J. Agric. Sci. Mansoura Univ., 31 (10): 6283 - 6292, 2006

EFFECT OF SOME WEED CONTROL TREATMENTS ON GROWTH, YIELD, YIELD COMPONENTES AND SOME SEED TECHNOLOGICAL CHARACTERS AND ASSOCIATED WEEDS OF FABA BEAN PLANTS.

Abd El-Razik, M. A.
Seed. Tech. Res. Dept., Field Crops Res. Inst., A.R.C., Giza, Egypt.

ABSTRACT

Two field experiments were conducted during 2003/ 2004 and 2004/ 2005 seasons at the Agricultural Exprimental Station of the National Research Center at Shalakan, Kalubia Governorate and seed technology unite, Mansoura, Egypt. The objective of this investigation was to study the effect of some weed control treatments(unweeded, two hand hoeing, Prometryn at 1.250L/fed, Metribuzin at 250 g/fed, Bentazon at 0.750L/fed, Fluazifop-butyl at 1L /fed and Bentazon+Fluazifop-butyl) on growth,yield,yield attributes and some seed technology of faba bean plants.

Fresh and dry weight of faba bean weeds were significantly decreased by different weed control treatments as compared to the unweeded check. The most effective treatments in decreasing fresh and dry weight of broad- leaved. Weeds were: two hand hoeing, Bentazon, Bentazon + Fluazifop-butyl and prometryn. While, Fluazifop-butyl, Metribuzin, Prometryn and Bentazon+ Fluazifop- butyl successively were the most treatments in decreasing fresh and dry weight of grass weeds. Also, the highest decrease in fresh and dry weight of total weeds were obtained by two hand hoeing, followed by that of Bentazon+ fluazifop- butyl treatment.

Two hand hoeing, followed by Bentazon+ Fluazifop-butyl and prometryn recorded the tallest plant height and produced the highest values of branches number of plant, No.of leaves/plant, fresh weight of plant, dry weight of plant, weight of pods/ plant, pod length, No. of seed/ pod, weight of seeds/ plant, 100-seed weight and seed yield ton/ fed as well as protein % and carbohydrates percentage in faba bean seeds. While, hand hoeing and Bentazon successively were the most treatments in increasing root length and seedling dry weight. Also, the highest increasing in germination speed were obtained by Metribuzin and two hand hoeing treatments.

INTRODUCTION

Faba bean (*Vicia faba*, L.) is one of the most important field crops in the Egyptian agriculture. It considered as the most important crop among legumes since the seeds provide rich source of protein, for public. The government encourages the cultivation of faba bean through the production of new improved cultivars and best cultivation methods for higher productivity.

Weeds are considered a major problem in bean field that cause great losses in seed yield because weed compete directly with plants for light, moisture and soil nutrients. Weed control is one of the essential cultural practices for raising faba bean yield and improving its quality. Hand hoeing has bean usually employed to control weeds in faba bean fields. It results in good control of weeds in faba bean crop (Ahmed, 1990; Ebaid, 1990; Abd-Allah *et al.*,1991; Radwan, 1992; Shams El-Din and Salwau, 1994; Gomaa and El- Naggar, 1995; Soliman *et al.*, 1998; Metwally, 2002 and Saad El-Din 2003). Chemical weed control treatments became of great importance due to

the high cost of farm labours at the present circumstances. The best weed control results were obtained by the application of Bentazon+ fluazifop butyl (Ahmed, 1990; Abd- Allah *et al.*, 1991; Heath *et al.*, 1992. Radwan, 1992; Salwau,1994 and Shams El-Din and Salwau, 1994), Fluazifop–butyl(Ngouajio and Daelemans, 1993; Tanji, 1994 and Saad El-Din, 2003) and Bentazon (Baumann, 1992; Heath *et al.*, 1992; Gronowicz *et al.*, 2000; Saad El-Din, 2003 and Saad El-Din and El-Metwally, 2003). Some workers reported increased growth characters, yield and its components of faba bean plants were hand hoeing (Gomaa and El- Naggar, 1995; Soliman *et al.*, 1998 and Saad El-Din,2003), Fluazifop- butyl (Metwally,2002; Saad El-Din and El-Metwally, 2003), Bentazon (Heath *et al.*, 1992; Metwally,2002 and Saad El-Din and El-Metwally, 2003) and Metribuzin (El-Metwally and Ahmed.,2001). (El-Douby and Samia 2001) and Saad El-Din 2003 found that hand hoeing twice or hand hoeing once + Fusilade herbicide recorded the highest values for growth characters and seed and biological yields/ fed of faba bean.

Finally this investigation was carred out to study the effect of some weed control treatments on growth characters, yield, its attributes and some seed technology characters on faba bean plants as well as on its associated weeds.

MATERIALS AND METHODS

Two field experiments were carred out during 2003/2004 and 2004/2005 seasons at the Agricultural Experimental station of the National Research Center at Shalakan, Kalubia Governorate, Egypt to study the effect of some weed control treatments on growth, yield and its attributes and some seed tecnology characters of faba bean. The soil texture was clay loam with medium fertility, containing 1.75% organic matter and pH 7.8.

The experiments were laid out in Randomized complet block design with four replicates. Weed control treatments were arranged randomly as follows:

1-Unweeded check (control)
2-Hand hoeing twice (after 3 and 6 weeks from sowing)
3-Prometryn at rate of 1.25 L/fed.
4-Metribuzin at rate of 250 g/fed.
5-Bentazon at rate of 0.75 L/fed.
6-Fluazifop-butyl at rate of 1L/fed.
7-Bentazon at rate of 0.5 L/fed + Fluazifop- butyl at rate of 0.75 L/fed.

The common, trade, chemical names and time of application of each herbicides used are shown in Table (1).

Faba bean (Giza 843) seeds were sown on 15th and 19th Novamber for the two seasons of 2003/2004 and 2004/2005, respectively. The experimental unit area was 12 m^2 (3x4m). Each plot comprised 5 ridges, 60 cm width and 4 meter long. The normal cultural practices of growing faba bean plants were followed especially fertilization and irrigation. Harvesting was performed in 23 and 26 April in the first and second seasons, respectively.

Table (1) : The common, trade name, chemical names and time of application of herbicides

Common name	Trade name	Chemical name	Time of application
Prometryn	Gizagard	N, N-bis (1-methyl ethyl)-6-(methylthiol-1,3,5-triazine-2,4-diamine	Pre-emergence
Metribuzin	Sencor70%	(4-amino-6-tert-butyL-3-(methylthio)1,2,4-triazine-5 (4H)one)	Pre-emergance
Bentazon48%	Basagran48%	3-isopropyl 1H-2,1,3-benzathiad-iazin-4-(3H)1,2,2-dioxide	Post-emergence after 2 weeks from sowing
Fluazifop-butyl-25%	Fusilade25%	Butyl-2-(4-(5-trifluoromomthyl-2-pyridy loxy)phenoxy)propionate.	Post- emergence after 3 weeks from sowing

Data recorded:

1-On weeds:

After 70 days from sowing in both seasons, weed samples from one square meter were randomly taken from each plot. Weeds were indentified and classified into broad- leaved, grasses and total weeds. Fresh weight of weeds was recorded and the dry weight of weeds was determined after drying in a forced draft oven at 70C to constant weight. The common weeds in both growing seasons were: *Beta valgaris,L; Ammi majus,L.; Rumex dentatus,L.; sonchus oleraceus, L.; Medicago hispida,L.; Melilotus indicus,L.; cynodon dectylon, L and cyperus rotundus.*

2- On faba bean plants:

Vegetative growth parameters:

Growth measurements of faba bean plants were recorded at 70 days from sowing as follows:

1-Plant height (cm). 2-Number of branches/ plant.
3-Number of leaves/ plant. 4-Fresh weight of plant(g).
5-Dry weight of plant (g).

Yield and yield attributes:

At time of harvest of faba bean plants, the following data were recorded:

1-Plant height (cm).
2-weight of pods/ plant(g).
3-Pod length (cm).
4- Number of pods/ plant.
5-Number of seeds/ pod.
6- Weight of seeds/ plant(g).
7- Seed yield (ton/ fed). For the last traits the two central ridges of each experimental unit were devoted the determination.

Seed technology characters:

1-100-seed weight (g). It was measured according to International Seed Testing Association (ISTA, 1985).
2-Germination percentage. It was estimated according to (AOSA. 1981).

3-Germination speed.
4-Plumula length (cm). It was measured according to Perry (1977).
5- Root length (cm). It was measured according to Perry (1977).
6- Seedling dry weight (g). It was estimated according to Steel and Torrie (1980).
7- Protein content. It was estimated according to A. O. A. C. Methods (1980) and crud protein percentage was computed by multiplying the total N by 6.25.
8- Carbohydrate percentage. It was estimated according to Dubious and Gilles, methods (1956).
9- Electrial conductivity (EC). It was evaluated according to (A.O.S.A, 1983).

Statistical analysis:

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

RESULTS AND DISCUSSION

Effect of different weed control treatments on:

Faba bean weeds:

a-Broad- leaved weeds: Data in Table (2) reveal that all weed control treatments under investigation except fluazifop-butyl decreased significantly the fresh and dry weight of broad leaved weeds as compared to the unweeded check at 70 days from sowing. The highest efficiency in decreasing fresh and dry weight of broad-leaved weeds was obtained by hand hoeing twice, followed by Bentazon, Bentazon+ Fluazifop-butyl, Prometryn and Metribuzin treatments, respectively. The highest effectiveness of hand hoeing, Bentazon, Prometryn and Metribuzin herbicides treatments against faba bean broad- leaved weeds could be attributed to the high sussceptibility of the present weed to both hand hoeing and the herbicidel activity of these herbicides. On the other side, the highest fresh and dry weight of broad- leaved were recorded when faba bean plots were unweeded. The same conclusion was mentioned by Ahmed (1990), Heath *et al.* (1992) and Metwally(2002).

b-Grass weeds:

Relevant data show that fresh and dry weight of grass weeds after 70 days from sowing were significantly decreased by different weed control treatments when compared with unweeded check in average of two seasons Table(2). The results also indicated that Fluazifop –butyl treatment gave the best controlled when compared to the weed control treatments. It reduced fresh and dry weight of grassy weed than unweeded check by 94.93 and 93.20 %, respectively. Treatments of Fluazifop- butyl, Fluazifop-butyl +Bentazon, Metribuzin, prometryn and hand hoeing twice were very effective in controlling most grassy weeds at 70 days from sowing. On the contrary, the highest fresh and dry weight of grass weeds after 70 days from sowing were observed with unweeded treatment followed by that of Bentazon treatment. These results may be due to the inhibition effect of herbicidal treatments on growth of weeds. The results are in harmony with those obtained by Abd- Allah *et al.*(1991), Tanji(1994) and Saad El- Din (2003).

Table (2): Averages of fresh and dry weight of weeds(g/m^2) after70 days from sowing as affected by some weed control treatments during 2003/2004 and 2004/ 2005 seasons (Average of two seasons).

Treatments	Fresh.w of weeds(g/m^2)			Dry. W of weeds(g/m^2)		
	Broad-leaved	Grasses	Total	Broad-leaved	Grasses	Total
Unweeded(control)	762.0	296	1058	93.5	25	118.5
Hand hoeing twice	31.5	36.0	67.5	5	4.5	9.5
Prometryn	290	35	325	34.9	4.3	39.2
Metribuzin	330	28	358	39.7	3.5	42.2
Bentazon	158.5	286.5	397.0	29.5	2.2	51.5
Fluazifop-butyl	752.5	15.0	767.5	92.5	1.7	94.2
Bentazon +Fluazifop-butyl	272.5	16.0	288.5	31	1.8	32.8
F. test	**	**	**	**	**	**
L .S. D at 5%	7	4.5	10	2	1	3.5

C-Total weeds:

It is obvious from the data in Table (2) that weed control treatments reveal significant influences on fresh and dry weight of total weeds. The results also indicated that hand hoeing twice treatment gave the best weed control when compared to other weed control treatments. It reduced fresh and dry weight of total weeds than unweeded check by 93.62 and 91.98 %, respectively. With regard to herbicidal treatments, data clear that the highest efficiency in decreasing fresh and dry weight of total weeds were obtained by Bentazon +Fluazifop–butyl, Prometryn, Metribuzin, Bentazon and fluazifop–butyl treatments, respectively. These treatments decreased fresh and dry weight of total weeds than unweeded treatment by 72.73, 69.28, 66.16, 62,48 and 27.46 % in fresh weight and by 72.32, 66.92, 64.39, 56.54 and 20.51 % in dry weight, respectively. While the unweeded treatment resulted the highest values of fresh and dry weight of total weeds in average of two seasons.

Generally, the results recorded in Table (2) reveal that hand hoeing and herbicidal treatments decreased significantly fresh and dry weight of faba bean weeds as compared to unweeded treatment. These results may be due to the inhibition and deleterious effect of herbicidal treatments on growth of weeds. Tthese results agree with the findings of Ebaid (1990), Soliman *et al.* (1998), El –Metwally and Saad El-Din (2003) and Saad El-Din (2003).

Faba bean study:

1-Growth charateristics:

Data presented in Table (3) show that plant height, Number of branches/plant , No.of leaves/plant, Fresh and dry weight of plant (g) were significantly increased as a result of controlling weeds by different weed control treatments as compared to the unweeded treatment in average of two seasons. The tallest plants were obtained by hand hoeing twice, followed by Bentazon + Fluazifop–butyl, Prometryn and Mitribuzin treatments. The maximum values of No.of branches/plant, No.of leaves/ plant, fresh and dry weight of plant (g) were recorded by hand hoeing followed by that of

Bentazon + Fluazifop–butyl and prometryn treatments. In contrast,the lowest values of growth characters were observed in the unweeded check. 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 faba bean growth if compared to other treatments. These results are in general agreement with those recorded by Jovicevic *et al.* (1992), El-Quesni and Radwan(1993), Ahmed *et al.* (2001) and El-Metwally and Saad El-Din (2003). Metwally (2002) noticed that number of branches/plant was not affected by any of the weed control treatments. On the other hand, slight reductions in faba bean plant height were noticed in the fusilade (Fluazifop –butyl) treatment (Jovicevic *et al.*, 1992).

Table (3): Average of plant height (cm), No. Of branches/ plant, No. Of leaves/ plant and fresh and dry weight of plant (g) after 70 days fromsowing as affected by some weed control tretments during 2003/ 2004 and 2004/ 2005 seasons (average of two seasons).

Treatments	Plant height (cm)	No.of branches/ plant	No.of leaves /plant	Fresh weight of plant(g)	Dry weight of plant (g)
Unweeded (control)	65.3	1.86	26.30	87.50	9.40
Hand hoeing twice	103.50	3.18	50.10	224.50	23.3
Prometryn	97.15	3.08	42.12	190.11	19.01
Metribuzin	95.13	3.01	40.15	187.32	18.01
Bentazon	81.50	3.06	34.50	137.12	14.24
Fluazifop- butyL	88.51	2.47	37.14	170.10	17.40
Bentazon + Fluazifop-butyL	99.72	3.09	45.31	196.50	20.40
F. test	**	**	**	**	**
L S D at 5 %	3.01	0.34	2.20	4.60	1.44

2- Yield and yield attributes of faba bean:

In average of two seasons, weed control treatments had significant effects on yield and yield attributes of faba bean as shown in Table (4). Hand hoeing twice, followed by that of Bentazon + Fluazifop–butyl, Prometryn and Metribuzin treatments produced the tallest faba bean plants as compared to other weed control treatments. Hand hoeing twice, followed by that of Bentazon +Fluazifop –butyl, Prometryn and Metribuzin treatments significantly increased pod length, number of pods/ plant, number of seeds /pod, weight of pods/ plant and weight of seeds/ plant as compared with other treatments. On the other hand , the lowest values of previous characters were recorded with the unweeded plots. The increase in yield attributes by different weed control treatments may be due to good control of faba bean weeds and minimizing weed competition which gave good chance of faba bean growth and improved good characters. The promoting effect of weed control treatments on growth characters(plant height, No of leaves, No of branches and fresh and dry weight) of faba bean plants may be reflect on increasing the yield and its components of faba bean. These results are in coincide with those detected by Salwau (1994), Shams El-Din and Salwau(1994), Balyan *et al.*(1995), Ahmed *et al.*(2001) and El- Metwally and Saad El-Din (2003).

Table (4):Average of plant height (cm), weight of pods/plant, pod length(cm), No.of pods/ plant, No.of seeds/pod, weight of 100-seeds(g), weight of seeds /plant and seed yield ton/fed as affected by some weed control treatments during 2003/2004 and 2004 /2005 seasons (Averages of two seasons).

Treatments	Plant height (cm)	Weight of pods/ plant	Pod length (cm)	No.of pods/ plant	No. of seeds/ pod	Weight of seeds/ plant	Seed yield (ton/ fed)
Unweeded(control)	87.10	42.50	7.30	6.23	2.70	20.25	0.92
Hand hoeing twice	125.40	181.7	10.30	19.30	4.31	38.50	2.52
Prometryn	112.61	167.12	9.64	15.20	3.87	35.90	2.14
Metribuzin	110.01	165.14	9.31	15.29	3.75	35.13	1.92
Bentazon	94.11	78.11	8.40	10.81	3.50	25.50	1.49
Fluazifop-butyl	107.00	72.11	9.10	9.70	3.34	27.50	1.70
Bentazon+ Fluazifop-butyl	119.00	143.11	10.0	16.30	4.10	36.40	2.35
F. test	**	**	**	**	**	**	**
L. S. D at5% °%	3.34	5.79	0.70	o.95	1.60	1.60	0.95

With regard to seed yield per feddan, data in Table (4) show significant differences in yield of faba bean in average of two seasons. Hand hoeing and all herbicidal treatments markedly produced higher seed yield than unweeded plots. Hand hoeing twice, Bentazon +Fluazifop –butyl, prometren, Metribuzin treatments recorded the highest seed yield per feddan as compared with other treatments. These superior treatments increased the average of seed yield than unweeded treatment by about 173.91,155.43, 132.61 and108.70% in average of two seasons. On the other side, the lowest values of faba bean yield was obtained when faba bean plots were unweeded. The results obtained were indicated that hand hoeing twice, Bentazon+ Fluazifop-butyl, Prometryn and Metribuzin produced a promising effect against weeds prevailing faba bean fields and in turn exhibited better increases in faba bean yield and its components in comparison with other treatments. These results are in agreement with those detcted by Timmer *et al.* (1993), Soliman *et al.* (1998), Metwally (2002) and Saad El – Din (2003).

3- Seed technology characters:

Data presented in Table (5) show that significant differences in seed technology characters with herbicidal treatments except germination percentage and plumula length (cm) over the main of two seasons. Two hand hoeing, followed by Bentazon+ Fluazifop-butyl recorded the highest values of 100-seed weight, protein %, carbohydrates % and EC. While, Metribuzin followed by two hand hoeing gave the highest value of germination speed compared with other treatments. Also, the highest increase in root length and seedling dry weight were obtained by two hand hoeing and Bentazon treatments. On the other side, the lowest values of 100-seed weight, germination speed, root length, seedling dry weight, protein %, carbohydrates % and electrical conductivity (EC) were recorded when faba bean plots were unweeded. These results may be due to the less competition for nutrients, water and light through limiting weeds infestation with herbicidal treatments due to increasing the uptake of different nutrients. This confirms the fendings of Ahmed(2001), El- Metwally and Ahmed (2001) and El- Metwally and Saad El- Din (2003. Results also indicated that there were no significant effect of weed control treatments on germination% and plumula length (cm).

Table (5): Average of 100-seed weight (g), germination percentage, germination speed, plumula length (cm), root length (cm), seedling dry weight (g), protein percentage, carbohydrate percentage and electrical conductivity (EC) as affected by some weed control treatments during 2003/ 2004 and 2004/ 2005 seasons (Averages of two seasons).

Treatments	100-seed weight (g)	Germination %	Germination speed	Plumula length (cm)	Root length (cm)	Seedling dry weight (g)	Protein %	Carbohydrates %	EC
Unweeded(control)	59.78	96.67	33.81	16.00	12.10	2.17	23.17	50.16	0.012
Hand hoeing twice	73.92	100.00	40.67	17.37	15.90	2.67	29.27	57.11	0.015
Prometryn	60.36	96.67	35.32	16.22	14.50	2.32	27.80	55.13	0.013
Metribuzin	61.69	98.67	41.70	16.60	11.73	2.07	27.11	54.50	0.012
Bentazon	63.72	94.67	33.52	17.32	15.37	2.54	26.12	53.20	0.013
Fluazifop-butyL	63.44	100.00	34.77	14.32	12.30	2.36	25.77	52.17	0.014
Bentazon+Fluzaifop	70.31	98.00	36.25	16.78	14.07	2.48	28.50	56.12	0.015
F. test	**	N S	**	N S	**	**	**	**	**
L S D at 5 %	3.43	-	4.08	-	2.43	0.29	0.35	0.73	0.001

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تأثير بعض معاملات مكافحة الحشائش على النمو والمحصول ومكوناتـــه وبعـــض الصفات التكنولوجية لبذور الفول البلدى والحشائش المصاحبة له.

محمود احمد عبد الرازق

قسم بحوث تكنولوجيا البذور– معهد بحوث المحاصيل الحقليه– مركز البحوث الزراعيه – الجيزه

أجريت تجربتان حقليتان بمزرعة المركز القومى للبحوث بشلقان محافظـة القليوبيـه و وحـدة بحـوث تكنولوجيا البذور بالمنصوره محافظة الدقهليه خلال موسـمى ٢٠٠٣/٢٠٠٤ و٢٠٠٤/٢٠٠٥ لدراسـة تـأثير بعـض معاملات مكافحة الحشائش(مقارنه ، عزيق مرتين، برومترين ، مترىبـوزين ، بنتـازون ، فلوزيفـوف- بيوتيـل ، بنتازون+ فلوزيفوف-بيوتيل) على النمو والمحصول ومكوناته والصفات التكنولوجيه لبذور الفول البلدى.

أظهرت النتائج ان استخدام معاملات مكافحة الحشائش ادى الى نقص معنوى فى الوزن الغـض والجـاف للحشائش المصاحبه للفول البلدى وذلك بمقارنتها بمعاملة الكنترول وقد أظهرت معاملة العزيق مرتين يليهـا معاملـة البنتازون تفوقا واضحا فى مكافحة الحشائش العريضة الاوراق مقارنة بالمعاملات الاخرى بينمـا أظهـرت معاملـة الفلوزيفوت- بيوتيل يليها معاملة الفلوزيفوب بيوتيل + البنتازون ثم معاملة البرومترين على التوالى تفوقا واضحا فـى مكافحة الحشائش ضيقة الاوراق وقد أظهرت معاملة العزيق مرتين يليهـا معاملـة بنتـازون+ فلوزيفـوب بيوتيـل ، البرومترين ،المتريبوزين على التوالىتفوقا واضحا فى مكافحة الحشائش الكلية.

أظهرت جميع معاملات مكافحة الحشائش تأثيرا فعال فى زيادة صفات النمو والمحصول ومكوناته لنباتات الفول البلدى وقد اظهرت معاملات العزيق اليدوى ، بنتازون + فلوزيفوب بيوتيل ، برومترين ثم المتريبـوزين علـى التوالى زيادة معنوية فى صفات عدد فروع النبات ، عدد اوراق النبات ، الوزن الغض والجاف للنبات ،وزن قرون النبات، طول القرن ، عدد البذور فى القرن ، وزن ١٠٠ بذره ، محصول البذور بالطن/ فدان و النسبه المؤبه للبروتين والكربوهيدرات لبذور الفول البلدى.

بينما أدى استخدام العزيق اليدوى يليه معاملة البنتازون إلى الحصول على زيادة معنوية لصـفات طـول الجزر والوزن الجاف للبادرات بالمقارنه ببقية المعاملات تحت الدراسه. أيضا أظهرت النتائج أن اسـتخدام معاملـة المتريبوزين يليها معاملة العزيق اليدوى مرتين إلى زيادة سرعة الإنبات بالمقارنة ببقية المعاملات تحت الدراسة.