



Egyptian Journal of Plant  
Protection Research Institute

www.ejppri.eg.net



**Incidence of certain insect pests infesting faba bean *Vicia faba* cultivars under some agriculture practices**

Enas, G. A. Elsayed<sup>1</sup>; Ahmed, M. A. Salman<sup>2</sup> and Mohamed, A. A. Abdel-Rahman<sup>1</sup>

<sup>1</sup>Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt.

<sup>2</sup>Department of Plant Protection, Faculty of Agriculture, Sohage University.

**ARTICLE INFO**

*Article History*

Received: 3 / 8 / 2021

Accepted: 26 / 9 / 2021

**Keywords**

Faba bean, *Aphis craccivora*, *Liomyza trifolii* and agricultural practices.

**Abstract:**

The unreliability fluctuations in faba bean yield from year to year could be attributed to insect and pathological infestations. Cowpea aphid, *Aphis craccivora* Koch. (Hemiptera: Aphididae) and the leafminer *Liomyza trifolii* (Burgess) (Diptera: Agromyzidae) were found to be the most destructive pests. Some agricultural practices have a major influence on the pest populations. Among the former factors, the faba bean cultivars can be considered. The time of bean seedling seemed to be a critical factor influencing the bean damaging. The early sowing date gave the chance to the majority of plant flowers to avoid from aphid infestation. The nitrogen fertilization played a major role to increase the level of piercing-sucking insect pest population.

**Introduction**

Faba bean is among the most important crops that supply the Egyptian people with protein. Moreover, it is essential for the feeding of livestock. Assiut Governorate is considered as one of the famous areas cultivated with faba bean in Egypt. Many reasons have been given to explain the yield fluctuations.

One of them attributed to the cowpea aphid which causes severe crop losses principally by direct feeding damage or as virus disease vector and disseminator. Moreover, many of other insect pests may cause a considerable crop damage, i.e. The leafminer and the leafhopper (Marzouk, 1990; Abate and Ampofo, 1996; El-Khawalka *et al.*, 1996; Sabra, 1997; El-Khayat, 1998; Mannaa *et al.*, 1999; Shaalan, 2005;

Shalaby *et al.*, 2012; El-Khayat *et al.*, 2015; Hosseini *et al.*, 2015; Mahmoud *et al.*, 2015; Jaskulska *et al.*, 2017 and Popat *et al.*, 2019).

During the past few years, the faba bean production in upper Egypt subjected to unstable status, the drastic losses in crop had been happened unexpectedly twice with this decade. Some situation has been mentioned by Wang and Zhou (1989) in China. Since faba bean considered as edible plant, the use of insecticides to control its pests would raise the residues remaining on treated plant and posed the health hazards.

The main purpose of this work is to examine some agricultural practices as alternative methods of insecticides to control the key pests of faba bean at Assiut.

## Materials and methods

The present study was undertaken at Refa village (27.0976° N, 31.2070° E), Assiut District (10 Kilometers south of Assiut City). It has long been planted to patches of alfalfa, faba bean, Egyptian clover, wheat, maize and vegetables. The present investigation was carried out throughout two successive seasons, 2017-2018 and 2018-2019 to evaluate the effect of sowing dates, faba bean cultivars and nitrogen fertilizer on the infestation levels of *A. craccivora* and leafminer. The rates of each tested variable were as follow: 1. Sowing dates (3 treatments): Early (7 October), recommended (20 October) and late (1 November). 2. Faba bean cultivars (3 treatments): Sakha 1, Giza 843 and Misr3. 3. Nitrogen fertilization (3 treatments): Half recommended 75 NU, Recommended 150 NU, and one and half of recommended. The experiments were carried out in a split – split plot in three replicates each was 1/400 feddan (6 rows) in equal size (72 plots) were applied. The insects (aphids and leafminer) were monitored weekly (after one month from the planting till the end of season by counting (all forms) visually in five faba bean plants in each plot weekly. Data were statistically analyzed with spilt spilt for the cowpea aphid and leafminer infestation means were compared according to Duncan's multiple range test.

## Results and discussion

### 1. Effect of sowing dates and faba bean cultivars:

Data in Table (1) show that the average numbers of the aphid were 167.52, 1939.44 and 2370.51 / plant on the faba bean planted in 7 October, 20

October and First of November during 2017-2018. It is clear obviously that the third date (Late) (1.11) harboured the highest population of aphid, which constituted about 1.22 times of those of the second sowing date and 14 times of the first. It means that the abundance of aphid grew rapidly on late growth of faba bean. The differences between sowing dates proved to be statistically significant. The same trend could be applied for 2018-2019 season (Table 2).

On the other hand, date in Table (1) show the population of leafminer (Larvae inside the mine) reached its maximum level on the early owing date (7 October), which constituted about 1.42 and 1.62 times to those prevailing on the plants of the second (20 October) and third sowing date (1 November). It means that the leafminer infestation affecting the plants of early sowing more than those that the other sowing dates. Contrary to aphid infestation. The differences between the mean numbers for different sowing dates were significant. The same trend was noticed for 2018-2019 season.

From the fore- mentioned results, it could be concluded that the early sowing of faba bean gives the plants the chance to escape from the heavy infestation of aphids, while the gradual late successive sowing dates increased the aphid populations to reach its maximum level on the delayed time. Consequently, the plants of the late sowing date suffering greatly from the aphid infestation affecting the plants of the early sowing dates (Contrary to the aphid infestation).

Altering the sowing date of crops has been a recognized method of cultural control for many pests (Abd El-Hafez *et al.*, 2012).

**Table (1):** The average number of studied insects/plants regardless of the effect of cultivars, at the three studied sowing dates through the whole period of observation, 2017-2018, Assiut.

Studied Insects	No. / plant		
	1 <sup>st</sup> (7.10.2017)	2 <sup>nd</sup> (20.10.2017)	3 <sup>rd</sup> (1.11.2017)
Aphids	167.52c	1939.44b	2370.51a
Leafminer	153.21a	107.45b	94.41c
Total	320.73	2046.89	2464.92
Mean	160.36	1023.44	1232.46

Means followed by the same letter within a row are not significantly different at 0.05 level of probability.

**Table (2):** The average number of studied insects/plants regardless of the effect of cultivars, at the three studied sowing dates through the whole period of observation, 2018-2019, Assiut.

Studied Insects	No. / plant		
	1 <sup>st</sup> (13.10.2018)	2 <sup>nd</sup> (27.10.2018)	3 <sup>rd</sup> (10.11.2018)
Aphids	3157.83c	3252.16b	3697.46a
Leafminer	122.53a	114.23b	82.65c
Total	3280.36	3366.39	3780.11
Mean	1640.18	1683.19	1890.05

Means followed by the same letter within a row are not significantly different at 0.05 level of probability.

## 2. Effect of faba bean cultivars:

From the obtained data in Tables (3 and 4), it is obvious that the faba bean cultivar Misr 3 was harbours the lowest number of aphids with significant differences between this cultivar and the others. Sakha 1 came in

the next grades. The cultivar Giza 843 was harboured the highest population of aphids during the two seasons of study. It is clear from the results that all of the studied cultivars did not exhibit any resistance effect against aphid infestation.

**Table (3):** The average number of studied insects/plants regardless of the effect of sowing dates, on the studied cultivars through the whole period of observation, 2017-2018, Assiut.

Studied Insects	No. / plant		
	Cultivars		
	Sakha 1	Giza 843	Misr 3
Aphids	1722.15b	2243.63a	1015.24c
Leafminer	73.28b	95.87a	55.56c
Total	1795.43	2339.5	1070.80
Mean	897.71b	1169.75a	535.40c

Means followed by the same letter within a row are not significantly different at 0.05 level of probability.

**Table (4):** The average number of studied insects/plants regardless of the effect of sowing dates, on the studied cultivars through the whole period of observation, 2018-2019, Assiut.

Studied Insects	No. / plant		
	Cultivars		
	Sakha 1	Giza 843	Misr 3
Aphids	3203.42b	3558.28a	3189.83c
Leafminer	107.44a	106.67a	97.55c
Total	3310.86	3664.95	3287.38
Mean	1655.43b	1832.47a	1643.69b

Means followed by the same letter within a row are not significantly different at 0.05 level of probability.

## 3. Effect of nitrogen fertilization:

Data presented in Tables (5 and 6) indicate that the population of aphids and leafminer increased significantly with the increase of nitrogen fertilizer. Significant differences were existed between the number of aphids and

leafminer on plants received different rates of nitrogen fertilization. The results obtained do not contradict with of the entomologists who worked on insects infesting faba bean in Egypt and abroad (Al-Jassany and Al-Adil, 1988; Marzouk, 1990; Abdel-Rassoul and

Abdel-Moity, 1992; El-Khawalka *et al.*, 2005; Shalaby *et al.*, 2012 and 1996; Mannaa *et al.*, 1999; Shaalan, Megawer *et al.*, 2017).

**Table (5): The average number of studied insects/plants regardless of the effect of sowing dates, on the studied Nitrogen fertilizer rate / plot through the whole period of observation, 2017-2018, Assiut.**

Studied Insects	No. / plant		
	Fertilization rate / plot		
	50 NU	100 NU	150 NU
Aphids	3100.31c	4800.45b	6521.23a
Leafminer	1945.21c	2150.54b	4581.20a
Total	5045.52	6950.99	11102.43
Mean	2522.76c	3475.49b	5551.215a

Means followed by the same letter within a row are not significantly different at 0.05 level of probability.

**Table (6): The average number of studied insects/plants regardless of the effect of sowing dates, on the studied Nitrogen fertilizer rate / plot through the whole period of observation, 2018-2019, Assiut.**

Studied Insects	No. / plant		
	Fertilization rate / plot		
	50 NU	100 NU	150 NU
Aphids	2770.37c	5946.10b	7641.32a
Leafminer	2067.11c	3148.74b	5264.13a
Total	4837.48	9094.84	12905.45
Mean	2418.74c	4547.42b	6452.72a

Means followed by the same letter within a row are not significantly different at 0.05 level of probability.

It should be mentioned that the infestation started early in November and grew up rapidly to be dominated in February and March, until the end of the season. The achieved results revealed to the following conclusion and recommendations: 1. The time of bean seedling seems to be a critical factor influencing the bean damage. The early sowing date gives the chance to majority of plant flowers to avoid the aphid infestation. 2. High infestation with aphids and leafminer were occurred in the case of plants receiving high rates of nitrogen fertilization. Nitrogen fertilization at the rate of 100 units' nitrogen / feddan.

#### References

Abate, T. and Ampofo J. K. O. (1996): Insect pests of beans in Africa: Their ecology and management. *Ann. Rev. Entomol.*, 41: 45-73.  
 Abd El-Hafez, G. A.; Tohamy, T. H.; Gabra, A. M. and Ibrahim, M.

A. M. (2012): Influence of sowing dates, plant densities on aphid, (*Aphis craccivora* Koch) infestation rate, yield and yield characteristics of two faba bean cultivars in Minia region. *J. Plant Production, Mansoura Univ.*, 3 (12): 2945-2956.

Abdel-Rassoul, M. A. and Abdel-Moity, S. H. (1992): Susceptibility of certain faba bean varieties to infestation with some sucking insects and leafminer in Alexandria area. *Alex. Sci. Exch.*: 3(2).

Al-Jassany, R. F. and Al-Adil, K. M. (1988): Population density and host plants of black bean aphid, *Aphis faba* Scopoli in central Iraq. *Moso Poptamia Journal of Agriculture*, 20(3): 329-345.

El-Khawalka, M.H.M.; EI-Bessomy, M.A. ; Mansourand, S. H. and Bastawisy, H. M. (1996): Susceptibility of some faba bean

- genotypes to field infestation with *Aphis craccivora* (Koch.) and *Bruchus rufimanus* (Boh.) with special references to yield. J. Agric. Sci. Mansoura Univ., 21(11): 4129-4132.
- El-Khayat, E. F. (1998):** Susceptibility of certain faba bean varieties to infestation with aphid and leafminer. Annals of Agric. Sci., Moshtohor, 36 (4): 2710-2721.
- El-Khayat, E. F.; Hegab, M. F. A. H.; Gaaboub, I. A.; El-Hosary, R. A. and Gouda, A. E. (2015):** Effect of faba bean varieties and phosphorus fertilization on the population density aphids and thrips in Qalubia governorate. J. Plant Prot. and Path., Mansoura Univ., 6 (5): 783 – 791.
- Hosseini, A.; Hosseini, M.; Goldani, M.; Karimi, J. and Madadi, H. (2015):** Effect of nitrogen fertilizer on biological parameters of the *Aphis craccivora* (Hemiptera: Aphididae) and associated productivity losses in common globe Amaranth. J. Agr. Sci. Tech., 17: 1517-1528.
- Jaskulska, M.; Kozłowski, J. and Kozłowska, M. (2017):** Susceptibility of field bean cultivars to slug damage. Folia Malacol., 25 (4): 273–280.
- Mahmoud, M. K.; El-Khawass, K. A.; Hammad, S. A. and Ali, M. I. (2015):** Susceptibility of three faba bean cultivars to field infestation with legume aphids *Aphis craccivora* Koch (Homoptera: Aphididae). International Journal of environment. 4 (1): 116-120.
- Mannaa, SH.; Nasser, M. A. K. and Abou-Ghadir, M. F. (1999):** Incidence of certain insect pests infesting faba bean lines under different agricultural conditions. In 8 th National Conference on Pests and Diseases of Vegetable and Fruits 9-10 November, Ismailia, Egypt.
- Marzouk, I. A. (1990):** Susceptibility of different varieties of faba bean to aphids and leafminer infestation and their control. Ph. D. Thesis, Fac. Of Agric., Al-Azhar University.
- Megawer, E. A.; EL-Sherif, A. M. A. and Mohamed, M. S. (2017):** Performance of five faba bean varieties under different irrigation intervals and sowing dates in newly reclaimed soil. Int. J. Agron. Agri. R., 10 (4): 57-66.
- Popat, R. C.; Padaliya, S. R.; Vaja, A. S.; Borad, M. G. and Parmar, D. J. (2019):** Population growth study of cowpea aphid, *Aphis craccivora* using statistical modelling. Journal of Entomology and Zoology Studies, 7 (6): 847-849.
- Sabra, J. M. (1997):** Biological and ecological studies on the looper worm and the leafminer on faba bean in Fayoum. M. Sc. Thesis, Fac. Of Agric., Al-Fayoum, Cairo University.
- Shalan, H. S. (2005):** Studies on some soya bean pests and their control with non traditional methods. Ph. D. Thesis Fac. Of Agric. Al-Azhar University.
- Shalaby, H. H.; Mousa, E. M. A. and El-Gawwad, S. A. (2012):** Population fluctuations of some insect pests infesting broad bean plantations in relation to certain ecological factors J. Plant Prot. and Path., Mansoura Univ., 3 (9): 935 – 942.
- Wang, H. P. and Zhou, j. L. (1989):** Relationship between population dynamics of *Aphis craccivora* Koch and physiological changes of *Vicia faba* L. Acta Ecologica Sinica, 9 (1): 41-47.

