EFFECT OF PLANTING METHODS, PLANT DENSITIES AND WEED CONTROL ON FABA BEAN AND ASSOCIATED WEEDS
II- GROWTH CHARACTERS OF FABA BEAN

BY

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ABSTRACT

Two field experiments were carried out at the Agricultural Research and Experimental Center, Faculty of Agric. Moshtohor, Kalubia, Egypt, during 1985/86 and 1986/87 seasons to study the effect of planting methods, plant densities and weed control treatments on growth characters of faba bean. Each experiment included 30 treatments which were the combination of two planting methods, three plant densities and five weed control treatments.

The studied growht characters of faba bean i.e. plant height, number of branches, leaves and pods/plant, L.A.I. and dry weight of different parts of the plant were not affected by planting methods except the number of branches/plant at 70 days, plant height and L.A.I. at 130 days from sowing where Afir method gave the heaviest values than Herati method. At all different growth stages, faba bean growth characters were increased by increasing plant density, the highest values were obtained with planting 93000 plant/fed., while the lowest were recorded at high plant population (280000 plants/fed.). All weed control treatments increased the dry weight of different parts of faba bean plant, i.e. branches, leaves and pods as well as total dry weight of plants than un-weeded check. The interaction between plant densities and weed control treatments on growth characters indciate that topogard or hand weeding gave the greater values under the lowest plant density.

INTRODUCTION

Faba bean (Vicic faba L.) is considered one of the most important field crops. It is usually planted for its seeds that is used as a source of protein for human consumption in Egypt. Improving growth of faba bean can be achieved by improving cultural practices, i.e., planting methods,

plant densities and weed control. Heraty (wet) method increased some growth characters of soybean and lentil compared with Afir (dry) method (Sary et al., 1988a and b). Dense planting caused a decrease in the number of different plant organs, while plant height and dry matter content/m^2 were increased with increasing the plant density of faba bean (Ahmed, 1973). Shalaby and Mohamed (1978a) stated that leaf area/plant, number of branches/plant, leaf area index. net assimilation rate and relative growth rate were decreased by increasing plant density. Abd El-Wahab et al. (1982), concluded that plant height and number of branches/plant were increased by increasing the distance between faba bean plants from 10.2 to 30 cm.

Concerning weed control, linuron at a rate of 1.0 kg/fed. increased number of branches/plant (Eweida and Fayed, 1978), hand hoeing, linuron and prometryn treatments increased both plant height and number of branches/plant of soybean over the un-weeded check (Moshtohory, 1983). Whereas, Nassib et al. (1982), found no effect owing to using hand weeding (twice) and terburtyn at a rate of 4.76 kg/ha. on number of branches, leaves and pods/plant in faba bean, Hussein et al., (1985), pointed out that terbutyn did not affect the dry weight of shoots and roots of faba bean. The aim of this work was to investigate the effect of planting methods, plant densities and weed control treatments on growth characters of faba bean.

MATERIALS AND METHODS

Materials and methods were previously described in the first paper of this series (Sary et al., 1989). The following data were recorded on samples each of five plants from each sub-sub-plot at three times namely 70, 100 and 130 days from faba bean planting: Plant height, number of branches/plant, number of leaves/plant, number of pods/plant, L.A.I., dry weight of branches, leaves, pods and total dry weight/plant.

RESULTS AND DISCUSSION

1- Effect of planting methods:

The available results in Table (1) reveal that there was no significant effect for planting methods on most growth character, i.e. plant height number of branches, leaves and pods/plant, L.A.I. and dry weight of branches, leaves, pods and total/airial part/plant. These results

Table (1): Effect of planting methods on some growth characters of faba bean plants (Combined analysis of 1985/86 and 1986/87 seasons).

Growth characters / Planting method	Plant height cm.	No. of branches/ plant	No. of leaves/ plant	No. of pods/ plant	L.A.I.	Dry weight of plant organs (gm)			
						Branches	Leaves	Pods	Total
At 70 days from sowing									
Afir method	38.49 a	1.69 b	17.97 a	-	1.31 a	1.81 a	1.92 a	-	3.73 a
Heraty method	38.33 a	1.59 a	17.62 a	-	1.25 a	1.77 a	1.83 a	-	3.61 a
At 100 days from sowing									
Afir method	67.71 a	1.88 a	24.22 a	4.95 b	2.64 a	5.44 a	4.36 a	1.17 a	10.97 a
Heraty method	68.13 a	1.80 a	24.00 a	4.37 a	2.41 a	5.53 a	4.18 a	1.09 a	10.81 a
At 130 days from sowing									
Afir method	77.57 b	1.77 a	15.58 a	7.47 a	1.54 b	6.44 a	3.07 a	10.10 a	19.60 a
Heraty method	74.08 a	1.81 a	15.78 a	7.25 a	1.40 a	6.67 a	3.01 a	10.17 a	19.86 a

are true at the different growth stages i.e. 70, 100 and 130 days from sowing except the number of branches/plant at 70 days and plant height and L.A.I. at 130 days from sowing. These results disagree with those reported by Sary et al. (1988a), in soybean and Sary et al. (1988b) on lentil, who indicated that Heraty method significantly increased the growth characters of plants.

2- Effect of plant densities:

The results in Table (2) indicate clearly that plant height significantly increased with increasing plant densities up to 280000 plants/fed. at the different periods of growth i.e., 70, 100 and 130 days from sowing. This increase in plant height at the high plant density may be attributed to the competition among plants for light, water and nutrents. These results are in harmony with those obtained by Ahmed (1973); Rizk (1973); Lisiewska and Kmiecik (1981b) and Pandy (1981) on faba bean. Whereas, Shaalan et al. (1977), on faba bean, reported that plant height was not affected by increasing plant population.

Concerning the effect of plant densities on the number of branches, leaves and pods/plant, it is clear from data in Table (2) that these characters were significantly affected to different extents by plant population. The three studied characters showed the same trend of response at the different periods of growth. The greatest numbers of branches, leaves and pods/plant were obtained at the lowest plant density, while the lowest values were obtained by using the high population of faba bean. The reduction in the number of these three organs of faba bean plants at higher plant density might be attributed to the competition between plants for the above and under ground space. These results are in agreement with those obtained by Ahmed (1973); Shaalan et al., (1977); Shalaby & Mohamed (1978a) and Pandy (1981) on faba bean. On the other hand, Rizk (1973) on faba bean, obtained an adverse trend.

With regard to leaf area index (L.A.I.), data in Table (2) indicated clearly that this character tended to increase as the plant density increased. This reuslt may be due to the greater number of plants grown per unit area in case of higher densities, which was considered as the main factor for increasing the value of L.A.I. In this respect, Shalaby and Mohamed (1978a) on faba bean, showed that L.A.I. value decreased as plant population was increased.

Increasing plant density caused significant decreases in the dry weight of the different organs and total plant

Table (2): Effect of plant densities on some growth characters of faba bean plants (Combined analysis of 1985/86 and 1986/87 seasons).

Growth characters / Plant densities	Plant height cm.	No. of branches/ plant	No. of leaves/ plant	No. of pods/ plant	L.A.I.	Dry weight of plant organs (gm)			
						Branches	Leaves	Pods	Total
At 70 days from sowing									
280 000 plants/fed.	35.54 c	1.19 a	14.40 a	-	1.99 c	1.73 a	1.61 a	-	3.34 a
140 000 plants/fed.	36.06 b	1.79 b	18.85 b	-	1.08 b	1.78 a	1.93 b	-	3.71 b
93 000 plants/fed.	33.62 a	1.94 c	20.13 c	-	0.76 a	1.87 a	2.08 c	-	3.95 b
At 100 days from sowing									
280 000 plants/fed.	74.70 c	1.28 a	16.28 a	3.70 a	3.20 c	4.43 a	2.83 a	0.92 a	8.19 a
140 000 plants/fed.	67.47 b	2.02 b	27.35 b	4.92 b	2.60 b	6.00 b	4.80 b	1.21 b	12.00 b
93 000 plants/fed.	61.59 a	2.21 c	28.70 b	5.37 b	1.78 a	6.03 b	5.18 b	1.27 b	12.47 b
At 130 days from sowing									
280 000 plants/fed.	81.75 c	1.22 a	10.25 a	4.80 a	1.73 c	4.89 a	1.88 a	7.02 a	13.79 a
140 000 plants/fed.	75.46 b	1.94 b	16.81 b	7.96 b	1.51 b	7.17 b	3.34 b	11.08 b	21.59 b
93 000 plants/fed.	70.27 a	2.19 c	19.98 c	9.31 c	1.17 a	7.61 b	3.90 c	12.30 b	23.81 b

throughout the growing season except the dry weight of branches/plant at 70 days from sowing (Table 2). At 100 and 130 days from sowing, the dry weight of branches/plant tended to increase by decreasing plant population up to 140000 plant/fed. Concerning the dry weight of leaves/plant, the results indicate clearly that the heighest dry weight of leaves/plant was obtained by planting 93000 plants/fed., while the lowest one was obtained at the higher population (280000 plants/fed.) of faba bean plants.

Mean values of the dry weight of pods/plant and total dry weight of faba bean take the same trend of the dry weight of branches/plant at the different periods of growth i.e., 70, 100 and 130 days from sowing. At the late stage of growth dry weight of total plant decreased from 23.81 to 21.59 and 13.79 gm, when plant density was increased from 93000 to 140000 and 280000 plants/fed. This trend in the dry weight of different organs and total plant was expected since number of branches, leaves and pods/plant were increased by decreasing the plant population per unit area and thus promoting plant growth. Similar trend was reported by Shalaby and Mohamed (1978a) on faba bean. On the other hand, Ahmed (1973) and Pandy (1981) on faba bean, found an increase in the dry weight by using the highest plant density of faba bean plants.

3- Effect of weed control treatments:

Data in Table (3) indicate clearly that the number of branches, leaves and pods/plant were significantly affected by the weed control treatments compared with the un-weeded check. These results hold fairly true at the different period of growth, 70, 100 and 130 days from sowing except the number of leaves at the late stage.

Concerning the L.A.I., results demonstrate that all weed control treatments significantly increased L.A.I. at 100 days from sowing. At early stage, only topogard treatment gave the highest value of L.A.I., while topogard and hand weeding treatments recorded the highest values at the later stage of growth (130 days from sowing). Data in Table (3) reveal that topogard treatment recorded the greatest values of dry weight of branches and leaves/plant after 70 days from sowing. On the other hand, prometryn and terbutryn as well as hand weeding had no significant effect on the two mentioned characters as compared with the un-weeded treatment except the effect of terbutryn on the weight of leaves per plant. After 100 days from sowing, results show that the dry weight of branches and leaves as well as total dry weight/plant showed similar

Table (3) : Effect of weed control treatments on some growth characters of faba bean plants (Combined analysis of 1985/86 and 1986/87 seasons).

Growth characters / Weed Control treatments	Plant height cm.	No. of branches/ plant	No. of leaves/ plant	No. of pods/ plant	L.A.I.	Dry weight of plant organs (gm)			
						Branches	Leaves	Pods	Total
At 70 days from sowing									
Prometryn	37.87 a	1.61 ab	18.02 b	-	1.27 ab	1.79 ab	1.87 ab	-	3.67 a
Terbutryn	38.35 a	1.68 b	18.13 b	-	1.26 a	1.80 ab	1.92 b	-	3.72 a
Topogard	38.69 a	1.72 b	18.53 b	-	1.36 b	1.91 b	1.98 b	-	3.89 a
Hand-weeding	38.40 a	1.68 b	17.78 b	-	1.29 ab	1.77 ab	1.87 ab	-	3.64 a
Control	38.74 a	1.50 a	16.49 a	-	1.20 a	1.68 a	1.73 a	-	3.41 a
At 100 days from sowing									
Prometryn	68.13 a	1.89 b	24.52 b	4.76 bc	2.58 b	5.56 b	4.39 b	1.12 a-c	11.07 b
Terbutryn	67.71 a	1.90 b	25.12 b	4.88 bc	2.64 b	5.64 b	4.45 b	1.18 bc	11.28 b
Topogard	68.35 a	1.90 b	24.32 b	4.51 ab	2.66 b	5.70 b	4.51 b	1.08 ab	11.30 b
Hand-weeding	66.11 a	1.94 b	26.04 b	5.19 c	2.71 b	5.76 b	4.60 b	1.28 c	11.64 b
Control	69.29 a	1.57 a	20.55 a	3.98 a	2.04 a	4.75 a	3.39 a	0.99 a	9.14 a
At 130 days from sowing									
Prometryn	75.31 a	1.82 b	14.80 a	7.50 b	1.45 ab	6.30 ab	2.92 ab	10.17 b	19.39 b
Terbutryn	76.16 a	1.83 b	15.69 ab	7.25 b	1.48 ab	6.71 bc	3.09 b	9.56 b	19.37 b
Topogard	75.53 a	1.87 b	16.20 ab	8.01 b	1.58 b	7.09 c	3.29 b	11.35 c	21.72 c
Hand-weeding	75.51 a	1.86 b	17.50 b	7.95 b	1.55 b	6.89 bc	3.33 b	11.49 c	21.71 c
Control	76.62 a	1.55 a	14.23 a	6.07 a	1.29 a	5.78 a	2.57 a	8.09 a	16.45 a

response. The increases in the total dry weight of faba bean plant amounted to 27.3%, 23.6%, 23.4% and 21.1% by hand weeding, topogard, terbutryn and prometryn treatments as compared with the control treatment, respectively. Regarding the dry weight of pods at 100 days from sowing, data reveal that topogard treatment recorded the highest value than the other treatments.

At the later stage of faba bean growth (130 days from sowing), the highest values of dry weight of branches, leaves, pods/plant and whole plant were recorded by topogard and hand weeding treatments (Table 3). These increases amounted to 40.3% and 42.0% in dry weight of pods/plant and 32.0% and 32.0% total dry weight of plant by applying topogard and hand weeding treatments, respectively compared with un-weeded check.

In conclusion, the sresults in this study indicate that the best treatments were the topogard and hand weeding. Eweida and Fayed (1978) and Moshtohory (1983), found that hand hoeing, linuron and prometryn treatments increased both plant height and number of branches/plant of soybean. Whereas, Nassib et al. (1982), found no effect owing to using hand-weeding (twice) and weed control treatments (terbutryne at 4.76 kg a.i./ha.) on number of branches, leaves and pods/plant also Hussein et al. (1985), reported that terbutryn did not affect the dry weight of shoots and roots of faba bean.

4- Effect of interactions:

a- Effect of interaction between planting methods and plant densities:

The interaction between planting methods and plants densities on all studied characters was not significant except number of leaves/plant and L.A.I. The results in Table (4) reveal that the number of leaves/plant takes the opposite trend of L.A.I. as affected by plant population under the two planting methods. The greatest number of leaves/plant was obtained by the lowest plant density (93000 plants/fed.) under Heraty method, while the lowest one was recorded by the highest plant density (280000 plants/fed.) under the same method. On the other hand, the highest value of L.A.I. resulted from the high density while the lowest one was obtained by low density under Afir method.

b- Effect of interaction between planting methods and weed control treatments:

The interaction between planting methods and weed control treatments had no significant effect on all studied growth characters of faba bean.

Table (4) : Effect of interaction between planting methods and plant densities on some growth characters of faba bean at 130 days from sowing (Combined analysis of 1985/86 and 1986/87 seasons).

Growth characters	No. of leaves/plant		L.A.I.	
Planting methods / Planting densities	Afir method	Heraty method	Afir method	Heraty method
280 000 plants/fed.	11.19 a	9.30 a	1.92 d	1.55 c
140 000 plants/fed.	17.48 b	16.14 b	1.60 c	1.41 bc
93 000 plants/fed.	18.06 b	21.90 c	1.10 a	1.23 ab

Table (5) : Effect of interaction between plant densities and weed control treatments on L.A.I. at 70 days from sowing (Combined analysis of 1985/86 and 1986/87 seasons).

Plant densities / Weed control treatments	280 000 plants/fed.	140 000 plants/fed.	93 000 plants/fed.
Prometryn	1.92 cd	1.13 b	0.76 a
Terbutryn	1.87 c	1.09 b	0.81 a
Topogard	2.20 e	1.08 b	0.81 a
Hand-weeding	2.05 de	1.06 b	0.76 a
Control	1.90 cd	1.05 b	0.66 a

c- Effect of interaction between plant densities and weed control treatments:

The characters affected by the interaction between plant densities and weed control treatments were L.A.I. after 70 days from planting (Table 5), number of branches, number of leaves and dry weight/plant after 100 days from sowing (Table 6), number of branches, number of leaves, number of pods/plant and dry weight/plant after 130 days from faba bean sowing (Table 7).

Data in Table (5) indicate that L.A.I. increased with increasing plant density up to 280000 plants/fed. with all weed control treatments especially, with topogard and hand-weeding. Results in Tables (5 and 6) indicate clearly that weed control treatments did not show a similar effect on number of branches, number of leaves/plant, dry weight of branches, leaves and total plant, under the different plant densities at 100 and 130 days from sowing. The greatest values of these characters were recorded by topogard or hand-weeding under the third density (93000 plant/fed.) or the second density (140000 plants/fed.). While the lowest values were obtained by all weed control treatments as well as un-weed one with the highest density (280000 plants/fed.).

Concerning the effect of this interaction on number of branches, leaves and pods/plant as well as dry weight of branches, pods and total plants at 130 days from sowing, data in Table (7) indicate that a similar effect on these characters at 100 days from sowing was obtained. Also, hand weeding or topogard treatments were the best treatments under the low population.

d- Effect of interaction between planting methods, plant densities and weed control treatments:

The effect of this interaction on all growth characters under this investigation was not significant except on plant height (Table 8) and L.A.I. (Table 9), after 70 days from sowing.

The tallest plant at 70 days from sowing was recorded by using topogard treatment at 1.5 kg/fed. at the high population of plants (280000 plants/fed.) by using Afir method, whereas, the shortest one was obtained by hand weeding treatment (twice) at the low populaiton (93000 plants/fed.) by using the Heraty method (Table 8).

Data in Table (9) indicate that, the height L.A.I. value was obtained by topogard treatment at the highest

Table (6) : Effect of interaction between plant densities and weed control treatments on some growth characters of faba bean plants at 100 days from sowing. (Combined analysis of 1985/86 and 1986/87 seasons).

Growth characters		No. of branches/plant		No. of leaves/plnat		Dry weight (gm) / plant					
						Branches		Leaves		airial part	
Plant densities	Weed control treatments										
280 000 plants/ fed.	Prometryn	1.26	a	16.12	a	4.39	ab	2.84	ab	8.14	ab
	Terbutryn	1.27	a	15.86	a	4.08	a	2.83	ab	7.78	ab
	Topogard	1.26	a	14.89	a	4.12	a	2.69	a	7.64	a
	Hand-weeding	1.40	ab	17.92	a	5.11	b	3.06	ab	9.22	bc
	Control	1.22	a	16.61	a	4.44	ab	2.75	a	8.15	ab
140 000 plants/ fed.	Prometryn	2.11	cd	29.56	cd	6.40	c	5.05	d	12.66	d
	Terbutryn	2.17	d	29.10	cd	6.46	c	5.06	d	12.80	d
	Topogard	2.10	cd	27.87	c	6.42	c	5.24	d	12.93	d
	Hand-weeding	2.15	d	28.06	c	5.90	c	5.13	d	12.42	d
	Control	1.57	b	22.15	b	4.81	ab	3.50	bc	9.22	bc
93 000 plants/ fed.	Prometryn	2.30	d	27.86	c	5.90	c	5.28	d	12.42	d
	Terbutryn	2.25	d	30.40	cd	6.38	c	5.46	d	13.26	d
	Topogard	2.34	d	30.19	cd	6.56	c	5.61	d	13.32	d
	Hand-weeding	2.27	d	32.14	d	6.27	c	5.61	d	13.29	d
	Control	1.91	c	22.90	b	5.02	b	3.93	c	10.06	c

Table (7) : Effect of interaction between plant densities and weed control treatments on some growth characters of faba bean plants at 130 days from sowing. (Combined analysis of 1985/86 and 1986/87 seasons).

Growth characters		No. of branches/plant		No. of leaves/plant		No. of pods/plant		Dry weight (gm/plant)					
								Branches		Pods		Airial part	
Plant densities	Weed control treatments												
280 000 plants/ fed.	Prometryn	1.31	a	10.60	a	4.92	a	5.05	ab	7.39	a-c	14.31	a
	Terbutryn	1.19	a	10.05	a	4.79	a	4.51	a	6.51	a	12.76	a
	Topogard	1.26	a	10.37	a	4.82	a	5.05	ab	7.26	a-c	14.29	a
	Hand-weeding	1.19	a	10.44	a	4.71	a	4.79	ab	7.31	a-c	14.06	a
	Control	1.17	a	9.77	a	4.77	a	5.05	ab	6.62	ab	13.52	a
140 000 Plants/ fed.	Prometryn	1.92	b-d	16.29	b	8.14	c-e	6.68	c-e	11.14	ef	21.03	bc
	Terbutryn	2.05	de	17.95	bc	7.90	b-d	7.61	d-g	10.54	de	21.75	c
	Topogard	2.04	de	17.52	bc	8.53	de	7.52	d-g	12.67	fg	23.71	c
	Hand-weeding	1.99	c-e	16.42	bc	8.70	de	7.69	e-g	12.41	e-g	23.50	c
	Control	1.72	b	15.89	b	6.54	b	6.34	cd	8.63	b-d	17.94	b
93 000 plants/ fed.	Prometryn	2.21	ef	17.50	bc	9.45	e-g	7.17	c-f	11.98	ef	22.84	c
	Terbutryn	2.26	ef	19.07	bc	9.05	d-f	8.02	fg	11.63	ef	23.58	c
	Topogard	2.32	f	20.69	c	10.69	g	8.70	g	14.12	gh	27.17	d
	Hand-weeding	2.41	f	25.64	d	10.45	fg	8.20	fg	14.76	h	27.58	d
	Control	1.74	bc	17.02	bc	6.91	bc	5.97	bc	9.01	cd	17.88	b

Table (8) : Effect of interaction between planting methods, plant densities and weed control treatments on plant height (cm.) at 70 days from sowing on faba bean plants (Combined analysis of 1985/86 and 1986/87 seasons).

Planting methods	Afir method			Heraty method		
Plant densities / Weed control treatments	280 000 plants/fed.	140 000 plants/fed.	93 000 plants/fed.	280 000 plants/fed.	140 000 plants/fed.	93 000 plants/fed.
Prometryn	43.27 c	35.49 ab	32.80 a	46.82 cd	35.60 ab	33.24 a
Terbutryn	46.65 cd	35.59 ab	34.52 a	44.50 cd	35.84 ab	32.97 a
Topogard	48.16 d	35.09 a	33.02 a	43.85 c	36.24 ab	35.77 ab
Hand-weeding	46.46 cd	36.10 ab	33.70 a	45.69 cd	35.50 ab	32.44 a
Control	46.57 cd	36.07 ab	33.80 a	43.42 c	39.09 b	33.47 a

Table (9) : Effect of interaction between planting methods, plant densities and weed control treatments on L.A.I. at 70 days from sowing of faba bean. (Combined analysis of 1985/86 and 1986/87 seasons).

Planting methods	Afir method						Heraty method					
Plant densities / Weed control treatments	280 000 plants/fed.		140 000 plants/fed.		93 000 plants/fed.		280 000 plants/fed.		140 000 plants/fed.		93 000 plants/fed.	
Prometryn	1.90	e-g	1.26	d	0.78	ab	1.93	e-g	1.01	bc	0.74	a
Terbutryn	1.89	e-g	1.09	cd	0.74	a	1.85	ef	1.10	cd	0.87	a-c
Topogard	2.33	h	1.26	d	0.74	a	2.07	fg	0.89	a-c	0.82	a-c
Hand-weeding	1.98	fg	1.09	cd	0.76	ab	2.11	g	1.04	cd	0.77	ab
Control	2.09	fg	1.00	bc	0.66	a	1.71	e	1.09	cd	0.65	a

plant density (280000 plants/fed.) and Afir method, while the lowest one was recorded by un-weeded treatment at low density (93000 plants/fed.) and using Heraty method.

REFRENCES

Abd El-Wahab, A.M.; Hussein, T.A.; Zaitoon, M.I. and Hassan, M.A.M. (1982): Effect of phosphorus fertilization levels, sowing dates and planting spaces on field bean. I- Effect on nodulation and some growth characters and flowering characteristics (unpublished). Fac. of Agric., El-Minia Univ., Egypt. (c.f. Nile Valley Faba bean Abst., 134, May 1982).

Ahmed, M.M.E. (1973): Growth and yield response of horse bean to plant population and nitrogenous fertilizer. M.Sc. Thesis, Fac. Agric., Ain Shams Univ., Egypt.

Eweida, M.H.T. and Fayed, M.H. (1978): Effect of some herbicides on weed control, yield and yield components of soybean. Proc. 4th Conf. Pest. Control.

Hussein, A.H.A.; Hassanein, E.E. and El-Marsafy, H.T. (1985): Study on the effect of igran herbicide on nodulation yield of faba bean, residual effect and associated weeds. Ann. of Agric. Sci., Moshtohor, 23: 29-40.

Lisiewska, Z. and Kmiercik, W. (1981): The effect of sowing density on selected morphological characteristics of broad bean plants, pods and seeds at milk-ripe stage. Acta Agraria et Silvestria 20, 179-187. (c.f. Faba bean Abst. 3(1): 19, 1983).

Moshtohory, M.R.M. (1983): Weed control in soybean with some agornomic practies. Ph.D. Thesis, Fac. of Agric., Zagazig Univ., Egypt.

Nassib, A.M.; Hussein, A.H.A. and Hassanein, E.E. (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. Bull. 2065, Fac. of Agric. Ain Shams Univ., Egypt.

Pandy, R.K. (1981): Growth dry matter and seed yield of faba beans (Vicia faba L.) as influenced by planting density. FABIS, 3: 37-38.

Rizk, M.A.M. (1973): The effect of density and distribution of plants on the yield and its components in two varieties of field bean (Vicia faba L.). M.Sc. Thesis, Fac. of Agric. Cairo, Univ., Egypt.

Sary, G.A.; El-Debaby, A.S.; Roshdy, A. and Salem, A.A. (1988a): Effect of soybean planting method on the efficiency of herbicides. I- Growth characters and associated weeds. Ann. of Agric. Sci., Moshtohor, 26(1): 1-16.

Sary, G.A.; Salem, M.S.; El-Deepah, H.R.A. and El-Naggar, H.M.M. (1988b): Response of lentil and associated weeds to sowing methods and some herbicidal treatments. II- Lentil yield and yield components. Accepted for Publication in Zagazig J. Agric. Res. (In Press).

Sary, G.A.; El-Sayed, K.I.; El-Deepah, H.R.A. and Shams El-din, G.M. (1989): Effect of planting methods, plant densities and weed control on faba bean and weeds. I- Effect of control of weeds. Ann. of Agric. Sci., Moshtohor, Vol. (2): 687-697.

Shaalan, M.I.; Sorour, F.A.; Sgaier, K. and Yousef, M.E. (1977): The effect of row spacing and phosphorus level on growth and yield of broad beans (Vicia faba L.). The Libyan J. of Agric. 6, Part 1.

Shalaby, Y.Y. and Mohamed, L.K. (1978): Variations in growth analysis of field beans due to plant density and phosphatic fertilization at different planting detes. Egypt. J. Agron., 3(1): 1-11.