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FIELD EVALUATION OF SOME SOYBEAN CULTIVARS FOR INFESTATION WITH SOYBEAN STEM FLY, *Melanagromyza sojae* (ZEHNTNER) AND LEAFMINER, *Liriomyza trifolii* (BURGESS) AT KAFR EL-SHEIKH REGION.

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ABSTRACT

Field studies were carried out at the experimental farm, Faculty of Agriculture, Kafr El-Sheikh University during two successive seasons, 2004 and 2005 to study the seasonal abundance of soybean stem fly, *Melanagromyza sojae* (Zehntner) and leafminer, *Liriomyza trifolii* (Burgess) on three soybean cultivars, the relative susceptibility of soybean cultivars to infestation and the relationship between both soybean plant height and number of plant trifoliate leaves and infestation with *M. sojae* and *L. trifolii* under field condition.

Results showed that *M. sojae* generally infested three soybean cultivars (Giza 35, Giza 82 and Clark) throughout tow seasons. Also, *M. sojae* had three peaks for mines, larvae and pupae during both seasons. Population density of *M. sojae* mines, larvae and pupae in 2005 season was higher 2004 season on three soybean cultivars.

Statistical analysis showed highly significant differences among soybean cultivars to infestation with *M. sojae* during 2004 and 2005 seasons. Giza 35 variety was the most resistant variety to infestation with *M. sojae* in the first and second seasons. Positive significant correlation was recorded between soybean plant height and infestation with *M. sojae* in both seasons, while this correlation was positive between number of soybean trifoliate leaves and *M. sojae* infestation. *M. sojae* larvae showed negative correlation in two cases.

Concerning leafminer, *L. trifolii* results showed that this insect had two peaks on the three soybean cultivars, in August and September in both seasons. Population density of *L. trifolii* in 2005 season was higher than 2004 season.

Statistical analysis showed highly significant differences among three cultivars to infestation with *L. trifolii* in both seasons. Giza 82 was the most resistance variety to infestation. Significant positive correlation was recorded between *L. trifolii* infestation in first season and both soybean plant height and number of plant trifoliate leaves. Also, significant correlation was found for Giza 82 in the second season in two cases.

It could be concluded that, Giza 35 cultivar was the most suitable one cultivated, because it is resistant to *M. sojae* and moderately infested by *L. trifolii*.

INTRODUCTION

Soybean, *Glycine max* (L.) is important crop in Egypt, as well as allover the world. It is a good source of protein and oil. Soybean plants are subjected to attack of many pests, among these insect pests, the soybean stem fly, *Melanagromyza sojae* (Zehntner) [Diptera: Agromyzidae] which is a serious pest causing 100 % infestation of soybean plants, as a result seed yield is reduced. The larvae of *M. sojae* cause extensive tunneling in the pith region of soybean stems causing seedlings to die, while growth and yield in

mature plants are significantly reduced (Talekar, 1989, Venkatesan and Kundu, 1994, Mesbah & El-Galaly, 1999 and Mesbah *et al.*, 2001).

Morphological and chemicals basis of resistance to stem fly *M. sojae* in soybean was the greatest potential tool for effective and economic management of that insect which used as an alternation to chemical control. These studies were investigated by many authors, El-Borai *et al.* (1992), Venkatesn and Kundi 1994), Mesbah and El-Galay (1999), Salunke *et al.* (2002) and Sridhar *et al.* (2002).

Leafminer *Liriomyza trifolii* (Burgess) [Diptera: Agromyzidae] is considered the main destructive pests infesting leguminous crops which causes a great damage to the plant. Some studies were carried out on this pest in Egypt and allover the world (Metwally, 1991; Metwally *et al.*, 1991; Mesbeh and Sherif, 1994; Bagmare *et al.* 1995; Doss *et al.* 1995; El-Basiony *et al.* 1996; Sharma *et al.* 1997; Awadalla and Fathy, 1998; Abou Attia, 1999 and Jeyakumar and Uthamasamy 2000).

Therefore, the present evaluation aims to study seasonal abundance of the two insect pests some soybean cultivars, the relative susceptibility of three soybean cultivars for infestation and the relationship between both plant height & numbers of compound leavaes and infestation rate.

MATERIALS AND METHODS

This study was carried out at the experimental farm, Faculty of Agriculture, Kafr El-Sheikh University during two successive seasons, 2004 and 2005 to study the seasonal abundance of *M. sojae* and *L. trifolii* on three soybean cultivars. To evaluate the relative susceptibility of three soybean cultivars for two insect pests. Also, the relationship between both, soybean plant height, number of soybean trifoliate leaves and infestation by stem and leafminer.

Three varieties of soybean namely, Giza 35, Giza 82 and Clark were assigned for the current study and sown on June 14th in 2004 and on June 8th in 2005. The experimental area (about 1/2 feddan) was divided into 12 plots (3 varities x 4 replications) distributed in a complete randomized block design. All agricultural practices were done without insecticidal treatments during two growing seasons.

To determine the agronomic parameters of soybean varieties and study of seasonal abundance and relative susceptibility to *M. sojae* and *L. trifolii*. A sample of 20 plants (5 plants x 4 replicates) were chosen randomly per variety, transferred to the laboratory and measured plant height and counted trifoliate per plant. Sampling procedures started about one month after sowing and continued to harvest.

To count leafminer, *L. trifolii* (mines and larvae), all trifoliate of 20 plants from each variety was examined by the aid of lens. For stem miner *M. sojae,* main stem and branches of soybean plants were dissected, mines, larvae and pupae were recorded and counted.

Analysis of variance of insect population among varieties was conducted according to Duncan's Multiple Rang Test (1955). Simple correlation between leafminer, *L. trifolii* and stem fly, *M. sojae* populations and each of plant height and numbers of trifoliate were calculated.

RESULTS AND DISCUSSION

1. Seasonal abundance of two insect pests:

1.1. Seasonal abundance of *M. sojae*:

Data in Tables (1 & 2) indicated that there were obvious differences in number of mines, larvae and pupae of soybean stem fly *M. sojae* per 20 plants of the tested soybean cultivars: Giza 35, Giza 82 and Clark during two seasons 2004 and 2005. As shown in Tables (1 & 2), the infestation of this insect increased gradually from mid July to about mid September, then subsided again in the second and third week of September respectively.

1.1.1. *M. sojae* mines:

Results in Tables (1 & 2) showed three peaks of *M. sojae* mines on soybean plants in both season of study. In season 2004, the first peak of mines was recorded (20, 20 and 32 mines/20 plants) for Giza 35, Giza 82 and Clark varieties respectively on 2nd August, second peak was (56, 64 and 46 mines/20 plants) respectively on 19th August. Third peak was (48, 46 and 76 mines/20 plants) respectively on 5th September. While in 2005 season, the first peak of mines was (28, 28 and 30 mines/20 plants) respectively on 21st July. The second peak of mines was (44, 50 and 48 mines/20 plants) respectively on 9th August. The third peak for infestation of *M. sojae* mines reached its maximum level (100, 84 and 120 mines/20 plants) respectively on 11th September 2005.

1.1.2 *M. sojae* larvae:

With regard to the number of *M. sojae* larvae/20 plants of the tested cultivars (Tables 1 & 2). Data indicated that, during two seasons of study, the soybean stem fly had three peaks of larvae between about mid July and mid September. In 2004 season, the larvae no recorded on 14th July on Giza 35 and Giza 82 variety. The first peak of larvae was recorded (12, 8 and 16 larvae/20 plants) for Giza 35, Giza 82 and Clark varieties respectively on 23rd July 2004. Subsequent fluctuation of larval population showed a second high peak (15, 25 and 22 larvae/20 plants) respectively on 19th August, followed by the third peak (12, 15 and 12 larvae/20 plants) respectively on 5th September. While in 2005 season the infestation by *M. sojae* larvae started during July with high numbers and had three peaks, the first and second peak was small (12, 16 and 8 larvae/20 plants) and (8, 12 and 18 larvae/20 plants) on 11th July and 1st August respectively. Then larval population showed a high third peak (20, 18 and 25 larvae/20 plants) respectively on 11th September.

1.1.3 *M. sojae* pupae:

With respect of *M. sojae* pupae (Tables 1 & 2), results showed that three peaks were recorded on three soybean cultivars during two seasons. In 2004 season, the first peak was recorded (12, 8 and 16 pupae/20 plants) for Giza 35, Giza 82 and Clark respectively on 2nd August 2004 season and then the pupal population steadily increased towards a second peak (28, 32 and 40 pupae/20 plants) respectively on 19th August. Subsequent fluctuation of pupal population showed a high third peak (32, 28 and 72 pipae/20 plants) respectively on 5th September. While in 2005 season, *M. sojae* pupal population showed the same trend as the first season. The first peak was

recorded (20, 18 and 24 pupae/20 plants) respectively on 21st July, then population increased gradually forming the second peak (36, 48 and 48 pupae/20 palnts) respectively on 17th August. Also, *M. sojae* pupal population showed high third peak (76, 80 and 100 pupae20 plants) respectively on 11th September 2005 season. Generally, population density of *M. sojae* mines, larvae and pupae in 2005 season was higher in comparison with that in 2004 season on the three soybean cultivars.

The current results are in agreement with those obtained by Mesbah and El-Galaly (1999). They showed that infestation rate of soybean stem fly, *M. sojae* on soybean plants increased with increasing in plant age. Also, they indicated that *M. sojae* had three overlapping broods of larvae and pupae between mid-June and late September.

Berg *et al.* (1995) indicated that *M. sojae* generally infested soybean throughout the season, infestation was initially low, reached its peak in the 5th-8th weeks after planting and declined towards the end of the season.

Maleque *et al.* (2001) found that the percentage of infested plants by *M. sojae* on plant age had a positive correlation. They found polynomial regression between both larval incidence, percentage of stem tunneling and plant age. Larval incidence and percentage of stem tunneling reached its peak at 46 – 60 days after sowing of soybean.

1.2. Seasonal abundance of leaf miner, *L. trifolii*:

In the two seasons of investigation, 2004 and 2005, soybean leaves remained uninfested by *L. trifolii* mines and larvae until 23rd July and 1st August in the first and second season respectively, then the infestation by that insect extended to about mid September in both seasons.

1.2. 1. *L. trifolii* mines:

Results in Tables (1 & 2) showed two peaks on soybean plants for *L. trifolii* mines in both seasons of study. In the 2004 season, the first peak of mines was recorded (12, 12 and 24 mines/20 plants) for Giza 35, Giza 82 and Clark varieties respectively on 19th August, while the second peak was (24, 16 and 32 mines/20 plants) respectively on 5th September. The *L. trifolii* mines in 2005 season was generally higher than in 2004 season.

Initial occurrence of mines was observed in August 2005 with a small peak (84 mines/20 plants) for Giza 35 on 26th August and (20 and 76 mines/20 plants) for Giza 82 and Clark on 17th August respectively. Subsequent fluctuation of *L. trifolii* mines showed a high peak (176, 160 and 304 mines/20 plants) respectively on 11th September.

1.2. 2. *L. trifolii* larvae:

With respect of *L. trifolii* larvae, two peaks were recorded in both seasons. In 2004 season, the first peak was recorded (8, 8 and 12 larvae/20 plants) for Giza 35, Giza 82 and Clark respectively on 19th August, followed by the second peak (12, 12 and 16 larvae/20 plants respectively) on 5th September. While in 2005 season, a small peak was recorded (16, 9 and 32 larvae/20 plants) respectively on 26th August, followed by a high peak (24, 12 and 56 larvae/20 plants respectively) on 11th September.

These results are in agreement with those of Metwally (1991) who indicated that *L. trifolii* population had three peaks in the first season, while two peaks in the second season on cowpea leaves.

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Sharma *et al.* (1997) revealed that mean temperature around 26°C was most conductive for the population *L. trifolii* build-up of key pests on soybean. They indicated that the correlation of weather parameters with the population build-up of leaf miner, *L. trifolii* was non-significant on soybean cultivars.

2. The relative susceptibility of some soybean cultivars to infestation by soybean stem fly, *M. sojae* and leaf miner, *L. trifolii*:

2. 1. Soybean stem fly, *M. sojae*:

Data in Tables (3) present the mean numbers of *M. sojae* mines, larvae and pupae counted allover the growing season on the tested varieties of soybean; Giza 35, Giza 82 and Clark during 2004 and 2005 seasons. Statistical analysis showed highly significant differences between soybean varieties to infestation with *M. sojae* during 2004 and 2005 seasons.

With respect to *M. sojae* mines, Giza 35 variety was the most resistant variety to infestation with *M. sojae* mines in the two seasons harbouring the lowest mean numbers of mines (29.5 and 46.2 mines/20 plants respectively). While Clark variety was the most susceptible variety, harbouring the highest mean numbers of mines (38.8 and 52.2 mines/20 plants respectively). Insignificant differences were recorded between Giza 35 and Giza 82 in the first season for *M. sojae* mines.

Concerning *M. sojae* larvae, highly significant differences were found among three soybean varieties during two seasons. Giza 35 was more tolerant to *M. sojae* larvae (7.9 and 8.7 larvae/20 plants respectively). While Calrk variety was susceptible to infestation, harbouring the highest mean numbers of larvae (11.4 and 12.8 larvae/20 plants respectively). Giza 82 was moderate to infestation.

Highly significant differences were found among three soybean varieties for *M. sojae* pupae in the first season, while highly significant between Clark variety and both Giza 35 and Giza 82 varieties in the second season. Giza 35 harbouring the lowest mean numbers of pupae in the two seasons (18 and 36 pupae/20 plants respect), while Clark variety was high susceptible variety harbouring the highest mean numbers of pupae (34.5 and 44 pupae/20 plants respectively). Giza 82 variety came in between.

These results are in agreement with those obtained by Mesbah and El-Galaly (1999) they showed that, Giza 35, Crawford and $H_{15}L_{17}$ were the most resistant genotypes for *M. sojae* and could be used as sources of resistance to that insect and in crossing programs for improving the commercial soybean cultivars. Gai *et al.* (1992) showed that 27 soybean genotypes differed in number of *M. sojae* eggs per leaf, apparently because of chemical antixenosis. They found that number of larvae in the stem, in the petiole and in the whole plant also differed significantly between genotypes but apparently represented an independent mechanism antibiosis.

2. 2. Leaf miner, *L. trifolii* :

Results in Table (3) showed the mean numbers of *L. trifolii* mines and larvae counted during 2004 and 2005 seasons on three soybean cultivars, Giza 35, Giza 82 and Clark.

Statistical analysis showed highly significant differences among varieties to infestation with *L. trifolii*. Giza 82 was the most resistance variety to infestation with *L. trifolii* mines in both seasons, harbouring the lowest

mean number of mines (7.4 and 50.4 mines/20 plants respectively). On the other hand, Clark variety was susceptible to infestation harbouring the highest mean numbers of mines (14.6 and 111.6 mines/20 plants respectively), while Giza 35 was moderate for infestation (9.5 and 52 mines/20 plants respectively).

Concerning *L. trifolii* larvae, Giza 82 was tolerant to infestation with *L. trifolii* larvae which harboring the lowest mean numbers of larvae (5 and 4.7 larvae/20 plants respectively). While Clark variety was susceptible harboring the highest mean numbers of larvae of *L. trifolii* (8.5 and 15.7 larvae/20 plants respectively). Giza 35 came in between.

Similar results were reported by Doss *et al.* (1995) who showed that, the more tolerant bean cultivar against leafminer, *L. trifolii* was Helda, then Novax moderately infested and Cerbo highly infested.

Table (3): The relative susceptibility of three cultivars to infestation by soybean stem fly, *M. sojae* and leafminer, *L. trifolii* at Kafr El-Sheikh region 2004 and 2005 seasons.

Cultivars	Mean No. of *M. sojae* / 20 plants						Mean No. of *L. trifolii* / 20 plants			
	2004			2005			2004		2005	
	Mines	Larvae	Pupae	Mines	Larvae	Pupae	Mines	Larvae	Mines	Larvae
Giza 35	29.5 a	7.9 a	18.0 a	46.2 a	8.7 a	36.0 a	9.5 b	5.4 a	52.0 b	6.4 b
Giza 82	30.5 a	9.0 b	20.0 b	48.4 b	9.7 b	36.9 a	7.4 a	5.0 a	50.4 a	4.7 a
Clark	38.8 b	11.4 c	34.5 c	52.2 c	12.8 c	44.0 b	14.6 c	8.5 b	111.6 c	15.7 c
L.S.D 5 %	1.56	0.68	1.20	1.42	0.77	1.46	0.85	0.70	1.06	0.82
1 %	2.37	1.03	1.82	2.15	1.17	2.21	1.29	1.07	1.61	1.24
Significance	**	**	**	**	**	**	**	**	**	**

3. The relationship between soybean plant height and number of trifoliate leaves on *M. sojae* and *L. trifolii* infestation rate:

3. 1. Soybean plant height:

Results in Table (4) showed that correlation coefficient between mean soybean plant height of three varieties (Giza 35, Giza 82 and Clark) and infestation with *M. sojae* (mines, larvae and pupae) and *L. trifolii* (mines and larvae) were usually positive during 2004 and 2005 seasons, but highly significant correlation was recorded between plant height and numbers of *M. sojae* mines on Clark variety (r = 0.840), while significant on Giza 35 (r = 0.752) in the first season. In the second season, significant correlation was recorded between palnt height and *M. sojae* mines on three soybean varieties (r= 0.705, 0.794 and 0.681 respectively).

With respect to *M. sojae* larvae, negative correlation was found between plant height and numbers of larvae on Clark (r = -0.024) in the first season, while in the second season on Giza 35 and Giza 82 (r = - 0.055 and – 0.179 respectively)

Significant correlation was recorded between plant height and *M. sojae* pupae on Clark variety in 2004 season (r = 0.807), while on three soybean varietes (r = 0.723, 0.712 and 0.693 respectively) in 2005 season.

Concerning *L. trifolii* mines and larvae, significant correlation was found between plant height and *L. trifolii* mines on three soybean varieties in

2004 season (r = 0.821, 0.736 and 0.799 respectively), while on Giza 82 only (r = 0.705) in 2005 season. Highly significant was recorded among plant height and *L. trifolii* larvae on Giza 35 (r = 0.859) and significant on Clark and Giza 82 varieties (r = 0.811 and 0.787) in 2004 and 2005 seasons respectively.

3. 2. Number of soybean plant trifoliate leaves:

Data in Table (4) revealed that correlation coefficient between mean number of soybean plant trifoliate and infestation with *M. sojae* (mines, larvae and pupae) and *L. trifolii* (mines and larvae) usually positive on three soybean varieties during 2004 and 2005 seasons, except, negative correlation was recorded in case of *M. sojae* larvae on Clark (r = - 0.075) in the first season while on Giza 35 and Giza 82 (r = - 0.211 and – 0.034) respectively in the second season. Highly significant correlation was found among mean number of soybean plant trifoliate and *M. sojae* mines and pupae on Clark variety (r = 0.853 and 0.842) respectively in the first season and on Giza 82 for mines (r = 0.807) in the second season, while significant on Giza 35 for mines (r = 0.817).

Table (4): The relationship between both soybean plant height & number of plant trifoliate and *M. sojae* & *L. trifolii* infestation rate during 2004 and 2005 seasons.

Cultivars	Correlation coefficient value									
	Mean No. of *M. sojae* / 20 plants						Mean No. of *L. trifolii* / 20 plants			
	2004			2005			2004		2005	
	Mines	Larvae	Pupae	Mines	Larvae	Pupae	Mines	Larvae	Mines	Larvae
1. Plant height (cm)										
Giza 35	0.752*	0.292	0.472	0.705*	- 0.055	0.723*	0.821*	0.859**	0.588	0.545
Giza 83	0.588	0.253	0.046	0.794*	- 0.179	0.712*	0.736*	0.517	0.705*	0.787*
Clark	0.840**	- 0.024	0.807*	0.681*	0.522	0.693*	0.799*	0.811*	0.607	0.572
2. Number of plant trifoliate										
Giza 35	0.817*	0.374	0.528	0.589	- 0.211	0.658	0.849**	0.909**	0.362	0.488
Giza 83	0.646	0.412	0.167	0.807**	- 0.034	0.664	0.762*	0.621	0.719*	0.866**
Clark	0.853**	- 0.075	0.842**	0.654	0.530	0.633	0.798*	0.829*	0.595	0.568

With respect to *L. triflii* , highly significant correlation was recorded between mean number of soybean plant trifoliate and infestation *L. trifolii* mines and larvae on Giza 35 variety (r = 0.849 and 0.909) respectively in the first season, while on Giza 82 (r = 0.866) for larvae in the second season. Significant correlation was noticed on Giza 82 variety for *L. trifolii* mines (r = 0.762 and 0.719) in the first and second season respectively, while on Clark variety for mines and larvae of *L. trifolii* (r = 0.798 and 0.829) respectively in 2004 season.

The current results are in agreement with those obtained by Mesbah and El-Galaly (1999). They showed that Giza 35 was the shortest genotype with little difference from $H_{15}L_{17}$, while H_2L_{20} and Giza 21 were significantly higher than the other soybean genotypes. In the same time, they reported thet Giza 35, Crawford and $H_{15}L_{17}$ were most resistane to infestation with *M. sojae*, while both of H_2L_{20} and Giza 21 were most susceptible to infestation with *M. sojae*. Berg *et al.,* (1998). They indicated that early attack by *M. sojae*

to soybean plants adversely affects plant development and associated with decreases in stem diameter, plant height and seed number/plant. Exit holes above the hypocotyl are indicative of attack later in the season and were associated with an increase in plant parameters. Late attack occurred in response to plant size or vigour.

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تقييم حقلى لبعض أصناف فول الصويا للإصابة بحشرة ذبابة ساق فول الصويا *Melanagromyza sojae* وصانعة أنفاق الأوراق *Liriomyza trifolii* فى منطقة كفر الشيخ

فايز على أبو عطية ، أسمهان السعيد يوسف

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أجريت الدراسة الحقلية فى المزرعة البحثية لكلية الزراعة – جامعة كفر الشيخ خلال موسمين متتاليين ٢٠٠٤ ، ٢٠٠٥ لدراسة الوفرة الموسمية لحشرة ذبابة ساق فول الصويا وحشرة صانعة أنفاق الأوراق على ثلاثة أصناف لفول الصويا (جيزة ٣٥ ، جيزة ٨٢ ، كلارك). ودراسة الحساسية النسبية

لأصناف فول الصويا للإصابة بالحشرتين، وكذلك دراسة العلاقة بين كل من ارتفاع النبات وعدد الأوراق المركبة الثلاثية لكل نبات ودرجة الإصابة تحت ظروف الحقل.

وأوضحت النتائج الآتى:-

تصيب هذه الحشرة الثلاثة أصناف محل الدراسة (جيزة ٣٥ ، جيزة ٨٢ ، كلارك) على مدار الموسمين، حيث بدأت الإصابة من منتصف شهر يوليو منخفضة ثم ازدادت تدريجياً مكونة ذروات (قمم) التعداد خلال الأسبوع الرابع من شهر يوليو وشهر أغسطس، والأسبوع الأول أو الأسبوع الثانى من سبتمبر فى كلا الموسمين على التوالى. ثم تناقصت أعداد الحشرة خلال الأسبوع الثانى أو الثالث من سبتمبر فى الموسمين. وقد تم ملاحظة ثلاث ذروات لتعداد الحشرة من الأنفاق – اليرقات - العذارى، حيث كانت الذروة الأولى والثانية منخفضة، ثم جاءت الذروة الثالثة عالية التعداد فى كلا الموسمين. كما أوضحت النتائج أن تعداد الحشرة من أنفاق – يرقات – عذارى فى موسم ٢٠٠٥م كان أعلى من موسم ٢٠٠٤م على أصناف فول الصويا الثلاثة.

أظهر التحليل الإحصائى وجود فروق عالية المعنوية بين أصناف فول الصويا الثلاثة للإصابة بحشرة ذبابة ساق فول الصويا *M. sojae* خلال موسمى الدراسة ٢٠٠٤، ٢٠٠٥، حيث كان الصنف جيزة ٣٥ أكثر الأصناف مقاومة للحشرة وأستقبل اقل متوسط لتعداد الحشرة من الأنفاق – اليرقات – العذارى (٢٩,٥ نفق ، ٧,٩ يرقة ، ١٨ عذراء/٢٠ نبات) فى الموسم الأول ، (٤٦,٢ نفق ، ٨,٧ يرقة ، ٣٦ عذراء/٢٠ نبات) فى الموسم الثانى، بينما كان الصنف كلارك أكثر الأصناف حساسية للإصابة وأستقبل أعلى تعداد للحشرة من أنفاق – يرقات – عذارى (٣٨,٨ نفق ، ١١,٤ يرقة ، ٣٤,٥ عذراء/٢٠ نبات) فى الموسم الأول، (٥٢,٢ نفق ، ١٢,٨ يرقة ، ٤٤ عذراء/٢٠ نبات) فى الموسم الثانى، ثم جاء الصنف جيزة ٨٢ معتدل الإصابة بالحشرة.

لوحظ ارتباط موجب معنوى بين ارتفاع نبات فول الصويا ودرجة الإصابة بالذبابة (أنفاق – عذارى)، حيث وجد ازدياد الإصابة بتقدم النبات فى العمر وزيادة ارتفاع النبات على مدار الموسمين، وكانت الإصابة شديدة فى صنف كلارك لزيادة ارتفاعه عن باقى الأصناف والصنف جيزة ٣٥ أقل إصابة لأنه أقصر الأصناف. بينما وجد ارتباط موجب بين تعداد الأوراق المركبة الثلاثية لنبات فول الصويا ودرجة الإصابة بحشرة *M. sojae* (أنفاق – عذارى) ولكن الإصابة بيرقات الحشرة أظهرت ارتباط سالب فى الحالتين.

وفيم يخص حشرة صانعة أنفاق الأوراق *L. trifolii* أظهرت النتائج أن أوراق نبات فول الصويا للثلاثة أصناف كانت خالية من الإصابة بحشرة صانعة أنفاق الأوراق حتى ٢٣ يوليو ٢٠٠٤ ، أول أغسطس ٢٠٠٥ ثم امتدت الإصابة حتى منتصف سبتمبر تقريباً فى كلا الموسمين. كما ظهر للحشرة ذروتين (الأنفاق – اليرقات) على أصاف فول الصويا الثلاثة. وكانت الذروة الأولى منخفضة فى حين كانت الذروة الثانية عالية التعداد على مدار الموسمين. والكثافة العددية للحشرة فى موسم ٢٠٠٥م كانت أعلى من موسم ٢٠٠٤.

أوضح التحليل الإحصائى وجود فروق عالية المعنوية بين أصناف فول الصويا الثلاثة للإصابة بحشرة *L. trifolii* فى كلا الموسمين. وكان الصنف جيزة ٨٢ أكثرهم مقاومة للإصابة بالحشرة حيث أستقبل أقل تعداد للحشرة (٧,٤ نفق ، ٥,٠ يرقات/٢٠ نبات) فى الموسم الأول، (٥٠,٤ نفق ، ٤,٧ يرقة/٢٠ نبات) فى الموسم الثانى. بينما كان الصنف كلارك حساس وأكثر قابلية للإصابة بالحشرة وأستقبل أعلى تعداد للحشرة (١٤,٦ نفق ، ٨,٥ يرقة/٢٠ نبات) فى الموسم الأول ، (١١١,٦ نفق ، ١٥,٧ يرقة/٢٠ نبات) فى الموسم الثانى. وكان الصنف جيزة ٣٥ معتدل الإصابة بحشرة صانعة أنفاق الأوراق *L. trifolii*.

وجد ارتباط موجب معنوى بين الإصابة بحشرة *L. trifolii* (أنفاق – يرقات) وكل من ارتفاع النبات وعدد الأوراق الثلاثية للنبات فى الموسم الأول ٢٠٠٤م للأصناف الثلاثة، والصنف جيزة ٨٢ فى الموسم الثانى ٢٠٠٥ بينما باقى الأصناف كان الارتباط موجب فى الحالتين.

ونستطيع الاستنتاج بأن الصنف جيزة ٣٥ مناسب للزراعة لأنه مقاوم لحشرة ذبابة ساق فول الصويا ومعتدل الإصابة بحشرة صانعة الأنفاق لما يمتلكه من صفات مورفولوجية.

Table (1): Seasonal abundance of soybean stemfly, *M. sojae*, leafminer, *L. trifolii* and some soybean parameters on three varieties at Kafr El-Sheikh region during 2004 season.

Sampling date	Av. Plant height (cm)			Trifoliate/plant (Av. No.)			No. of *M. sojae* /20 plants									No. of *L. trifolii* /20 plants					
							Mines			Larvae			Pupae			Mines			Larvae		
	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark
14/7/2004	31.5	33	30.3	3	2.8	2	8	12	16	0.0	0.0	8	8	12	8	0	0.0	0.0	0.0	0.0	0.0
23/7	35.2	35.8	32.2	3.4	3.4	2.6	16	16	20	12	8	16	16	20	24	4	4	4	2	4	4
2/8	35.6	49.4	44.2	5.4	6.8	8	20	20	32	5	4	7	20	24	28	4	3	9	3	3	8
11/8	46	64	64.2	8.2	14.2	10.2	16	16	20	6	9	10	8	16	24	8	8	16	4	6	8
19/8	62.4	63.6	73	12.6	14.2	11.8	56	64	46	15	25	22	28	32	40	12	12	24	8	8	12
27/8	82.6	84	88	17	18.8	16	36	32	38	8	7	8	12	16	36	8	4	8	6	3	6
5/9	85	89	95	18.4	20.2	18.2	48	46	76	12	15	12	32	28	72	24	16	32	12	12	16
13/9	92	95	97	16.2	18	16.6	36	38	62	5	4	8	20	12	44	16	12	24	8	4	14
Total	**470.3**	**513.8**	**523.9**	**84.2**	**98.4**	**85.4**	**236**	**244**	**310**	**63**	**72**	**91**	**144**	**160**	**276**	**76**	**59**	**117**	**43**	**40**	**68**
Mean	**58.8**	**64.2**	**65.5**	**10.5**	**12.3**	**10.7**	**29.5**	**30.5**	**38.8**	**7.9**	**9.0**	**11.4**	**18**	**20**	**34.5**	**9.5**	**7.4**	**14.6**	**5.4**	**5.0**	**8.5**

Table (2): Seasonal abundance of soybean stemfly, *M. sojae*, leafminer, *L. trifolii* and some soybean parameters on three varieties at Kafr El-Sheikh region during 2005 season.

Sampling date	Av. Plant height (cm)			Trifoliate/plant (Av. No.)			No. of *M. sojae* /20 plants									No. of *L. trifolii* /20 plants					
							Mines			Larvae			Pupae			Mines			Larvae		
	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark	Giza 35	Giza 82	Clark
11/7/2005	40	46.6	47.4	4.2	5.4	5.4	12	16	14	12	16	8	12	14	12	0.0	0.0	0.0	0.0	0.0	0.0
21/7	60	64.2	66	14.8	16.8	12.6	28	28	30	6	8	6	20	18	24	0.0	0.0	0.0	0.0	0.0	0.0

1/8	70.2	83.2	82.8	18.4	29.6	22.4	20	20	26	8	12	18	16	12	20	8	7	20	3	3	6
9/8	86.4	83.2	94.2	27.6	28.2	31.2	44	50	48	8	6	11	36	16	44	12	10	24	4	4	8
17/8	93.6	84.6	93.2	28.6	24	18.6	36	46	44	6	4	10	36	48	48	8	20	76	3	5	7
26/8	94.4	90.2	96	27.2	26.2	28.6	32	60	60	2	4	12	28	40	40	84	13	64	16	9	32
3/9	95.8	97	95.4	29	40	35.4	76	80	68	4	9	14	60	56	60	36	116	304	4	5	8
11/9	96.	98.5	98.3	26.2	37.8	28.6	100	84	120	20	18	25	76	80	100	176	160	304	24	12	56
18/9	96.3	99.6	101	23	30	22.2	68	52	56	12	10	13	40	48	48	144	128	212	4	4	24
Total	**732.7**	**747.1**	**774.3**	**199**	**238**	**205**	**416**	**436**	**470**	**78**	**87**	**115**	**324**	**332**	**396**	**468**	**454**	**1004**	**58**	**42**	**141**
Mean	**81.4**	**83.0**	**86.0**	**22.1**	**26.4**	**22.8**	**46.2**	**48.4**	**52.2**	**8.7**	**9.7**	**12.8**	**36**	**36.9**	**44**	**52**	**50.4**	**111.6**	**6.4**	**4.7**	**15.7**

2307 2308 2309 2310 2311 1312 1313 2314 2315 2316 2317

2320