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# Susceptibility of Some Faba Bean Cultivars to Field Infestation with Some Insect Pests

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**Abstract:** A field experiment was conducted at experimental farm of N.R.C. at Shalakan (El-Kalubyia governorate). It described the susceptibility of six faba bean varieties (Giza 714, G716, G843, G429, G643 and G461) to infestation with legume aphids, *Aphis craccivora* (koch), the leaf miner, *Liriomyza congesta* Becker and broad bean beetle, *Bruchus rufimanus* (Boch.). The six tested varieties showed different susceptibility to the three insect pests. The highest susceptible one was Giza 461 and the lowest susceptible one was Giza 843 to aphids. The variety Giza 714 showed moderate infestation with leaf miner while the two varieties Giza 843 and Giza 429 recorded highest infestion with broad bean beetle in green pods while Giza 643 showed moderate infestation with broad bean beetle on dry seeds.

**Key words:**

## INTRODUCTION

Cultivated faba bean is generally used as human food in developing countries and as animal feed, in both industrialized and developing countries. It can be used as a vegetable, green or dried, fresh or canned. Faba bean has been considered as a meat extender or substitute and as a skim-milk substitute. Faba bean (*Vicia faba*) attacked by serious pests which reduces its quality and quantity. The major insect pests that attack the green parts of bean in Egypt are the legume aphids, *Aphis craccivora* Koch, and the leaf miner, *Liriomyza congesta* Becker[8,7,1] . Also green pods and seeds of faba bean attacked by broad bean beetle *Bruchus rufimanus* (Boch.)[12,5,3]. Recently, several programs for pest control have been deve1oped to enhance resistant varieties. The present work was conducted to determine the levels of infestation of six faba bean varieties with some insect pests.

## MATERIALS AND METHODS

A field experiment was conducted at experimental farm of the N.R.C. at Shalakan (El- Kalubyia govemorate) to evaluate the infestation rates of six faba bean varieties (Giza 714, G716, G843, G429, G643 and G461) with some faba bean pests. The experiment was carried out during two successive winter seasons 2003-2004 and 2004-2005. In each season, an area of about 120 $m^2$ was prepared and divided into 18 plots of about 6$m^2$ each. Every plot was separated from other by uncultivated two rows. The previous mentioned faba varieties were evaluated in complete randomized design. These varieties were obtained from Ministry of Agriculture. All faba bean seeds were sown on December 21$^{th}$ and 23$^{th}$ for first and second seasons. Seeds were planted (2 seeds/hill) at distance of 20 cm. between hills. Each variety was replicated in 3 plots. Five plants from each plot were randomly chosen and 30 leaflets from different plant levels were collected and then examined weekly. The numbers of aphids (adult and nymph ) and leaf miners were recorded. The first date of examination was after one month of plantation date.

To determine the infestation rate with *Bruchus rufimanus* (egg and larvae), 100 green pods after three months of planting besides 100 dry seeds after harvest were collected randomly and examined.

The obtained data were statistically analyzed by ANOVA according to Snedecor and Cochran[13].

## RESULTS AND DISCUSSIONS

**Susceptibility of Different Broad Bean Varieties to Insect Infestation:**

**1.Infestation with aphids:** The obtained results indicated that there were no significant differences ($P > 0.05$) in the mean numbers of aphids among the tested varieties, except in case of Giza 461 during two seasons (2003/2004 and 2004/2005) table (1), then, the highest mean number of aphids infestation was recorded on Giza 461, being 90.94 (33 %) and 92.8 (32.2%) individuals/30 leaves/5 plants during two successive seasons, respectively. The lowest infestation was observed on Giza 843, being 19.72 (7.2 %) and 21.6 (7.5 %) individuals /30 leaves/5 plants the during two successive seasons, respectively.the tested broad bean varieties could be arranged in descending order according to intensity of infestation by The highest significant differences ($p < 0.01$) in mean infestation of green pods were recorded on G843 and G714.

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**Table 1:** Mean numbers of immature stages of aphids (*Aphis craccivora*) /30 leaves/5 plants and percentages of infestation of six broad bean varieties during two winter seasons.

| Faba varieties | Mean numbers/week (2003/2004) | % Infestation | Mean number / week (2004/2005) | % Infestation | General means: Mean number/ week/ two seasons | General means: % Infestation in two seasons |
|---|---|---|---|---|---|---|
| Giza 714 | 26.7[a] | 9.7 | 28.9[a] | 10.02 | 27.6 | 9.9 |
| Giza 716 | 30.2[a] | 10.9 | 32.2[a] | 11.2 | 31.2 | 11.05 |
| Giza 843 | 19.72[a] | 7.2 | 21.6[a] | 7.5 | 20.7 | 7.4 |
| Giza 429 | 52.02[a] | 18.9 | 54.8[a] | 19 | 53.4 | 19 |
| Giza 643 | 56.2[a] | 20.4 | 58.2[a] | 20.2 | 57.2 | 20.3 |
| Giza 461 | 90.94[b] | 33 | 92.8[b] | 32.2 | 91.9 | 32.6 |
| Statistical analysis | $L.S.D_{0.05}$ = 64.3<br>$L.S.D_{.0.01}$ = 85.02 | | $L.S.D_{0.05}$ = 55.5<br>$L.S.D_{.0.01}$ = 73.3 | | | |

F-Test (one way ANOVA)
Means in vertical columns with the same letters are not significantly different (P>0.05)

**Table2:** Mean numbers of leaf miners/30 leaves/5 plants and percentages of infestation of of six broad bean varieties during two winter seasons.

| Faba varieties | Mean numbers/week (2003/2004) | % Infestation | Mean number/ week (2004/2005) | % Infestation | General means: Mean numbers/weeks/ two seasons | General means: % Infestation in two seasons |
|---|---|---|---|---|---|---|
| Giza 714 | 193.61[b] | 22.8 | 285.3[b] | 26.02 | 239.5 | 24.4 |
| Giza 716 | 147.6[a] | 17.3 | 172.7[a] | 15.8 | 159.6 | 16.6 |
| Giza 843 | 110[a] | 12.9 | 128.3[a] | 11.7 | 119.2 | 12.3 |
| Giza 429 | 161.78[a] | 19.01 | 197[a] | 18 | 179.4 | 18.5 |
| Giza 643 | 109.7[a] | 12.9 | 147.4[a] | 13.4 | 128.6 | 13.2 |
| Giza 461 | 128.3[a] | 15.1 | 165.7[a] | 15.1 | 147 | 15.1 |
| Statistical analysis | $L.S.D_{0.05}$ = 71.92<br>$L.S.D_{.0.01}$ = 94.96 | | $L.S.D_{0.05}$ = 130.9<br>$L.S.D_{.0.01}$ = 172.9 | | | |

F-Test (one way ANOVA)
Means in vertical columns with the same letters are not significantly different (P>0.05).

**Table3:** Percent infestation of immature stages of *Bruchus rufimanus* (Boch.) on green pods and dry seeds of six broad bean varieties during two winter seasons.

| Faba varieties | % infestation on green pods | | % infestation on seeds | |
|---|---|---|---|---|
| | Season 2003/2004 | Season 2004/2005 | Season 2003/2004 | Season 2004/2005 |
| Giza 714 | 14.5 | 15.5 | 13.5 | 16.5 |
| Giza 716 | 12.8 | 13.3 | 11.5 | 15.3 |
| Giza 843 | 19.4 | 20.8 | 19.4 | 11.4 |
| Giza 429 | 21.04 | 17.7 | 17.7 | 15.6 |
| Giza 643 | 16.4 | 14.4 | 24.7 | 23.9 |
| Giza 461 | 15.8 | 16.6 | 13.2 | 17.05 |

Generally, aphids in both two successive seasons (2003/2004 and 2004/2005) as follows : Giza 461 > G643> G429 > G716 > G714 > G843; as the percentages of infestation were 32.6%, 20.3%, 19%, 11.05%, 9.9% and 7.4%, respectively.

**2.Infestation with leaf miners:** Results presented in table (2) revealed that there were no significant differences (P > 0.05 ) in the mean numbers of immature stages of leaf miner among the tested varieties, except in case of Giza 714 during two tested seasons (2003/2004 and 2004/2005). The moderate susceptible one was Giza 714 recording 193.61 (22.8%) and 285.3 (26.02%) individuals/30 leaves/5 plants, respectively. While, a slight infestation was recorded on G643 and G843 recording 109.7 (12.9%), 147.4 (13.4%) and 110 (12.9%), 128.3 (11.7%), individuals/30 leaves/5 plants, respectively.

Thus, the faba bean varieties could be arranged in descending order according to their susceptibility to infestation with leaf miners during the two seasons (2003-2004 and 2004-2005) as follows: Giza714 > G429 > G716 > G461 > G643 > G843; as the percentages of infestation were 24.4 %, 18.5 %, 16.6 %, 15.1 %, 13.2 % and 12.3 %, respectively.

**3. Infestation with broad bean beetle :** The data in table (3) show that, generally Giza 843 recorded the highest infestation by *Bruchus* beetle on green pods through two tested seasons. It recorded (20.1%) while Giza 429 come in the second order with 19.4% infestation on green pods. On the other hand, the green pods of variety Giza 716 showed high resistance against *Bruchus* beetle where it recorded the lowest infestation (13.05%) among tested varieties. Also, the variety Giza 716 showed the same trend against *Bruchus* beetle on dry seeds where it recorded the lowest infestation (13.4%). Hence, it could be concluded that faba bean Giza 716 is the highest resistant variety against *Bruchus* beetle.

From the previous results, it could be concluded that all tested faba bean varieties were variably infested with aphids, leaf miners and broad bean beetle, during winter plantation.

It is worthy to mention that El-Kawalka et al[4] found that Giza 714 and Giza 461 genotypes of faba bean had low susceptibility to infestation with the aphids and broad bean beetle in Etay El-Baroud region, while Bastawisy et al[2] recorded that Giza 461 and Giza 643 were relatively resistance to aphids. Metwally et al[10] observed that Giza 716/1039, Giza 714, Giza 461 and Giza 716/1024 showed moderate infestation by aphids in Kafer El- Sheikh region. The variations in results among authors may be related to certain environmental conditions influence the fundamental physiological processes of the plant as well as the pest, thus, a variety that exhibits resistance in one locality or environment may be susceptible in another[6] (Kumar, 1984).

On the other hand, Holt and Wratten[9] found that several factors have been shown to be associated with the resistant in faba bean. The concentration of non-protein amino acids in the leaf and stem extracts was correlated with antibiotic resistance to *A. faba* on *V. faba* cultivars.

Morvan et al[11] found that the resistance reaction is induced by aphids infestation, but the susceptibility of *V. faba* is the result of aphid triggered physiological reaction of the plant. A preliminary analysis of phloem extracts and honey dew show little differences in amino acid content and pattern of phloem extracts from resistant and susceptible varieties, but a much higher resorption of amino acids on partially resistant cultivar. This is an indication for an insufficient amino acid supply, which could be caused by the reduction of feeding rate.

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