J. Agric. Sci. Mansoura Univ., 28(8) : 5931 - 5944, 2003

RESPONSE OF WHEAT AND FABA BEAN PLANTS AND THEIR ASSOCIATED WEEDS TO SOME WEED CONTROL METHODS.

Saad El-Din A. Samia and I.M. El-Metwally
Botany Department, National Research Centre, Cairo, Egypt

ABSTRACT

Two pot experiments were conducted during two seasons, 2000/2001 and 2001/2002 in greenhouse of the National Research Centre, Dokki, Cairo, Egypt to study the response of wheat, faba bean plants and associated weeds to some weed control methods. Wheat experiment treatments were as follows: Soil solarization for 2, 4, 6 and 8 weeks, Metosulam at a rate of 0.04 L/fed, Tralkoxydium at a rate of 1 L/fed, Metosulam at a rate of 0.026 L/fed + Tralkoxydium at a rate of 0.667 L/fed and unweeded. Whereas, faba bean experiment treatments were as follows: Soil solarization for 2, 4, 6 and 8 weeks, Bentazon at a rate of 0.5 L/fed, Fluazifop-butyl at a rate of 1 L/fed, Bentazon at a rate of 0.333 L/fed + Fluazifop-butyl at a rate of 0.667 L/fed and unweeded.

The important results obtained from this study could be summarized as follows: Soil solarization for a period of 8 weeks significantly decreased fresh and dry weight of broad-leaved wheat weeds after 50 and 70 days from sowing. Metosulam came in the second rank. Also, soil solarization for 8 weeks gave the lowest fresh and dry weight of grasses and total weeds followed by that of Metosulam + Tralkoxydium treatment. Solarized for 8 weeks had significant effect on growth characters, yield and yield components of wheat plants followed by that of solarized for 6 weeks and Metosulam + Tralkoxydium treatments as compared to other treatments.

Soil solarization for 8 weeks significantly decreased fresh and dry weight of broad-leaved, grasses and total faba bean weeds after 50 and 70 days from sowing when compared with other treatments. Bentazon + Fluazifop-butyl came in the second rank. Soil solarization for 8 weeks caused a significant increase in growth characters of faba bean plants after 50 and 70 days from sowing, yield and yield components of faba bean plants, followed by that of soil solarization for 6 weeks and Bentazon + Fluazifop-butyl treatments, respectively as compared with other treatments. There is no significant effect of weed control methods on protein and total carbohydrates percentage of wheat grains and faba bean seeds.

INTRODUCTION

Wheat (*Triticum aestivum*, L.) is the main winter cereal crop in Egypt. Local wheat production is insufficient to face the consumption of the population. Weeds generally compete with wheat on nutrients, water, light and other essential requirements. Thus weed control is one of the essential cultural practices for raising wheat yield and improving its quality. The reduction of wheat yield due to weed infestation reached 31.9% (Tiwari and Parihar, 1997) to 61% (Hucl, 1998) compared to the weed free control. Subhash *et al.* (1997), Atalla *et al.* (1998) and Fayed *et al.* (1998) reported that Tralkoxydium was highly effective herbicide against annual grassy weeds in wheat. Al-Ashkar (1998) and El-Metwally (2002) recorded that application of Metosulam significantly decreased the density as well as fresh and dry weight of broad-leaved weeds in wheat fields. Ahmed (2001) concluded that

application of Metosulam at a rate of 0.04 L/fed significantly increased yield and yield attributes of wheat.

In Egypt, legume crops can offer a partial solution to the protein problem. Faba bean plays a dominate role in human nutrition as a protein source. Reduction in faba bean yield resulting from weed competition accounted for about 30 to 44% (Hassan, 1987). Therefore, weed control is one of the essential cultural practices for raising faba bean yield and improving its quality. 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).

Soil solarization is one of the non chemical techniques which can be used for weed and soil-borne diseases control as it has been reported by many reviewers. Meanwhile, the response of weeds to soil solarization varied upon the weed species. Annual weeds have been effectively controlled by soil solarization than perennial ones (Abdallah, 1991 and Linke, 1994). Soil solarization up to six weeks give good control of many species of weeds. However, annual weeds are usually more sensitive than perennials (Al-Masoom *et al.*, 1993 and Linke, 1994). Beside being effective in weed control, soil solarization also increased not only plant growth but also yield quality of faba bean (Farag, 1994). Soil solarization for six weeks resulted in approximately 100, 70 and 16% reduction in annual broad-leaved, annual grasses and perennial weeds, respectively (Abdallah, 2000). Abdallah (1999) reported that soil solarization increased green pod yield of faba bean more than 53 times the hand hoeing control yield. The corresponding fresh straw yield increase was 176%. Soil solarization increased yield of faba bean as a result of the control of annual weeds and orobanche parasite. The objective of this study was to investigate the effect of soil solarization and some herbicides on growth, yield attributes, yield and quality of wheat and faba bean plants as well as their associated weeds.

MATERIALS AND METHODS

The pot experiments were conducted to study the influence of some weed control methods (soil solarization and some herbicides) on growth, yield attributes, yield and quality of wheat and faba bean plants as well as associated weeds during 2000/2001 and 2001/2002 seasons under green house condition at the National Research Centre, Dokki, Cairo. Each experiment included 8 treatments arranged in a randomized complete blocks design with four replications. Pots (30 cm diameter) to be solarized were cleaned, ploughed, leaveled infested with weeds (*Chenopodim album*, L., as a broad leaved weeds by 5 seeds/pot and *Avena fatua*, L. as a grassy weeds by 5 grains/pot as well as *Orobanche crenata* as a parasitic weed only in faba bean pots by 0.1 gm/pot and irrigated 3 days before covering with clear polyethylene tarps 50 μm for 8, 6, 4 and 2 weeks during August and September. The other treatments were left for herbicides and unweeded check. At planting, the polyethylene sheet was removed carefully to avoid soil disturbance.

Wheat experiment:

Soil solarization and weed control treatments were arranged as follows:

1. Solarized for two weeks.
2. Solarized for four weeks.
3. Solarized for six weeks.
4. Solarized for eight weeks.
5. Metosulam herbicide (Sinal 10 Sc). (N-2,6-dichioro-3-methyl phenyl)-5,7-dimethoxy-[1,2,4] Triazolo [1,5a] pyrimidine-2-sulphona mide), sprayed 3 weeks from sowing at the rate of 0.04 L/fed.
6. Tralkoxydium herbicide (Grasp 10% EC): (2[1-(etnoximino)propyl]-3-hydroxyl-5(2,4,6 trimethyl 1 phenyl)(cylohox – 2-enone), sprayed 4 weeks from sowing at the rate of 1 L/fed.
7. Metosulam at the rate of 0.026 L/fed + Tralkoxydium at the rate of 0.667 L/fed.
8. Unweeded (control).

Wheat grains (*Triticum aestivium*, L) cultivar Sakha 69 at a rate of 2.5 gm/pot was sown at 15 and 20 of October in the 1st and 2no seasons, respectively. The other cultural practices were applied as usual. Harvesting was in 3 and 7 May in both seasons, respectively. After 50 and 70 days from sowing in both seasons, weed samples from pot were taken from each replicate. Weeds were identified and classified into broad-leaved and grasses. Fresh weight of weeds was recorded and dry weight of weeds was determined after drying. Samples of 10 plants were taken at random from each pot at 50 and 70 days from sowing to determine growth characters (plant height, fresh and dry weight of plant and number of tillers/plant). Flag leaf area was determined after heading stage. At harvest, samples of ten wheat tillers were randomly taken from each pot to measure; plant height (cm), spike length (cm), number of spikletes/spike, number of grains/spike, grains weight/spike and 1000-grain weight (gm). Also, at havest samples of five wheat plants were randomly taken from each pot to measure grain yield/plant. Crude protein percentage was determined according to A.O.A.C. (1980). While, the total carbohydrates percentage was determined according to Dubois *et al.* (1956).

Faba bean experiment:

Soil solarization and weed control treatments were arranged as follows:

1. Solarized for two weeks.
2. Solarized for four weeks.
3. Solarized for six weeks.
4. Solarized for eight weeks.
5. Bentazon (Basagran 48%); (3-iso propyl I H-2, 3-benzathinadiazin-4-(3H) one, 2,2 – dioxide), sprayed 3 weeks from sowing at the rate of 0.5 L/fed.
6. Fluazifop-butyl (Fusilade); (Butyl 2-(4-(5-trifluoronomethyl-2-pyridyloxy) phenoxy) propionate) sprayed 4 weeks from sowing at the rate of 1L/ fed.

7. Bentazon at the rate of 0.333 L/fed + Fluazifop-butyl at the rate of 0.667 L/fed.
8. Unweeded (control).

Faba bean seeds (*Vicia* faba, L.) Giza 843 cultivar at a rate of 10 seeds/pot was sown at 15 and 20 of October in the 1st and 2nd seasons, respectively. The other cultural practices were applied as usual. Harvesting was in 4 and 9 March in the first and second seasons, respectively. After 50 and 70 days from sowing in both seasons, weed samples from each pot were taken from each replicate Weeds were identified and classified into broad-leaved and grasses. Fresh weight of weeds was recorded and dry weight of weeds was determined after drying. After 50 and 70 days from sowing samples of 5 plants were randomly collected from each pot to study the following characters i.e plant height (cm), fresh and dry weight of plant, number of leaves/plant and number of branches/plant. At time of harvesting, plant height, number of pods/plant, weight of pods/plant (gm), pod length (cm), number of seeds/pod, 100-seed weight (gm) and seed yield/plant (gm) were recorded. Protein percentage was determined according to A.O.A.C. (1980). The total carbohydrates percentage was determined according to Dubois *et al.* (1956).

Data obtained during the two seasons were subjected to statistical analysis by the technique of analysis of variance (ANOVA) as published by Gomez and Gomez (1984). Combined analysis of the data of the two growing seasons was undertaken.

RESULTS AND DISCUSSION

1- Effect of soil solarization and some herbicidal treatments on weeds and wheat plants:

1.1. On weeds:

Broad-leaved weeds:

Fresh and dry weight of broad-leaved weeds were significantly reduced by application of weed control treatments as compared to unweeded check after 50 and 70 days from sowing (Tables 1 and 2). Soil solarization for a period of 8 weeks was strongly effective in controlling broad-leaved weeds. It resulted in almost 92.39 and 93.73% reduction in dry weight of broad-leaved weeds after 50 and 70 days from sowing, respectively. The highest efficiency in decreasing fresh and dry weight of broad-leaved weeds was obtained by application of solarized for 8 weeks followed by Metosulam, Metosulam + Tralkoxydium, solarized for 6 weeks and solarized for 4 weeks treatments, respectively. On the other side, the highest fresh and dry weight of broad-leaved weeds were recorded when wheat pots were unweeded.

Table (1): Averages of fresh and dry weight of wheat weeds (gm/pot) after 50 days from sowing as affected by some weed control treatments (combined analysis of both seasons).

Treatments	Broad-leaved gm/pot		Grasses gm/pot		Total weeds gm/pot		
	Fresh weight	Dry weight	Fresh weight	Dry weight	Fresh weight	Dry weight	% reduce - tion
Solarized for 2 week	16.00	3.20	13.25	3.32	29.25	6.52	28.67
Solarized for 4 week	5.73	1.15	6.80	1.48	12.53	2.63	71.23
Solarized for 6 week	2.65	0.53	3.80	0.95	6.45	1.48	83.81
Solarized for 8 week	1.68	0.34	2.50	0.63	4.18	0.97	89.39
Metosulam	1.95	0.39	14.70	3.68	16.65	4.07	55.47
Tralkoxydium	19.40	3.88	3.38	0.85	22.73	4.73	48.25
Metosulam+ Tralkoxydium	2.10	0.42	3.15	0.79	5.25	1.21	86.76
Unweeded	22.35	4.47	18.65	4.67	41.00	9.14	---
LSD 5%	2.02	0.41	1.75	0.44	2.70	0.52	---
1%	2.75	0.55	2.38	0.60	3.67	0.70	---

Table (2): Averages of fresh and dry weight of wheat weeds (gm/pot) after 70 days from sowing as affected by some weed control treatments (combined analysis of both seasons).

Treatments	Broad-leaved gm/pot		Grasses gm/pot		Total weeds gm/pot		
	Fresh weight	Dry weight	Fresh weight	Dry weight	Fresh weight	Dry weight	% reduction
Solarized for 2 week	22.49	4.50	20.40	5.11	42.89	9.61	36.44
Solarized for 4 week	7.90	1.58	10.18	2.55	18.08	4.13	72.69
Solarized for 6 week	3.62	0.73	5.62	1.41	9.24	2.14	85.85
Solarized for 8 week	2.30	0.46	3.69	0.93	5.99	1.39	90.81
Metosulam	2.50	0.50	24.00	6.01	26.50	6.51	56.94
Tralkoxydium	26.78	5.30	5.00	1.29	31.78	6.59	56.42
Metosulam+ Tralkoxydium	2.88	0.58	4.65	1.17	7.53	1.75	88.43
Unweeded	36.68	7.34	31.12	7.78	67.80	15.12	---
LSD 5%	2.42	0.48	1.89	0.48	2.99	0.67	---
1%	3.29	0.66	2.57	0.65	4.07	0.91	---

Grass weeds:

Data presented in Tables (1 and 2) show that soil solarization and herbicidal treatments significantly reduced the fresh and dry weight of grass weeds after 50 and 70 days from sowing when compared to unweeded check. The highest decrease in fresh and dry weight of grass weeds was obtained by solarized for 8 weeks followed by Metosulam + Tralkoxydium, Tralkoxydium and solarized for 6 weeks treatments, respectively after 50 and 70 days from sowing. These results may be due to the inhibition effect of herbicidal treatments on growth of weeds. While, the greatest values of fresh and dry weight of grass weeds were recorded when wheat pots were unweeded.

Total weeds:

Fresh and dry weight of total weeds after 50 and 70 days from sowing were significantly reduced by the application of weed control treatments as compared to unweeded check (Tables 1 and 2). Application of solarized for 8 weeks, Metosulam + Tralkoxydium, solarized for 6 weeks and solarized for 4 weeks treatments caused significant decrement in total weeds amounted by 89.39, 86.76, 83.81 and 71.23% after 50 days from sowing,

respectively and by 90.81, 88.43, 85.85 and 72.69% after 70 days from sowing, respectively in dry weight of total weeds. The growth reduction of total weeds in solarized pots may be due to specific sensitivity of this weeds (broad-leaved and grass) to high temperature as reported by Abdallah (1991), Farag (1994) and Abdallah (2000). The decrease in fresh and dry weight of total weeds may be due to efficiency of Metosulam + Tralkoxydium as post-emergence herbicides on many different weed species. However, there were no significant differences in fresh and dry weight of total weeds among solarized for 8 weeks, Metosulam + Tralkoxydium and solarized for 6 weeks at 50 and 70 days from sowing. The results were coincided with those obtained by Atalla *et al.* (1998) and El-Metwally (2002).

1.2. **Wheat**

Growth characters:

Data recorded in Table (3) indicate that fresh and dry weight of plant, plant height and number of tillers/plant after 50 and 70 days from sowing and flag leaf area after heading stage as well as plant height at harvest markedly increased as a result of controlling weeds by different weed control treatments as compared to the unweeded treatment. Maximum values were obtained by soil solarization for a period of 8 weeks followed by that solarized for 6 weeks and Metosulam + Tralkoxydium treatments, respectively as compared to unweeded treatment. Whereas, the unweeded treatment gave the lowest values of growth characters. Data in Table (3) show that weed control treatments had no significant effect on number of tillers/plant.

The results obtained herein indicated that the use of soil solarization or herbicides produced a promising effect against weed prevailing in wheat pots and in turn exhibited better increase in wheat growth. These results are in general agreement with those obtained by Pandey *et al.* (1997) and Ahmed (2001).

Yield and yield attributes:

Data in Table (4) show positive effects on wheat yield and yield attributes due to weed control treatments. Such effects were significant on the characters of spike length, number of spikletes/spike, number of grains/spike, weight of grains/spike, 1000-grain weight and grain yield/plant. Application of soil solarization for a period of 8 weeks, followed by solarized for 6 weeks, Metosulam + Tralkoxydium and solarized for 4 weeks gave the greatest wheat yield and yield attributes as compared to unweeded treatment. These superior treatments increased the average of grain yield/plant than unweeded treatment by about 94.32, 81.80, 71.23 and 66.73%, respectively. In contrast, the lowest value of yield and yield attributes was obtained by the unweeded treatment.

Application of the previous treatments was effective in controlling weeds and consequently the competition was limited and more light, water and nutrients were available to promote wheat yield attributes if compared with other treatments. Similar results were reported by Pandey *et al.* (1997), Al-Ashkar (1998) and Ahmed (2001).

Chemical composition:

Results in Table (4) point to increase in the contents of crude protein percentage and total carbohydrates percentage in wheat grains as a result of weed control treatments as compared to unweeded treatment. These increase, however, were not significantly. Solarized for 8 weeks produced the highest values of crude protein percentage and total carbohydrates percentage. While, unweeded treatment gave the lowest value.

Table (3): Averages of some growth characters of wheat plants as affected by some weed control treatments (combined analysis of both seasons).

Treatments	After 50 days from sowing				After 70 days from sowing					
	Fresh weight of plant/gm	Dry weight of plant/gm	Plant height cm	No. of tiller /plant	Fresh weight of plant/gm	Dry weight of plant/gm	Plant height cm	No. of tillers /plant	Flag leaf area cm²	Plant height cm at harvest
Solarized for 2 week	2.07	0.41	25.13	1.88	5.45	1.07	38.25	2.63	34.99	100.12
Solarized for 4 week	2.67	0.53	31.50	2.25	6.87	1.35	50.63	3.65	36.53	104.05
Solarized for 6 week	3.38	0.68	35.38	2.50	9.47	1.86	64.88	4.25	37.47	104.73
Solarized for 8 week	4.10	0.82	41.38	2.63	10.37	2.03	66.38	4.38	37.97	105.56
Metosulam	2.45	0.49	26.5	2.13	6.07	1.19	45.25	3.13	35.48	102.73
Tralkoxydium	2.21	0.44	25.00	1.88	5.75	1.13	42.13	2.88	34.40	102.20
Metosulam+ Tralkoxydium	2.92	0.58	34.13	2.38	7.59	1.49	59.13	3.75	36.58	103.50
Unweeded	1.93	0.39	22	1.63	4.39	0.86	33.25	2.13	32.80	96.80
LSD 5%	0.25	0.12	2.56	NS	1.20	0.21	5.02	0.96	2.14	1.55
1%	0.33	0.16	3.48	NS	1.63	0.29	6.83	1.31	2.91	2.11

Table (4): Yield and yield components of wheat plants as well as chemical compositions of grains as affected by some weed control treatments (combined analysis of both seasons).

Treatments	Spike length (cm)	No. of spikelets/ spike	No. of grains/spike	Weight of grains/spike (gm)	1000-grain weight	Grain yield/plant (g)	Crude protein%	Total carbohydrates %
Solarized for 2 week	9.75	17.60	54.70	1.85	44.10	5.66	11.50	74.30
Solarized for 4 week	10.55	19.00	58.15	2.05	45.59	8.52	11.91	74.83
Solarized for 6 week	11.30	19.25	60.55	2.19	46.91	9.29	12.14	75.10
Solarized for 8 week	11.75	20.00	61.45	2.27	48.02	9.93	12.26	75.30
Metosulam	10.15	18.65	56.90	1.97	44.94	6.82	11.85	74.75
Tralkoxydium	9.90	18.35	55.85	1.90	44.67	6.30	11.81	74.66
Metosulam+ Tralkoxydium	10.95	19.65	59.61	2.10	46.04	8.75	11.99	75.00
Unweeded	9.30	16.95	52.75	1.72	43.77	5.11	11.31	74.03
LSD 5%	0.93	0.46	1.19	0.11	1.31	0.33	NS	NS
1%	1.26	0.63	1.63	0.15	1.79	0.45	NS	NS

2- Effect of soil solarization and some herbicidal treatments on weeds and faba bean plants:

2.1. On weeds:

Broad leaved weeds:

Results in Tables (5 and 6) show that fresh and dry weight of broad-leaved weeds at 50 and 70 days from sowing were significantly affected by weed control treatments. Application of solarized for a period of 8 weeks,

Bentazon + Fluazifop-butyl, Bentazon and solarized for 6 weeks treatments caused significant decrease in fresh and dry weight of broad-leaved weeds amounted by 95.38, 93.59, 90.76 and 87.63% after 50 days from sowing, respectively and 95.49, 93.56, 90.87 and 87.54 after 70 days from sowing, respectively when compared to unweeded treatment. While, the unweeded treatment resulted the highest values of fresh and dry weight of broad-leaved weeds. The results of the present investigation are in harmony with those obtained by Metwally (2002), Radwan and Hussein (2002) and El-Metwally and Saad El-Din (2003).

Table (5): Averages of fresh and dry weight of faba bean weeds (gm/pot) after 50 days from sowing as affected by some weed control treatments (combined analysis of both seasons).

Treatments	Broad-leaved gm/pot		Grasses gm/pot		Total weeds gm/pot		
	Fresh weight	Dry weight	Fresh weight	Dry weight	Fresh weight	Dry weight	% reduction
Solarized for 2 week	21.50	4.30	11.35	2.84	32.85	7.14	36.81
Solarized for 4 week	9.60	1.29	4.73	1.18	14.33	2.47	78.14
Solarized for 6 week	4.15	0.83	2.68	0.67	6.83	1.50	86.73
Solarized for 8 week	1.55	0.31	1.13	0.29	2.68	0.60	94.69
Bentazon	3.10	0.62	12.85	3.22	15.95	3.84	66.02
Fluazifop-butyl	23.30	4.66	2.00	0.50	25.30	5.16	54.34
Bentazon+ Fluazifop-butyl	2.15	0.43	1.33	0.33	3.48	0.76	93.27
Unweeded	33.55	6.71	18.35	4.59	51.90	11.30	--
LSD 5%	2.24	0.45	1.77	0.44	2.48	0.75	--
1%	3.04	0.61	2.40	0.61	3.38	1.01	--

Table (6): Averages of fresh and dry weight of faba bean weeds (gm/pot) after 70 days from sowing as affected by some weed control treatments (combined analysis of both seasons).

Treatments	Broad-leaved gm/pot		Grasses gm/pot		Total weeds gm/pot			Orobanche at harvest		
	Fresh weight	Dry weight	Fresh weight	Dry weight	Fresh weight	Dry weight	% reduction	No. of Orobanche shoots / pot	Fresh weight/pot	Dry weight/pot
Solarized for 2 week	30.05	6.01	16.95	4.24	47.00	10.25	36.65	8.71	76.31	8.40
Solarized for 4 week	14.05	2.81	7.00	1.72	21.05	4.53	72.00	3.32	30.12	3.27
Solarized for 6 week	5.79	1.16	3.39	0.98	9.18	2.14	86.77	2.10	5.22	0.53
Solarized for 8 week	2.09	0.42	1.67	0.42	3.76	0.84	94.81	0.82	2.11	0.20
Bentazon	4.25	0.85	19.10	4.78	23.35	5.63	65.20	7.43	110.13	12.18
Fluazifop-butyl	31.83	6.37	2.92	0.73	34.75	7.10	56.12	18.92	109.17	12.11
Bentazon+ Fluazifop-butyl	2.98	0.60	2.62	0.48	5.60	1.08	93.33	15.64	106.78	11.65
Unweeded	46.55	9.31	27.45	6.87	74.00	16.18	--	20.11	112.23	12.41
LSD 5%	3.04	0.61	2.12	0.54	3.82	0.89	--	0.92	3.04	0.76
1%	4.13	0.83	2.89	0.73	5.20	1.22	--	1.24	4.11	1.03

Grass weeds:

Relevant data show that fresh and dry weight of grass weeds after 50 and 70 days from sowing were markedly decreased by different weed control treatments (Tables 5 and 6). Solarized for 8 weeks, Bentazon + Fluazifop-

butyl, Fluazifop-butyl and solarized for 6 weeks treatments were very effective in controlling most grassy weeds at both ages. On the contrary, the highest fresh and dry weight of grassy weeds were observed with unweeded treatment followed by Bentazon and solarized for 2 weeks, respectively. These results coincided with those detected by Abdallah (1999), El-Metwally and Ahmed (2001), El-Metwally (2002) and El-Metwally and Saad El-Din (2003).

Total weeds:

The results of weed control treatments presented in Tables 5 and 6 show significant effects on fresh and dry weight of total weeds at both ages. The highest decrease in fresh and dry weight of total weeds after 50 and 70 days from sowing were obtained by solarized for 8 weeks, Bentazon + Fluazifop-butyl, solarized for 6 weeks and solarized for 4 weeks treatments, respectively. The superior treatments decreased the average dry weight of total weeds after 50 days from sowing than unweeded treatment by about 94.69, 93.27, 86.73 and 78.14% and by about 94.81, 93.33, 86.77 and 72.00% at 70 days from sowing. On the other hand, the unweeded treatment gave the highest values of fresh and dry weight of total weeds.

These results may be due to the inhibition effect of herbicidal treatments (Bentazon + Fluazifop-butyl) on growth of weeds (El-Metwally and Ahmed, 2001; Metwally, 2002 and El-Metwally and Saad El-Din, 2003). Also the growth reduction of total weeds by solarization pots may be due to good control of many species of weeds especially annual weeds. Winter annual weeds are especially sensitive to solarization and control (Abdallah, 1991; Nimje, 1996; Abdallah, 1999 and Radwan and Hussein, 2002).

Orobanche weed:

The parasitic weed *Orobanche crenata* was significantly decreased in number, fresh and dry weight by weed control treatments (Table 6). Soil solarization for 8 weeks was strongly effective at harvest compared to other treatments. Solarized for 6 weeks came in the second rank.

The effect may be due to the temperature under plastic layer which was high enough to kill *Orobanche* seeds. Linke *et al.* (1991) showed that *Orobanche* seeds buried in soil to a depth of 5 cm were completely killed following solarization whereas seed buried deeper (10 to 15 cm) were destroyed up to 99%. Results are in accordance with those obtained by Abu-Irmaileh (1991); Farag (1994); Abu-Irmaileh and Thahabi (1997) and Abdallah (1999).

2.2. Faba bean

Growth characters:

Results in Table (7) indicate that plant height, fresh and dry weight of plant, number of leaves/plant, number of branches/plant after 50 and 70 days from sowing and plant height at harvest were significantly increased by using weed control treatments compared with the unweeded treatment.

Soil solarization for a period of 8 weeks recorded the highest values of studied growth characters followed by that of solarized for 6 weeks, Bentazon + Fluazifop-butyl and solarized for 4 weeks treatments, respectively. On the other hand, the lowest values of studied growth characters were recorded with the unweeded treatment.

Table (7): **Averages of some growth characters of faba bean plants as affected by some weed control treatments (combined analysis of both seasons).**

Treatments	After 50 days from sowing					After 70 days from sowing				
	Plant height (cm)	Fresh weight of plant (gm)	Dry weight of plant (gm)	No. of leaves /plant	No. of branches/ plant	Plant height (cm)	Fresh weight of plant (gm)	Dry weight of plant (gm)	No. of leaves /plant	No. of branches/ plant
Solarized for 2 week	36.63	29.84	3.39	10.38	2.27	45.63	62.07	6.90	14.75	3.27
Solarized for 4 week	40.00	42.48	4.82	12.00	3.60	51.00	69.87	7.73	17.38	4.70
Solarized for 6 week	43.63	47.92	5.40	13.00	4.06	56.13	78.03	8.60	19.88	4.95
Solarized for 8 week	47.50	53.68	6.11	13.88	4.42	60.13	82.05	9.12	20.63	5.16
Bentazon	39.13	37.28	4.20	11.25	3.25	48.13	67.65	7.47	16.38	3.70
Fluazifop-butyl	38.38	35.04	3.90	10.75	3.11	45.75	65.07	7.20	15.50	3.56
Bentazon+ Fluazifop-butyl	41.25	45.60	5.06	12.63	3.92	53.00	72.24	8.21	18.75	4.43
Unweeded	32.13	24.08	3.04	9.13	2.80	41.38	54.66	5.95	13.75	3.11
LSD 5%	3.53	3.02	0.44	1.87	0.51	4.55	5.44	0.68	2.04	0.55
1%	4.81	4.13	0.59	2.54	0.70	6.19	7.22	0.92	2.78	0.75

Table (8): Yield and yield components of faba bean plants as well as some chemical composition of seeds as affected by some weed control treatments (combined analysis of both seasons).

Treatments	Plant height at harvest (cm)	No. of pods/plant	Weight of pods/plant	Pod length (cm)	No. of seeds/pod	100-seed weight (gm)	Seed yield/plant	Total protein%	Total carbohydrate s %
Solarized for 2 week	97.96	8.33	50.15	9.20	3.60	102.80	46.97	27.65	62.10
Solarized for 4 week	107.47	10.15	63.70	10.40	3.95	111.75	55.63	28.11	63.11
Solarized for 6 week	110.60	14.15	66.90	11.15	4.25	113.85	73.51	28.63	63.85
Solarized for 8 week	117.60	17.24	70.25	11.55	4.65	115.25	80.07	28.90	64.12
Bentazon	105.93	9.80	55.80	10.10	3.85	109.50	51.34	27.85	62.70
Fluazifop-butyl	104.47	9.73	54.80	9.80	3.75	108.35	49.52	27.77	62.55
Bentazon+ Fluazifop-butyl	109.74	14.86	68.05	10.95	4.05	112.50	67.75	28.47	63.70
Unweeded	95.66	5.65	44.58	8.35	3.25	94.75	42.76	27.03	61.75
LSD 5%	2.83	0.57	2.64	0.39	0.25	1.91	2.21	NS	NS
1%	3.86	0.78	3.59	0.53	0.35	2.71	3.01	NS	NS

Increased plant growth response due to soil solarization is frequently observed (Katan, 1997 and Abdallah *et al.*, 1998). The effect may be largely due to the control of soil born pests and weeds and in the release of mineral nutrients from the soil. These results were in general agreement with those obtained by Katan (1997), Abdallah *et al.* (1998), Abdallah (1999) and El-Metwally and Ahmed (2001).

Yield and yield components:

Data in Table (8) show positive effects on faba bean yield components due to the weed control treatments. Such effects were significant on number of pods/plant, weight of pods/plant, pod length, number of seeds/pod and 100-seed weight. Solarized for 8 weeks, solarized for 6 weeks, Bentazon + Fluazifop-butyl and solarized for 4 weeks gave the

greatest faba bean yield components characters. Vice-versa, the unweeded treatment produced the lowest faba bean yield component characters. The highest increase in seed yield/plant was obtained by solarized for 8 weeks, solarized for 6 weeks, Bentazon + Fluazifop-butyl and solarized for 4 weeks treatments, respectively. These superior treatments increased the average of seed yield/plant than unweeded treatment by about 87.25, 71.91, 58 44 and 30.10%, respectively.

The superiority of soil solarization or Bentazon + Fluazifop-butyl in producing high seed yield/plant might be due to its high efficiency in controlling broad spectrum of weeds and leading to the increase in seed yield. Also, the increase in seed yield is due to soil solarization in controlling Orobanche. These results are in good accordance with those obtained by Linke *et al.* (1991); Farag (1994); Abdallah (1999); El-Metwally and Ahmed (2001) and Metwally (2002).

Chemical composition of faba bean seeds:

Data in Table (8) show that weed control treatments had no significant effect on protein percentage and total carbohydrates percentage. Similar trend was reported by Radwan and Hussein (2002).

REFERENCES

Abdallah, M.M.F. (1991). Control of different weed species of different soil depth with soil solarization. Egypt J. Agron. Special Issue, PP 81-88.

Abdallah, M.M.F. (1999). No tillage sweet corn production following solarizaed faba bean and effect of Orobanche seeding depth. Bull. Fac. Agric., Cairo Univ., 50: 416-435.

Abdallah, M.M.F. (2000). Improving vegetables transplants using soil solarization. III. Tomato *Lycopersicon esculentum*. Arab Univ., J. Agric. Sci. Fac. of Agric. Ain Shams Univ., Cairo, 8(3): 719-733.

Abdallah, M.M.F.; S.A. El-Hadad and M.M. Satour (1998). Improving vegetables transplants using soil solarization. I. Cabbage and lettuce. 7th Conf. Agric. Dev. Res., Fac. of Agric. Ain Shams Univ., Cairo, December 15-17, Annals Agric. Sci., Sp Issue, 3: 831-843.

Abu-Irmaileh, B.E. (1991). Soil solarization controls broomrapes *Orobanche spp.* In host vegetables crops in the Jordan valley. Weed Tech., 5(3): 575-581.

Abu-Irmaileh, B.E. and S. Thahabi (1997). Comparative solarization effects on seed germination of cuscuta and *Orobanche spp.* Proc. Of the 2nd International Conference on soil solarization and Int. Manag. of soil pests. March, 16-21. Aleppo Syria.

Ahmed, S.A. (2001). Performance of wheat plants and some associated weeds to some weed control treatments. Egypt J. Appl. Sci., 16(4): 169-183.

Al-Ashkar, N.M.A. (1998). Effect of some new herbicides on wheat growth and associated weeds. M.Sc. Thesis Fac. of Agric. Cairo University.

Al-Masoom, A.A.; A.R. Saghir; S. Itani and Souheil, Itani (1993). Soil solarization for weed management in U.A.E. Weed Technolgy, 7(2): 507-510.

A.O.A.C. (1980). Official Methods of Analysis (13th ed). Association of Official Analytical Chemists, Washington, D.C.

Atalla, S.I.; M.M. Abd El-Hamid and L.A. El-Mashed (1998). Effect of some weed control treatments on weeds and yield of three wheat cultivars. J. Agric. Sci. Mansoura Univ., 23(8): 3583-3590.

Dubois, M., K.A. Gilles; J. Hamilton; R. Rebers and F. Smith (1956). Colrometric methods for determination of sugar and related substances. Ann. Chem., 28: 350-356.

El-Metwally, I.M. (2002) Performance of some wheat cultivars and associated weeds to some weed control treatments. Zagazig J. Agric. Res., 29(6): 1907-1927.

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. Annals of Agric. Sci. Moshtohor, 39(2): 787-803.

El-Metwally, I.M. and S A. Saad El-Din (2003). Response of pea (*Pisum sativum*, L.) plants to some weed control treatments. J. Agric. Sci. Mansoura Univ., 28(2):947-969.

Farag, I.A. (1994). Studies on soil solarization. I. Effect of soil solarization treatments on weed control and yield of faba bean. Assuit J. of Agric. Sci., 25(5):205-220.

Fayed, T.B.; S.R.S. Sabry and S.H. Aboul-Ela (1998). Effect of wild oat (*Avena fatua*, L.) herbicides on weed density, wheat grain yield and yield components. Annals Agric. Sci. Ain Shams Univ., Cairo, 43(1):173-183.

Gomez, K.A. and A. A. Gomez (1984). Statistical Procedure for Agricultural Research. John Willey and Son. Inc., New York.

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

Heath, M.C.; J.H. Clarcke 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.

Huel, P. (1998). Response to weed control by four spring wheat genotypes differing in competitive ability. Canadian J. Plant Sci., 78(1): 171-173.

Katan, J. (1997). Soil Solarization: Integrated control aspects. In Principles and practice of Managing soil borne plant pathogens. Robert Halled. APS Press PP, 250-278.

Linke, K.H. (1994). Effect of soil solarization on arable weeds under Mediterranean conditions. Control, Lack of response or stimulation Crop Protection, 13(2): 115-120.

Linke, K.H.; M.C. Saxena; J. Sauervorn and H. Masri (1991). Effect of soil solarization on the yield of food legumes and pest control. FAO plant production and protection. Paper (1991). 109:139-154. Proc. Of the 1st International Conference on Soil Solarization Amman, Jordan, 19-25, February.

Metwally, G.M. (2002). Influence 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

Nimje, P.M. (1996). Effect of row spacing, mulching and weed control on weed growth and yield of soybean. (*Glycin max*) Indian J. Agron., 41(3):427-432

Pandey, I.B.; S.S. Mishra and S.J. Singh (1997). Effect of seed-furrow mulching, nitrogen rates and weed management practices on growth and yield of late-sown wheat (*Triticum aestivum*, L.). Indian J. Agron., 42(3): 463-467.

Radwan, S.M.A. and H.F. Hussein (2002). Evaluation of different weed control measures on some rhizosphere microorganisms, weeds and productivity of pea under bio-organic fertilization. Egypt J Appl. Sci., 17(7): 287-309.

Saad El-Din, S.A. (2003). Efficiency of some weed control tereatments on growth, yield and its components of broad bean (*Vicia faba*, L.). Egypt J. Appli. Sci., 18(6B):586-604.

Subhash, K.; G. Singh and Y.S. Shivay (1997). Performance of Tralkoxydium and Isoproturon for broad spectrum weed control and wheat growth. Indian J. Agron., 42(3): 474-478.

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).

Tiwari, R.B. and S.S. Parihar (1997). Weed management in wheat (*Triticum aestivum*). Indian J. Agron., 42(4): 726-728.

استجابة نباتات القمح والفول البلدى والحشائش المصاحبة لـــهما لبعــض طــرق مكافحة الحشائش.

سامية أمين سعد الدين و إبراهيم محمد المتولى
قسم النبات – المركز القومى للبحوث – الدقى – القاهرة – مصر

أجريت هذه الدراسة بمحطة المركز القومى للبحوث خلال الموسمين ٢٠٠٠/٢٠٠١ و ٢٠٠١/٢٠٠٢ بهدف دراسة استجابة نباتات القمح والفول البلدى والحشائش المصاحبة لهما فى الأصص (قطر ٣٠ سم) لبعض طرق مكافحة الحشائش .

كانت معاملات تجربة القمح كالتالى:
التعقيم الشمسى لمدة ٢ ، ٤ ، ٦ و ٨ اسبوع ، مبيد الميتوسيولام بمعدل ٠,٠٤ لتر/فدان، مبيد التراكوسيديم بمعدل ١ لتر/فدان ، مبيد الميتوسيولام بمعدل ٠,٠٢٦لتر/فدان + مبيد التراكوسيديم بمعدل ٠,٦٦٧لتر/فدان بالإضافة لمعاملة المقارنة بدون تعشيب.

بينما كانت معاملات تجربة الفول كالتالى:
التعقيم الشمسى لمدة ٢ ، ٤ ، ٦ و ٨ اسبوع ، مبيد البنتازون بمعدل ٠,٥ لتر/فدان ، مبيد الفلوزيفوب – بيوتيل بمعدل ١ لتر/فدان ، مبيد البنتازون بمعدل ٠,٣٣٣ لتر/فدان + الفلوزيفوب- بيوتيل بمعدل ٠,٦٦٧لتر/فدان بالإضافة الى معاملة المقارنة بدون تعشيب.
ونفذت التجربة فى تصميم القطاعات الكاملة العشوائية فى أربع مكررات .

ويمكن تلخيص أهم النتائج المتحصل عليها فيما يلى:
تجربة القمح:
ادى استخدام التعقيم الشمسى باستخدام البلاستيك الشفاف لمدة ٨ اسبوع إلى الحصول على أفضل مكافحة للحشائش العريضة والضيقة الأوراق وكذلك الكلية يليها معاملة الميتوسيولام ، معاملة التعقيم الشمسى لمدة ٦ أسبوع بالنسبة للحشائش العريضة الأوراق ومعاملة الميتوسيولام + التراكوسيديم ثم معاملة التعقيم الشمسى لمدة ٦ أسبوع بالنسبة للحشائش الضيقة الأوراق والحشائش الكلية وذلك بالمقارنة ببقية المعاملات وذلك بعد ٥٠ و ٧٠ يوم من الزراعة.
كذلك أدى التعقيم الشمسى لمدة ٨ أسبوع إلى الحصول على أفضل النتائج بالنسبة للنمو والمحصول ومكوناته يليها معاملة التعقيم الشمسى لمدة ٦ أسبوع ثم معاملة الميتوسيولام + التراكوسيديم على التوالى.

تجربة الفول البلدى:
ادى استخدام التعقيم الشمسى لمدة ٨ اسبوع إلى الحصول على أفضل مكافحة للحشائش العريضة والضيقة الأوراق وكذلك الكلية يليها معاملة البنتازون + الفلوزيفوب – بيوتيل وذلك بالمقارنة ببقية المعاملات وذلك بعد ٥٠ و ٧٠ يوم من الزراعة.
أما بالنسبة لحشيشة الهالوك أدى استخدام التعقيم الشمسى لمدة ٨ اسبوع يليها التعقيم الشمسى لفترتى ٦ و ٤ أسبوع إلى الحصول على أفضل مكافحة لحشيشة الهالوك بالمقارنة ببقية المعاملات عند الحصاد.
أدى استخدام التعقيم الشمسى لمدة ٨ أسبوع إلى الحصول على أفضل النتائج بالنسبة للنمو والمحصول ومكوناته لنباتات الفول البلدى يليها معاملة التعقيم الشمسى لمدة ٦ أسبوع ثم معاملة البنتازون + الفلوزيفوب – بيوتيل على التوالى. ولم يكن هناك تأثير معنوى على صفات النسبة المئوية للبروتين والكربوهيدرات الكلية بالنسبة لحبوب القمح أو لبذور الفول البلدى.
ومن النتائج المتحصل عليها تأكد أهمية استخدام التعقيم الشمسى لمدة ٨ و ٦ أسابيع قبل الزراعة كطريقة ناجحة فى مقاومة الحشائش وتحسين إنتاج محاصيل القمح والفول البلدى دون اللجوء لإستخدام المبيدات من ناحية وتوافر مواصفات الجودة وكمية الإنتاج من المحاصيل وخاصة ذات الأهمية التصنيعية (القمح) والغذائية (الفول) والتى يعتبر خلوها من المبيدات ضرورة لإستعمالها فى الغذاء الآمن الصحى.