PRELIMINARY STUDIES ON THE POPULATION OF LEGUME APHID, *APHIS CRACCIVORA* (KOCH.) AND JASSIDS, *EMPOASCA SPP.* ON DIFFERENT FABA BEAN VARIETIES AND BREEDING LINES UNDER THE FIELD CONDITIONS OF KAFR EL-SHEIKH GOVERNORATE, EGYPT.

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Abstract

Legume aphid, *Aphis craccivora* (Koch.) and jassids, *Empoasca* spp. are of the most important insect pests infesting faba bean. Field experiment was carried out at Sakha Agric. Res. Station, Kafr El-Sheikh Governorate, to study the population of these two insects on four varieties (Giza 402, Giza 3, Giza 461 and Reina Blanca) and two breeding lines (714 and 716/1039) of faba bean as influenced by temperature, relative humidity and wind speed during 1992/93 season.

Weekly mean numbers of the two insects per 10 tillers revealed three abundance peaks for aphids on January 19, February 23 and March 23 and two peaks for jassids on February 12 and March 16 on all tested varieties and breeding lines. The highest infestation with aphids occurred on variety Giza 3 while breeding line 716/1039 and variety Reina Blanca were the least infested. Giza 402 significantly harboured the highest number of jassid population while breeding lines 714, 716/1039 and variety Reina Blanca had the least infestation. All tested varieties and breeding lines suffered higher numbers of aphids than jassids.

The three considered weather factors namely: temperature, relative humidity and wind speed insignificantly affected aphid and jassid populations on all tested varieties and breeding lines except for wind speed on jassids infesting breeding line 716/1039 and variety Giza 461, where the effect was significant and highly significant, respectively. The combined effect of the three considered weather factors was more pronounced on jassids than on aphids for all tested varieties and breeding lines. Aphid population was more affected by the three weather factors collectively on variety Reina Blanca and breeding line 716/1039, while jassids were more influenced by these factors on Giza 461.

Variety Reina Blanca and breeding line 716/1039 may be recommended for Sakha region, Kafr El-Sheikh Governorate.

INTRODUCTION

In Egypt, faba bean, *Vicia faba* (L.) is one of the most important leguminous crops as a source of protein. Legume aphid, *Aphis craccivora* (Koch.) and jassids, *Empoasca spp.* are of the most important sucking insect pests attacking faba bean in the field causing severe injury and yield losses. Aphid and jassid attack are always associated with transmission of several virus diseases which affect the yield (Kamel, 1981; Bishara et al., 1985; El-Defrawi, 1987; Abd El-Fatah 1991 and Rizkalla et al., 1994).

The use of resistant cultivars to insects represents one of the simplest and most convenient methods of insect pest control (Dent, 1991). Resistant varieties form a key component in any pest management programme (Pathak and Saxena, 1976). Horber (1972) pointed out that resistant varieties may improve the effectiveness of insecticides.

The population of legume aphid and jassids was evaluated on four varieties and two breeding lines of faba bean grown under field conditions at Sakha region, Kafr El-Sheikh governorate. The effect of certain weather factors on their population activity was also investigated.

MATERIALS AND METHODS

Work was carried out at the Experimental Farm of Sakha Agric. Res. Station, Kafr El-Sheikh governorate, to investigate the susceptibility of four varieties and two breeding lines of faba bean to infestation with legume aphid and jassids during 1992/93 growing season. The experimental area was divided into plots 1/100 feddan each. Every tested variety or breeding line was replicated four times in a complete randomized block design. Normal agricultural practices were carried out and no pest control was practiced throughout the whole growing season. The varieties Giza 402, Giza 3, Giza 461, Reina Blanca and the breeding lines 716/1039 and 714 were seeded on mid-November, 1992.

To estimate aphid and jassid populations, weekly samples of ten tillers of every variety or breeding line were selected at random from each replicate after 40 days from seeding until the end of the season. The total numbers of aphids (nymphs and adults) and jassids (all forms) were visually counted in the field and used as an

index of population density. Multiple range test at 5% level was used to partition the means into significant ranges (Duncan, 1955).

The daily records of temperature, relative humidity and wind speed during the inspection period were obtained from the Meteorological Department at Sakha Research Station. Weekly means of these weather factors during the preceding week of sampling were used to calculate the simple correlation and regression coefficients for the relationship between every pest's population and the three considered weather factors (Fisher, 1950).

RESULTS AND DISCUSSION

Population data

Table 1 shows the total numbers of *A.craccivora* and their means on the tested faba bean varieties and breeding lines. In general, initial infestation with aphids took place in few numbers during the 2nd week of January and three peaks of abundance were observed on all tested varieties and breeding lines on January 19, February 23 and March 23.

Statistical analysis revealed that Giza 3 received the highest significant aphid population with a mean of 151.85 insects/10 tillers, while the least population was detected on breeding line 716/1039 and Reina Blanca variety with means of 45.76 and 40.92 aphids/10 tillers, respectively. Other varieties and breeding lines were of moderate infestation. These observations are in agreement with Hassanein (1989) who found that at Zagazig governorate, faba bean Giza 3 was the highest infested variety with aphid. El-Gantiry et al. (1994) reported that during 1985/86 season, at Beni-Suef, Reina Blanca was less susceptible to *A.craccivora* infestation than Giza 3.

Regarding jassids, *Empoasca spp.*, Table 2 indicated that infestation started early at low numbers, then recorded a moderate peak during the 2nd week of January after which the population decreased slowly until the 1st week of February for all tested varieties and breeding lines. Population increased again reaching a maximun on March 16 (2nd peak). Results further indicated that Giza 402 significantly harboured the highest number of jassids with a mean of 17.15 insects/10 tillers, while breeding line 716/1039 exhibited the least number with a mean of 8.95 insects. Other varieties and breeding line were of moderate infestation. These results seem to disagree with Walfenberger and Sleesman (1963) who mentioned that all

Table 1. Mean number of *Aphis craccivora* (Koch.) per 10 tillers on six faba bean varieties and breeding lines under field conditions at Sakha region (Kafr El-Sheikh governorate) during 1992/93 season.

Date of sampling / Varieties and breeding lines	Dec. 1992		Jan. 1993				Feb. 1993				Mar. 1993					Apr. 1993		Total	Mean
	22	29	5	12	19	26	2	9	16	23	2	9	16	23	30	6	13		
Giza 402	0	0	0	61.0	142.0	100.0	45.0	50.0	55.0	227.0	80.0	70.0	90.0	350.0	40.0	20.0	11.0	1341.0	78.82 b
Giza 3	0	0	0	52.5	450.0	250.0	100.0	50.0	60.0	437.5	140.0	120.0	160.0	707.5	30.0	20.0	4.0	2581.5	151.85 a
Giza 461	0	0	0	72.25	154.25	50.5	25.0	50.0	65.0	210.0	90.0	60.0	100.0	253.0	20.0	13.0	5.0	1168.0	68.70 bc
Reina Blanca	0	0	0	42.0	100.5	20.5	30.0	40.0	60.0	135.5	35.0	40.0	57.0	130.0	5.25	0.0	0.0	695.75	40.92 d
* B.L. 714	0	0	0	80.75	108.0	20.0	30.0	50.0	65.25	200.0	40.0	30.0	50.0	332.5	30.0	21.5	15.0	1073.0	63.11 c
* B.L. 716/1039	0	0	0	67.0	128.0	25.25	30.0	35.0	40.0	132.5	25.0	35.0	45.0	158.25	30.0	15.0	12.0	778.0	45.76 d

* B.L = Breeding line

Means followed by the same letter are not significantly different.

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

Date of sampling / Varieties and breeding lines	Dec. 1992		Jan. 1993				Feb. 1993				Mar. 1993					Apr. 1993		Total	Mean
	22	29	5	12	19	26	2	9	16	23	2	9	16	23	30	6	13		
Giza 402	14.75	19.0	17.0	25.25	20.0	11.75	9.0	10.25	13.0	14.0	15.5	13.75	40.25	21.75	22.75	19.0	4.5	291.5	17.15 a
Giza 3	12.0	10.0	15.5	19.5	15..25	8.25	6.0	7.5	9.5	10.75	13.5	13.75	33.25	15.75	12.0	8.0	3.0	213.5	12.55 b
Giza 461	6.25	4.75	7.75	19.0	12.25	4.25	3.75	4.5	6.25	12.75	12.0	13.5	26.25	12.75	15.0	8.75	3.75	173.5	10.20 c
Reina Blanca	7.5	3.0	5.5	12.5	6.75	5.0	4.75	6.0	7.25	6.5	13.25	13.75	36.25	13.75	14.0	7.75	2.5	166.0	9.76 cd
* B.L. 714	4.25	4.0	6.0	13.25	4.0	4.25	5.25	4.0	7.25	6.5	12.0	14.75	34.75	14.0	12.25	10.25	3.0	159.75	9.39 cd
* B.L. 716/1039	3.25	5.75	7.5	15.0	8.25	7.25	6.5	4.25	5.0	5.5	8.75	13.25	27.75	13.0	12.0	7.0	2.25	152.25	8.95 d

* B.L = Breeding line

Means followed by the same letter are not significantly different.

broad bean varieties were susceptible to infestation and injury by *Empoasca faba*.

Effect of three weather factors on the population density of aphids and jassids

Table 3 refers that aphid population was not significantly affected by the three considered weather factors (temperature, relative humidity and wind speed) on all tested varieties and breeding lines. This means that these weather factors were within the optimum range for aphids activity. The results also show insignificant relationship with jassid population on all tested varieties and breeding lines except for the effect of wind speed on variety Giza 461 and breeding line 716/1039 where that effect was highly significant and significant, respectively. This means that wind speed was out of the optimum range for jassid activity on Giza 461 and breeding line 716/1039.

In general, the combined effect of the three tested weather factors (expressed as percentage of explained variance) was more pronounced on jassid population (26.13-53.16%) than on aphid (2.52-16.63%) for all tested varieties and breeding lines. This supports the probability that there might be some other unconsidered factors affecting the population of both insect pests on faba bean plants. It is also obvious that aphid populations were more affected by these weather factors collectively on Reina Blanca and breeding line 716/1039 than on the other varieties and breeding line. On the other hand, jassid population appeared to be relatively more influenced by these factors on Giza 461 variety.

Previous results should be taken very cautiously since they are based on one season of experimentation. However, they may lead to the preliminary deduction that aphid population was higher than that of jassids on all tested varieties and breeding lines of faba bean. Also, Reina Blanca variety and breeding line 716/1039 were relatively less infested by both pests while variety Giza 3 was the most susceptible to aphid infestation. Cultivation of variety Reina Blanca and breeding line 716/1039 at Sakha region, Kafr El-Sheikh may be regarded as one of the possible tactics for the integrated management of insect pests in faba bean fields.

Table 3. Statistical parameters for Aphis craccivora (Koch) and jassids, Empoasca spp. populations in relation to temperature (Temp.), relative humidity (R.H.) and wind speed (W.S.) on different faba bean varieties and breeding lines during 1992/93 season.

Varieties and breeding lines	Weather factors	Aphis crassivora			Empoasca spp.		
		r	b	% Explained variance	r	b	% Explained variance
Giza 402	Mean temp. (°C)	-0.0984	-7.2982		-0.1316	-1.3730	
	Mean R.H. (%)	0.0545	-2.8593		0.1413	-0.0449	
	Mean W.S. (Km/h)	0.0338	5.7184	2.85	0.3919	2.7757*	26.13
Giza 3	Mean temp. (°C)	-0.1097	-22.1605		-0.1918	-1.3852	
	Mean R.H. (%)	-0.1495	-12.9632		0.2370	0.0750	
	Mean W.S. (Km/h)	0.0286	14.1568	6.66	0.4462	2.6806	37.65
Giza 461	Mean temp. (°C)	-0.1967	-10.3350		0.0249	-0.7264	
	Mean R.H. (%)	0.0451	-1.1791		0.2997	0.2442	
	Mean W.S. (Km/h)	0.1274	12.0206	9.47	0.6832**	3.0367**	53.16
Reina Blanca	Mean temp. (°C)	-0.3686	-8.1999		0.0770	-0.2048	
	Mean R.H. (%)	0.1763	0.2075		0.2720	0.4297	
	Mean W.S. (Km/h)	0.0043	5.2182	16.63	0.4727	2.3779	28.07
Breeding line 714	Mean temp. (°C)	-0.1410	-7.0809		0.1083	-0.0934	
	Mean R.H. (%)	0.0136	-1.2968		0.2529	0.4034	
	Mean W.S. (Km/h)	-0.1150	3.4033	2.52	0.4806	2.3109	27.76
Breeding line 716/1039	Mean temp. (°C)	-0.2804	-8.8375		-0.0096	-0.5382	
	Mean R.H. (%)	0.0393	-1.3577		0.2917	0.2839	
	Mean W.S. (Km/h)	0.0977	8.0325	14.41	0.5047*	2.1862*	34.35

*, ** = Significant and highly significant at 5% and 1%, respectively.

r = Simple correlation, b = Regression coefficient .

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دراسات أولية عن تعداد من البقوليات والجاسيد على أصناف وسلالات مختلفة من الفول البلدى تحت الظروف الحقلية بمحافظة كفر الشيخ

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يعتبر من البقوليات Aphis craccivora Koch. والجاسيد Empoasca spp.من أهم الافات الحشرية التى تصيب نباتات الفول البلدى فى الحقل. وقد أجرى هذا البحث بمزرعة محطة البحوث الزراعية بسخا بمحافظة كفر الشيخ كدراسة أولية عن تعداد هاتين الحشرتين على الأربعة أصناف التالية: جيزة ٤٠٢ ، جيزة ٣ ، جيزة ٤٦١ ورينا بلانكا وكذا السلالتين ٧١٤ ، ١٠٣٩/٧١٦، كما تضمنت الدراسة تأثير ثلاثة عوامل جوية سائدة هى متوسطات درجة الحرارة والرطوبة النسبية وسرعة الرياح على التعداد خلال موسم ١٩٩٣/٩٢م.

وبتتبع متوسط التعداد الأسبوعى لكلا الحشرتين على نباتات الفول لوحظت ثلاثة ذروات لحشرة المن وقعت فى ١٩ يناير و ٢٣ فبراير و ٢٣ مارس، بينما إتضح أن للجاسيد ذروتين وقعتا فى ١٢ فبراير و ١٦ مارس وذلك على كل الأصناف والسلالات المختبرة. كما أوضحت النتائج أن أعلى تعداد للمن كان على الصنف جيزة ٣ وأقل تعداد له على الصنف رينا بلانكا والسلالة ١٠٣٩/٧١٦ . أما بالنسبة للإصابة بالجاسيد فكان الصنف جيزة ٤٠٢ أعلى إصابة بينما كان الصنف رينا بلانكا والسلالة ١٠٣٩/٧١٦ والسلالة ٧١٤ أقل إصابة . وبصفة عامة كان تعداد المن أعلى من تعداد الجاسيد على كل الأصناف والسلالات المختبرة.

ووجد أن تأثير كل من العوامل الجوية الثلاثة المأخوذه فى الاعتبار غير معنوى على تعداد المن والجاسيد على كل الأصناف والسلالات المختبرة عدا تأثير سرعة الرياح على الجاسيد الذى كان معنويا على السلالة ١٠٣٩/٧١٦ ومعنويا جدا على الصنف جيزة ٤٠٢ . وكان التاثير المشترك للعوامل الجوية الثلاثة أكثر وضوحا على المن على الصنف رينا بلانكا والسلالة ١٠٣٩/٧١٦، بينما كان الجاسيد أكثر تأثيرا بهذه العوامل الجوية مجتمعه على الصنف جيزة ٤٦١ . وكذلك كان التاثير المشترك للعوامل الجوية الثلاثة أكثر وضوحا على الجاسيد منه على المن على كل الأصناف والسلالات المختبرة للفول البلدى.

وتوحى هذه النتائج المبدئية بامكانية التوصية بزراعة الصنف رينا بلانكا والسلالة (٧١٦/ ١٠٣٩) فى منطقة سخا بكفر الشيخ كأحد عناصر برامج المكافحة المتكاملة للافات فى حقول الفول البلدى.