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FABA BEAN YIELD LOSSES DUE TO OROBANCHE INFESTATION AND EFFECT OF PLANT DENSITY AND WEED CONTROL ON ANNUAL WEEDS AND OROBANCHE AND FABA BEAN PRODUCTIVITY

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ABSTRACT

Two field experiments were conducted in naturally infested fields with weeds and broomrape (*Orobanche crenata* Forsk.) at Shandaweel Research Station, Sohag governorate during 2006/07 and 2007/08 winter seasons to estimate yield losses due to Orobanche infestation and to study the effect of plant density and some weed control treatments on controlling annual weeds; Orobanche and faba bean yield and its components.

In the first experiment, results indicated significant correlation between number of orobanche spikes and weight of orobanche spikes, plant height, number of pods/plant, weight of pods/plant and weight of seeds/faba bean plant in both seasons except number of branches/plant in the first season. Data showed clearly that the existence of one and four orobanche spike/faba bean plant decreased seed yield by 19.9 % and 46.6 % in the first season and by 14.3 and 50.0 %, respectively, in the second season. In the second experiment, the data showed that increasing plant density from 13 to 27 plants per m^2 reduced dry weight of grassy, broad-leaved, grassy, and total weeds by 51.9, 24.1and 32.8 %, respectively, in the first season and by 17.8, 19.1and 18.7 %, respectively, in the second season. Contrary, increasing plant density from 13 to 27 plants per m^2 increased number and dry weight of orobanche spikes/m^2 by 13.2, 10.8%,

24.0 and 10.7%, respectively, in the first and the second seasons and increased seed yield of faba bean by 60.7 and 50.0 %, respectively, in the first and the second seasons. All weed control treatments reduced the dry weight of annual weeds, number and dry weight of orobanche spikes and increased all faba bean characters compared with the untreated plots. Hand hoeing twice and black plastic 8 WAP achieved good control of annual weeds. The highest values for seed yield was obtained from hand hoeing and pulling, Bazagran + Fusilade + Oroban herbicides and white plastic 8 WAP by 171.4, 128.6 and 85.7 %, respectively, in the first season and from hand hoeing and pulling, Bazagran + Fusilade + Oroban herbicides and white plastic 6 WAP by 134.8, 1174 and 69.6 %, respectively, in the second season. The best treatments for faba bean yield and quality were achieved from high plant density with hand hoeing and pulling twice and Bazagran + Fusilade + Oroban herbicides

INTRODUCTION

Faba bean (*Vicia faba* L.) is the fourth most important pulse crop in the world. It occupies the greatest legume crops area planted in the Arab countries (Amin, 1988). Faba bean is a valuable food legume rich in proteins and carbohydrate (Karamanos *et al.*, 1994). The low yield obtained locally may be attributed to several factors, including cultivars and poor cultural practices, such as bad management of faba bean production. One of the most important constraints to faba bean production is the infestation with annual and parasitic weeds of the genus *Orobanche*. These weeds make faba bean growers suffer strongly from the effect of these weeds. Reduction in faba bean yield, resulting from weed competition accounted for about 30.0 to 44.0 % (Hassan, 1987). Yield losses, due to weed infestation were estimated by 62.2% (Hassanein *et al.* 1998b). Al-Marsafy *et al.* (1998) found that weed infestation was estimated by 19.7 t /ha. of annual weeds and 0.95 t/ha. of orobanche. Nehra and Malik (1999) found that weed competition caused 60 and 72% yield reduction compared to weed free treatments during both seasons.

The parasitic weed *Orobanche crenata* Forsk seriously affects the faba bean crop causing significant yield losses. Estimation the level of Orobanche infection to faba bean and yield losses is very

helpful for researchers. Mesa Garcia and Garcia Torres (1985) reported that four crenate broomrape reduce broad bean by half Gm. (1/2/gm). In Egypt, there is a few study about the level of Orobanche infection and faba bean yield reduction. Hassanein *et al.* (1998a) indicated that one Orobanche spike per plant can decrease faba bean seed yield by 15 % and four spikes /faba bean plant can decrease seed yield by 55 %. In some governorates (Monofia) of the Nile Delta, 1-4 orobanche spikes / faba bean plants decreased seed yield by 15-53 % (ARC 1998). Density influences plant establishment, growth, seed yield, and the profitability of a crop. Salwau(1994) reported that weed fresh weight (FW) decreased with increasing plant density but yield was higher with increasing plant density . Nassib *et al.* (1982) noted that increasing plant population decreased total fresh weight of weeds at 3 months after sowing and increased seed and straw yields. Hand weeding increased seed and straw yields and 100-seed weight. The best faba bean yield was obtained at plant density of 25 plants/m^2 in Romania (Comarovschi, 1974) and Bianchi (1979) in Italy, obtained the highest yields at 40 and 85 plants/m^2, respectively. In Spain, Caballero (1987) found that increasing plant population from 10 to 50 plants/m^2 increased seed yield from 4.59 to 5.23 tons /ha. The use of plastic mulching is very popular in many vegetable-growing areas. A non-transparent plastic is used to impede the transmission of photosynthetic radiation through the plastic to the weeds so that the development of weeds is then arrested. Advantages are also better moisture conservation as a reduction in irrigation needs means a reduction in nitrogen leaching, a better soil structure conservation, and an increase in the vegetable yield. Ebaid (1990) found that all weed control treatments (Topogard [terbuthylazine + terbutryn], hand weeding and mulching with polyethylene) lowered the number of weeds in faba bean from 74.5-76.0, 54.2-61.4 and 4.4-4.8 plants/m^2, respectively, compared to the untreated control 134.0-152.0 plants/m^2 and increased crop seed yields from 8.5-8.7, 7.2-7.5 and 9.5-9.8 ardab/ feddan, respectively, compared to the untreated control 6.8-7.0 ardab/ feddan. 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). Nehra and Malik (1999) showed that two hand weedings at 30 and 60 DAS gave an effective level of weed control. Herbicides are the most important of the available methods for annual weeds and *Orobanche spp.* control. The best control and highest seed yield of faba bean were achieved by application of Bentazon (Heath *et.al.* 1992; El-Metwally and Ahmed, 2001 and Saad El-Din, 2003) and Fluazifop-butyl (Tanji, 1994 and Metwally, 2002). Heath *et.al* (1991) noted that Bentazone controlled many broadleaved weeds as effectively as pre-em. treatments when applied post-em. at the full dose (1.44 kg/ha). Yehia and Mekky (2002) reported that the tallest and heaviest plants were obtained with 200 cm^3 Oroban /feddan applied twice. The highest number of branches, number of pods, pod weight, seed weight, and seed yield were obtained with Roundup applied thrice, followed by 200 cm^3 Oroban /feddan.

The aim of this work was to estimate yield losses, due to Orobanche infestation, and study the effect of density and weed control treatments on annual weeds , Orobanche , yield and yield components of faba bean .

MATERIAL AND METHODS

Two field experiments were conducted at Shandaweel Agriculture Research Station, Sohag Governorate, Egypt during 2006/07 and 2007/08 winter seasons to estimate yield losses due to Orobanche infestation and to study the effect of plant density and plastic mulching on annual weeds, Orobanche, yield and yield components of faba bean . The texture of soil was clay loam. Two experiments were conducted:-

In the first experiment, faba bean (Misr1) seeds were planted in hills, 20 cm distance and 60 cm ridges width. At harvest, number and weight of Orobanche spikes/ faba bean plant (g), plant height (cm), number of branches, number of pods, weight of pods (g) and plant

yield for every faba bean plant (g) were estimated in samples of 320 faba bean plants for both seasons. The samples were analyzed to study the correlation between number of Orobanche and above characters.

The second experiment was conducted to find out the effects of plastic mulches and weed control treatments in conserving moisture and improving the growth and yield of faba bean (*Vicia faba* L.). A split plot design in three replicates was used in this investigation. The treatments were arranged as follows:

A: Main plot (Density):

1- Faba bean (Misr 1) seeds were planted on one side of the ridge (60 cm), 25 cm between hills and thinned to two plants/ hill; density of faba bean was 13.0 plants /m^2.

2- Faba bean (Misr 1) seeds were planted on two sides of the ridge (60 cm), 25 cm between hills and thinned to two plants/ hill; density of faba bean was 27.0 plants /m^2.

B-Sub plot (weed control methods):

1. Black plastic mulching (6 week after planting).
2. Black plastic mulching (8 week after planting).
3. White plastic mulching (6 week after planting).
4. White plastic mulching (8 week after planting).
5. Bazagran 48% as (Bentazon) at rate of 750 cc/fed. + Fusilade super EC 12.5% (Fluazifop-p-butyl) at rate of 1.5 l/fed at 30 days after sowing + Oroban 10% EC (imazapic) at the rate of 0.2 L/fed. sprayed at beginning the flowering stage with a 21 days interval
6. Hand hoeing twice before first and second irrigation along with hand pulling at 12 and 14 weeks from planting.
7. Untreated (check).

Covering with black and white polyethylene sheets 50µm for 6 and 8 week after planting achieved after irrigation and before planting faba bean and removed carefully after these times. Knapsack sprayer was used with water volume of 200 L/fed. Nitrogen fertilization and other cultural practices except weed control and varieties were carried as recommended. Faba bean was planted on 14th November and 12nd November in the first and second seasons, respectively. The preceding

summer crop was corn in both seasons. Experimental plot consisted of 3 ridges, 60 cm width, and 2.5 meters long (4.5m^2).

Data recorded

A- Annual weeds

Weeds were hand pulled from one square meter taken randomly from each plot at 60 days after sowing and classified to broadleaved and grassy weeds and were air dried for seven days and then oven dried at 70 °C until reaching a constant weight and weighed to record : Dry weight of broadleaved, grassy and total weeds g/m^2.

B- Orobanche:-

Before faba bean harvest the number and dry weight of broomrape spike/m^2 were estimated.

C- Yield and yield component:-

At harvest, five plants of faba bean were randomly taken to determine yield parameters: plant height (cm), number of branches /plant, number of pods/plant, weight of pods /plant (g), weight of seeds /plant (g) and 100-seed weight (g), while the yield/fed. was determined from the whole plots.

Data obtained were subjected to statistical analysis of variance (ANOVA) as split-plot design. The treatment means were compared using the least significant differences (LSD) mentioned by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Yield losses due to Orobanche infestation

Data in Table 1 reveal positive significant correlation among number of orobanche spikes/plant and weight of orobanche spikes. Negative significant correlation was detected between number of orobanche spikes/plant along with plant height, number of pods/plant, weight of pods/plant and weight of seeds/plant. However, insignificant relationship among number of orobanche spikes /plant and number of branches/plant in 2006/07 season. In 2007/08 season, correlation among number of orobanche spikes/plant and weight of orobanche spikes was significantly positive, while, the correlation between number of orobanche spikes/plant and plant height, number

of branches/plant, number of pods/plant, weight of pods/plant and weight of seeds/plant were negatively significant. These results indicated clearly that the existence of one and four orobanche spikes / plant can decrease seed yield of infected plant by 19.9 % and 46.6 % in the first season and by 14.3 and 50.0 % in second season. These results are in agreement with those obtained by Hassanein *et al.* (1998).

The correlation between number of orobanche spikes / faba bean plant and weight of seeds / plant (fig.1) were negative and significant in both seasons.

Effect of plant density and weed control treatments

Annual weeds:

The dominant weeds in this study were *Chenopodum sp*, *Sonchus oleraceus L.*, *Ammi majus*, *Emex spinosus L.*, *Rumex dentatus L.*, *Brassica sp.* and *Melilotus indica L.* as broadleaved weeds and *Avena spp.* and *Phalaris spp* as grassy weeds.

Data in Tables 2 and 3 show that plant density and weed control treatments significantly reduced dry weight of grassy, broad and total weeds (g/m^2) in both seasons.

Plant density showed highly significant effect on dry weight of broad-leaved, grassy and total weeds in both seasons. These results indicated that higher plant density (27.0 plants/ m^2) was more effective in reducing the dry weight of grassy, broad-leaved, grassy, and total weeds by 51.9, 24.1and 32.8 % in the first season and by 17.8, 19.1and 18.7 %, respectively, in the second season compared to the lower plant density (13.0 plants/ m^2). This result may be due to the strong competition of dense planting on growth factors such as water, light and nutrients and hence, decreased weeds dry weight. Similar results were obtained by Nassib *et al.* (1982) and Salwau (1994).

All weed control treatments reduced significantly the dry weight of broad, grassy and total weeds in both seasons as compared with weedy check (untreated). Using hand hoeing twice and Black plastic, 8 weeks after planting (WAP) were the most effective in controlling broad, grassy and total weeds by 88.1and 83.0%, 96.2and 94.2% and 94.4 and 91.6%, respectively, in the first season.

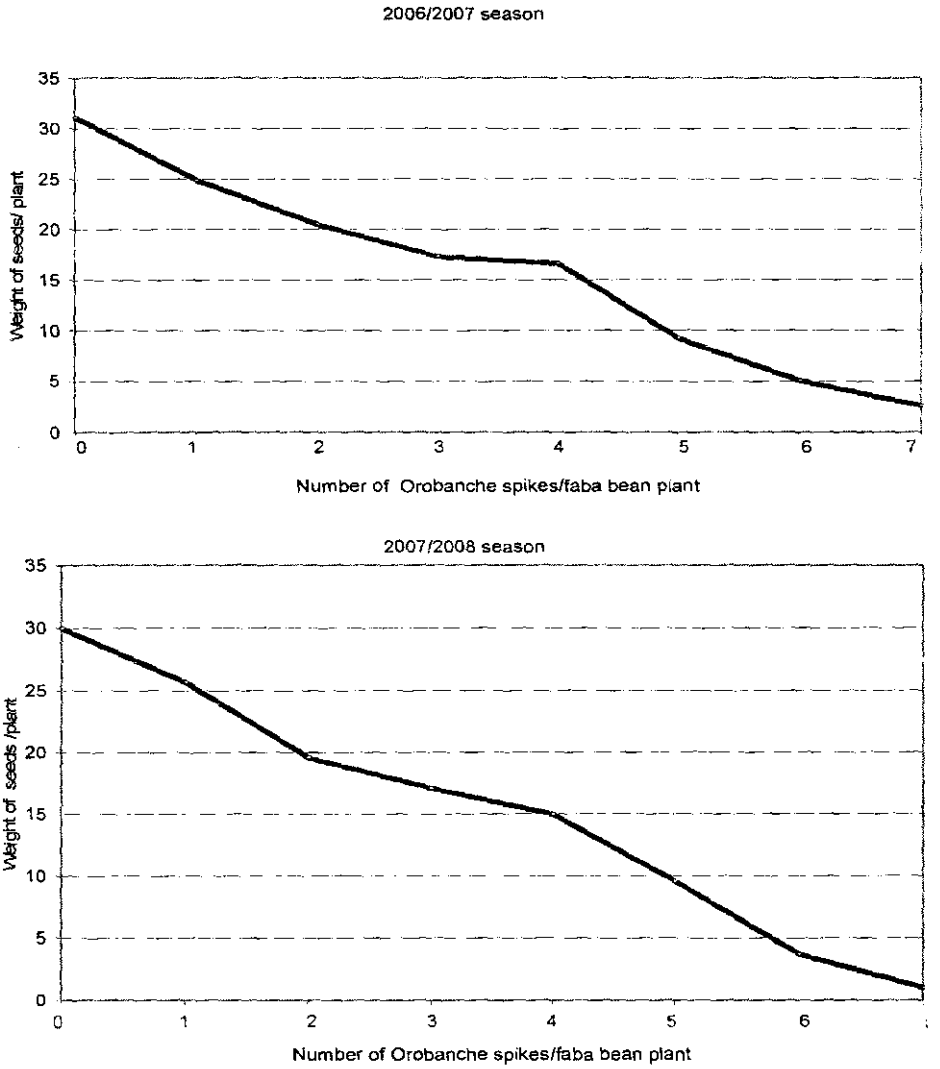

Fig. 1: Relationship between number of Orobanche spikes/plant and weight of seeds/plant in the 2006/07 and 2007/08 seasons.

Table 2: Effect of plant density on dry weight of grassy weeds, broad-leaved and total weeds and orobanche (g/m^2) in 2006/2007 and 2007/2008 seasons.

No	Density	Broad weeds	Narrow weeds	Total weeds	No of broomrape	Weight of broomrape
			2006/2007			
1	13.0 plants/m^2	54.1	119.5	173.7	4.6	9.9
2	27.0 plants/m^2	26.0	90.7	116.7	5.3	11.1
$LSD_{0.05}$		**18.5**	**13.8**	**28.7**	**0.1**	**0.07**
			2007/2008			
1	13.0 plants/m^2	56.7	109.8	166.6	3.8	9.1
2	27.0 plants/m^2	46.6	88.8	135.4	5.0	10.8
$LSD_{0.05}$		**12.0**	**20.9**	**10.9**	**0.6**	**1.3**

Table 3: Effect of weed control treatments on dry weight of grassy weeds, broad-leaved, total weeds and orobanche (g/m^2) in 2006/2007 and 2007/2008 seasons.

No	Weed control treatment	Broad weeds	Narrow weeds	Total weeds	No of broomrape	Weight of broomrape
			2006/2007			
1	Black plastic 6 WAP	22.8	61.6	84.4	5.6	11.8
2	Black plastic 8 WAP	18.4	21.2	39.6	6.6	13.7
3	white plastic 6 WAP	45.3	96.2	141.4	4.2	9.1
4	white plastic 8 WAP	45.3	56.7	102.0	6.2	13.5
5	Bazagran+ Fusilade+ Oroban	27.9	63.1	91.0	3.3	6.9
6	Hand hoeing+Hand pulling	12.9	13.7	26.6	1.7	3.3
7	Untreated	108.0	363.4	471.4	7.2	15.3
$LSD_{0.05}$		**8.6**	**11.8**	**15.1**	**0.8**	**1.35**
			2007/2008			
1	Black plastic 6 WAP	37.9	72.8	110.8	4.5	9.6
2	Black plastic 8 WAP	23.4	52.1	75.4	6.1	14.2
3	white plastic 6 WAP	44.0	94.4	138.4	4.2	9.9
4	white plastic 8 WAP	33.7	54.7	88.4	5.7	13.7
5	Bazagran+ Fusilade+ Oroban	25.9	35.2	61.2	1.9	3.8
6	Hand hoeing+Hand pulling	12.7	14.9	27.7	1.6	2.9
7	Untreated	184.1	371.0	555.1	6.9	15.8
$LSD_{0.05}$		**7.7**	**18.6**	**20.8**	**0.7**	**1.4**

So, using hand hoeing twice and black plastic 8 WAP gave a high decrease with broad weeds by 93.1 and 87.3 %, respectively, in second season. While, using hand hoeing twice and Bazagran + Fusilade herbicides gave the lowest values with grassy and total weeds in both seasons 96.0 and 90.5 and 95.0 and 89.0 %, respectively, compared with the untreated treatment. The different results may be due to the application of Bazagran + Fusilade super together were highly efficient in controlling grassy and broad weeds. Additionally, hand hoeing twice was more effective in controlling all annual weeds compared to the other treatments. The present results are in accordance with those obtained by Heath *et.al* (1991); Heath *et.al.* 1992; Tanji, (1994), El-Metwally and Ahmed, 2001, Metwally, 2002 and Saad El-Din, 2003).

Data in Tables 4 and 5 show that the interaction between plant density and weed control treatments was significant on the dry weight of grassy, bread and total weeds in both seasons. Application of hand hoeing twice and black plastic 6 WAP with plant density (27.0 plants/ m^2) gave the lowest values in the first season compared to the untreated with plant density (13.0 plants/ m^2). While, using hand hoeing (twice) and Bazagran+Fusilade herbicides with plant density (27.0 plants/ m^2) gave the best values in the second season compared to the untreated plots with plant density (13.0 plants/ m^2).

Number and dry weight of Orobanche spikes/m^2 (g):

Data in Table 2 show that plant density significantly affected the number and the dry weight of orobanche spikes/m^2 in both seasons. Plant density (13.0 plants/m^2) gave the lowest values of number and dry weight of orobanche spikes/m^2 by 13.2 and 10.8% in the first season and by 24.0 and10.7% in the second season compared with plant density (27.0 plants/m^2). These results may be due to increase in plant density, increase in stimulant of orobanche seeds and then increase in number and dry weight of orobanche spikes/m^2. These results are in line with those obtained by Nassib (1982).

Table 4: Effect of interactions between plant density and weed control treatments on dry weight of annual weeds and orobanche (g/m^2) in 2006/07 season.

No	Treatments		Broad weeds	Narrow weeds	Total weeds	No of orobanche	Weight of orobanche
	Dens.	Weed control treatment					
1	13.0 plants/m^2	Black plastic 6 WAP	27.4	72.7	100.1	5.0	10.5
2		Black plastic 8 WAP	24.4	25.6	50.0	6.3	13.3
3		white plastic 6 WAP	56.2	118.8	175.0	4.1	8.8
4		white plastic 8 WAP	73.4	78.7	152.0	6.0	13.6
5		Bazagran + Fusilade+ Oroban	34.9	130.3	165.2	3.2	6.7
6		Hand hoeing+Hand pulling	18.5	17.9	36.4	1.2	2.6
7		Untreated (weedy check)	144.2	393.0	537.2	6.4	14.1
1	27.0 plants/m^2	Black plastic 6 WAP	18.1	50.6	68.7	6.1	13.2
2		Black plastic 8 WAP	12.4	16.8	29.1	6.8	14.2
3		white plastic 6 WAP	34.3	73.6	107.9	4.2	9.4
4		white plastic 8 WAP	17.3	34.6	51.9	6.4	13.3
5		Bazagran + Fusilade+ Oroban	20.8	116.0	136.8	3.4	7.0
6		Hand hoeing Hand pulling	7.3	9.6	16.9	2.2	4.0
7		Untreated (weedy check)	71.8	333.8	405.7	8.1	16.4
$LSD_{0.05}$			12.2	16.6	21.4	1.1	1.9

All weed control treatments (Table 3) significantly reduced the number and dry weight of orobanche spikes/m^2 in both seasons compared with the untreated plots. Hand pulling, oroban herbicide and white plastic 6 WAP achieved good results of number and dry weight of orobanche spikes/m^2 by (76.4, 54.2 and 41.7) and (78.4, 54.9 and 40.5)%, respectively, in the first season. The same trend, in the second season except black plastic 6 WAP instead of white plastic 6 WAP of number and dry weight of orobanche spikes/m^2 by (76.8, 72.5 and 39.1) and (81.6, 75.9 and 39.2)%, respectively, in the second season.

Table 5: Effect of interactions between plant densities and weed control treatments on dry weight of annual weeds and Orobanche (g/m2) in 2007/08 season.

No	Treatments		Broad weeds	Narrow weeds	Total weeds	No of orobanche	Weight of orobanche
	Dens.	Weed control					
1	13.0 plants/m^2	Black plastic 6 WAP	28.4	77.0	105.5	3.7	8.9
2		Black plastic 8 WAP	18.5	55. 6	74.0	5.2	13.1
3		white plastic 6 WAP	44.1	103.1	147.3	3.7	9.1
4		white plastic 8 WAP	37.1	59.5	96.6	5.2	13.4
5		Bazagran+ Fusilade+ Oroban	30.2	40.6	70.8	1.3	2.1
6		Hand hoeing+Hand pulling	16.1	15.7	31.8	1.5	2.1
7		Untreated	222.5	417.3	639.9	6.0	15.2
1	27.0 plants/m^2	Black plastic 6 WAP	47.4	68.6	116.0	5.3	10.2
2		Black plastic 8 WAP	28.3	48.5	76.80	7.1	15.3
3		white plastic 6 WAP	43.9	85.6	129.50	4.7	10.7
4		white plastic 8 WAP	30.2	50.0	80.1	6.1	14.0
5		Bazagran+ Fusilade+ Oroban	21. 7	29.9	51.5	2.4	5.4
6		Hand hoeing Hand pulling	9.3	14.1	23.5	1.7	3.6
7		Untreated	145.7	324.7	470.3	7.7	16.3
$LSD_{0.05}$			**10.9**	**26.3**	**29.4**	**1.0**	**2.0**

All interaction between plant density (13.0 plants/ m^2) and hand pulling, oroban herbicide (Table 4&5) gave the best results of number and dry weight of orobanche spikes/m^2 in both seasons compared to weedy check with plant density (27.0 plants/ m^2).

Yield and yield components:-

Data in Table 6 reveal that plant density had non-significant effect on yield and its components in both seasons except weight of seed/plant and seed yield (ard./fed.) in the first season and number of pods/plant, weight of pods (g/plant), seed weight (g/plant) and seed yield (ardab/fed) in the second season.

For seed yield (ardab/fed), plant density (27.0 plants/ m^2) increased seed yield by 60.7 and 50.0 %, respectively, in 2006/07 and 2007/08 seasons as compared with plant density (13.0 plants/ m^2). These results are in harmony with those obtained by Comarovschi, (1974) ,Bianchi (1979) and Caballero (1987).

Table 6: Effect of plant densities on yield and yield component of faba bean in2006/2007 and 2007/2008 seasons.

No	Density	Plant height	No of branches /plant	No of pods /plant	weight of pods /plant	weight of seeds /plant	100-seed weight	Seed yield (ard./fed.)
					2006/2007			
1	13.0 plants/m^2	102.5	2.24	8.0	19.3	13.0	66.9	2.8
2	27.0 plants/m^2	106.5	2.16	8.6	19.8	14.3	67.0	4.5
$LSD_{0.05}$		NS	NS	NS	NS	1.2	NS	1.0
					2007/2008			
1	13.0 plants/m^2	106.1	2.3	8.0	20.7	14.5	64.2	3.0
2	27.0 plants/m^2	110.0	2.1	9.2	23.1	17.0	62.1	4.5
$LSD_{0.05}$		NS	NS	0.3	1.2	0.9	NS	0.6

Data in Table 7 show that all weed control treatments significantly increased plant height (cm), number of branches/plant, number of pods/plant, weight of pods (g/plant), seed weight (g/plant), 100-seed weight and seed yield (ardab/fed) in both seasons.

Seed yield (ardab/fed) increased by all weed control treatments, the highest values were obtained from hand hoeing and pulling, Bazagran+Fusilade+Oroban herbicides and white plastic 8 WAP by 171.4, 128.6 and 85.7 %, respectively, in 2006/2007 season and from hand hoeing and pulling, Bazagran+Fusilade+Oroban herbicides and white plastic 6 WAP by 134.8, 1174 and 69.6 %, respectively, in 2007/2008 season compared to the untreated plot. These results are in agreement with those of Heath *et al.* (1992), Tanji (1994), El-Metwally and Ahmed (2001), Metwally (2002), Yehia and Mekky (2002) and Saad El-Din (2003).

Table 7: Effect of weed control treatments on yield and yield component of faba bean in 2006/2007 and 2007/2008 seasons.

No	Weed control Treatment	Plant height	No of branches /plant	No of pods /plant	weight of pods /plant	weight of seeds /plant	100-seed weight	Seed yield (ard./fed.)
				2006/2007				
1	Black plastic 6 WAP	110.0	2.5	8.2	17.8	12.3	64.0	2.5
2	Black plastic 8 WAP	97.8	2.6	8.9	20.9	13.1	71.7	2.8
3	white plastic 6 WAP	109.5	2.0	7.4	19.1	13.8	63.5	3.5
4	white plastic 8 WAP	99.5	2.1	8.3	19.7	13.1	65.0	3.9
5	Bazagran+Fusilade + Oroban	108.5	2.3	9.3	21.5	15.5	68.5	4.8
6	Hand hoeing +Hand pulling	99.2	2.4	10.4	24.3	18.3	71.7	5.7
7	Untreated	107.2	1.6	5.4	13.4	9.4	64.0	2.1
$LSD_{0.05}$		**6.5**	**0.5**	**1.3**	**2.8**	**2.1**	**6.9**	**0.6**
				2007/2008				
1	Black plastic 6 WAP	113.3	2.5	8.5	21.2	15.8	62.9	2.6
2	Black plastic 8 WAP	105.0	2.6	9.9	25.2	18.7	66.1	3.2
3	white plastic 6 WAP	110.8	2.0	7.3	18.0	12.2	58.7	3.9
4	white plastic 8 WAP	106.3	2.3	9.0	23.3	17.0	63.7	3.8
5	Bazagran+Fusilade + Oroban	110.8	2.3	10.5	27.0	19.5	67.8	5.0
6	Hand hoeing +Hand pulling	100.0	2.6	10.1	25.9	19.3	66.4	5.4
7	Untreated	110.0	1.4	5.0	12.5	8.0	56.5	2.3
$LSD_{0.05}$		**6.8**	**0.4**	**0.7**	**2.1**	**1.9**	**5.0**	**0.4**

Table 8 shows that all interactions between plant density and weed control treatments were not-significant in both seasons except weight of seed/plant and seed yield (ard./fed.) in both seasons and number of pods/plant and weight of pods (g/plant) in the second season.

Plant density (27.0 plants/m^2) with hand hoeing and pulling, white plastic 8 WAP and Bazagran+Fusilade+Oroban herbicides achieved good values of seed yield (ardab/fed) in both seasons.

Table 8: Effect of interactions between plant densities and weed control treatments on yield and yield components of faba bean in2006/2007 and 2007/2008 seasons.

No	Treatments		2006/07 season		2007/08 season			
	Dens.	Weed control treatment	weight of seeds /plant	Seed yield (ard./fed.)	No of pods /plant	weight of pods /plant	weight of seed /plant	Seed yield (ard./fed.)
1	13.0 plants/m^2	Black plastic 6WAP	12.0	1.7	7.3	19.3	13.5	2.3
2		Black plastic 8WAP	14.4	1.9	8.3	21.1	15.6	2.3
3		white plastic 6WAP	12.7	2.3	6.8	16.2	10.9	2.8
4		white plastic 8 WAP	11.6	2.3	8.6	22.3	15.5	2.4
5		Bazagran+Fusilade+ Oroban	16.6	4.3	10.3	27.5	19.5	4.5
6		Hand hoeing +Hand pulling	16.2	5.3	10.1	26.5	18.9	4.9
7		Untreated	7.7	1.5	4.5	11.9	7.7	1.9
1	27.0 plants/m^2	Black plastic 6 WAP	12.6	3.2	9.6	23.1	18.2	2.8
2		Black plastic 8 WAP	11.8	3.7	11.4	29.4	21.8	4.0
3		white plastic 6 WAP	14.9	4.7	7.8	19.8	13.5	4.9
4		white plastic 8 WAP	14.7	5.4	9.4	24.4	18.5	5.3
5		Bazagran+Fusilade+ Oroban	14.4	5.3	10.7	26.5	19.5	5.4
6		Hand hoeing Hand pulling	20.4	6.1	10.1	25.3	19.7	5.9
7		Untreated	11.1	2.7	5.4	13.1	8.2	2.7
$LSD_{0.05}$			**3.0**	**0.9**	**1.0**	**2.9**	**2.7**	**0.6**

REFERENCES

Al-Marsafy; H.T., A.N.M. Nassar and A.A. Fakkar (1998). The efficiency of new herbicides against broomrape and other annual weeds in faba bean. Nile Valley Regional Program for wild oats control in cereals and some other winter crops 6th Annual Meeting 6-11 Sept., Cairo, Egypt. PP 219-220.

Amin; A.N.M. (1988). Principles of field crops. Basra Univ. Press, p. 442–452.

ARC, Weed Control Research Section (1998). Chemical weed control in faba bean. Highlights of back-up research, presented in the Annual Coordination Meeting of the

Nile Valley and Red Sea Regional Program (NVRSRP), Cairo, 6-11 September.

Bianchi; A.A. (1979). Results of three years of experimental trials on the cultural techniques of the horse bean for seeding (*Vicia faba minor* Beck). 2. Plant densities and distance between the rows. *Riv. Agron.* **13**, p. 201–206.

Caballero; R. (1987). The effect of plant population and row width on seed yields and yields components of field beans. *Res. Dev. Agric.* **4** (3), p. 147–150.

Comarovschi; G. (1974). Effect of sowing method on yield of bean. *Field Crops Abstr.* **32**, p. 944

Ebaid; M.A. (1990). Effect of weed control method and irrigation number on growth and yield of field bean (Vicia faba L.). Annals of Agric. Sci., Moshtohor. 28(3): 1429-1439.

El-Metwally; I.M. and S.A. Ahmed (2001). Growth, yield and yield components of mung bean as affected by phosphorus levels and some weed control treatments. Annual of Agric. Sci. Moshtoher, 39 (2): 787-803.

Gomez, K.A. and A.A. Gomez (1984) Statistical Procedures for Agricultural Research. John Willey and Sons. Inc, New York, U.S.A.

Hassan; S.M.M. (1987). Faba bean growth, yield characteristics and accompanied weeds influenced by plant population and pre-emergence herbicide application. Egypt J. Agron.,12 (1-2): 47-56.

Hassanein; E.E., H.M. Ibrahim and H.T. Al-Marsafy (1998a). Estimation yield losses due to Orobanche infection in faba bean. Nile Valley Regional Program for wild oats control in cereals and some other winter crops 6th Annual Meeting 6-11 Sept., Cairo, Egypt. PP 228-233.

Hassanein; E.E., H.M. Ibrahim and Z.R. Yehia (1998b). The efficiency of new herbicides against broomrape and other annual weeds in faba bean. . Nile Valley Regional Program for wild oats control in cereals and some other

winter crops 6th Annual Meeting 6-11 Sept., Cairo, Egypt. PP 210-212.

Heath.; M.C; J.H. Clarke and S.E. Dgilvy (1991). Comparison of pre- and post-emergence herbicides for the control of broadleaved and grass weeds in spring field beans.Aspects of Applied Biology. 27: 167-172.

Heath.; M.C; J.H. Clarke and S.E. Dgilvy (1992) Effect of herbicide applications on broad-leaved weeds and yield of spring field beans. Tests of Agrochemicals and cultivars, 13: 38-39.

Karamanos; A.J., G. Papadopoulos., C. E.Argoulas and P. Papastylianou (1994). Chemical composition of seeds of 11 fields grows faba bean cultivars in two cultivation periods. *FAB IS* **34/35**, p. 39–47.

Kharrat, M. and M.H. Halila (1996). Control of *Orobanche foetida* on *vicia faba:* comparison between different control measures. Pages 734-738 in Advances in Parasitic plant research (Junta de Andalucia, ed.).

Mesa-Garcia, J. and Garcia-Torres (1985). A competition index for Orobanche crenata Forsk. and effects on broadbean (*Vicia faba* L.). Weed Res. 24: 379-382.

Metwally; G.M. (2002). Influnce of herbicidal weed control treatments on weed growth nutrient uptake yield and yield components of faba bean (*Vicia faba.* L.). J. Agric. Sci. Mansoura Univ.,27(2): 2185-2196.

Nassib; A.M; A.H.A. Hussein and E.E. Hassanein (1982). Effect of plant density and weed control treatments on yield, yield components, seed quality and associated weeds of faba bean (*Vicia faba* L.). Res. Bulletin, Faculty of Agri. Ain-Shams Uni., (2065): 25pp.

Nehra, O.P. and R.K. Malik (1999). Weed management studies in faba bean (*Vicia faba* L.). Indian J. of Weed Sci.31 (3/4): 130-132.

Saad El-Din, S.A. (2003). Efficiency of some weed control treatments on growth, yield and its components of broad

bean (*Vicia faba* L.). Egypt J. Appli. Sci., 18(6B):586-604.

Salwau; M.I.M. (1994). Productivity of faba bean as influenced by weed control methods and plant densities .Annals of Agric. Sci., Moshtohor. 32 (3): 1131-1146.

Tanji; A. (1994). The response of sterile oats (*Avena sterilis*.L.) to graminicides in broad-bean .Al-Awamia, 86: 69-81. (C.F. CD-ROM Computer System).

Yehia; Z.R. and M.S. Mekky (2002). A comparative study on some post-emergence herbicides for the control of broomrape in faba bean fields. Assiut J. of Agric. Sci., 33(5): 85-96.

خسائر محصول الفول البلدي الناتجة عن الاصابه بالهالوك وتأثير الكثافة النباتية ومكافحة الحشائش على الحشائش الحولية و الهالوك وانتاجية محصول الفول البلدى

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أقيمت تجربتان حقليتان في حقول مصابة طبيعيا بالحشائش والهالوك بمحطة البحوث الزراعية بشندويل-سوهاج خلال موسمي النمو الشتوى ٢٠٠٦/٢٠٠٧و٢٠٠٧/٢٠٠٨م لتقدير خسائر محصول الفول البلدي الناتجة عن الإصابة بالهالوك و لدراسة تأثير الكثافة النباتية وبعض معاملات مكافحة حشائش وهالوك على مقاومة الحشائش الحولية والهالوك و المحصول و مكوناته في الفول البلدي.

أشارت النتائج في التجربة الأولى إلى أنه يوجد هناك ارتباط معنوي بين عدد نباتات الهالوك/نبات وكل من وزن نباتات الهالوك ،طول النبات ، عدد قرون النبات، وزن قرون النبات و وزن بذور النبات في الموسمين فيما عدا عدد الاشطاء في الموسم الأول. أيضا، أوضحت النتائج إلى أن وجود نبات واحد و أربعة نباتات هالوك /نبات فول بلدي يخفض محصول النبات للفول بمقدار ١٩,٩% و ٤٦,٦% في الموسم الأول وبمقدار ١٤,٣و ٥٠,٠ % على التوالي في

الموسم الثاني. أشارت النتائج في التجربة الثانية إلى أن زيادة الكثافة النباتية من ١٣ الـى ٢٧ نبات/م^{٢} قللت الوزن الجاف للحشائش الحولية النجيلية، العريضة و الكلية بمقدار ٥١,٩، ٢٤,١ و ٣٢,٨ فى الموسم الاول على التوالى وبمقدار ١٧,٨، ١٩,١ و ١٨,٧ % فى الموسم الثـانى على التوالى. وبالعكس، أدت إلى زيادة العدد والوزن الجاف للهالوك/م^{٢} بمقـدار ١٣,٢ ، ١٠,٨ ،٢٤,٠و ١٠,٧ فى الموسم الاول و الثانى على التوالى و زيادة محصول البذور لنبـات الفـول بمقدار ٦٠,٧ و ٥٠,٠ % في الموسم الاول والثانى على التوالى . قللت كل معـاملات مكافحـة الحشائش الوزن الجاف للحشائش الحولية وعدد و وزن الهالوك و زيادة جميع صفات المحصول تحت الدراسة مقارنة بمعاملة المقارنة. وكانت معاملة العزيق مـرتين و التغطيـة بالبلاسـتيك الأسود لمدة٨ أسابيع من الزراعة أفضل المعاملات فى مقاومة الحـشائش الحوليـة. وبالنـسبة لمحصول البذور (أردب/ فدان)، فان أعلى قيم تم الحصول عليها من معاملة العزيـق والنقـاوة اليدوية مرتين، مبيدات الحشائش بازجران+ فيوزيليد سـوبر+ أوربـان واسـتخدام التغطيـة بالبلاستيك الأبيض لمدة٨ أسابيع من الزراعـة بمقـدار ١٧١,٤ ، ١٢٨,٦ و ٨٥,٧ % علـى التوالي في الموسم الأول وبمعاملة العريق والنقاوة مرتين، مبيدات الحشائش بازجران+ فيوزيليد سوبر+ أوربان واستخدام التغطية بالبلاستيك الأبيض لمدة٦ أسابيع من الزراعة بمقدار ١٣٤,٨ ، ١١٧,٤ و ٦٩,٦ % على التوالي في الموسم الثاني. وتشير النتائج إلى أنه لتعظيم إنتاجيـة الفول البلدي بمحافظة سوهاج يجب استخدام الكثافات النباتية العالية مع معاملة العزيق والنقاوة (مرتين) ومبيدات الحشائش بازجران+ فيوزيليد سوبر+ أوربان.