A | 11.00A | 13.00AB | 14.00B | 9.00B | 16.00AB |
| Crawford | 2.00B | 4.00BCD | 5.00CD | 12.00BD | 5.00DE | 13.00CDE |
| Giza 21 | 2.00B | 3.00CD | 3.00DE | 11.00CD | 5.00DE | 12.00DEF |
| Giza 22 | 2.00B | 3.00CD | 3.00DE | 11.00CD | 4.00DE | 11.00EF |
| Giza 35 | 7.00A | 13.00A | 15.00A | 17.0 A | 15.00A | 18.00A |
| Giza 82 | 0.00C | 5.00BC | 6.00C | 13.00BC | 6.00CD | 14.00BCD |
| Giza 83 | 6.00A | 6.00B | 11.00B | 13.00BC | 6.00CD | 14.00BCD |
| Giza 111 | 0.00C | 4.00BCD | 6.00C | 12.00BD | 6.00CD | 13.00CDE |
| Toano | 0.00C | 12.00A | 15.00A | 14.00B | 10.00B | 18.00A |
| H1L1 | 0.00C | 2.00DE | 2.00E | 10.00D | | |
| H4L10 | 3.00B | 0.00E | 6.00C | 12.00BD | | |
| H5L5 | 0.00C | 2.00DE | 2.00E | 10.00D | 3.00E | 10.00E |
| H15L17 | | | | | 8.00BC | 15.00BC |
| F9H2L12 | | | | | 4.00DE | 11.00EF |
| Holladay | | | | | 5.00DE | 13.00CDE |
| F- or T-test | a | b | b | c | a | b |

***M. sojae* parasitoids:**

Three hymenopterous parasitoids emerged from the soybean stem borer fly in the two successive seasons 2002 & 2003. The identified parasitoids were:

1. *Halticoptera* sp. (Chalcidoidea: Pteromalidae: Miscogastrini), the internal parasitoids emerged from the pupae of the stem fly and some other leaf miners pupae (Oatman, 1960; Marshall, 1987; Murphy and LaSalle, 1999 and Mesbah *et al.*, 2001).

2. *Sphegigaster* sp. (Chalcidoidea: Pteromalidae: Sphegigasterini), a solitary pupal parasitoid (Murphy and LaSalle, 1999 and Mesbah *et al.*, 2001).

3. *Platynocheilus* sp. (Chalcidoidea: Tetracampidae). This parasitoid was recorded for the first time on *M. sojae* in Egypt, it attacked the Agromyzid miner flies but it is exceedingly rare (Boucek, 1993 and Gibson *et al.*, 1997 and Murphy and LaSalle, 1999).

Cultivars sown on June had significantly higher numbers of these parasitoids than those sown on May of the two tested seasons (Table, 6). The highest number was collected from the soybean varieties Giza 35 and the lowest from H5L5, during the two successive seasons.

**TABLE (V)**
Population of *B. tabaci* in various soybean varieties at different planting dates during 2002 and 2003 seasons.

| Soybean varieties | Growing season 2002 | | | | Growing season 2003 | |
|---|---|---|---|---|---|---|
| | After 60 days of planting (90 leaves/ 3plants/ plot) | | | | | |
| | April 21st | May 6th | May 18th | June 7th | May 17th | June 10th |
| Clark | 7.00 CD | 16.00E | 18.00GH | 21.00H | 25.00G | 30.00G |
| Crawford | 0.00F | 21.00D | 22.00F | 27.00F | 38.00E | 53.00E |
| Giza 21 | 0.00F | 28.00BC | 40.00C | 54.00C | 66.00C | 200.00B |
| Giza 22 | 8.00C | 26.00C | 27.00E | 30.00E | 40.00E | 60.00D |
| Giza 35 | 14.00B | 29.00B | 94.00B | 100.00B | 100.00B | 311.00A |
| Giza 82 | 0.00F | 27.00BC | 34.00D | 38.00D | 60.00D | 62.00D |
| Giza 83 | 23.00A | 33.00A | 105.00A | 155.00A | 111.00A | 312.00A |
| Giza 111 | 7.00CD | 19.00D | 19.00G | 24.00G | 28.00G | 30.00G |
| Toano | 7.00 CD | 19.00D | 20.00FG | 25.00FG | 32.00F | 40.00F |
| H1L1 | 6.00CDE | 15.00E | 16.00H | 20.00H | | |
| H4L10 | 5.00DE | 14.00E | 16.00H | 19.00HI | | |
| H5L5 | 4.00E | 10.00F | 12.00I | 17.00I | 13.00H | 20.00I |
| H15L17 | | | | | 66.00C | 100.00C |
| F9H2L12 | | | | | 14.00H | 20.00I |
| Holladay | | | | | 25.00G | 25.00H |
| F- or T-test | a | ab | bc | c | a | a |

***B. tabaci* parasitoids:**

Two hymenopterous parasitoids emerged from the whitefly, *B. tabaci* larvae or pupae present on soybean leaves during the two consecutive cropping seasons (2002 & 2003), *Encarsia lutae* (Masi) and *Eretmocerus aegypticus* Evan. (Hymenoptera: Aphelinidae). Table (7) shows the mean numbers of *B. tabaci* parasitoids and the statistical analysis among the sowing dates in each year and

differences among soybean varieties in each planting date. The mean numbers of the parasitoids were higher in late planting dates than in earlier ones. Number of parasitoids reached its maximum in Giza 83 (6.00, 12.00, 25.00 and 50.00 individuals on the sowing dates of 21st April, 6th &18th May and 7th June 2002; 30.00 and 87.00 individuals on 17th May and 10th June 2003, respectively) and its minimum was in H5L5 (1.00, 3.00, 4.00 and 7.00 individuals on the different sowing dates in 2002; 5.00 and 7.00 individuals in 2003, respectively). Barro *et al.* (2000) mentioned that in Australia *Encarsia* spp. and *Eretmocerus* spp. emerged from *B. tabaci* attacking soybean. Also, they found that parasitism increased with increasing host density .

**TABLE (VI)**

Number of *M. sojae* parasitoids/ 3 plants in various soybean varieties at different planting dates during 2002 and 2003 seasons.

| Soybean varieties | Growing season 2002 | | | | Growing season 2003 | |
|---|---|---|---|---|---|---|
| | April 21st | May 6th | May 18th | June 7th | May 17th | June 10th |
| Clark | 5.00 BC | 11.00 A | 11.00B | 14.00AB | 8.00AB | 15.00AB |
| Crawford | 2.00DE | 3.00CD | 5.00 DEF | 9.00C | 6.00BCD | 10.00B |
| Giza 21 | 1.00DE | 3.00CD | 4.00FGH | 8.00CD | 5.00CDE | 7.00D |
| Giza 22 | 1.00DE | 3.00CD | 4.00FGH | 6.00DE | 4.00DE | 6.00D |
| Giza 35 | 9.00A | 12.00A | 14.00A | 16.00A | 10.00A | 17.00A |
| Giza 82 | 3.00CD | 7.00B | 8.00C | 13.00B | 6.00BCD | 1 4.00B |
| Giza 83 | 3.00CD | 10.00A | 8.00C | 13.00B | 7.00BC | 14.00B |
| Giza 111 | 2.00DE | 5.00BC | 6.00CDE | 9.00C | 6.00BCD | 10.00C |
| Toano | 6.00B | 12.00A | 14.00A | 15.00AB | 8.00AB | 16.00AB |
| H1L1 | 1.00DE | 2.00D | 3.00H | 5.00E | | |
| H4L10 | 3.00CD | 6.00B | 7.00CD | 10.00C | | |
| H5L5 | 0.00E | 1.00D | 2.00GH | 5.00E | 3.00E | 6.00D |
| H15L17 | | | | | 8.00AB | 15.00AB |
| F9H2L12 | | | | | 5.00CDE | 6.00D |
| Holladay | | | | | 5.00CDE | 10.00C |
| F- or T-test | a | b | b | c | a | b |

## SUMMARY

During 2002 and 2003, a field experiment was conducted in Sakha Research Station, Kafr El-Sheikh Governorate, to compare pests' damage in some soybean cultivars (Giza 21, 22, 35, 82, 83 & 111, Clark, Crawford, Toano, H1L1, H5L5, H4L10 H15L17, F9H2L12 and Holladay), at various sowing dates (21 April, 6 & 18 May and 7 June 2002 or 17 May and 10 June 2003). Also, the parasitoids of

the stem fly, *Melanagromyza sojae* (Zehntner) and whitefly, *Bemisia tabaci* (Gennadius) were surveyed. Results indicated that cultivars sown on late planting dates had higher population and damage than those sown on earlier ones. Clark and Holladay were the most susceptible soybean varieties for leaf damage. The mean numbers of pores due to the highest infestation with stem fly increased in the soybean variety Giza 35. Throughout the two seasons, Giza 83 had the highest percentage of pod infestation among the different varieties, whereas the lowest was recorded in Toano, H4L10 and H1L1 in the first season 2002 and Toano, F9H2L12 then Holladay in 2003. Also, Giza 83 suffered maximum incidence of whitefly adults. The minimum percentage of leaf feeding, number of stem pores, whitefly incidence and *M. sojae* numbers were in H5L5 during the two consecutive seasons.

Three hymenopterous parasitoids had emerged from the stem borer, *M. sojae*. Through the two successive seasons 2002 and 2003, *Halticoptera* sp., *Sphegigaster* sp. and *Platynocheilus* sp. are collected. Two hymenopterous parasitoids (*Encarsia lutae* (Masi) and *Eretmocerus aegypticus* Evan.) emerged from *B. tabaci*, during the two seasons.

**TABLE (VII)**

Number of *B. tabaci* parasitoids in various soybean varieties at different planting dates during 2002 and 2003 seasons.

| Soybean varieties | Growing season 2002 | | | | Growing season 2003 | |
|---|---|---|---|---|---|---|
| | April 21st | May 6th | May 18th | June 7th | May 17th | June 10th |
| Clark | 2.00BC | 4.00F | 5.00GH | 9.00EFG | 8.00F | 10.00HI |
| Crawford | 0.00D | 7.00DE | 9.00EF | 11.00DE | 11.00E | 17.00F |
| Giza 21 | 0.00D | 10.00ABC | 13.00C | 28.00C | 19.00C | 65.00B |
| Giza 22 | 3.00B | 8.00CD | 10.00DE | 13.00D | 14.00D | 25.00E |
| Giza 35 | 5.00A | 11.00AB | 20.00B | 38.00B | 24.00B | 85.00A |
| Giza 82 | 0.00D | 9.00BCD | 12.00CD | 13.00D | 15.00D | 30.00D |
| Giza 83 | 6.00A | 12.00A | 25.00A | 50.00A | 30.00A | 87.00A |
| Giza 111 | 2.00BC | 4.00F | 6.00GH | 9.00EFG | 10.00EF | 12.00GH |
| Toano | 2.00BC | 5.00EF | 7.00FG | 10.00EF | 10.00EF | 14.00G |
| H1L1 | 2.00BC | 4.00F | 5.00GH | 8.00FG | | |
| H4L10 | 1.00CD | 3.00F | 5.00GH | 8.00FG | | |
| H5L5 | 1.00CD | 3.00F | 4.00H | 7.00G | 5.00G | 7.00IJ |
| H15L17 | | | | | 16.00D | 35.00C |
| F9H2L12 | | | | | 5.00G | 8.00IJ |
| Holladay | | | | | 8.00F | 10.00HI |
| F- or T-test | a | ab | b | c | a | b |

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