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RESPONSE OF SOME MUNGBEAN [*Vigna radiata* (L.), Wilczek] VARIETIES TO THE BROAD BEAN LEAF MINER, *Liriomyza trifolii* (BURGESS) INFESTATION AND EFFECT OF INFESTATION ON SEED YIELD IN NORTH DELTA REGION

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ABSTRACT: *Two field experiments were carried out at the experimental Farm and Economic Entomology Department, Faculty of Agriculture, Kafr El-Sheikh, Tanta University during the growing seasons of 2004 and 2005. The first one to investigate the ecological aspects of the broad bean leaf miner, Liriomyza trifolii (Burgess) in mungbean fields and the second one to determine the agronomic parameters and evaluating the relative susceptibility of six mungbean varieties to L. trifolii infestation. The results showed that the infestation rate increased with increasing in plant age.*

The obtained results showed that L. trifolii had the highest rate of infestation in August and it had two peaks in the first season and three peaks during the second one. Data of field evaluation of six mungbean varieties for L. trifolii infestation showed that Kawmy-1 and KPS_2 were less susceptible varieties. Data showed that Kawmy-1 and KPS_2, surpassed UTT, M_{53}, KPS_1 and Giza-1 in chlorophyll content, both weight and number of pods/plant and seed yield/fed. It could be concluded from this study that sowing of Kawmy-1 and KPS_2 mungbean varieties could be recommended to get high seed yield of mungbean and would be a best source for resistance of L. trifolii to be used in crossing programs for improving the commercial cultivars at Kafr El-Sheikh region. Such entomological studies are needed before initiating a proper integrated pest management (IPM) program in the future.

Key words: *Diptera, Liriomyza trifolii, Mung bean, infesttaion rate, varieties, susceptibility*

INTRODUCTION

Mungbean, *Vigna radiata* (L.) Wilczek, is an ancient leguminous crop. It has been used as a human food in Asia, Australia, U.S.A. and Africa. Mungbean seeds are one of the highest protein (22-24%) containing. Moreover, mungbean could be used as a green fodder for the domestic animals in case of the newly-reclaimed soils in Egypt.

Although very little works were done by the Egyptian researchers in respect of insect pests infesting mungbean plants, but the leaf miner,

Liriomyza trifolii (Burgess) [Diptera: Agromyzidae] is reported as one of the most important pest which causes economic damage to leguminous crop (Ahamed, 1999, Facknath, 2005). The use of insecticides is one of the most available and effective tool against insect outbreaks. However, the extensive use of chemicals caused destruction of natural enemies (Morrison *et al.*, 1979). Therefore, the greatest potential method for effective and economic management of insect pests is available through transfer the insect resistance to commercial cultivars and advanced breeding lines (Hartwig *et al.*, 1984 and Burton *et al.*, 1986). Sources of resistance and relative susceptibility of different mungbean varieties to infestation with major insect pests of mungbean were studied (Salem, 1998; Ibrahim *et al.*, 2001 and Ibrahim, 2002).

The main goal of the present work was to collect enough ecological data on *L. trifolii* and determine the agronomic characters of six mungbean varieties and evaluating their relative susceptibility to *L. trifolii* infestation, that might help recommending an efficient program for *L. trifolii* management in the future. To reach such a goal, the investigations included the following objectives.

1- Seasonal abundance of *L. trifolii* in mungbean plants at Kafr El-Sheikh region.
2- Relationship between mungbean growth stages and infestation rate of L. *trifolii.*
3- Relationship between certain mungbean agronomic characters of six mungbean varieties and relative susceptibility to infestation with the broad bean leaf miner.

MATERIALS AND METHODS

The present study was carried out at the Experimental Farm and Economic Entomology Department, Faculty of Agriculture Kafr El-Sheikh, Tanta University, Egypt, during 2004 and 2005 seasons.

To study the seasonal abundance, relationship of different mungbean growth stages and Infestation rate with population of *L. trifolii* in mungbean plants, one mungbean variety (Kawmy-1) was sown on June 16^{th} and 15^{th} in the two seasons of study. For investigating the relationship between mungbean agronomic parameters and relative susceptibility to infestation with *L. trifolii,* six mungbean varieties namely Kawmy-1, KPS_2, UTT, M53, KPS1 and Giza-1 were sown on June 16 and 15 in 2004 and 2005 seasons, respectively.

Euckadein (*Rhizobium* spp.) as nitrogen fixation bacterium was mixed with sand and then added to the hills of the rows at the time of sowing to increase root modulation. The experimental area was divided into 18 plots (3 x 4 m^2) each. Randomized block design with three replicates was adopted.

Each replicate consisted of six plots. For each variety normal agricultural treatments were followed, where no chemical treatments were applied.

To study the seasonal abundance of the considered insect under field conditions, weekly samples of ten composed leaves were picked up from each plot at random. These leaves were kept in cloth bags and transferred directly to the laboratory for pests inspection using a stereoscopic binocular microscope. The infestation by the broad bean leaf miner was expressed in mean number of larvae/five leaflets of mungbean.

To study the relationship between different mungbean growth stages and infestation rate with *L. trifolii*, according to Banks (1987) and Mesbah (1995), mungbean growth stages could be determined as V_2 (first trifoliate expanded 18 days after sowing), F_1 (first flower in plot-34 days after sowing), F_{100} (100% of plants started flowering-46 days after sowing) and R_7 (beginning of seed filling-68-days after sowing). Weekly samples of ten composed leaves were picked up from each plot at random. The infestation rate with the broad bean leaf miner was expressed in mean number of larvae/five leaflets of mungbean according to Ibrahim (2002).

For investigating the relationship between mungbean agronomic parameters and relative susceptibility to *L. trifolii* infestation, samples (10 composed leaves) as previous described were repeated weekly through the period of investigation.

During the growing seasons ten plants were taken from each plot at 55 days from sowing to determine chlorophyll a, b and total chlorophyll contents in representative sample according to Wettestein (1957).

Harvesting took place after 95 days from sowing in both seasons. At harvest, 20 randomly selected plants from each plot were taken to determine plant height (cm), number of branches per plant, both number and weight of pods per plant, length of pod and 100-seed weight. While from two central ridges in each plots, mungbean pods were gathered, air dried and shelled, then the seed yield per plot was recorded and converted to kg per feddan at 12 percent moisture content. The obtained data were statistically analyzed using Duncan's Multiple Range Test (1955).

RESULTS AND DISCUSSION

1. seasonal abudance of *L. trifolii* in mungbean plants during 2004 and 2005 seasons:

As shown from Table (1) and Fig.(1) the infestation by the broad bean leaf-miner expressed in mean number of larvae per five leaflets of mungbean. The lowest mean number of larvae (0.11) was found on 8th of July, insect number increased gradually to reach the first peak (80.51) on 29th of July for Kawmy-1 variety.

Then this population decreased suddenly to (25.71) for the tested variety. The abundance increased steadily to reach its summit (96.17) for Kawmy-1 as a second peak on 19th of August, 2004 season.

At the last date of inspection the population density was (7.30) for the pervious tested variety.

Table (1): Seasonal abundance of *L. trifolii* (larvae) in mungbean plants (Kawmy-1) at Kafr El-Sheikh region during 2004 and 2005 season.

Season	Average no. of larvae/five leaflets												
Sampling date	8/7	15/7	22/7	29/7	5/8	12/8	19/8	26/8	2/9	9/9	16/9	Total	Mean
2004	0.11	0.59	3.35	80.51	25.71	83.24	96.17	88.63	59.34	23.93	7.30	468.88	42.62
2005	0.91	1.88	4.71	28.0	45.81	14.73	62.51	1.78	2.10	11.31	5.33	179.07	16.27

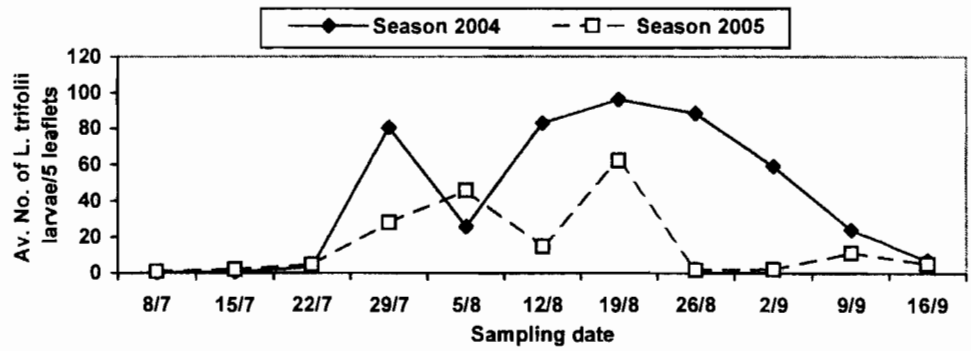

Fig. (1): Seasonal abundance of *L. trifolii* (larvae) in mungbean plants at Kafr El-Sheikh region during 2004 and 2005 seasons.

Table (1) showed that *L. trifolii* population fluctuated in the second season of study as follows, three peaks were noticed, the first one (45.81) occurred on 5th of August and the second (62.51) occurred on 19th of the same month, third peak (11.31) was found on 9th of September for Kawmy-1, variety.

Data presented in Table (1) indicate that in 2005, population density was relatively less than that of 2004 season. In both seasons, results indicated also that *L. trifolii* population density was higher in August compared with other months. These results are in conformity was those obtained by Awadalla (1998) mentioned that the population density of the insect had three peaks on broad bean. Ahmed (1999), who found that the leaf-miner had only one peak (7.5 mines) in 1995 while it had two peaks of (3.8 and 4.0) mines in the second season. El-Dash and Abo Sheashae (2001) at Minufiya

Governorate observed three and four peaks of *L. trifolii* in 2000 and 2001 seasons, in respect. Ibrahim (2002) who mentioned that *L. trifolii* had two peaks on mungbean in Alexandria region. Such variations on peaks or mines numbers might be due to the variation of weather, host plants, cultivars of the same crop.

2. Description of life cycle, injury and the relationship between mungbean growth stages and *L. trifolii* infestation rate in mungbean plants:

Data presented in Table (2) indicate that the infestation of mungbean seedlings with *L. trifolii* occurred at early age of seedlings. As a consequence of inspection of mungbean seedlings, mines began to observe in leaflets at the early stages (V_2-F_1) in 2004 and 2005 seasons.

Table (2): The relationship between mungbean age and *L. trifolii* infestation rate at North Delta in 2004 and 2005 seasons.

Mungbean growth stage	Mungbean age (in days)	Average no. of larvae/five leaflets	
		Season 2004	Season 2005
V_2-F_1	18-34	11.5	4.69
F_1-F_{100}	35-45	109.34	90.19
F_{100}-R_7	46-68	272.33	209.43

V_2 (first trifoliate expanded 18 days after sowing)
F_1 (first flower in plot-34 days after sowing)
F_{100} (100% of plant started flowering – 46 days after sowing)
R_7 (beginning of seed filling – 68 days after sowing).

Damage may be due to both larvae and adult females piercing the leaves to lay their eggs. Eggs are laid singly in punctures in the leaf epidermis. The first larval stage of the leaf miner burrows into the mesophyl tissue. The second stage also feeds in the mesophyl tissue the third stage larva concentrates its feed in towards the upper leaf surface. When it is mature, it cuts a longitudinal slit in the leaf and leaves to pupate on the leaf surface or on the ground. However when large population are present it is particularly severe in recently seedlings, which may die and they are capable of destroying leaves and affecting the growth of plants.

In 2004 (Table 2) the number of larvae in infested plants (11.5 larvae/five leaflets) was found at mungbean growth stages (V_2-F_1), this number reached to 109.34 larvae/five leaflets during (F_1-F_{100}) growth stages. The number of larvae increased to a maximum of 272.33 larvae/five leaflets at (F_{100}-R_7) growth stage.

In 2005 (Table 2) the number of larvae recorded in leaflets of mungbean plants at early growth stage was low (4.69/five leaflets). Sharply increased to 90.19 larvae/five leaflets at (F_1-F_{100}) growth stages and increased to 209.43 larvae /five leaflets at (F_{100} -R_7) growth stages. Such high population of *L. trifolii* should cause an injury to mungbean plants. This study reveals the importance of controlling the pest in mungbean fields or at least minimizing the infestation at the early stages of mungbean growth. Talekar (1989) mentioned that this injury due to larval feeding on leaves tissues which the photosynthetic area (source) and hence the plant capacity to preserve greater number and weight of pods per plant, which reflected in final seed yields per feddan. These observations agree with those reported by Facknath (2005) who reported that *L. trifolii* is a serious pest of many leguminous crops, causing great damage to their yields.

3. The relative susceptibility of six mungbean varieties to infestation with *L. trifolii* under natural conditions:

The relative susceptibility of six mungbean varieties to infestation with *L. trifolii* under natural conditions in the two growing seasons is presented in Table (3, 4) the mean numbers of *L. trifolii* larvae/5 leaflets were 42.62, 44.23, 45.97, 46.68, 47.14 and 47.58 during 2004 season.

Table (3): Population density of *L. trifolii* in mungbean plants at Kafr El-Sheikh region during 2004 season.

Variety / Date of inspection	Average No. of larvae/five leaflets						
	Kawmy-1	KPS_2	UTT	M_{63}	KPS_1	Giza 1	L.S.D
8/7/2004	0.11 c	0.31 b	0.48ab	0.51 ab	0.60 a	0.72 a	0.042
15/7/200	0.59 c	0.83 a	0.67b	0.70 ab	0.71 ab	0.89 a	0.041
22/7/200	3.35 c	4.17 b	4.29b	4.56b	4.71 b	5.32 a	1.041
29/7/200	80.51c	83.91b	83.67b	84.30a	84.32 a	84.73 a	1.060
5/8/200	25.71	25.48	25.19	26.10	25.93	26.21	NS
12/8/200	83.24	84.79	84.28	85.23	85.32	85.21	NS
19/8/200	96.17	97.81	98.33	97.18	98.54	97.33	NS
26/8/200	88.63	89.43	89.05	90.21	92.59	90.71	NS
2/9/200	59.34 c	60.81b	62.28ab	63.92 a	62.83 ab	64.72 a	1.63
9/9/200	23.93	30.11	48.07	50.71	52.82	55.71	NS
16/9/200	7.30	8.90	9.40	10.13	10.19	11.83	NS
Mean	42.62 c	44.23 b	45.97 ab	46.68ab	47.14 a	47.58 a	*

*, ** and NS indicate P < 0.05, P < 0.01 and not significant, respectively. Means of each factor for each trait designated by same letter is not significant at 5% level according to Duncan's Multiple Range test.

Table (4): Population density of *L. trifolii* on mungbean plants at Kafr El-Sheikh region during 2005 season.

Variety / Date of inspection	Average No. of larvae/five leaflets						
	Kawmy-1	KPS_2	UTT	M_{63}	KPS_1	Giza-1	L.S.D
8/7/2005	0.91 c	1.03 b	1.71 b	2.03 a	2.31 a	2.71 a	0.177
15/7/200	1.88	2.39	2.81	3.89	2.97	2.68	NS
22/7/200	4.71 c	5.06 b	5.98 b	18.13 a	10.33 ab	16.57 a	0.445
29/7/200	28.0	28.24	39.21	35.89	29.81	29.99	NS
5/8/200	45.81 c	46.57 c	58.10 b	61.51 b	69.31 ab	78.72 a	2.826
12/8/200	14.73 c	15.05	26.40	26.77	26.20	27.21	NS
19/8/200	62.51	63.81	75.23	84.89	90.71	95.37	NS
26/8/200	1.78 c	2.53 c	8.17 b	3.79 c	20.85 a	28.92 a	0.156
2/9/200	2.10 c	2.20c	4.28 b	7.56 ab	8.79 a	9.38a	0.138
9/9/200	11.31	11.41	12.81	14.11	16.75	18.71	NS
16/9/200	5.33	5.92	6.13	6.89	7.41	7.99	NS
Mean	16.27c	16.74 c	21.89 b	24.13 ab	25.94 a	28.93 a	*

*, ** and NS indicate $P < 0.05$, $P < 0.01$ and not significant, respectively. Means of each factor for each trait designated by same letter is not significant at 5% level according to Duncan's Multiple Range test.

While in 2005 season a general mean was 16.27, 16.74, 21.89, 24.13, 25.94 and 28.93 larvae/ five leaflets for Kawmy-1, KPS_2, UTT, M_{53}, KPS_1 and Giza-1, respectively and there are significant differences among tested mungbean varieties in both seasons. Data in Tables (3 and 4) infer that Kawmy-1 and KPS_2 were less susceptible to infestation with *L. trifolii*. As in Tables (3, 4) the mean numbers of *L. trifolii* larvae of Giza-1 was 47.58 and 28.93) this number was the most highest among those of the six varieties in both seasons of study. It means that Giza-1 variety was the most susceptible to infestation with *L. trifolii* than any of the other tested varieties. This result agrees with Ali *et al.* (1996) who found that Giza-1 (V2010) variety is the most susceptible to infestation with major insect pests than KPS_2 and UTT variety. Sources of resistance in cultivar is the result of various phenological morphological and biochemical events occurring in the plant system. Lin (1992) found that some strains of mung beans were moderately resistant to Liriomyza species due to their being highly pubescent to their possessing anti-feeding qualities and to being of low attractancy. Generally, this result agrees with Lambert and Kilen (1984) they reported that each variety showing resistance to one of the insect species. So, it could be concluded that Kawmy-1 and KPS_2 in resistance character could be used as sources of resistance to *L. trifolii* and in crossing programs for improving the other mungbean cultivars.

4. Relationship between certain mungbean agronomic characters, seed yield and infestation with the broad bean leaf miner in 2004 and 2005 seasons:

Data in Tables (5 and 6) indicated that there are no significant differences among the tested mungbean varieties in plant height, branch number/plant and Giza-1 had highest value of plant height (77.6 and 84.7) in both seasons but Kawmy-1 had highest value of branch number/plant (5.2 and 6.7) in 2004 and 2005 seasons significant differences among the tested varieties (Kawmy-1 and KPS_2 superior UTT, M_{53} KPS_1 and Giza 1) regarding their number and weight of pods per plant in both seasons, (18.9, 16.5, 17.2, 16.3, 15.6 and 15.8) and (15.6, 14.7, 14.2, 14.7, 14.6 and 14.2) in the first season, while in the second season (21.9, 20.7, 18.2, 19.3, 19.5 and 16.1) and 18.2, 17.8, 15.7, 16.1, 16.4 and 13.8). Data showed that there are significant differences among tested mungbean varieties in chlorophyll a, b and total chlorophyll content in both seasons (Tables 5 and 6). Kawmy-1 and KPS_2 varieties had higher values (3.9 , 2.9, 6.8, 3.7, 2.8, 6.5 and 4.8, 2.9, 7.7, 4.7, 2.6, 7.3) of chlorophyll a, b and total chlorophyll than Giza-1 variety (3.6, 2.7 6.3 and 4.0, 2.1, 6.1) in both seasons, respectively.

Table (5): Yield and yield atttributes of some mungbean varieties with infestation rate of *L. trifolii* in 2004 season.

Treatment	Variety						F-test
	Kawmy-1	KPS_2	UTT	M_{53}	KPS_1	Giza-1	
Plant height (cm)	75.4	76.3	75.8	76.5	77.2	77.6	NS
Branch number/plant	5.2	5.0	4.8	4.7	4.9	4.6	NS
Pod length (cm)	8.2 c	8.3 c	9.4 ab	8.9 b	9.7 ab	10.1 a	*
Pod number/plant	18.9 a	16.5 b	17.2 ab	16.3 b	15.6 c	15.8 c	*
Pod weight (g)	15.6 a	14.7 b	14.2 c	14.7 b	14.6 b	14.2 c	*
100-seed weight (g)	7.3 c	8.1 b	7.4 c	8.1 b	8.5 ab	9.2 a	*
Seed yield/fed. (kg)	980.3 a	906.2 a	811.6 c	895.3 b	890.2 b	870.5 c	*
Chlorophyll a (mg/l)	3.9 a	3.7 a	3.2 c	3.5 b	3.4 c	3.6 b	**
Chlorophyll b (mg/l)	2.9 a	2.8 a	2.5 c	2.7 b	2.6 c	2.7 b	*
Total chlorophyll content (mg/l)	6.8 a	6.5 a	5.7 c	6.2 b	6.0 c	6.3 b	*
Infestation rate of *L. trifolii*	42.62 c	44.23b	45.97 a	46.68	47.14 a	47.58 a	*

*, ** and NS indicate $P < 0.05$, $P < 0.01$ and not significant, respectively. Means of each factor for each trait designated by same letter is not significant at 5% level according to Duncan's Multiple Range test.

Table (6): Yield and yield atttributes of some mungbean varieties with infestation rate of *L. trifolii* in 2005 season.

Treatment	Variety						F-test
	Kawmy-1	KPS_2	UTT	M_{53}	KPS_1	Giza-1	
Plant height (cm)	79.3	80.6	81.2	82.7	83.5	84.7	NS
Branch number/plant	6.7	5.3	5.7	5.8	5.9	5.5	NS
Pod length (cm)	9.5 ab	9.3 b	9.4 b	9.5 ab	9.6 ab	9.8 a	*
Pod number/plant	21.9 a	20. 7 a	18.2 c	19.3 b	19.5 ab	16.1 d	**
Pod weight (g)	18.2 a	17.8 a	15.7 c	16.1 b	16.4 b	13.8 d	*
100-seed weight (g)	5.8 c	6.3 b	7.2 ab	7.3 a	6.8 b	7.9 a	*
Seed yield/fed. (kg)	1320.9 a	1210.8 a	1119.3 a	1002.5 b	972.3 b	900.8 c	**
Chlorophyll a (mg/l)	4.8 a	4.7 a	4.5 ab	4.6 ab	4.3 b	4.0 b	*
Chlorophyll b (mg/l)	2.9 a	2.6 c	2.1 b	2.1 b	2.3 a	2.1 b	**
Total chlorophyll content (mg/l)	7.7 a	7.3 a	6.6 ab	6.7 ab	6.6 b	6.1 c	**
Infestation rate of *L. trifolii*	16.27 c	16.74 b	21.89 a	24.13 a	25.94 a	28.93 a	*

*, ** and NS indicate $P < 0.05$, $P < 0.01$ and not significant, respectively. Means of each factor for each trait designated by same letter is not significant at 5% level according to Duncan's Multiple Range test.

Data presented in Table (5 and 6) show significant differences among tested mungbean varieties in seed yield in both seasons. Data indicated that the mungbean varieties namely Kawmy-1 and KPS2 gave higher values 980.3, 906.2 kg/fed. and 1320.9, 1210.8 kg/fed. than those recorded from other tested varieties in both seasons (2004 and 2005).

It seems that largest chlorophyll content may enlarge the photosynthetic area (source) and hence the plant capacity to preserve greater number and weight of pods per plant for Kawmy-1 and KPS2 than other tested varieties. In contrast, Giza-1 was superior significantly Kawmy-1 variety regarding pod length (10.1, 9.8, 8.2 and 9.5) in the two seasons and 100-seed weight (9.2, 7.9 and 7.3, 5.8) in both seasons. On the other hand, plant height (75.4, 76.3, 75.8, 76.5, 77.2 and 77.6) in the first season (79.3, 80.6, 81.2, 82.7, 83.5 and 84.7) in the second season was not differing significantly among six varieties in the two seasons. These results might be attributed to differences in their genetic constitution and their interaction with environmental conditions and that it is may be due to the fact that every variety has different agronomic potential as shown in Table 7. Abou Khadrah (1997) and El-Hefni (1997) showed that

sowing mung bean variety (Kawmy-1) gave the highest seed yield compared with Giza-1.

Table (7): Effect of interaction between yield and yield attributes of some mungbean varieties x infestation rate of *L. trifolii* in 2004 and 2005 seasons.

Treatment	Variety						Interaction between infestation and variety
	Kawmy-1	KPS_2	UTT	M_{53}	KPS_1	Giza-1	
Plant height (cm)	77.35	78.45	78.50	79.6	80.35	81.15	NS
Branch number/plant	5.95	5.15	5.25	5.2	5.40	5.05	NS
Pod length (cm)	9.95 b	8.80 c	9.40 b	9.2 b	9.65 b	11.37 a	NS
Pod number/plant	20.4 a	18.60 a	17.7 b	17.8 b	17.55 b	15.95 c	*
Pod weight (g)	16.90 a	16.2 a	14.95 c	15.4 b	15.50 b	14.00 c	*
100-seed weight (g)	6.55 c	7.20 b	7.30 b	7.7 b	7.65 a	8.55 a	NS
Seed yield/fed. (kg)	1150.60 a	1058.50 a	965.45 b	948.9 b	931.25 b	885.65 c	**
Chlorophyll a (mg/l)	4.35 a	4.20 a	3.85 b	4.05 a	3.85 b	3.80 c	*
Chlorophyll b (mg/l)	2.90 a	2.70 a	2.3 c	2.4 b	2.45 b	2.40 b	*
Total chlorophyll content(mg/l)	7.25 a	6.90 a	6.15 a	6.45 b	6.30 b	6.20 c	*
Infestation rate of *L. trifolii*	29.44 c	30.48 b	33.93 a	35.40 a	36.54 a	38.25 a	*

*, ** and NS indicate $P < 0.05$, $P < 0.01$ and not significant, respectively. Means of each factor for each trait designated by same letter is not significant at 5% level according to Duncan's Multiple Range test.

The interaction among varieties and infestation rate of *L. trifolii* had significant effect on both number and weight of pods per plant, Kawmy-1 and KPS_2 varieties gave the higher number of pods and heaviest pods/plant.

Table (7) show that the interaction between varieties and infestation rate of *L. trifolii* had significant effect on chlorophyll a, b and total chlorophyll. The lowest chlorophyll content (6.2) resulted form sowing Giza-1 variety. While, the highest value was produced by Kawmy-1 and KPS_2 varieties (7.25, 6.9). Data in Table (7) show that the interaction among mungbean varieties and infestation of *L. trifolii* was significantly affected seed yield and the highest values were recorded with Kawmy-1 and KPS_2 mung bean varities . Also, there were no significant effect on plant height and branch number/plant, pod length and 100-seed weight. Increasing infestation rate of *L. trifolii* decreased significantly number, weight of pods per plant, total chlorophyll content and seed yield/fed. (Facknath, 2005) reported, however, if

the infestation of *L. trifolii* is severe, photosynthetic capacity is reduced, thus causing a slowing in the development of flowers and fruits and when large populations are present they are capable of destroying leaves and affecting the growth of plants.

The superiority of the mungbean variety Kawmy-1 and KPS2 could be attributed to its genetic potential. As mentioned before, Kawmy-1 and KPS2 had the highest values of chlorophyll content, number of branches, pods and heaviest pods weight per plant, which reflected in final seed yields per feddan as compare with other tested varieties. Seed yield of cultivar is the result of interplay of its genetic make-up and environmental factors in which plant grow. Also, many investigators emphasized the importance of pod setting in determining the final yield of mungbean (Ashour *et al.*, 1994).

It could be concluded from this study that sowing of Kawmy-1 and KPS2 mungbean varieties could be recommended to get high seed yields of mungbean and less susceptible varieties to *L. trifolii* under Kafr El-Sheikh region.

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استجابة بعض أصناف فول المانج للإصابة بذبابة أوراق الفول *Liriomyza trifolii* (Burgess) وتأثير الاصابة بالحشرة على محصول الحبوب فى منطقة شمال الدلتا

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الملخص العربى

يعتبر فول المانج *Vigna radiata* (L.) Wilczek محصول جديد فى الزراعة المصرية وهو محصول بقولى صيفى سريع النضج. ومن أهم الآفات التى تصيبه ذبابة أوراق الفول التى تحدث خسائر جسيمه فى محصوله.

أجريت هذه الدراسة بمزرعة كلية الزراعة بكفرالشيخ وقسم الحشرات الاقتصادية خلال موسمى ٢٠٠٤ ، ٢٠٠٥ بهدف دراسة التذبذب الموسمى فى مستوى الاصابة بهذه الافه ، وتقييم حساسية ست أصناف من فول المانج (قومى ١ ، جيزة-١، M_{53}, UTT, KPS_2, KPS_1) للإصابة بالذبابة والعلاقة بين بعض الصفات النباتية لفول المانج ومستوى الإصابة. وتأثير ذلك على المحصول الناتج. وفيما يلى ملخص للنتائج التى تم الحصول عليها:

١- تشير النتائج إلى أن أعلى معدل إصابة بالذبابة كان خلال شهر أغسطس وظهر للحشرة ذروتين من النشاط فى الموسم الأول وثلاث ذروات فى الموسم الثانى وذلك خلال الفترة من يونيو حتى سبتمبر.

٢- اوضحت النتائج حدوث زياده فى معدل اصابة نباتات فول المانج بالذبابه مع تقدم النباتات فى العمر.

٣- عند اختبار حساسية الأصناف للإصابة بالحشرة كان الصنفان KPS_2, Kawmy-1 أقل حساسية للاصابه بالحشرة والصنف جيزه-١ اكثر الاصناف حساسية.

٤- من دراسة الصفات النباتية للأصناف المختبرة أوضحت النتائج تفوق الصنفين قومى-١ ، KPS_2على باقى الأصناف المختبرة وخاصة جيزة-١ فى المحتوى الكلوروفيلى وكل من

وزن وعدد القرون على النبات ومحصول البذور للفدان وكان التفاعل بين معدل الاصابة بالذبابة فى الاصناف المختبرة وبعض صفات النمو الخضرى للمحصول فى خلال الموسمين معنويا (محصول البذور/للفدان ، محتوى الاوراق من الكلوروفيل ، عدد ووزن القرون) فى كلا الموسمين ، وغير معنويا مع كل من ارتفاع النبات عند الحصاد وعدد الفروع على النبات ووزن الـ ١٠٠ بذرة. يتضح من الدراسة ان الصنفين قومى-١ ، KPS_2 تمثل مصادر جيده لمقاومة ذبابه أوراق الفول علاوة على ارتفاع محصولهما وذلك تحت ظروف منطقة كفرالشيخ.