

EFFECT OF VARIETIES, TRAP CROPS AND BROOMRAPE CONTROL TREATMENTS ON BROOMRAPE (*Orobanche crenata* Forsk) AND FABA BEAN (*Vicia faba* L.) PRODUCTIVITY.

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Abstract

Two field experiments were conducted in naturally infested fields with broomrape (*Orobanche crenata* Forsk.) at Shandaweel Research Station, Sohag governorate during 2004/05 and 2005/06 winter seasons. The aim of this work in first experiment is to study the effect of two varieties (Misr 1 and Giza 40) and five trap crops being fenugreek, lupine, flax, coriander and turnip and in the second experiment is to study the effect of varieties (Misr 1 and Giza 40) and four *Orobanche* control treatments (glyphosate, imazapic, hand pulling and Untreated check) on controlling *Orobanche*, yield and its components in faba bean. Faba bean variety (Misr1) caused decreased number and dry weight of *Orobanche* spikes by 17.3, 17.0 and 13.1%, respectively, in both seasons as compared with variety (Giza 40). Also, faba bean varieties gave highly significant increase in faba bean yield and yield components characters in both seasons. For seed yield, faba bean variety (Misr1) increased seed yield by 175.0 and 192.9 %, respectively, in both seasons as compared with variety (Giza 40). All studied trap crops decreased significantly number and dry weight of broomrape spikes and increased significantly yield and its components in both seasons. The highest reduction percentage on number of *Orobanche* spikes obtained by hand pulling and fenugreek were (87.3 & 86.9 and 63.6 & 65.7), respectively, in both season. While, hand pulling and fenugreek decreased significantly dry weight of broomrape spikes/m² by 87.8 and 61.8 %, respectively, in first season and by 88.9 and 69.0%, respectively, in second season as compared with untreated plots. For seed yield, the highest values was obtained from fenugreek and coriander by (157.1 & 150.0%) and (200.0 & 200.0%), respectively, in both seasons compared to untreated plot. The interaction between varieties and trap crops gave the highest reduction on number and dry weight of *Orobanche* spikes and this reflected on yield and its components. In the other experiment, faba bean variety (Giza 40) decreased the number and dry weight of *Orobanche* spikes by 51.4 and 60.7 % respectively, in 2005/06 season. Also, faba bean variety (Misr1) recorded highest values of yield and yield components characters than (Giza 40) variety. For seed yield, faba bean variety (Misr1) increased seed yield by 308.3 and 66.7 %, respectively, in both seasons as compared with (Giza 40) variety. On the other hand, all *Orobanche* control treatments decreased significantly number and dry weight of *Orobanche* spikes and increased significantly yield and yield component characters in both seasons. Seed yield increased by all *Orobanche* control treatments, the highest values was obtained from imazapic and glyphosate by (133.3 & 111.1%), (140.0 and 140.0 %), respectively, in both seasons compared to untreated plot. The

interactions between varieties and Orobanche control treatments gave the highest reduction on number and dry weight of Orobanche spikes in both seasons. So, the best seed yield was obtained from the interaction between faba bean variety (Misr 1) with glyphosate and imazapic (6.4 and 6.2 ardab/fed) compared to the interaction between faba bean Giza 40 variety and untreated plot (0.4 ardab/fed) in 2004/05 season. From these results, using some integrated weed management as growing tolerant cultivars (Misr1), some trap crops (fenugreek and coriander) and application imazapic or glyphosate herbicides gave the highest reduction in Orobanche injury and increased faba bean production.

INTRODUCTION

Crenate broomrape (*Orobanche crenata* Forsk.) is a major constraint to legume cultivation in the Mediterranean region, affecting 1.12 million ha of the faba bean (*Vicia faba* L.) area (Manschadi *et al.*, 1997). The devastating effect that *O. crenata* attack has on legumes forces many farmers to delay or abandon their cultivation. Sauerborn and Saxena (1986) pointed out that losses in faba bean yield due to Orobanche infestation were from 5 to 24 %. Until now there are many methods for controlling this parasitic weed as tolerant cultivar, trap crops, hand pulling and chemical herbicides but, every method was not sufficient by it self. In Egypt, (Nassib and Ibrahim, 1978). Nassib (1982) reported that percentage of Orobanche infested faba bean plants and the number as well as the total dry weight of Orobanche spike/plant were lower in variety Giza 402 than those of other varieties (Rebaya 40, Giza 2 and Giza 4). Khalil (1983) in Egypt, found that Giza 402 plants were tolerant to Orobanche infestation and more one metric ton of seed / ha. Recently in Egypt, some faba new lines have been described with appreciable resistance such as Giza 429, Giza 674, and X-843. Also, the use of trap crops (Certain crops other than faba bean) has been tried to enhance the germination of Orobanche seed. Zahran *et al.* (1982) reported that five different crops were under sown broad bean as a trap crop. The trial had taken place at Shandaweel Research Station in heavily infested soil with *O. crenata* apparently the trap crops did result in reduction of broomrape parasitism at different levels. Megahed (1986), found that the third method (Fenugreek was broadcasted among faba bean plants) resulted in a reduced broomrape dry weight. So, faba bean sprayed with glyphosate gave the highest yield followed by the third method. Research results showed that fenugreek and coriander decreased the number of attached parasites per host plant and disturbed their development. Intercropping faba bean with fenugreek (*Trigonella foenum-graecum* L.) gave interesting results. It increased small-seeded faba bean yield by 49% compared to a highly infested check with *Orobanche foetida*, and yielded 770 Kg/ ha of fenugreek seeds (Kharrat and Halila 1999). In fact, those trap crops increased faba bean yield respectively by 18 to

15%. The cultivation of trap crops is best used as part of integrated management practices (Zemrag 2001). Bakheit *et al* (2001) revealed that intercropping faba bean with each of lupin, fenugreek and Egyptian clover markedly reduced the *Orobanche crenata* Forsk infestation of faba bean. the number of branches, the height of the first pod, the number of pods, the seed yield and the number and dry weight of *Orobanche* spikes were significantly affected by the intercropping treatments, but these had no significant influence on plant height, straw yield or 100-seed weight. intercropping faba bean with each of lupin, fenugreek and Egyptian clover increased the faba bean seed yield, consequently the economic return was also increased. Although hand weeding of broomrapes is one of the most used techniques by farmers to control *Orobanche*, this method is inefficient in highly infested faba bean fields. Indeed, continuous hand pulling of broomrape had slightly increased faba bean yield but not significantly, compared to the control in infested fields sown with a susceptible variety at Beja (Kharrat and Halila 1996). Herbicides are the most important of the available methods for *Orobanche spp.* control. Shaban *et al.* (1986), in Egypt studied the effect of different doses of glyphosate (0.82 and 122 a.i.g /ha) on broomrape in faba bean. They noticed that plant height and number of pod/ plant decreased, while number of branches/plant increased with increasing the dose glyphosate. Glyphosate gave a good control of *Orobanche* with 2spray at 15 days intervals, starting at attachment or budding stages, with 60 to 70 g a.i./ha. (Kharrat and Halila 1996) Glyphosate at the rate of 178.7cc/ha. applied twice controlled more than 96 % of broomrape and increased seeds and straw yield by 103 and 68 %, respectively (Hassanein and Kholosy, 1997). The aim of this work is to study the effect of varieties, trap crops, herbicides *Orobanche* control and their effects on controlling *Orobanche* and yield of faba bean.

MATERIALS AND METHODS

Two field experiments were conducted at Shandaweel Research Station in Sohag governorate during 2004/05 and 2005/06 winter seasons to study the effect of faba bean variety, some trap crops and herbicides on *Orobanche* and faba bean productivity.

Two faba bean cultivars (Misr 1 and Giza 40) were planted on 15th November in both seasons and trap crops were planted after 21 days from faba bean planting. Faba bean varieties were planting at the rate of 60 kg seeds /fed.on 60 cm between ridges and 25cm between hills on both sides of ridges and all trap crops planting disperse in the top of the ridges for faba bean. The rate of seed for fenugreek, lupine, flax, coriander and turnip were 20, 40, 30, 5 and 3 kg/fed., respectively. We removal

growing trap crops 3 weeks from under planting in order to avoid trap crops/faba bean competition early and improve the host crop production. The normal cultural practices were carried out according to the local recommendations. Soil texture of the experimental plots in both seasons was sandy loam. The treatments for each experiment were arranged in a split plot design in four replications. The sub plot area was 10.5 m² contains five rows 3.5 m length and 60 cm apart as follow:-

I- First experiment: Effect of varieties and trap crops on faba bean productivity:

A-Main plots (Varieties):

Misir 1 and Giza 40.

B-Sub plots (Trap crops):

Fenugreek. (*Trigonella foenum* L.), Egyptian lupine. (*Lupinus termis*, Forsk), Flax (*Linum usitatissimum* L.), Coriander (*Coriandrum sativum* L.), Turnip (*Brassica campestris* L.), hand pulling twice and untreated (check).

II- Second experiment: Effect of varieties and weed Orobanche treatments on faba bean productivity:

A-Main plots (Varieties):

Misir 1 and Giza 40.

B-Sub plots (Orobanche control treatments):-

- 1-Glyphosate {N- (phosphonomethyl) glycine} known commercially as Roundup (48% WSC) used at 2 times with a rate of 75 cc/fed. at beginning of the flowering stage at 21 days interval.
- 2- Imazapic [(±) -2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid.] known commercially as Oroban 10 % EC at the rate of 0.2 ./fed. sprayed at beginning the flowering stage with a 21 days interval.
- 3- Hand pulling twice.
- 4- Untreated (check).

The herbicidal treatments were sprayed with a knapsack sprayer equipped with one nozzle boom. The water volume used was 200 liters/fed.

2.2. Data recorded:-

A- Broomrape:-

Before faba bean harvest directly was counted number of broomrape spike/m² and dry weight of broomrape/m².

B- Yield and its components:-

At harvest, mid April, samples of ten plants were collected at random from the central rows of each plot to study the following criteria: plant height (cm), number of

branches/plant, number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and seed yield (g/plot) and then the yield of feddan from the yield plot.

Statistical analysis:-

The collected data were subjected to proper statistical analysis of split plot design according to procedure outlined by Snedecor and Cochran (1967). Means were compared at 5% level of significance by the least significant different (L.S.D) test.

RESULTS AND DISCUSSION

I- First experiment: Effect of varieties and trap crops on faba bean productivity:

1-Effect of varieties :

The data in Table (1) showed that faba bean Masr 1 variety decreased the number and dry weight of broomrape spikes/m² by 17.3, 17.0 and 13.1%, respectively, in 2004/05 and 2005/06 seasons as compared with faba bean Giza 40 variety. It is suggested that the promotion of resistance may be attributed to one or more of the following factors: No production of stimulant or production of inhibitors, dilution or wash of stimulant by excess water in the rhizosphere, difficulty in translocation substances from the host plant where its osmotic pressure is very high, difficulty of penetration of the haustorium into the host root, based on lignifications or mechanical barriers formation. These results are in line with those obtained by Nassib (1982).

Table 1. The effect of faba bean varieties on broomrape growth, yield and yield components of faba bean in 2004/05 and 2005/06 winter seasons.

Varieties	2004 / 05 winter season							
	Orobanche		Faba bean					
	No. of spikes /m ²	Weight of spikes /m ²	Plant height (cm)	No. of branches / plant	No. of pods / plant	Weight of pods / plant	Seed weight (g) / plant	Seed yield ardab / fed
Misr 1	6.7	11.4	108.4	2.4	8.5	20.5	17.2	4.4
Giza 40	8.1	13.4	94.3	2.5	5.5	12.5	9.1	1.6
L.S.D _{0.05}	0.4	N.S	3.5	N.S	1.2	1.2	1.3	0.4
Varieties	2005 / 06 winter season							
	No. of spikes /m ²	Weight of spikes /m ²	Plant height (cm)	No. of branches / plant	No. of pods / plant	Weight of pods / plant	Seed weight (g) / plant	Seed yield ardab / fed
	Misr 1	4.4	7.3	107.7	2.8	9.9	19.8	15.6
Giza 40	5.3	8.4	93.8	2.1	3.5	7.3	4.0	1.4
L.S.D _{0.05}	0.2	0.9	0.7	0.2	0.6	2.1	0.9	0.3

Data recorded in Table (1) revealed that two faba bean varieties significantly differed in plant height (cm), number of branches/plant, number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and seed yield (ardab/fed) in both seasons, except weight of spikes /m² and number of branches/plant in the first season. Faba

bean Misr 1 variety recorded highest values of plant height (cm), number of branches/plant, number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and seed yield (ardab/fed) than faba bean Giza 40 variety. For seed yield (ardab/fed) faba bean Misr 1 variety increased seed yield by 175.0 and 192.9 %, respectively, in 2004/05 and 2005/06 seasons as compared with faba bean Giza 40 variety. These results are in agreement with those of Khalil (1983).

2- Effect of trap crops :

Data recorded in Table (2) revealed that all trap crops decreased significantly number and dry weight of broomrape spikes in both seasons. Hand pulling twice, fenugreek, turnip and flax decreased significantly number of broomrape spikes by 87.3, 63.6, 58.8 and 58.2 %, respectively, in 2004/05 season and Hand pulling twice, fenugreek, flax and coriander decreased significantly number of broomrape spikes by 86.9, 65.7, 63.6 and 49.5 %, respectively, in 2005/06 season. While hand pulling twice, fenugreek, flax, lupine and turnip decreased significantly weight of broomrape spikes by 87.8, 61.8, 56.9 and 55.3 %, respectively, in 2004/05 season and hand pulling twice, fenugreek, flax and coriander decreased significantly weight of broomrape spikes by 88.9, 69.0, 67.8 and 54.4%, respectively, in 2005/06 season. This is my be due to trap crop plants are those that induce germination of *Orobanche* seeds but their roots don't allow normal attachment and parasite development. They are sometimes known as "false hosts". These results are in agreement with those of Megahed (1986) and Bakheit *et al*/(2001).

Table 2. The effect of trap crops on broomrape control, yield and yield components of faba bean in 2004/05 and 2005/06 winter seasons.

Trap crops	2004 / 05 winter season							
	Orobanche		Faba bean					
	No. of spikes /m ²	Weight of spikes /m ²	Plant height (cm)	No. of branches / plant	No. of pods / plant	Weight of pods / plant	Seed weight (g) / plant	Seed yield ardab / fed
1- Fenugreek	6.0	10.0	104.1	2.4	7.3	17.0	13.3	3.6
2- Lupine	7.0	11.7	104.9	2.5	7.7	18.7	15.5	3.3
3- Flax	6.9	11.3	98.8	2.4	6.1	14.5	11.5	3.3
4- Coriander	7.0	12.4	103.5	2.8	8.2	18.9	15.2	3.5
5- Turnip	6.8	11.9	102.6	2.3	6.8	16.7	13.5	2.9
6-H.W twice	2.1	3.2	99.9	2.5	7.0	16.4	12.9	3.0
7- Untreated	16.5	26.2	95.9	2.1	6.1	13.1	10.2	1.4
L.S.D _{0.05}	0.8	1.5	2.6	0.2	0.9	1.7	1.7	0.3
2005 / 06 winter season								
1- Fenugreek	3.4	5.3	104.3	2.5	7.4	14.0	10.5	3.6
2- Lupine	5.4	8.4	104.9	2.6	7.0	13.9	10.5	2.7
3- Flax	3.6	5.5	97.00	2.3	8.1	15.6	11.6	2.8
4- Coriander	5.0	7.8	100.1	2.8	8.2	16.2	12.1	3.6
5- Turnip	5.2	9.1	97.8	2.3	5.8	13.4	9.8	3.2
6-H.W twice	1.3	1.9	103.8	2.6	6.2	12.9	8.9	2.3
7- Untreated	9.9	17.1	97.5	2.2	4.4	9.1	5.6	1.2
L.S.D _{0.05}	0.8	1.1	2.6	0.2	0.8	1.6	1.4	0.5

The data in Table (2) reported that all trap crops increased significantly plant height (cm), number of branches/plant, number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and seed yield (ardab/fed) in both seasons. All trap crops gave the highest values of plant height (cm), number of branches/plant, number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and seed yield (ardab/fed) than untreated check treatment in both seasons. Seed yield (ardab/fed) increased by all trap crops, the highest values was obtained from fenugreek, coriander, lupine and flax in 2004/05 season and fenugreek, coriander, turnip and flax in 2005/06 season which were 157.1, 150.0, 135.7 and 135.7, respectively, in first season and 200.0, 200.0, 166.7 and 133.3 %, respectively, in second season compared to untreated plot in both seasons. This increase of seed yield may be due to the increase number of branches/plant, number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and due to the decrease of the number and dry weight of broomrape spikes. These results are in agreement with those of Kharrat and Halila (1999) and Bakheit *et al* (2001).

3- Interaction between varieties and trap crops on broomrape control, yield and yield component s of faba bean :

3-1-2004/05 season.

Table (3) showed that all interactions between varieties and trap crops gave the highest reduction on number and dry weight of broomrape spikes. The greatest reduction percentage for the number and dry weight of broomrape spikes were obtained from interaction between faba bean Giza 40 and Misr1 varieties with hand pulling twice by 90.6, 90.8, 86.3 and 86.2 %, respectively, followed by faba bean Misr 1 variety and fenugreek were 73.3 and 73.4 %, respectively, compared to faba bean Giza 40 variety and untreated plot. All interactions between varieties and trap crops increased plant height (cm), number of branches/plant, number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and seed yield (ardab/fed). The tallest plants were obtained from faba bean Misr 1 variety and turnip but the shortest plants were resulted from faba bean Giza 40 variety and untreated plot.

The interaction between faba bean Giza 40 variety and Coriander gave the highest value for number of branches/plant while the lowest value was obtained from faba bean Misr 1 variety and untreated plot. The highest value of number of pods/plant were obtained from faba bean Misr1 variety and lupine compared to faba bean Giza 40 variety and flax which gave the lowest value for this characters. The greatest weight of pods (g/plant) and seed weight (g/plant) were obtained from faba bean Misr 1 variety and Coriander while, the lowest values was obtained from the interaction between faba bean Giza 40 variety and check. The best seed yield (ardab/fed) was obtained from the interaction between faba bean Misr 1 variety and Fenugreek (5.6 ardab/fed) but, the lowest seed yield (0.7 ardab/fed) was resulted from the interaction between faba bean Giza 40 variety and untreated plot.

3-1-2005/06 season.

The data in Table (3) indicated that the interaction between varieties and trap crops was significant on dry weight of broomrape spikes only. The greatest reduction percentage for the dry weight of broomrape spikes were obtained by the interaction between faba bean Giza 40 and Misr 1 varieties and hand pulling twice by 90.9, 88.2 %, respectively, followed by faba bean Misr 1 variety with fenugreek and flax by 77.0 and 74.9 %, respectively, compared to faba bean Giza 40 variety and untreated plot. All interactions between varieties and trap crops were highly significant for plant height (cm), number of branches/plant, number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and seed yield (ardab/fed). The tallest plants were obtained from faba bean Misr 1 variety with lupine but, the shortest plants were resulted from faba bean Giza 40 variety and turnip.

Table 3. The interaction effect between faba bean varieties and trap crops on broomrape control, yield and yield components in 2004/05 and 2005/06 seasons.

Treatments		2004 / 05 winter season							
		Orobanche		Faba bean					
Varieties	Trap crops.	No. of spikes /m ²	Weight of spikes /m ²	Plant height (cm)	No. of branches / plant	No. of pods/ plant	Weight of pods / plant	Seed weight (g) / plant	Seed yield ardab / fed
Misr 1	1- Fenugreek	4.8	7.5	108.3	2.5	8.1	18.8	15.3	5.6
	2- Lupine	6.9	11.5	110.8	2.4	10.1	23.2	20.2	4.8
	3- Flax	6.00	10.4	103.8	2.3	8.1	18.9	16.0	4.7
	4- Coriander	6.4	11.5	112.8	2.8	10.0	24.5	20.4	5.1
	5- Turnip	5.8	10.7	113.8	2.3	8.4	22.2	19.0	4.1
	6-H.W twice	2.5	3.9	103.0	2.3	8.3	19.3	15.7	4.5
	7- Control	15.1	24.1	106.8	2.1	6.9	16.3	13.6	2.0
Giza 40	1- Fenugreek	7.1	12.4	100.0	2.4	6.6	15.2	11.3	1.6
	2- Lupine	7.1	11.9	99.0	2.5	5.4	14.5	10.8	1.7
	3- Flax	7.9	12.2	93.8	2.4	4.2	10.1	7.0	1.8
	4- Coriander	7.6	13.1	94.3	2.9	6.3	13.3	10.0	1.9
	5- Turnip	7.7	13.2	91.5	2.4	5.2	11.2	8.0	1.7
	6-H.W twice	1.7	2.6	96.8	2.7	5.7	13.5	10.0	1.5
	7- Control	18.0	28.2	85.0	2.2	5.4	9.9	6.7	0.7
L.S.D _{0.05}		1.2	2.1	3.7	N.S	1.2	2.4	2.4	0.5
		2005 / 06 winter season							
Misr 1	1- Fenugreek	2.8	4.3	106.5	2.9	10.0	17.9	14.8	5.1
	2- Lupine	4.8	7.8	115.0	2.9	10.0	19.5	16.0	4.3
	3- Flax	2.9	4.7	104.3	2.8	12.0	22.8	18.7	4.1
	4- Coriander	4.9	7.4	105.0	3.0	12.1	23.9	19.3	5.2
	5- Turnip	5.1	9.2	108.3	2.8	8.9	21.0	16.7	5.0
	6-H.W twice	1.4	2.2	111.8	2.9	9.7	19.9	14.9	3.3
	7- Control	9.1	15.5	103.0	2.7	6.8	13.8	9.0	1.8
Giza 40	1- Fenugreek	4.0	6.2	102.0	2.2	4.8	10.1	6.1	2.2
	2- Lupine	6	8.9	94.8	2.3	4.0	8.2	4.9	1.1
	3- Flax	4.3	6.3	89.8	1.9	4.3	8.4	4.5	1.6
	4- Conander	5.2	8.2	95.3	2.6	4.4	8.6	4.9	2.1
	5- Turnip	5.3	8.9	87.3	1.8	2.8	5.9	2.9	1.4
	6-H.W twice	1.2	1.7	95.8	2.4	2.6	5.9	2.8	1.2
	7- Control	10.7	18.7	92.0	1.7	2.1	4.4	2.1	0.6
L.S.D _{0.05}		N.S	1.6	3.6	0.3	1.1	2.2	2.0	0.7

The interaction between faba bean Misr 1 variety and coriander gave the highest values for number of branches/plant while the lowest values was obtained from faba bean Giza 40 variety and untreated plot. The greatest number of pods/plant, weight of pods (g/plant) and seed weight (g/plant) was obtained from

faba bean Misr 1 variety and Coriander while, the lowest values were obtained from the interaction between faba bean Giza 40 variety and control treatment. The best seed yield (ardab/fed) was obtained from Misr 1 variety and Coriander (5.20 ardab/fed) but, the lowest seed yield (0.60 ardab/fed) was resulted from Giza 40 variety and untreated plot.

II- Second experiment: Effect of varieties and weed Orobanche treatments on faba bean productivity:

1-Effect of varieties :

Data presented in Table (4) showed that tested two faba bean varieties had no significant effect on the number and dry weight of broomrape spikes in first season. Faba bean Giza 40 variety decreased the number and dry weight of broomrape spikes by 51.4 and 60.7 % respectively, in 2005/06 seasons as compared with faba bean Misr1 variety. The result may be due to death of Giza 40 plants (host) which led to the death of *Orobanche* plants (parasite). Thus, decrease the number and weight of *Orobanche* spikes.

The data in Table (4) revealed that two faba bean varieties significantly differed on yield and its components in both seasons except number of branches/plant in both seasons and number of pods/plant in the first season. Variety Misr1 recorded highest values of plant height (cm), number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and seed yield (ardab/fed) than faba bean Giza 40 variety.

Table 4. Effect of varieties on broomrape control, yield and yield components of faba bean in 2004/2005 and 2005/2006 seasons.

Varieties	2004 / 05 winter season							
	Orobanche		Faba bean					
	No. of spikes /m ²	Weight of spikes /m ²	Plant height (cm)	No. of branches / plant	No. of pods / plant	weight of pods / plant	Seed weight (g) / plant	Seed yield ardab / fed
Misr 1	5.3	28.9	105.7	3.1	10.8	22.9	16.7	4.9
Giza 40	4.6	28.0	98.5	2.8	7.8	15.2	10.6	1.2
L.S.D _{0.05}	NS	NS	3.6	NS	NS	1.7	1.3	0.8
2005 / 06 winter season								
Misr 1	3.7	8.9	102.3	3.5	8.2	17.0	11.7	2.5
Giza 40	1.8	3.5	79.3	2.2	3.4	6.8	3.8	1.5
L.S.D _{0.05}	0.8	0.9	4.8	NS	1.5	1.6	1.2	0.2

For seed yield (ardab/fed) faba bean Misr 1 variety increased seed yield by 308.3 and 66.7 %, respectively, in 2004/05 and 2005/06 seasons as compared with faba bean Giza 40 variety. These results are in harmony with those obtained by Khalil (1983).

2- Effect of some herbicides :

Data recorded in Table (5) revealed that all broomrape control treatments decreased significantly number and dry weight of broomrape spikes in both seasons. Imazapic and hand pulling twice decreased significantly number and dry weight of broomrape spikes by 97.6, 73.4, 97.7 and 73.0 %, respectively, in 2004/05 season and 95.8, 94.7, 95.9 and 95.9 %, respectively, in 2005/06 season. They suggest that glyphosate may be effective against broomrape because of its translocation from host to parasite through the phloem Zahran *et al.* (1980). Arjon- Berral *et al.* (1990) reported that the action of glyphosate on *O. crenata* is attributable to its selective accumulation in the young parasite plant up to a level four times as high as that in faba bean host root three days after spraying . These results are in agreement with those of Megahed (1986) and Hassanein and Kholosy (1997).

The data in Table (5) reported that all broomrape control treatments increased significantly yield and its components in both seasons. All broomrape control treatments gave the highest values of plant height (cm), number of branches/plant, number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and seed yield (ardab/fed) than untreated check treatment in both seasons. Seed yield (ardab/fed) increased by all broomrape control treatments, the highest values were obtained from Imazapic and Glyphosate in both seasons by 133.3, 111.1, 140.0 and 140.0 %, respectively, in 2004/05 and 2005/06 seasons compared to untreated plot. These results are in agreement with those of Shaban *et al.* (1986) and Hassanein and Kholosy (1997).

Table 5. Effect of weed control treatments on broomrape control, yield and yield components of faba bean in 2004/2005 and 2005/2006 winter seasons.

Weed control treatment	2004 /2005 winter season							
	Orobanche		Faba bean					
	No. of spikes /m ²	Weight of spikes /m ²	Plant height (cm)	No. of branches / plant	No. of pods / plant	Weight of pods / plant	Seed weight (g) / plant	Seed yield ardab / fed
Glyphosate	3.9	25.2	103.3	3.1	9.9	19.8	14.5	3.8
Imazapic	0.3	1.6	103.6	3.2	9.5	20.7	15.7	4.2
Hand pulling	3.3	18.5	106.3	3.2	11.3	20.6	15.0	2.4
control	12.4	68.4	95.2	2.0	6.5	15.1	9.3	1.8
L.S.D _{0.05}	0.6	4.3	5.0	0.4	1.3	2.0	1.3	0.4
2005 /2006 winter season								
Glyphosate	0.6	0.9	94.0	3.0	8.1	15.7	10.6	2.4
Imazapic	0.4	0.9	94.1	3.4	7.1	14.4	9.5	2.4
Hand pulling	0.5	0.9	94.1	2.7	5.5	12.3	7.3	2.3
control	9.5	22.2	80.8	2.3	2.6	5.3	3.6	1.0
L.S.D _{0.05}	0.9	1.1	6.0	0.5	1.2	1.6	1.5	0.3

3- Interaction between varieties and broomrape control treatments.

Table (6) showed that all interactions between varieties and broomrape control treatments gave the highest reduction on number and dry weight of broomrape spikes in both seasons. The greatest reduction percentage for the number and dry weight of broomrape spikes were obtained by the interaction between faba bean Misr 1 variety with imazapic, faba bean Giza 40 variety with imazapic followed by faba bean Giza 40 variety with hand pulling twice by 100.0, 100.0, 96.5, 95.5, 81.1 and 80.1 %, respectively, in 2004/05 season compared to faba bean Misr. 1 variety with control treatment. In 2005/06, the greatest reduction percentage for the number and dry weight of broomrape spikes were obtained by the interaction between faba bean Misr1 variety with imazapic, hand pulling twice and Glyphosate so faba bean Giza 40 variety with imazapic and hand pulling twice. were 97.0, 97.0, 96.3, 97.3, 96.3, 97.3, 96.3, 97.3, 96.3 and 97.3 %, respectively, compared to faba bean Misr1 variety and untreated plot. All interactions between varieties and broomrape control treatments increased yield and its components in both seasons except plant height (cm) and number of branches/plant in both seasons, weight of pods/plant in the first season and seed yield (ardab/fed) in second season. The highest value of number of pods/plant were obtained from faba bean Misr1 variety with hand pulling twice and Glyphosate compared to faba bean Giza 40 variety with untreated plot in both seasons. The greatest weight of pods (g/plant) was obtained from faba bean Misr 1 variety with Glyphosate while, the lowest values was obtained from the interaction between faba bean Giza 40 variety and control treatment in second season. The greatest weight of seed (g/plant) was obtained from faba bean Misr 1 variety with hand pulling twice and Glyphosate, respectively, in both seasons while, the lowest values was obtained from the interaction between faba bean Giza 40 variety and control treatment. The best seed yield (ardab/fed) was obtained from the interaction between faba bean Misr 1 variety with Glyphosate and imazapic (6.4 and 6.2 ardab/fed) but, the lowest seed yield (0.4 ardab/fed) was resulted from the interaction between faba bean Giza 40 variety and untreated plot in 2004/05 season.

CONCLUSION

From these results, using integrated management as growing tolerant cultivars (Misr1), some trap crops (fenugreek and coriander) and application imazapic or glyphosate herbicides gave the highest reduction in Orobanche injury and increased faba bean seed yield.

Table 6. Effect of interaction between varieties and weed control treatment on broomrape control, yield and yield components of faba bean in 2004/2005 and 2005/2006 winter seasons.

Treatments		2004/2005 winter season					2005 /2006 winter season				
		Orobanche		Faba bean			Orobanche		Faba bean		
		No. of spikes /m ²	No. of spikes /m ²	No. of pods / plant	Seed weight (g) / plant	Seed yield ardab / fed	No. of spikes /m ²	No. of spikes /m ²	No. of pods / plant	Weight of pods / plant	Seed weight (g) / plant
Misr 1	Glyphosate	3.1	19.4	11.1	17.8	6.4	0.5	0.9	12.2	23.2	16.7
	Imazapice	0.0	0.0	9.9	16.4	6.2	0.4	1.0	10.5	20.9	15.2
	hand pulling	3.4	22.4	14.7	20.0	4.0	0.5	0.8	7.1	16.8	10.4
	control	14.3	73.8	7.4	12.7	3.2	13.4	33.1	3.1	7.1	4.7
Giza 40	Glyphosate	4.8	31.0	8.7	11.2	1.2	0.8	0.9	3.9	8.2	4.5
	Imazapice	0.5	3.3	9.1	15.0	2.1	0.5	0.9	3.8	7.9	3.9
	hand pulling	2.7	14.7	7.9	10.0	0.9	0.5	0.9	3.9	7.7	4.3
	control	10.5	63.0	5.7	6.4	0.4	5.7	11.3	2.0	3.5	2.4
L.S.D _{0.05}		0.9	6.1	1.9	1.8	0.6	1.3	1.6	1.7	2.3	2.3

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تأثير الاصناف، المحاصيل الصائدة ومعاملات مكافحة الهالوك

على الهالوك و انتاجية الفول البلدي

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المعمل المركزي لبحوث الحشائش- مركز البحوث الزراعية- الجيزة

أقيمت تجربتين حقليتين في حقول مصابة بالهالوك بمحطة البحوث الزراعية بشندويل - سوهاج خلال موسمي النمو ٢٠٠٤/٢٠٠٥ و ٢٠٠٥/٢٠٠٦. اجريت التجربة الأولى لدراسة تأثير صنفين من الفول البلدي (مصر ١ و جيزة ٤٠) وستة محاصيل صائدة هي الحلبة، الترمس ، الكنان ، الكزبرة واللفت بالاضافة الى معاملة النقاوة اليدوية و المقارنة (بدون معاملة). واجريت التجربة الثانية لدراسة تأثير الصنفين السابقين واربعه معاملات مكافحة الهالوك (راونداب، أوربان ، نقاوة يدوية و بدون معاملة) على مكافحة الهالوك و المحصول و مكوناته في الفول البلدي.

أشارت النتائج إلى أن الصنف مصر ١ قلل من العدد والوزن الجاف لشماريخ الهالوك بنسبة ١٧,٣ ، ١٧,٠ ، ١٣,١ % في الموسمين على الترتيب مقارنة بالصنف جيزة ٤٠. وكذلك أعطت الأصناف زيادة معنوية في صفات المحصول ومكوناته في الموسمين. وبالنسبة محصول البذور فقد زاد محصول صنف مصر ١ على صنف جيزة ٤٠ بنسبة ١٧٥,٠ ، ١٩٢,٩ % في الموسمين على الترتيب. كما احدثت المحاصيل الصائدة انخفاضاً معنوياً في كل من العدد والوزن الجاف لشماريخ الهالوك/م^٢ وزيادة معنوية في صفات المحصول ومكوناته في الموسمين. نسبة النقص العالية في عدد شماريخ الهالوك نتجت من استخدام النقاوة اليدوية و الحلبة (٨٧,٣ و ٨٦,٩ %) و (٦٣,٦ و ٦٥,٧ %) على الترتيب في الموسمين. كذلك أعطت معاملة النقاوة اليدوية والحلبة نقص معنوي في الوزن الجاف لشماريخ الهالوك/م^٢ وبنسبة ٨٧,٨ و ٦١,٨ في الموسم الأول على التوالي و بنسبة ٨٨,٩ و ٦٩,٠ % على الترتيب في الموسم الثاني مقارنة بمعاملة الكنترول. و بالنسبة محصول البذور أردب / فدان، فقد تم الحصول على اعلى قيم من معاملة الحلبة والكزبرة بمقدار (١٥٧,١ و ١٥٠,٠) و (٢٠٠,٠ و ٢٠٠,٠ %) على الترتيب في الموسمين مقارنة بمعاملة الكنترول. أدى التأثير المشترك بين الاصناف والمحاصيل الصائدة الى نقص معنوي كبير في كل من عدد ووزن شماريخ الهالوك/م^٢ في الموسمين والذي انعكس على المحصول ومكوناته. في التجربة الأخرى، حيث أعطى

صنف الفول جيزة ٤٠ نقص في العدد و الوزن الجاف لشماريخ الهالوك/م بمقدار ٥١,٤ و ٦٠,٧ على الترتيب في موسم ٢٠٠٦/٢٠٠٥. أيضا سجل صنف مصر ١ أعلى قيم للمحصول ومكوناته مقارنة بالصنف جيزة ٤٠ . بالنسبة محصول البذور أردب / فدان، أعطى صنف مصر ١ زيادة في محصول البذور بمقدار ٣٠٨,٣ و ٦٦,٧ % على الترتيب في الموسمين مقارنة بالصنف جيزة ٤٠ . من ناحية أخرى، أعطت جميع معاملات مقاومة الهالوك نقص معنوي في العدد والوزن الجاف لشماريخ الهالوك/م^٢ وزيادة معنوية في صفات المحصول ومكوناته في الموسمين. أعطت جميع معاملات مقاومة الهالوك زيادة في محصول البذور وأعلى قيمة نتجت من استخدام مبيد الاوربان والراونداب بمقدار (١١١,١٨٣٣,٣ %) و (١٤٠,٠ & ١٤٠,٠ %) على الترتيب في الموسمين مقارنة بمعاملة الكنترول . أعطى التفاعل المشترك بين الأصناف معاملات مقاومة الهالوك إلى نقص معنوي في كل من العدد والوزن الجاف لشماريخ الهالوك/م^٢ في الموسمين. كذلك، تم الحصول على أعلى محصول من التفاعل بين صنف مصر ١ مع مبيد الراونداب و الاوربان (٦,٤ & ٦,٢ أردب / فدان) مقارنة بالتفاعل بين صنف جيزة ٤٠ مع الكنترول (٠,٤ أردب / فدان). نستنتج من هذه الدراسة أن استخدام بعض عناصر المكافحة المتكاملة بزراعة الأصناف الأكثر تحملا للإصابة بالهالوك مثل مصر ١، باستخدام بعض المحاصيل الصائدة كالحلبة والكزبرة واستخدام مبيد الاوربان والراونداب بالمعدلات الموصى بها يقلل الى حد كبير من الإصابة بالهالوك مع تعظيم إنتاجية الفول البلدي بمحافظة سوهاج .