

RELATIVE SUSCEPTIBILITY OF SOME SOYBEAN VARIETIES TO THE MAIN PIERCING- SUCKING INSECTS INFESTATION IN KAFR EL-SHEIKH GOVERNORATE

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ABSTRACT

Pest resistant and tolerant crop varieties offer a major mean of pest control as it could be incorporated into integrated pest management programs to minimize the serious problems of insecticides. The current work was carried out at Sakha Agricultural Research Station Farm to evaluate the relative susceptibility of six soybean varieties (Crawford, Giza 21, Giza 22, Giza 111, H 30 and H 32) to infestation with the main piercing-sucking insects (whitefly, *Bemisia tabaci* Genn.; aphids, *Aphis* spp.; jassids, *Empoasca* spp. and green stink bug, *Nezara viridula* L.) during two soybean growing seasons;2009 and 2010.

Data indicated that whitefly population was higher in the first season than in the second one on all the evaluated varieties, while the reverse was found for the other insects. Based on the mean number of the two successive seasons, Giza 111 significantly received the highest number of whitefly and jassids, followed by Giza 22, while Crawford and H 30 had the lowest whitefly and jassids density, respectively. Also, H 30 and Giza 111 significantly had higher number of aphids among the evaluated varieties. As for the green stink bug, the highest population was found on Giza 22, Crawford and Giza 111, while the lowest one was counted on Giza 21 and H 32 .

In respect to susceptibility degree, Giza 111, Giza 22 and H 32 appeared susceptible to whitefly and jassids, while Crawford and H 30 appeared moderately resistant to whitefly and jassids, respectively. Giza 111 and H 30 appeared susceptible to aphids, while the other varieties showed low resistance. Also, Giza22, Crawford and Giza111 appeared susceptible to the green bug, while Giza21 and H32 appeared as moderately resistant.

Generally, it can be concluded that Giza111 was the highest infested variety with all the tested insects. On the other hand, Crawford was the least infested variety with the whitefly and aphids, while H30 was the least infested with jassids and the green stink bug.

INTRODUCTION

Soybean, *Glycine max* (L.) is one of the most important leguminous crops in Egypt and the world as well. As it has a good nutritional value for people and animals, so it plays a vital role in various industries. Also, it is an excellent source of protein (Badenhopf and Kackler, 1971) and is considered as one of the richest sources of oils, as it contains 18-22%. Soybean plants attract many serious insect species during its growing stages. Among pests, are the whitefly, *Bemisia tabaci* Genn.; aphids, *Aphis* spp. ; jassids, *Empoasca* spp. and the green stink bug, *Nezara viridula* L. These insects cause serious damage either directly by sucking plant juice or indirectly by viral diseases transmission (Yonnes *et al.*,2001;Hegab,2001; Taha *et al.*, 2001 ; Iqbal *et al.*,2008 and El-Samahy & Saad,2010).

The use of conventional insecticides in soybean insect control created serious problems such as environmental pollution, destruction of

beneficial insects, secondary pest outbreaks and development of insect resistance to many insecticides. Therefore, there is an urgent need to seek a simple and safe tactic in the integrated pest management such as pest resistant or tolerant crop varieties (Dent,1991) .

The present work was carried out to evaluate the relative susceptibility of six soybean varieties to natural infestation by the main piercing-sucking insects during two successive growing seasons; 2009 and 2010 in Kafr El-Sheikh Governorate.

MATERIALS AND METHODS

The experiment was carried out at Sakha Agriculture Research Station Farm to evaluate the relative susceptibility of six soybean varieties to infestation with four piercing-sucking insects ; whitefly, *Bemisia tabaci* Genn.; aphids, *Aphis* spp. ; jassids, *Empoasca* spp. and the green stink bug, *Nezara viridula* L. during two successive seasons ; 2009 and 2010 . The seeds of the tested varieties ; Crawford ; Giza 21 ; Giza 22 ; Giza 111 ; H 30 and H 32 were obtained from Food Legumes Research Section , Sakha Agric. Res. Station . In each season , the experimental area was divided into 18 plots each of 1/100 feddan . The seeds were sown by late May and each variety was replicated three times in a completely randomized block design. The normal agricultural practices were carried out without any pesticidal treatments throughout the growing season .

To estimate the population density of the green stink bug , a sample of 20 plants was randomly selected from each plot on weekly basis and the number of nymphs and adults was directly counted in the field . As for , aphids and jassids , weekly sample of 20 leaflets of soybean was randomly selected from each plot representing three levels of the plant height. The number of the considered insects (nymphs and adults) was directly counted and recorded in the field . The same leaflets were picked up and transferred in paper bags to the laboratory to count the immature stages of whitefly by a binocular microscope . The inspection began four weeks after sowing and continued till the end of the season .

The classification of the susceptibility degree (SD) of each soybean variety was determined according to the general mean (\bar{X}) of the insects, and the standard deviation (sd) as reported by Chiang and Talekar (1980). The variety that had mean number of the insects more than $\bar{X} + 2sd$ was considered highly susceptible (HS) ; between $\bar{X} + 2sd$ and \bar{X} , susceptible (S); between \bar{X} and $\bar{X} - 1sd$ low resistant(LR); between $\bar{X} - 1sd$ and $\bar{X} + 2sd$ moderately resistant (MR) and less than $\bar{X} - 2sd$ was . The obtained data were statistically analyzed using F- test and means were compared according to Duncan's Multiple Range Test (Duncan,1955).

RESULTS AND DISCUSSION

The seasonal means of four insects; whitefly, *Bemisia tabaci* Genn.; aphids, *Aphis* spp. ; jassids, *Empoasca* spp and green stink bug, *Nezara viridula* L. on the six soybean varieties during two seasons ; 2009 and 2010

are presented in Table (1). All the tested varieties exhibited variable attractions to the considered insects, as they differed significantly in their susceptibility to infestation with these pests. Also, the results indicated that the population of aphids, jassids and the green bug were lower on all the tested varieties in the first season than in the second one, while the reverse was found for the whitefly. In general, Giza111 harbored the highest number of whitefly and jassids followed by Giza 22, while Giza111 and H30 received the highest number of aphids in the two seasons. Giza 22 and Crawford followed closely Giza 111, recording the highest number of the green bug.

Based on the mean number of the two study seasons, results in Table (2) revealed significant differences among the tested varieties to infestation with the considered insects. Variety Giza 111 harbored significantly the highest number of the whitefly and jassids with 282.57 and 62.68 insects /20 leaflets, respectively while the least numbers of whitefly (103.31 insects) and jassids (31.68 insects) were recorded on Crawford and H 30, respectively. As for aphids, varieties H 30 and Giza 111 significantly exhibited the highest population , 76.01 and 72.68, respectively, while the rest varieties harbored lower numbers, ranging from 47.87 to 55.25 insects / 20 leaflets without significant differences. Regarding the green stink bug , Giza 22, Crawford and Giza 111 received the highest number of population (67.77, 66.93 and 60.90 insects//20 plants, respectively). On the other hand, Giza 21 and H 32 exhibited the least number (50.06 and 49.31 insects, respectively).

These results agree with the findings of Hegab 2001; Pherson *et al*, 2009 and Al-Habshy *et al.*, 2011 who mentioned that soybean varieties greatly varied in their susceptibilities to homopterous insects.

Table (1): Seasonal mean numbers of four piercing-sucking insect number on six soybean varieties during two soybean growing seasons of 2009 and 2010 in Kafr El-Sheikh. Governorate

Variety	Mean No. / 20 leaflets ± SE*						Mean No. /20 plants± SE*	
	<i>Bemisia tabaci</i> (1)		<i>Aphis</i> spp. (2)		<i>Empoasca</i> spp. (2)		<i>Nezara viridula</i> (2)	
	2009	2010	2009	2010	2009	2010	2009	2010
Crawford	114.63± 42.91 e	92.00± 30.33 e	44.13± 8.61 b	55.13± 10.62 b	37.24 ± 8.80 bc	42.38± 8.61 b	62.74± 9.91 a	71.13± 10.72 a
Giza 21	119.62± 44.13 e	160.25± 42.81 d	44.87± 11.12 b	50.88 ± 11.31 b	25.85 ± 6.22 cd	43.26± 6.71 b	41.62 ± 10.54 c	58.51± 9.41 ab
Giza 22	253.63± 99.72 b	230.13± 86.50 b	41.75 ± 9.33 b	58.00± 10.82 b	47.99± 8.71ab	60.63± 10.03 a	62.28 ± 10.23 a	73.26 + 10.82 a
Giza 111	303.38± 90.92 a	261.75± 95.52 a	64.86± 7.61 a	80.50± 7.41 a	56.86± 15.52 a	68.87± 10.42 a	55.43 ± 11.61 ab	66.38± 15.02 ab
H 30	172.63± 62.64 d	164.00 ± 60.52 d	68.63± 22.72 a	83.38± 22.53 a	23.60± 4.84 d	39.76 ± 6.31 b	48.99 ± 11.91 bc	67.51± 14.10 ab
H 32	210.00± 53.22 c	199.38± 51.51 c	47.50± 26.84 b	63.00± 18.34 b	39.62 ± 10.22 b	53.63± 11.84 ab	44.63 ± 8.52 bc	54.00 ± 7.83 b
Mean ± SE*	195.65±31.21	184.59±24.92	51.96±4.91	65.15±5.70	38.52±5.32	51.42±4.94	52.61±2.12	65.13±3.11
F	80.493 **	41.95 ***	4.79*	7.82**	10.66 ***	5.67**	5.53**	2.62 ns

In a column ,means followed by the same letter are not significantly different at 5% level of probability by Duncan's Multiple Range Test.

SE*= standard error

(1)= immature stages (2)= nymphs and adults

Table(2): Two-season means of numbers of four piercing-sucking insect pests and susceptibility degree (SD) of six soybean varieties during two seasons of 2009 and 2010 in Kafr El-Sheikh Governorate.

Variety	<i>Bemisia tabaci</i>		<i>Aphis</i> spp.		<i>Empoasca</i> spp.		<i>Nezara viridula</i>	
	General mean±sd*	SD	General mean±sd*	SD	General mean±sd*	SD	General mean±sd*	SD
Crawford	103.31±16.00 f	MR	49.63±7.78 b	LR	39.81±3.63 cd	LR	66.93±5.93 a	S
Giza 21	139.94 ±28.73 e	LR	47.87 ±4.53 b	LR	34.55±12.31 d	LR	50.06 ±11.94 b	MR
Giza 22	241.88±16.62 b	S	49.87±11.49 b	LR	54.31±8.94 ab	S	67.77±7.76 a	S
Giza 111	282.57±29.44 a	S	72.68±11.06 a	S	62.86±8.49 a	S	60.90 ±7.74 a	S
H 30	168.32±6.10 d	LR	76.01±10.43 a	S	31.68±11.43 d	MR	58.25±13.09 ab	LR
H 32	204.69±7.51 c	S	55.25±10.96 b	LR	46.62±9.91 bc	S	49.31±6.62 b	MR
Mean ±sd*	190.12±66.28		58.55±12.52		44.97±12.01		58.87±7.97	
F	151.02***		13.89***		11.69***		5.93**	

For each column ,means followed by the same letter in each column are not significantly different at 5% level of probability by Duncan's Multiple Range Test.

S= susceptible LR= low resistant MR= moderately resistant
Sd*= standard deviation

However, the differences in the susceptibility of soybean varieties to these insects between the first and second season may be due to the differences in the climatic factors and/or the abundance of the natural enemies as they play a great role in regulating the population density and seasonal abundance of insect species on soybean plants (Raupach *et al.*,2002; Abd-Elsamad *et al.*, 2011 and Al-Habshy, *et al.*,2011). Thus, variety that exhibits resistance in one locality or environment may be susceptible in another, as certain environmental conditions influence fundamental physiological processes of the plant as well as the plant (Kumar,1984 and Metcalf & Luckmann, 1975). Also, the chemical constituents of some leguminous plant varieties affect the population density of aphids, leafhoppers and plant hoppers as mentioned by Hegab (2001); Hashem (2005); Myers *et al.* (2005);Youssef (2006) and Al-Habshy *et al.*(2011).

In respect to the susceptibility degree, the results presented in Table (2) showed that Giza 111, Giza 22 and H 32 appeared as susceptible(S) to whitefly and jassids, as they harbored the highest number of the two insects. Giza 21 and H 30 appeared as low resistant(LR),to whitefly, while Crawford appeared moderately resistant. Crawford and Giza 21 appeared low resistant to jassids, while H 30 appeared moderately resistant. Giza 111 and H 30 appeared susceptible (S) to aphids, as they had the highest number, while the other varieties showed low resistance. Also, Giza 22, Crawford and Giza 111 appeared susceptible to the green bug ,while Giza 21 and H 32 appeared as moderately resistant (MR).

From the foregoing results, it could be concluded that Crawford was the least susceptible to infestation with the whitefly and aphids, while H 30 variety was the least susceptible to both jassids and green stink bug. On the other hand, Giza 111 was the most infested variety with all the considered insects.

Finally, the results will enable soybean growers to select insect resistant variety in order to minimize use of insecticides for controlling insect pests on such crop.

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الحشرات الثاقبة الحساسية النسبية لبعض أصناف فول الصويا للإصابة بأهم الماصة في محافظة كفر الشيخ
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معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقي

يمثل إنتاج الأصناف المقاومة والمتحملة للإصابة الحشرية طريقة هامة لمكافحة الآفات حيث يمكن دمجها في برامج الإدارة المتكاملة للآفات لتقليل المشاكل الخطيرة للمبيدات الحشرية . ولذا تم إجراء تجربة بمزرعة محطة البحوث الزراعية بسخا- كفر الشيخ لدراسة حساسية ستة أصناف من فول الصويا (كراوفورد، جيزة 21، جيزة 22، جيزة 111، هجين 30 وهجين 32) للإصابة بأربعة أنواع من الحشرات الثاقبة الماصة (الذبابة البيضاء – المن – الجاسيد – والبقة الخضراء) خلال موسمي 2009، 2010. أوضحت النتائج أن أعداد حشرة الذبابة البيضاء كانت أعلى في الموسم الأول عنها في الموسم الثاني علي جميع الأصناف المختبرة بينما حدث العكس بالنسبة للثلاثة أنواع الحشرية الأخرى. بناءً على متوسط التعداد في موسمي الدراسة وجد أن الصنف جيزة 111 سجل معنوياً أعلى تعداد للذبابة البيضاء والجاسيد بينما كان الصنف كراوفورد أقل إصابة بالذبابة البيضاء والصنف هجين 230 أقل إصابة بالجاسيد . أيضا كان الصنف هجين 30 وجيزة 111 أكثر إصابة بالمن من الأصناف المختبرة الأخرى، بالنسبة للبقة الخضراء كان الصنف جيزة 22 وكراوفورد وجيزة 111 أعلى إصابة بينما كان جيزة 21 وهجين 32 أقل إصابة .

بناءً على تقدير درجة حساسية الأصناف المختبرة وجد أن الأصناف جيزة 111 وجيزة 22 وهجين 32 كانت أكثر حساسية للذبابة البيضاء والجاسيد بينما كان الصنف كراوفورد وهجين 30 ذو مقاومة متوسطة للذبابة البيضاء والجاسيد على التوالي . أما الصنف جيزة 111 وهجين 30 فقد أظهر حساسية للمن بينما أظهرت الأصناف الأخرى المختبرة درجة مقاومة منخفضة. أيضاً جيزة 22 وكراوفورد وجيزة 111 كانت حساسة للبقة الخضراء بينما أظهر الصنف جيزة 21 وهجين 32 درجة مقاومة متوسطة. وبصفة عامة يمكن القول بأن الصنف جيزة 111 أكثر إصابة بالحشرات موضع الدراسة وأن الصنف كراوفورد أقل إصابة بالذبابة البيضاء والمن بينما كان هجين 30 أقل إصابة بالجاسيد والبقة الخضراء . 0

بتحكيم البحث

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