SUSCEPTIBILITY OF SOME FABA BEANS VARIETIES AND BREEDING LINES TO INFESTATION WITH APHIS CRACCIVORA (KOCH.) AND EMPOASCA SPP. UNDER FIELD CONDITIONS OF KAFR EL-SHEIKH GOVERNORATE, EGYPT .

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Abstract

Faba bean plants are attacked by leguminous aphid, Aphis craccivora (Koch.) and jassids, Empoasca spp. in the field causing severe injury. Therefore, some faba bean varieties (Giza 402, Giza 3, Giza 461 and Giza Blanca) and three breeding lines (714, 716/1024 and 716/1039) were evaluated for their susceptibility to infestation with the two mentioned insects at the farm of Sakha Agric. Res. Station during the growing season of 1991/92 in an attempt to seek for less susceptible varieties to these insects.

The obtained results showed that the population of aphids was higher than jassids on all the tested varieties and breeding lines of faba bean. Out of seven faba bean varieties and breeding lines, Giza 3 proved to be the highest susceptible to aphid infestation. Regarding the infestation with jassids, Giza 3 and Giza 402 were the most infested. On the other hand, the lowest variety in susceptibility for aphids and jassids was Blanca. So, it can be recommended for cultivation at Kafr El-Sheikh Governorate as agricultural method in the integrated control programme on faba bean.

INTRODUCTION

Faba bean, Vicia faba (L.) is one of the most important leguminous crops as a source of plant protein in Egypt. In the field, faba bean plants are attacked by several insect pests. The most important of these are sucking insects mainly, leguminous aphid, Aphis craccivora (Koch.) and to a certain extent, jassids, Empoasca spp. These sucking insects cause severe injury to faba bean plants by sucking plant sap and secreting abundant honeydew on which grows a sooty mould or by acting as vectors of important faba bean viruses (El-Defrawi, 1987, Abd El-Fatah 1991 and Rizkalla *et al.*, 1994).

The widespread use of insecticides for control of these pests creates several

problems i.e., environmental pollution, distruction of beneficial insects and insect resistance to many pesticides. Consequently, it has dictated the urgent need for an integrated pest management (IPM) strategy for their control. One useful tactic of IPM programmes is the selection of cultivars resistant to pest species. Plant resistance to pests represents the inherent ability of crop plants to restrict, retard or overcome pest infestation (Kumar, 1984) and thereby to improve the yield and/or quality of the harvestable crop product. From the point of view of the farmer, horticulturalist and others, the use of resistant cultivars represents one of the simplest and most convenient methods of insect pest control (Dent, 1991) since they spread rapidly without much extension effort (Dyck, 1974).

So, some varieties and breeding lines of faba bean were evaluated for their susceptibility to infestation with leguminous aphid, A. craccivora (Koch.) and jassids, Empoasca spp. under field conditions at Kafr El-Sheikh Governorate.

MATERIALS AND METHODS

The experiment was conducted at the Farm of Sakha Agricultural Research Station, Kafr El-Sheikh to evaluate four varieties and three breeding lines of faba bean to infestation with leguminous aphid A.craccivora (Koch.) and jassids Empoasca spp. during 1991/92 season. The experimental area was divided into plots, each of 1/100 feddan. The tested varieties and breeding lines were Giza 402, Giza 3, Giza 461, Giza Blanca, 714, 716/1039 and 716/1024. Seeds were sown on mid-November, 1991 in complete randomized blocks with four replicates for each entry. The normal agricultural practices were followed regularly without any insecticidal treatments throughout the growing season. To assess the population of aphids and jassids on the involved varieties and breeding lines, samples of ten tillers of each entry were selected weekly at random from each replicate, 40 days after cultivation until the end of the season. The total numbers of aphids and jassids were counted in the field. Duncan's multiple range test (1955) at 5% level was used to reveal significance among the means of the insects on the tested material.

RESULTS AND DISCUSSION

Data recorded in Table 1 present the total numbers of leguminous aphid,

Table 1. Mean number of Aphis craccivora (Koch.) per 10 tillers (4 replicates) settled on 7 faba broad bean varieties and breeding lines under field condition at Sakha region (Kafr El-Sheikh Governorate) during 1991/92 season.

Date of sampling	Dec. 1991		Jan. 1992				Feb. 1992				Mar. 1992					Mar. 1992		Total	Mean
Varieties and breeding lines	22	29	5	12	19	26	2	9	16	23	2	9	16	23	30	6	13		
Giza 402	0	0	0	80.0	100.0	137.0	80.0	70.0	175.0	225.0	60.0	40.0	40.0	85.0	45.5	45.5	12.5	1195.5	70.32 b
Giza 3	0	0	0	100.0	282.5	312.5	120.0	80.0	65.0	282.5	120.0	60.0	55.0	352.0	80.0	40.0	20.0	1869.5	109.97 a
Giza 461	0	0	0	0	175.5	125.0	30.0	25.0	20.0	120.0	25.0	50.0	60.0	100.0	30.0	25.0	11.0	697.0	41.0 c
Giza Blanca	0	0	0	0	57.5	137.5	20.0	30.0	10.0	50.0	30.0	30.0	40.0	90.0	20.0	15.0	10.0	540.0	31.76 c
714	0	0	0	50.0	60.0	120.0	20.0	20.0	30.0	100.0	20.0	30.0	45.0	80.0	30.0	10.0	5.0	620.0	36.47 c
716/1039	0	0	0	70.0	80.0	120.0	80.0	70.0	150.0	200.0	70.0	45.0	40.0	77.0	40.0	38.5	10.0	1090.5	64.14 b
716/1024	0	0	0	112.5	112.5	70.0	35.0	20.0	10.0	100.0	50.0	50.0	60.0	80.0	20.0	10.0	5.0	735	43.23 c

F value for different varieties = 18.95** P = 1%

Means followed by the same letter are not significantly different.

A.craccivora with their means in relation to their occurrence on the tested faba bean varieties and breeding lines during the inspection period. It appears that aphid infestation was low in number on all the tested varieties except for Giza 461 and Giza Blanca since the infestation appeared one week later. The results cleared that three peaks of population were detected on 26th January, 23 rd February and 23rd March on all the tested varieties and breeding line 716/1039 during the sampling period, while breeding line 716/1024 had only two peaks on 23rd February and March 23. Statistical analysis of data confirmed that Giza 3 harboured significantly the highest number of aphids with a mean of 109.97 insects/10 tillers, followed by Giza 402 and breeding line 716/1039 with means of 70.32 and 64.14 insects/10 tillers. Other varieties and breeding lines were less infested. The mentioned results are in a good harmony with the findings of Hassanein, 1989 who reported that variety Giza 3 was the highest infested variety with aphid, A.craccivora at Zagazig Governorate. El-Gantiry *et al.*, 1994 also, found that Reina Blanca (= Giza Blanca) was less susceptible than Giza 3 to A.craccivora infestation during 1985/1986 season at Beni-Suef Governorate.

With regard to jassids, Empoasca spp., the results summarized in Table 2 cleared that the population appeared early with low numbers and recorded a moderate peak of abundance after two weeks of inspection on all tested varieties and breeding lines. Then, the population fluctuated and reached its maximum by March 16. Statistical analysis indicated that the highest infestation significantly occurred on Giza 3 and Giza 402 which were harbouring mean of 5.46 and 5.24 insects per 10 tillers, while the lowest population took place on variety Giza Blanca and breeding line 716/1039 with mean of 3.65 and 3.70 insects. Other varieties and breeding lines were of moderate infestation. These observations contradicted with the findings of Walfenberger and Sleesman (1963) who mentioned that all broad bean varieties were susceptible to infestation and injury with *Empoasca faba*.

However, certain environmental conditions influence 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 (Kumar, 1984). Also, plant resistance to insects generally derives from certain biochemical and/or morphological characteristics of plants which affect the behaviour and/or the metabolism of insects as to influence the relative degrees of damage caused by these insects (Metcalf and William, 1975).

In conclusion, the current data clearly indicated that the variety Giza 3 was

Table 2. Mean number of Empoasca spp. per 10 tillers settled on 7 selected faba bean varieties and breeding lines under field condition at Sakha region (Kafr El-Sheikh Governorate) during 1991/92 season.

Date of sampling	Dec. 1991		Jan. 1992				Feb. 1992				Mar. 1992					Mar. 1992		Total	Mean
Varieties and breeding lines	22	29	5	12	19	26	2	9	16	23	2	9	16	23	30	6	13		
Giza 402	2.5	2.0	4.25	4.73	3.75	3.5	3.5	3.5	3.5	4.5	11.00	6.5	12.75	9.5	6.25	5.5	1.75	89.0	5.24 a
Giza 3	3.5	3.7	5.25	4.0	3.75	3.75	4.5	4.5	3.75	4.0	7.75	4.5	16.25	10.5	6.5	4.5	1.5	92.25	5.46 a
Giza 461	3.25	3.0	5.25	4.75	3.0	4.0	3.75	4.0	5.25	8.75	4.25	3.5	10.25	5.75	4.0	3.0	1.25	77.0	4.52 b
Giza Blanca	2.25	2.75	3.5	3.50	4.0	3.0	3.75	3.5	5.75	4.5	3.5	2.75	8.5	4.5	3.25	2.0	1.0	62.0	3.65 c
714	4.25	3.0	7.25	3.00	3.0	5.75	4.25	4.0	4.25	9.25	6.25	4.5	8.5	4.0	2.25	2.75	1.25	77.5	4.55 b
716/1039	3.5	2.5	4.25	3.75	3.0	3.0	3.0	3.5	4.25	3.5	5.25	3.75	8.5	4.75	2.75	2.25	1.0	63.0	3.70 c
716/1024	2.5	2.5	3.75	3.75	4.5	4.0	3.25	3.25	4.75	3.0	7.00	4.0	8.0	6.0	3.5	3.25	1.5	68.5	4.18 b

F value for different varieties = 19.30 P = 1%

Means followed by the same letter are not significantly different.

the most preferable to infestation with aphids while Giza 3 and Giza 402 were highly infested with jassids. On the other hand, variety Giza Blanca, Giza 461, and breeding lines 716/1024 and 714 were less infested with aphids, while Giza Blanca and Breeding line 716/1039 were less infested with jassid. Also, it appears that aphid population was higher than jassid on all tested varieties and breeding lines. Thus, the gained results can encourage adopting breeding programmes to produce new faba bean varieties less susceptible to insect infestation and this must be mainly of value to faba bean growers as an agricultural method in integrated pest management.

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مدى قابلية بعض اصناف وسلالات الفول البلدى للاصابة بحشرتي من البقوليات والجاسيد تحت الظروف الحقلية لمحافظة كفر الشيخ

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يعتبر من البقوليات والجاسيد من أهم الحشرات التى تهاجم الفول البلدى فى الحقل مسببة ضررا شديدا ولذا تم تقييم مدى قابلية بعض أصناف وسلالات الفول البلدى التالية للإصابة بهاتين الحشرتين وهى : جيزة ٤٠٢ ، جيزة ٣، جيزة ٤٦١ ، جيزة بلانكا، والسلالة ٧١٤ ، والسلالة ٧١٦ / ١٠٢٤ والسلالة ٧١٦ / ١٠٣٩ بمزرعة محطة البحوث الزراعية بسخا – كفر الشيخ موسم ١٩٩١ / ١٩٩٢ كمحاولة للبحث عن اصناف اقل قابلية للاصابة بهذه الحشرات.

أكدت النتائج ان تعداد المن كان أعلى من تعداد الجاسيد على جميع الاصناف والسلالات المختبرة كما أوضحت النتائج ان الصنف جيزة ٣ كان أعلى الاصناف والسلالات قابلية للإصابة بالمن بينما الصنف جيزة ٤٠٢ ، جيزة ٣ كانا اعلى الأصناف والسلالات قابلية للإصابة بالجاسيد فقط. ومن ناحية أخرى كان الصنف جيزة بلانكا أقل الاصناف والسلالات المختبرة قابلية للإصابة بالمن والجاسيد ولذا يمكن التوصية بزراعة هذا الصنف بمحافظة كفر الشيخ كطريقة زراعية تستخدم فى برامج المكافحة المتكاملة للفول البلدى.