

**ECOLOGICAL STUDIES OF FABA BEAN LEAFMINER *LIRIOMYZA TRIFOLII* (BURGESS) (DIPTERA – AGROMYZIDAE) ON COMMON BEAN PLANT *PHASEOLUS VULGARIS* (L.) IN EL – BEHERA AGROECOSYSTEM**

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(Manuscript received 31 January 2010)

**Abstract**

The rate of infestation of Faba bean of leaf miners *Liriomyza trifolii* (Berg.) represented by mean number of larvae and mines / 100 leaves of common bean plants were recorded weekly throughout 2002 and 2003 seasons in experimental farm at Etay El-Baroud Agricultural Research Station El – Behera Governorate . Data indicated that the mean number of *L. trifolii* (Burg.) Larvae on common bean plant increased as the season progressed and reached its maximum on October 3<sup>rd</sup> ( 237.75 larvae - 307.5 mines / 25 leaves ) during 2002 while during 2003 season the mean number of larvae population achieved the maximum on October 5<sup>th</sup> (235.00 larvae - 453.25 mines / 25 leaves ) . Throughout the year , the abundance of *L. trifolii* was relatively low in the beginning of growing seasons but the infestation become more serious in the end of seasons. and produced three generations on common bean plants per season of 2002 and 2003. The 1<sup>st</sup> generation was low and occurred from August 29<sup>th</sup> to September 12<sup>th</sup> and from August 29<sup>th</sup>, to September 14<sup>th</sup> in 2002 and 2003 respectively, with generation period of (3 weeks). The second generation begins from September 19<sup>th</sup> to October 10<sup>th</sup> and from September 21<sup>st</sup> to October 12<sup>th</sup> on 2002 and 2003 season , respectively ( 4 weeks) .The third generation begins from October 17<sup>th</sup> To November 14<sup>th</sup> and from October 19<sup>th</sup> to the November 16<sup>th</sup> in 2002 and 2003 seasons , respectively , with generation period of ( 5 weeks ) .

**INTRODUCTION**

Common bean *Phaseolus vulgaris* (L.), is considered one of the most important leguminous vegetable crop in Egypt. The cultivated area of this crop was estimated as 37600 feddans for green pods and 27450 faddans for dry seed yield in 1998 (according to Agriculture) Economic Reports. Ministry of Agriculture 2003. The vegetable leafminer *Liriomyza trifolii* (Burg.) is one of the most important insect pests which attack common bean plants in Egypt. It causes losses at about 50% of this crop (Omar and Faris 2000). Larvae primary mine into the leaf layer where chloroplasts are located (Chandler and Gilstrap 1986), and adult females puncture both upper and lower leaf surface to feed and lay eggs (Nagata et al, 1998). The lower part of common bean plants showed higher infestation rate of *L. trifolii* followed by the middle and the upper

part which harbored the least population level (Shalaby 2004). The population of *L. trifolii* (Burg.) immature has three peaks. The highest infestation level were on the middle portion of plants by (El- Gendi *et al.*, 1995). Throughout the year, the abundance of *L. trifolii* was relatively low in the beginning of growing seasons but the infestation became more serious in the end of seasons (Dang *et al.*, 2007). The objective of this study was to investigate the infestation rate with *L. trifolii* and number of field generations on common bean plants during two successive seasons of 2002 and 2003 seasons in El – Behera agroecosystem.

### MATERIALS AND METHODS

To study the population fluctuation of Faba bean leaf miner *L. trifolii* (Burgess) on common bean plants, *Phaseolus vulgaris* (L.) two experiments were carried out during two successive seasons 2002 and 2003 at the experimental farm of Etay – El Baroud Agricultural Research Station El – Behera Governorate.

An area of one kerate was cultivated at 15 August with seeds of common bean cultivar Bronco. Agricultural practices were followed and no chemical insecticides were applied throughout the whole seasons. Weekly samples of 25 / Leaves were picked up at random from the middle level of bean plants and identified by Biological Control Dep. Plant Protection Research Institute, and transferred to the laboratory. The leaves were examined through a binuclear microscope to record numbers of larvae and mines. Number and duration of generations per season were estimated according to the method of Audemard & Millare (1975).

### RESULTS AND DISCUSSION

The rate of infestation of leaf miners *Liriomyza trifolii* represented by mean number of larvae and mines / 25 leaves) on common bean plants were studied from 2002 – 2003 are presented in Tables ( 1 , 2 ) and illustrated in Figures ( 1 , 2 ). The mean number reached to maximum on October 3<sup>rd</sup> ( 237.75 larvae - 307.50 mines / 25 leaves ) during 2002 while during 2003 season, the mean number of larvae population achieved its maximum on October 5<sup>th</sup> ( 235.00 larvae - 453.25 mines / 25 leaves ). In this respect Shalaby 2004 mentioned that the total *L. trifolii* larvae population reached its maximum on November 28<sup>th</sup> (62-5 larvae / 20 / Leaves ) during 1999, while during 2000 season, the total larvae population achieved its maximum on November 20<sup>th</sup> ( 24 . 8 larvae / 20 leaves ).

The infestation rate of *L. trifolii* ( Burgess ) begins as soon as plant emerge and increased as the season progressed recording three generations on common bean

plants for each of 2002 and 2003 seasons . The first generation was low and occurred from August 29<sup>th</sup> to September 12<sup>th</sup> and from August 31<sup>st</sup> to September 14<sup>th</sup> in 2002 and 2003 , respectively with generation period of 3 weeks . The second generation begins from September 19<sup>th</sup> to October 10<sup>th</sup> and from September 21<sup>st</sup> to October 12<sup>th</sup> in 2002 and 2003 seasons respectively (4 weeks). The third generation begins from October 17 to November 14<sup>th</sup> and from October 19<sup>th</sup> to November 16<sup>th</sup> in 2002 and 2003 seasons, respectively (5 weeks). This agrees with results given by – Gl – Gundiatal , 1995 , Geraud et al . , ( 1998 ) , Hannou ( 1992 ) , Marzouk ( 1990 ) Heyer et al ( 1989 ) who mentioned that *L. trifolii* produced three generation on beans per season . Infestation begins as soon as plant emerges.

Table 1. Population densities of Faba bean leaf miner *L. trifolii* on common bean plants cultivated at August 2002 in El- Behera Governorate .

Inspection Dates	Plant Age (Days)	Mean number of ..... /25 leaves	
		Larvae	Mines
29 August	14	28.25	35.25
5 September	21	58.25	53.75
12 September	28	80.00	110.00
19 September	35	204.00	229.25
26 September	42	102.50	188.25
3 October	49	237.75	307.50
10 October	56	185.00	287.75
17 October	63	215.50	460.00
24 October	70	85.00	335.00
31 October	77	55.00	235.00
7 November	84	26.75	180.25
14 November	91	28.75	109.00

Table 2. Population densities of Faba bean leaf miner *L. trifolii* on common bean plants cultivated at August 2003 in El-Bhera Governorate

Inspection Dates	Plant Age (Days)	Mean number of ..... /25 leaves	
		Larvae	Mines
31 August	14	31.75	34.25
7 September	21	60.25	88.00
14 September	28	180.25	233.75
21 September	35	114.25	153.75
28 September	42	127.75	287.75
5 October	49	235.00	453.25
12 October 56	56	204.25	230.75
19 October	63	155.00	304.00
26 October	70	79.00	235.25
2 November	77	102.50	202.50
9 November	84	47.75	179.00
16 November	91	32.00	107.50

Table 3. Number of generation periods of Faba bean leaf miner, *L. trifolii* on common bean plants during 2002 and 2003 seasons, in El-Behra Governorate.

Number of Generation	Season ,2002			Season ,2003		
	Approximated date of occurrence		Generation Period	Approximated date of occurrence		Generation Period
	From	To		From	To	
1 <sup>st</sup> generation	29 August	12 September	3 weeks	31 August	14 September	3 weeks
2 <sup>nd</sup> Generation	19 September	10 October	4 weeks	21 September	12 October	4 weeks
3 <sup>rd</sup> generation	17 October	14 November	5 weeks	19 October	16 November	5 weeks

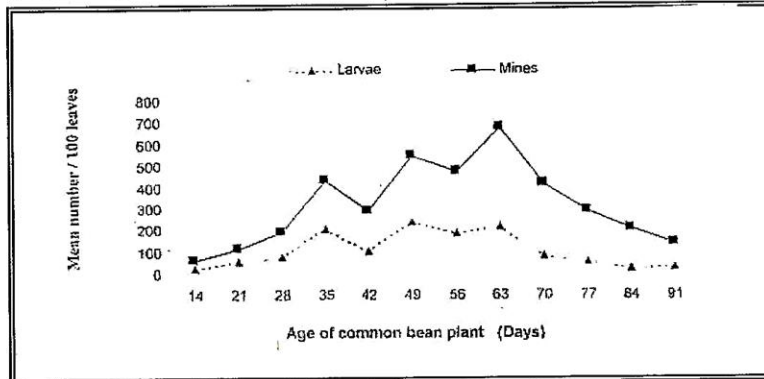


Figure (1): Population fluctuation of Faba bean leaf miner *L. trifolii* on common bean plants during 2002 season.

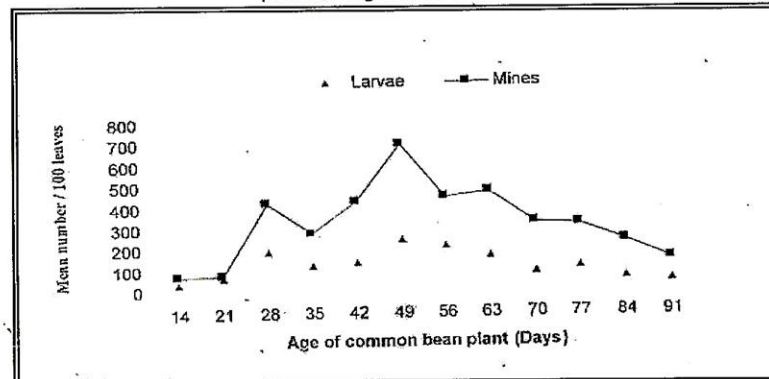


Figure (2) : Population fluctuation of leaf miner *L. trifolii* on common bean plants during 2003 season .

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دراسة بيئية لصانعة أنفاق أوراق الفول (*Liriomyza trifolii* (Burgess)  
 (*Phaseolus vulgaris* علي نباتات الفاصوليا (*Diptera*: ) *Agromyzidae*)  
 تحت ظروف النظام البيئي لمحافظة البحيرة

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معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي جيزه .

أجريت هذه الدراسة بمحطة البحوث الزراعية ايتاي البارود - محافظة البحيرة خلال الموسمين الزراعيين ٢٠٠٢ ، ٢٠٠٣ لتقدير الكثافة العددية وعدد الأجيال لصانعة أنفاق أوراق الفول (*Liriomyza trifolii* (Bmrgess) علي نبات الفاصوليا *Phaseolus vulgaris* خلال الموسمين الزراعيين ٢٠٠٢ و ٢٠٠٣ وقد أظهرت الدراسة أن الإصابة بصانعة أنفاق أوراق الفول تبدأ بمجرد أنبات أوراق الفاصوليا و تزيد أعدادها بتقدم الموسم الزراعي و تصل إلي أقصى عدد في الثالث من أكتوبر ( ٢٣٧,٥٧ يرقة - ٣٠٧,٥٠ نفق / ٢٥ ورقة نبات) خلال عام ٢٠٠٢ م ، و الخامس من أكتوبر ( ٢٣٥ يرقة - ٤٥٣,٥٦ نفق / ٢٥ ورقة نبات ) . وتبدأ الإصابة بنبابه الفاصوليا مع بداية ظهور البادرات و تزيد بتقدم الموسم الزراعي مسجلة عدد ثلاث أجيال . الجيل الأول يكون ضعيف و يبدأ من ٢٩ / ٨ - ١٢ / ٩ - ٣١ / ٨ - ١٤ / ٩ خلال الموسمان الزراعيان ٢٠٠٢ ، ٢٠٠٣ علي التوالي حيث تستمر فترة الجيل (٣ أسابيع) و الجيل الثاني يبدأ من ١٩ / ٩ - ١٠ / ١٠ ، ٢١ / ٩ - ١٢ / ١٠ خلال الموسمان الزراعيان ٢٠٠٢ ، ٢٠٠٣ حيث تستمر فترة الجيل ٤ أسابيع . و الجيل الثالث يبدأ من ١٧ / ١٠ - ١٤ / ١١ ، ١٩ / ١٠ - ١٦ / ١١ خلال الموسمان الزراعيان ٢٠٠٢ م ، ٢٠٠٣ ، حيث تستمر فترة الجيل ( ٥ أسابيع ) .