



FACULTY OF AGRICULTURE

Minia J. of Agric. Res. & Develop.
Vol. (28) No. 2 pp 193 -211, 2008

FIELD OBSERVATIONS OF CERTAIN BROAD BEAN INSECT PESTS AND THEIR ASSOCIATED PREDATORS IN MIDDLE EGYPT

S. H.H. Hamouda

Plant Protection Department, Faculty of Agriculture,
Minia University, Egypt.

Received 20 March 2008 Accepted 20 April 2008

ABSTRACT

Field observations on insects associated with three broad bean cultivars were carried out during 2005/2006 growing season. using direct count and sticky trap techniques. Five insect pests and two common predators were recorded on all broad bean cultivars. The dominant pest was cowpea aphid, (*Aphis craccivora* Koch) which represented about 70% of the insect fauna followed by the leafminer, (*Liriomyza trifolii* Burgess) which represented by about 13.4%.

However, green peach aphid (*Myzus persicae* Suz.), onion thrips, (*Thrips tabaci* Lin) and the leafhopper, (*Empoasca decipiens* Paoli) showed low occurrence during the whole growing season. Numbers of the two associated predators [i.e. the lady bird beetle, *Coccinella undecimpunctata* L. and anthocorid bug, *Orius albidipennis* (Reut.)] showed positive correlation with their preys (0.31-0.67) which reflected that these insect predators unable to suppress the key pest, *A. craccivora*.

In addition, the high infestation by *A. craccivora* occurred during the critical vegetative growth stage with insignificant differences between Giza 2, Giza 429 and Wally broad bean cultivars. Therefore, the broad bean fields must be examined every 3-7 days to avoid heavy infestation by aphids.

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INTRODUCTION

Broad bean, (*Vicia faba* L.) is considered as one of the main sources of food for human and animals. Few years ago, this crop occupied an important belt among the cultivated areas in Minia region during winter growing season.

Broad bean is generally subjected to severe infestation by sucking pests (aphids, thrips, jassid) and leafminers, which cause serious damage and affect yield production (Selim *et al.*, 1987; Abd El-Alim, 1994; Hannou, 1995; Mohamed, 1996; Salem, 1998, Abou-Elhagag and Salman, 2001 and Capiner, 2004). The role of sowing date, crop cultivar, plant age and density, fertilization and irrigation systems, weed control and natural enemies on the pest infestation and yield reduction of broad bean crop received considerable attention by entomologists (Khalil *et al.*, 1974; Lanc, 1981; Blaester-Diekmann, 1982; Guirguis *et al.*, 1983; Aly and Makadey, 1990; Makadey *et al.*, 1990; Hassanein, 1994; Dravas and Anderson, 1996; Abd El-Wahab, 1998 and Mohamed, 2003).

Recently, the cultivated area with broad bean in Minia region decreased sharply due to pest infestation problems and the significant seed-yield reduction. Therefore, this study deals with the relative prevalence of sucking insects and leafminer, (*Liriomyza trifolii* Burgess) on three broad bean cultivars using two different sampling techniques. The relationship between the sucking insects and their associated predators was discussed.

MATERIALS and METHODS

Two field trials were conducted in the Experimental Farm of Faculty of Agriculture, Minia University during 2005/2006 growing season. In each trial, an area of land was selected and divided into 3 equal plots, 7 x 12 meters each. Seeds of three broad bean cultivars i.e. Giza 2, Giza 429 and Wally were sown on 15th of November 2005. The regular agricultural practices were followed and no pesticide treatments were applied.

Broad bean insect pests and their associated predators

Sampling Technique:

Direct count:

Sucking pests:

In the first experiment, inspection started on 3rd week after cultivation. In each cultivar 25 plants were randomly chosen and examined directly in situ every 3-4 days (early in the morning). The number of aphids was counted on, the terminal 10 cm of the plant top. In addition, the number of jassids, thrips and associated predators were also recorded for the whole plant.

Leafminer:

During the whole season, fifty leaflets cultivar/week were randomly collected and kept in paper bags, then transferred to the laboratory for inspection of larvae and mines of the leafminer(*L. trifolii*).

Sticky traps:

In the second experiment, when broad bean plants were completely appeared above ground (first week of December) four sticky traps (yellow plastic sheets 20 x 30 cm fixed on 1.5 meter stick and weekly covered with Delfak oil) were used for each broad bean cultivar. The number of aphids, jassid, thrips and other insect visitors were weekly counted till harvest.

Statistical analysis:

The data were subjected to analysis by using L.S.D., Qui-square and simple correlation tests according to Snedecor (1970). was computed.

RESULTS and DISCUSSION

Obtained data indicated that broad bean harboured five common insect pests, i.e. cowpea aphid. (*Aphis craccivora* Koch).; green peach aphid, (*Myzus persicae* Sulz)., cotton thrips, (*Thrips tabaci* Lin) and jassid, (*Empoasca decipiens* Paoli) and (leafminer, *Liriomyza trifolii* Burgess). In addition, the occurrence of two common predators, lady bird beetle (*Coccinella undecimpunctata* L.) and anthocorid bug, (*Orius albidipennis* Reut.) were also recorded. The results are summarized as follows:

A. Sucking insects (direct count):

Cowpea aphid (*A. craccivora*):

Data in Table 1 represent weekly average number of nymphs and adults (apterous and alate) of cowpea aphid, as well as the percentage of infested plants during the whole season. All broad bean cultivars were highly infested by this pest during the period extended from the 1st week of December 2005 till the 3rd week of January 2006 (7 weeks), where the percentages of infested plants ranged from 92 to 100% and aphid number ranged between 9.7 to 204.7 individuals/10 cm of plant top. The maximum aphid density on all cultivars was recorded during the first week of January 2006 (81.2-204.7 individuals/10 cm of plant top). Aphid numbers decreased sharply during February and March 2006.

Results also showed that nymphs of *A. craccivora* were highly abundant during the vegetative growth stage of all broad bean cultivars (during December and January); but rarely occurred during February and completely absent during March (Table 1). Migrant aphid (on plants) existed during the whole season and showed one peak, (13 individuals) during the first week of January, 2006.

Susceptibility of broad bean cultivars to aphid, (*A. craccivora*) infestation, showed relative increase in the numbers occurred in Giza 2 cultivar over other cultivars (Table 1).

Generally, numbers of cowpea aphid recorded in this study were very high and may cause a lot of damage to the plants due to sucking plant sap. Also, aphid species was reported to be the primary factor as a vector of the serious virus disease, Faba Bean Necrotic Yellow Virus (FBNYV) (Rizkallah *et al.*, 1995 and Abd El-Wahab, 1998).

Green peach aphid (*M. persicae*):

Table 2 shows that this insect was almost absent during December in broad bean fields and appeared from the 1st week of January at a very low density (0.1-2.0 individuals/10 cm of plant top) compared with cowpea aphid *A. craccivora* (Table 1).

Table 1: Weekly infestation percentages of plants and numbers of cowpea aphid, *Aphis craccivora* associated with three broad bean cultivars in Minia region during 2005/2006 growing season (Direct count).

Sampling date Month/ year	Week	% Average plant infestation and mean number of aphids/10 cm of the plant top														
		Giza 2 cultivar					Giza 429 cultivar					Wally cultivar				
		% infested Plant	N	AP	AL	Total	% infested Plant	N	AP	AL	Total	% infested Plant	N	AP	AL	Total
Dec. 2005	1	96.0	8.9	4.0	2.0	14.9	92.0	4.6	3.5	1.6	9.7	94.0	11.9	5.8	2.6	20.3
	2	96.0	22.0	7.3	2.7	32.0	96.0	16.3	7.7	2.9	26.9	96.0	13.9	6.9	1.4	22.2
	3	96.0	50.0	18.7	3.0	71.7	93.3	44.7	17.5	3.3	65.5	93.3	55.2	20.4	3.0	78.6
	4	100.0	71.1	20.4	8.7	100.2	98.0	60.6	15.7	6.2	82.5	94.0	60.5	16.0	7.5	84.0
Mean	97.0	38.0	12.6	4.1	54.7	94.8	31.6	11.1	3.5	46.2	94.3	35.4	12.3	3.6	51.3	
Jan. 2006	1	100.0	170.0	21.7	13.0	204.7	94.0	76.5	20.9	8.4	105.8	96.0	60.5	14.5	6.2	81.2
	2	100.0	32.8	40.4	8.7	81.9	100.0	59.7	16.7	5.7	82.1	90.0	55.8	19.1	0.4	75.5
	3	100.0	15.2	6.0	2.2	23.4	98.0	8.7	4.1	1.5	14.3	98.0	7.6	3.9	2.9	14.4
	4	94.7	2.4	1.9	1.3	5.6	97.3	1.9	2.2	1.4	5.5	90.7	2.1	1.4	0.8	4.3
Mean	98.7	55.1	17.5	6.3	78.9	97.3	36.7	11.0	4.3	51.9	93.7	31.5	9.7	2.6	43.9	
Feb. 2006	1	90.0	0.8	0.7	1.0	2.5	90.0	0.8	0.9	1.2	2.9	90.0	0.8	0.9	1.3	3.0
	2	76.0	0.1	0.5	0.7	1.3	54.0	0.2	0.4	0.6	1.2	76.0	0.4	0.0	0.5	0.9
	3	44.0	0.0	0.0	0.7	0.7	26.0	0.0	0.5	0.3	0.8	26.0	0.0	0.0	0.5	0.5
	4	30.0	0.2	0.0	0.3	0.5	40.0	0.1	0.0	0.7	0.8	38.0	0.0	0.0	0.5	0.5
Mean	60.0	0.3	0.3	0.7	1.3	52.5	0.3	0.5	0.7	1.4	57.5	0.3	0.2	0.7	1.2	
March 2006	1	36.0	0.0	0.0	0.6	0.6	18.0	0.0	0.0	0.2	0.2	38.0	0.0	0.0	0.8	0.8
	2	30.0	0.0	0.0	0.6	0.6	46.0	0.0	0.0	0.9	0.9	42.0	0.0	0.0	0.7	0.7
	3	10.7	0.0	0.0	0.2	0.2	21.3	0.0	0.0	0.3	0.3	30.7	0.0	0.0	0.4	0.4
Mean	25.6	0.0	0.0	0.5	0.5	28.4	0.0	0.0	0.5	0.5	36.9	0.0	0.0	0.6	0.6	

N: Nymph

AP: Apterous

AL: Alate

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Table 2: Weekly average number of the green peach aphid, *Myzus persicae* infesting three cultivars of broad bean crop cultivated in Minia region during 2005/2006 season (Direct count).

Sampling Date Month / Week	Avg. No. of individuals/10 cm of the plant top		
	Giza 2 cultivar	Giza 429 cultivar	Wally cultivar
Dec. 2005	1	-	-
	2	-	-
	3	-	-
	4	0.3	0.0
Mean	0.08	0.0	0.0
Jan. 2006	1	2.0	0.3
	2	1.3	1.1
	3	1.7	1.8
	4	1.6	2.3
Mean	1.7	1.4	1.2
Feb. 2006	1	2.7	3.1
	2	5.3	26.2
	3	5.6	7.7
	4	6.2	5.3
Mean	5.0	10.6	4.1
March 2006	1	1.5	4.5
	2	3.2	2.4
	3	3.0	3.3
Mean	2.6	3.4	3.7
G. average	2.3	3.9	2.3

However, The number increased gradually during January till the end of February, then decreased during March. The maximum number of this aphid was observed on all tested cultivars during February, where the monthly mean aphid numbers were 4.1, 5.0 and 10.6 individuals/10 cm of plant top on Wally, Giza 2 and Giza 429 cultivars, respectively. In general, Giza 429 cultivar harboured twice the numbers occurred in Giza 2 and Wally cultivars (annual averages were 3.9, 2.3 and 2.3 individuals/10 cm of plant top, respectively). Abd El-Wahab (1998) mentioned that *M. persicae* failed to transmit virus diseases to broad bean plants, especially the damaging virus FBNYV.

Broad bean insect pests and their associated predators

Cotton thrips (*T. tabaci*):

As shown in Table 3, the thrips infestation occurred during the whole season extended from the 1st week of December till the 3rd week of March (15 weeks). The number of thrips did not exceed 1.1 individuals/ plant till the 3rd week of February (11 weeks), then increased slightly during March. Maximum thrips density was observed on Giza 429 cultivar in the 1st week of March (5.63 individuals/plant). In general, all cultivars responded almost similarly to thrips infestation.

Table 3: Average number of thrips and jassid/plant associated with three broad bean cultivars in Minia region during 2005/ 2006 season (Direct count).

Sampling Date Month / Week	Giza 2 cultivar		Giza 429 cultivar		Wally cultivar		
	Thrips	Jassid	Thrips	Jassid	Thrips	Jassid	
Dec. 2005	1	0.25	0.95	0.50	0.75	0.50	0.66
	2	0.60	1.10	0.44	1.10	0.20	1.05
	3	0.27	1.27	0.59	1.21	0.39	1.43
	4	1.10	1.75	0.92	1.60	0.50	1.85
Mean	0.56	1.27	0.61	1.17	0.40	1.25	
Jan. 2006	1	0.68	0.68	0.32	0.82	0.90	0.26
	2	0.37	0.48	0.33	0.27	0.33	0.20
	3	0.18	0.11	0.17	0.16	0.17	0.35
	4	0.32	0.50	0.54	0.27	0.56	0.65
Mean	0.39	0.44	0.34	0.38	0.49	0.37	
Feb. 2006	1	0.74	0.32	0.59	0.45	0.74	0.34
	2	0.56	0.11	0.60	0.56	0.32	0.20
	3	0.50	0.58	0.50	1.50	0.67	0.62
	4	1.20	0.75	1.60	1.45	1.65	1.60
Mean	0.75	0.44	0.82	0.99	0.85	0.69	
March 2006	1	3.53	0.76	5.63	0.76	0.50	0.50
	2	1.68	1.94	1.54	1.68	1.68	1.62
	3	2.93	1.16	3.12	1.31	3.67	1.17
Mean	2.71	1.29	3.43	1.25	1.95	1.10	
G. average	1.10	0.86	1.30	0.95	0.92	0.85	

Thrips: *Thrips tabaci*.

Jassid : *Empoasca decipiens*.

Leafhopper (*E. decipiens*):

Jassid infestation started from the first week of December and continued also for 15 weeks in all tested cultivars (Table 3). The average number of jassids/week was very low and did not exceed 1.94 individual/plant during the whole season. Monthly mean number of this pest showed increase during December and March compared to those recorded during January and February. Broad bean cultivars under investigation similarly responded to the jassid infestation (the annual mean numbers ranged between 0.85-0.95 individuals/plant).

However, Selim *et al.* (1987) found that *A. craccivora* was the main pest infesting broad bean plants.

These results agree with those of Mohamed and Salman (2001) and Mohamed (2003), who showed that *A. craccivora* increased from December till January and during January and February. They also added that faba bean cultivars differed in their susceptibility to the infestation with the cowpea aphid, *A. craccivora*.

B. Sucking pests population using sticky trap technique:

Results in Table 4 represent the weekly average numbers of sucking insects (adults) collected by sticky traps from three broad bean cultivars during the whole season. Sucking insects occurred during the period extended from the 1st week of December till the third week of March (14 weeks). Based on the annual means, the highest population density of these pests was recorded for the aphid, *A. craccivora* adults (194.0, 208.5 and 227.1 adults/trap in the fields of Giza 2, Giza 429 and Wally cultivars, respectively. Meanwhile, thrips and jassid adults occurred at very low densities (7.1-10.7 and 2.9-3.5 adults/trap, respectively).

The sticky trap records revealed the occurrence and the dominance of aphid adults in the broad bean ecosystem over the other pests. This occurrence was reflected and explain the high infestation of broad bean plants by the wingless stages of aphids recorded for the direct count (Table 1).

Broad bean insect pests and their associated predators

Table 4: Weekly average number of insects/sticky trap in three broad bean cultivars in Minia region during 2005/2006 growing season.

Sampling Date Month / Week	Giza 2 cultivar				Giza 429 cultivar				Wally cultivar				
	Aphid	Jassid	Thrips	Others	Aphid	Jassid	Thrips	Others	Aphid	Jassid	Thrips	Others	
Dec. 2005	2	254.8	4.4	9.2	0.3	194.2	5.8	9.8	0.1	192.7	5.9	7.2	0.5
	3	154.6	2.7	2.6	0.5	124.9	1.8	1.3	0.4	155.7	3.3	3.5	0.4
	4	343.3	2.6	2.6	0.3	333.9	4.3	2.3	0.4	313.3	2.8	1.5	0.9
Mean	250.9	3.2	4.8	0.4	217.7	4.0	4.5	0.3	220.6	4.0	4.1	0.6	
Jan. 2006	1	259.4	2.9	9.2	1.4	294.8	4.8	9.4	2.0	242.6	5.8	7.9	2.8
	2	169.6	4.5	8.5	0.2	235.4	5.4	10.0	0.2	134.9	3.9	5.3	0.3
	3	111.4	1.7	8.4	1.6	148.0	1.4	8.1	1.0	172.7	3.5	5.2	0.1
	4	102.2	1.9	3.7	0.3	155.7	4.6	6.7	0.3	240.2	5.0	7.8	0.3
Mean	160.7	2.8	7.5	0.9	208.5	4.1	8.6	0.9	197.6	4.6	6.6	0.9	
Feb. 2006	1	238.0	0.6	6.3	0.8	262.2	2.6	6.6	0.3	297.8	2.8	8.6	0.7
	2	232.9	4.4	8.7	0.0	272.2	4.3	11.3	0.4	344.3	7.3	9.1	0.0
	3	172.7	3.3	28.3	0.0	326.3	2.4	8.2	0.7	483.9	1.9	15.3	0.5
	4	153.3	3.3	4.3	1.2	195.7	0.7	7.5	0.4	234.2	1.8	8.4	1.2
Mean	199.2	2.9	11.9	0.5	264.1	2.5	8.4	0.5	340.1	3.5	10.4	0.6	
March 2006	1	178.3	2.0	33.2	0.3	184.5	1.4	8.4	0.4	200.4	1.7	8.2	0.7
	2	150.7	1.9	11.6	0.3	123.3	1.1	15.9	0.0	84.6	1.3	6.0	0.3
	3	166.9	4.0	10.4	0.0	123.4	2.4	5.7	0.0	165.6	2.9	7.4	0.2
Mean	165.3	2.6	18.4	0.2	143.7	1.6	10.0	0.1	150.2	2.0	7.2	0.4	
G. average	194.0	2.9	10.7	0.5	208.5	3.0	7.9	0.5	227.1	3.5	7.1	0.6	

Aphid : *Aphis craccivora* (alate individuals).

Jassid : *Empoasca decipiens* (adults).

Thrips: *Thrips tabaci* (adults).

Others: Adults of bees, flies, wasps, moths.

Many authors tested a standard yellow sticky traps as a tool for monitoring certain flying insects i.e. aphids, whitefly and thrips which were adhered to the traps (Daoud *et al.*, 1999 and Mohamed, 2003).

C. Relationship between the sucking insects and their associated predators:

Table 5 summarizes the weekly mean number of two common predators, i.e. the lady bird beetle, *Coccinella undecimpunctata* L. and the anthocorid bug, *Orius albidipennis* (Reut.) on different broad bean cultivars. Numbers of anthocorid predaceous bug were higher than coccinellid predator. Both predators occurred during the whole season extended from the 1st week of December till the 3rd week of March. Maximum occurrence of the total predators was recorded in the last week of December (3.12, 2.72 and 3.09 individuals/plant on Giza 2, Giza 429 and Wally cultivars, respectively). The predators numbers coincided with the relative occurrence of their preys (sucking insects) on all cultivars.

Table 5: Population density of two common predators (*Coccinella undecimpunctata* and *Orius albidipennis*) on three broad bean cultivars during 2005/2006 growing season.

Sampling Date Month / Week	Average number/plant									
	Giza 2 cultivar			Giza 429 cultivar			Wally cultivar			
	Coccinella	Orius	Total	Coccinella	Orius	Total	Coccinella	Orius	Total	
Dec. 2005	1	0.00	0.18	0.18	0.00	0.55	0.55	0.00	0.39	0.39
	2	0.02	1.77	1.79	0.00	0.97	0.97	0.02	1.50	1.52
	3	0.04	2.20	2.24	0.04	2.20	2.24	0.06	1.60	1.66
	4	0.32	2.80	3.12	0.21	2.60	2.81	0.47	2.62	3.09
Mean	0.10	1.74	1.84	0.06	1.58	1.64	0.14	1.53	1.67	
Jan. 2006	1	0.18	0.98	1.16	0.06	0.50	0.56	0.44	0.14	0.58
	2	0.16	0.30	0.46	0.16	0.51	0.67	0.04	0.42	0.46
	3	0.02	0.36	0.38	0.00	0.33	0.33	0.00	0.24	0.24
	4	0.03	0.03	0.06	0.05	0.13	0.18	0.11	0.10	0.21
Mean	0.10	0.42	0.52	0.07	0.37	0.44	0.15	0.22	0.37	
Feb. 2006	1	0.20	0.36	0.56	0.16	0.54	0.70	0.14	0.34	0.48
	2	0.04	0.14	0.18	0.16	0.02	0.18	0.06	0.24	0.30
	3	0.12	0.00	0.12	0.28	0.15	0.43	0.04	0.08	0.12
	4	0.14	0.20	0.34	0.10	0.35	0.45	0.07	0.20	0.27
Mean	0.13	0.18	0.31	0.17	0.27	0.44	0.08	0.21	0.29	
March 2006	1	0.08	0.32	0.40	0.11	0.16	0.27	0.01	0.41	0.42
	2	0.00	0.00	0.00	0.10	0.14	0.24	0.20	0.22	0.42
	3	0.12	0.00	0.12	0.21	0.13	0.34	0.21	0.11	0.32
Mean	0.07	0.11	0.18	0.14	0.14	0.28	0.14	0.25	0.39	
G. average	0.10	0.61	0.71	0.11	0.59	0.70	0.13	0.55	0.68	

Coccinella: *Coccinella undecimpunctata*.

Orius: *Orius albidipennis*.

Broad bean insect pests and their associated predators

The relationship between total sucking insects and their associated predators on broad bean cultivars is presented in Table 6. The predators showed maximum occurrence by the end of December (2.7-3.1 individuals/plant), coinciding with the increase in total sucking pests. Afterwards, the sucking insects infestation continued to increase till the 3rd week of January, while the numbers of their predators dramatically decreased. These results showed moderate to low correlation coefficient values ranged 0.31-0.67. The results also indicated that, relative density of the predators was very low and was unable to keep sucking pests population below the economic threshold. Hence, sucking pests/plant must be checked every 3-7 days to avoid heavy infestation.

Table 6: Correlation between the total sucking insects and their associated predators on three broad bean cultivars during 2005/2006 growing season.

Sampling Date Month / Week	Giza 2 cultivar		Giza 429 cultivar		Wally cultivar		
	Sucking insects	Predators	Sucking insects	Predators	Sucking insects	Predators	
Dec. 2005	1	16.1	0.2	11.0	0.6	21.5	0.4
	2	33.7	1.8	28.4	1.0	25.5	1.5
	3	73.7	2.2	66.8	2.2	80.4	1.7
	4	103.4	3.1	85.0	2.7	86.4	3.1
Jan. 2006	1	208.1	0.1	107.2	0.6	83.5	0.6
	2	84.1	0.2	83.8	0.7	77.0	0.5
	3	25.4	0.0	17.4	0.3	16.2	0.2
	4	8.0	0.1	8.6	0.2	7.7	0.2
Feb. 2006	1	6.3	0.2	7.0	0.7	8.0	0.5
	2	7.3	0.2	28.6	0.1	4.8	0.3
	3	7.4	0.3	10.5	0.4	6.5	0.1
	4	8.7	0.1	9.2	0.5	8.3	0.3
March 2006	1	6.4	0.1	11.1	0.3	7.6	0.4
	2	7.4	0.1	6.5	0.2	6.8	0.4
	3	7.3	0.2	8.0	0.3	7.8	0.3
Correlation Coefficient	r = 0.31		r = 0.59		r = 0.67		

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The present results agree with those stated by Mohamed (2003), who found that the total individuals of ladybird beetle caught were low compared with the total individuals caught.

D. Leafminer (*L. trifolii*):

Leafminer infestation as monitored by the presence of larvae and mines observed during the period extended from the second week of December till the third week of March (14 weeks) is given in Table 7.

Table 7: Average numbers of the leafminer, *Liriomyza trifolii* (larvae and mines/50 leaflets) infesting three broad bean cultivars in Minia region during 2005/2006 growing season.

Sampling Date Month / Week	Giza 2 cultivar		Giza 429 cultivar		Wally cultivar		
	Larva	Mine	Larva	Mine	Larva	Mine	
Dec. 2005	2	8.0	45.0	2.0	15.0	3.0	32.5
	3	5.0	103.7	6.3	73.0	5.0	66.0
	4	3.0	67.5	2.5	36.0	0.0	32.0
Mean	5.3	72.1	3.6	41.3	2.7	43.5	
Jan. 2006	1	22.0	106.5	7.0	44.0	3.5	130.6
	2	16.0	150.5	7.5	139.5	4.5	96.0
	3	10.0	97.3	9.0	173.0	19.3	224.7
	4	10.5	195.0	8.5	170.5	9.5	153.0
Mean	14.6	137.3	8.0	131.8	9.2	151.1	
Feb. 2006	1	5.5	166.5	9.0	156.5	5.5	162.0
	2	8.0	251.5	5.5	183.0	5.5	288.5
	3	6.0	256.5	5.0	219.5	4.0	249.5
	4	7.5	130.0	6.5	233.0	6.0	229.5
Mean	6.8	201.1	6.5	198.0	5.3	232.4	
March 2006	1	0.3	4.2	0.1	7.5	0.1	9.4
	2	0.2	4.2	0.1	8.2	0.1	7.7
	3	0.1	7.0	0.1	4.9	0.0	3.9
Mean	0.2	5.1	0.1	6.9	0.1	7.0	
G. average*	6.7	103.9	4.6	94.5	4.3	108.5	

* L.S.D. values at 0.05 were 2.7 and 15.5 for larvae and mines, respectively.

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Numbers of larvae during December were (2.7-5.3 larvae/50 leaflets on all cultivars), then increased, highly in January (8.0-14.6 larvae/ 50 leaflets). This was followed by a decrease during February (5.3-6.8 larvae/50 leaflets), and a sharp decrease during March (0.1-0.2 larvae/50 leaflets) on all cultivars. The mines of *L. trifolii* were more common in February (198.0-232.4 mines/50 leaflets) on all cultivars, then decreased sharply during March on all cultivars. Maximum larval content was detected in the first week of January on Giza 2 cultivar (22 larvae/50 leaflets) followed by Wally cultivar (19.3 larvae/50 leaflets) during the 3rd week of January.

Concerning the susceptibility of broad bean cultivars, statistical analysis showed insignificant differences among the infestation of broad bean cultivars by *L. trifolii*. The annual mean of larval content ranged between 4.3-6.7 larvae/50 leaflets, while the number of mines averaged 94.5-108.5 mines/50 leaflets for all cultivars. These results are in conformity with those of Aly and Makady (1990); Abou-Elhagag and Salman (2001), who found three peaks for *L. trifolii* during January, February and March. Moreover, Ismail *et al.* (2004) revealed that, the mean number of mines recorded three peaks which were detected around mid- December, 2nd week of January and 4th week of February on the middle level of the broad bean plants.

Finally, based on these results and on the data in Tables 8, 9 and 10, it could be concluded that:

Five insect pests (i.e. *A. craccivora*, *M. persicae*, *T. tabaci* and *E. decipiens* (sucking insects) and the leafminer, *L. trifolii*, as well as, two common predators, *C. undecimpunctata* and *O. albidipennis* were recorded on broad bean cultivars under investigation during 2005/2006 growing season.

The key pest was cowpea aphid, (*A. craccivora*) which represented 71.9-94.4% of total insects and total sucking pests infesting broad bean cultivars as estimated either by direct count or sticky trap techniques, followed by leaf miner (*L. trifolii*) which represented about 13.4% on all tested cultivars.

High infestation by *A. craccivora* occurred during the critical vegetative growth stage of broad bean plants (during December and January) and the nymphs and apterous adults (stable stages on plants)

Table 8: Annual mean of insects (pests and predators) associated with three broad bean cultivars in Minia region during 2005/2006 growing season.

Parameter	Giza 2 cultivar					Giza 429 cultivar					Wally cultivar				
	Dec.	Jan.	Feb.	Mar.	Mean	Dec.	Jan.	Feb.	Mar.	Mean	Dec.	Jan.	Feb.	Mar.	Mean
	<i>Aphis craccivora</i>														
% infested plants	97.0	98.7	60.0	25.6	70.3	94.8	97.3	52.5	28.4	68.3	94.3	93.7	57.5	36.9	70.8
Avg No./10 cm of plant top.	54.7	78.9	1.3	0.5	33.8	46.2	51.9	1.4	0.5	25.0	51.3	43.9	1.2	0.6	24.2
Avg. No. per sticky trap (alate only)	250.9	160.7	199.2	165.3	194.0	217.7	208.5	264.1	143.7	208.5	220.6	197.6	340.1	150.2	227.1
	<i>Myzus persicae</i>														
Avg. No./10 cm of plant top	0.08	1.7	5.0	2.6	2.3	0.0	1.4	10.6	3.4	3.9	0.0	1.2	4.1	3.7	2.3
	<i>Thrips tabaci</i>														
Avg. No. per plant	0.56	0.39	0.75	2.71	1.10	0.61	0.34	0.82	3.43	1.30	0.40	0.49	0.85	1.95	0.92
Avg. No. per sticky trap	4.8	7.5	11.9	18.4	10.7	4.5	8.6	8.4	10.0	7.9	4.1	6.6	10.4	7.2	7.1
	<i>Empoasca decipiens</i>														
Avg. No. per plant	1.27	0.44	0.44	1.29	0.86	1.17	0.38	0.99	1.25	0.95	1.25	0.37	0.69	1.10	0.85
Avg. No. per sticky trap	3.2	2.8	2.9	2.6	2.9	4.0	4.1	2.5	1.6	3.0	4.0	4.6	3.5	2.0	3.5
	<i>Liriomyza trifolii</i>														
Avg. No. of larvae/50 leaflets	5.3	14.6	6.8	0.2	6.7	3.6	8.0	6.5	0.1	4.6	2.7	9.2	5.3	0.1	4.3
Avg. No. of mines/50 leaflets	72.1	137.3	201.1	5.1	103.9	41.3	131.8	198.0	6.9	94.5	43.5	151.1	232.4	7.0	108.5
	Common and dominant predators														
<i>Coccinella undecimpunctata</i> /plant	0.10	0.10	0.13	0.07	0.10	0.06	0.07	0.17	0.14	0.11	0.14	0.15	0.08	0.14	0.13
<i>Orius albidipennis</i> /plant	1.74	0.42	0.18	0.11	0.61	1.58	0.37	0.27	0.14	0.59	1.53	0.22	0.21	0.25	0.55
Total predators/plant	1.84	0.52	0.31	0.18	0.71	1.64	0.44	0.44	0.28	0.70	1.67	0.37	0.29	0.39	0.68

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represented over 98% of the total aphid population (direct count). Meanwhile, the adults of aphids were abundant in the ecosystem during the whole season of broad bean (sticky trap technique). However, broad bean cultivars showed insignificant differences in infestation by aphids, jassid, thrips and leafminer.

Table 9: Occurrence of certain insects associated with three cultivars of broad bean in Minia region during 2005/2006 growing season using direct count technique.

Insects	% Occurrence by using direct count			
	Giza 2 cultivar	Giza 429 cultivar	Wally cultivar	Mean overall
Cowpea aphid	74.3	68.6	72.8	71.9 a
Green peach aphid	5.1	10.7	6.9	7.6 b
Thrips	2.4	3.6	2.8	2.9 b
Leafhopper	1.9	2.6	2.6	2.4 b
Leafminer	14.7	12.6	12.9	13.4 b
Predators	1.6	1.9	2.0	1.8 b
Total	100.0	100.0	100.0	100.0

Moreover, predators occurred with low numbers on broad bean plants and showed positive correlations with their preys (sucking pests) during December, but their numbers were unable to keep the aphid infestation below the economic threshold. Therefore, the broad bean fields must be examined every 3-7 days to avoid the outbreaks infestation by aphids.

Table 10: Occurrence of certain sucking pests infesting three cultivars of broad bean in Minia region during 2005/2006 growing season using sticky trap technique.

Sucking pests	% Occurrence by using sticky trap			
	Giza 2 cultivar	Giza 429 cultivar	Wally cultivar	Mean overall
Cowpea aphid	93.2	94.8	95.3	94.4 a
Thrips	5.1	3.6	2.9	3.9 b
Leafhopper	1.4	1.4	1.5	1.4 b
Others	0.3	0.2	0.3	0.3 b
Total	100.0	100.0	100.0	100.0

Means overall followed by the different letter are significantly different at 0.05 probability level (Qui-squar test). (For both Tables 9 & 10).

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رصد حقلى على بعض الآفات الحشرية للقول البلدى ومفترساتها المصاحبة فى مصر الوسطى

سيد حسن حسين حموده

قسم وقاية النبات – كلية الزراعة – جامعة المنيا

تم إجراء رصد حقلى على ثلاثة من أصناف الفول البلدى خلال الموسم الزراعى ٢٠٠٥/٢٠٠٦م باستخدام طريقتى العد المباشر والمصائد اللاصقة. تم تسجيل خمسة آفات حشرية وأثنين من المفترسات على جميع أصناف الفول البلدى المختبرة. كان من اللوبيا هو أكثر الآفات شيوعاً ومثل حوالى ٧٠% من مجموع الفونا الحشرية وتبعه صانعة الأنفاق (ذبابة الفول) والتى مثلت حوالى ١٣,٤%. أظهرت النتائج أن حشرات من الخوخ الأخضر وتربس القطن ونطاط أوراق البطاطس كانت أقل تواجداً أثناء موسم الزراعة. كما سجلت أعداد المفترسين المصاحبين وهما أبو العيد ذو الإحدى عشرة نقطة وبق الأوريس ارتباطاً موجباً مع فرائسها (تراوح بين ٠,٣١-٠,٦٧) والذى انعكس بأن هذه المفترسات الحشرية لم تكن قادرة على كبح أعداد من اللوبيا.

وبالإضافة إلى ذلك، فإن الإصابة العالية بمن اللوبيا تركزت أثناء المرحلة الحرجة للنمو الخضرى للقول البلدى، ولم تكن الاختلافات معنوية بين أصناف الفول البلدى الثلاثة المختبرة وهى جيزة ٢، جيزة ٤٢٩ ووالى. وعلى ذلك يجب فحص حقول الفول البلدى كل ٣-٧ أيام لتتلافى حدوث الإصابات الوبائية بهذا النوع من المن.