RESULTS and DISCUSSION

In the present investigation two field experiments were conducted to study the effect of five weed control treatments and three plant densities under two planting methods on weeds, growth, yield and yield components of faba bean plants.

I. Effect of planting methods :

The total weeds species which were found in every plot were annual and pernnial broad leaved weeds. It was clear that the most prevailing weeds during the two growing seasons of faba bean were, Anagallis arvensis (Weather grass), Medicago hispida (Bur clover weed), Beta vulgaris (Wild beat), Brassica nigra (Wild mustard), Convolfulus arvensis (Bind weed) and Ammi sp. (Bishops weed), whereas Euphorbia sp. (spurge, spotted) and Sonchus oleraceus (Sow thistle) rarely existing.

The number, fresh and dry weight of weeds per unit area (m^2) could be used as a reliable index to their distribution.

1. Number, fresh and dry weight of weeds :

Data in Table (1) show the effect of two planting methods afir and heraty on the number, fresh and dry weight of weeds.

The results indicate clearly that the number of weeds was significantly affected by planting methods of faba bean at 45 and 90 days from sowing. It is clear that the heraty method reduced the number of weeds than afir method. This reduction amounted

Table (1) : Effect of planting methods on weeds/m^2 in faba bean fields (Combined analysis of 1985/86 and 1986/87 seasons) [All weeds were broad-leaved].

Weed characters / Planting methods	No. of weeds	Fresh weight of weeds (gm)	Dry weight of weeds (gm)
	At 45 days from sowing		
Afir method	69.49 b	47.63 a	6.38 a
Heraty method	38.04 a	45.00 a	6.88 a
	At 90 days from sowing		
Afir method	77.83 b	515.65 a	54.83 a
Heraty method	41.07 a	378.48 a	47.64 a

to 38.04 and 41.07 % at 45 and 90 days from sowing as compared with afir method.

With regard to the fresh and dry weight of weeds data presented in Table (1) indicate that heraty method reduced both fresh and dry weight of weeds than the afir method, but the difference is not great enough to reach the significant level at 5 %. These results were true at 45 and 90 days from sowing. It could be concluded that the heraty method was effective in depressing weed density, where in this method most germinated weed seeds were removed at the time of sowing faba bean seeds. On the contrary in afir method, most seeds of weeds germinate at the same time of germination of faba bean seeds. Similar results were obtained by Hassanein et al., (1987) and Sary et al., (1988).

2. Number of absent hills of faba bean :

Results presented in Table (2) show the effect of two planting methods on the number of absent hills of faba bean. The results indicate clearly that there is no difference between heraty and afir method on this character.

Table (2) : Effect of planting methods on number of obsent hills of faba bean plants at 30 days from sowing (Combined analysis of 1985/86 and 1986/87 seasons).

Planting methods	No. of absent hills/plot
Afir method	7.47 a
Heraty method	7.87 a

Table (3) : 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

3. Growth characters of faba bean plants :

The available results in Table (3) reveal that there is no significant effect between the two planting methods on the most growth characters, 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 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 El-Debaby et al., (1988) in soybean fields, who indicated that heraty method significantly increased the growth characters of soybean plants.

4. Yield and yield components :

Data in Table (4 & 5) show the effect of planting methods on the yield and yield components of faba bean.

The results indicate clearly that the difference between two planting methods was not significant. These results are true on the studied characters i.e., number of pods, number of seeds/plant, weight of straw, weight of pods, weight of seeds/plant and seed yield, straw yield, biological yield and protein yield kg/fed. and harvest index and crude protein %, while the weight of 100-seed was significantly affected by the two planting methods. In this connection, Hassanein et al., (1987) reported that the seed and straw yield of faba bean decreased significantly by using heraty method as compared with

Table (4) : Effect of planting methods on yield and its components/plant of faba bean. (Combined analysis of 1985/86 and 1986/87 seasons).

Characters planting methods	No. of pods/plant	No. of seeds/plant	Weight of straw/plant (gm)	Weight of pods/plant (gm)	Weight of seeds/plant (gm)	Weight of 100 seed (gm)
Afir method	6.71 a	17.62 a	6.00 a	13.13 a	10.32 a	58.17 a
Heraty method	6.79 a	18.01 a	6.27 a	13.66 a	10.75 a	60.09 b

Table (5) : Effect of planting methods on yield of faba bean Kg/fed. (Combined analysis of 1985/86 and 1986/87 seasons).

Characters / Planting methods	Seed yield kg/fed.	Straw yield kg/fed.	Biological yield kg/fed.	Protein yield kg/fed.	Harvest index	Crude protein %
Afir method	1323.13 a	1722.51 a	3045.64 a	348.93 a	43.54 a	26.38 a
Heraty method	1408.82 a	1697.05 a	3105.87 a	371.95 a	45.46 a	26.41 a

the afir one. Also, El-Debaby et al., (1988) found that by using heraty method, the biological, yield seed yield and straw yield of soybean increased significantly than afir method.

II. Effect of plant densities :

1. Number, fresh and dry weight of weeds :

Data in Table (6) show the effect of three plant densities on number, fresh and dry weight of weeds in faba bean fields at 45 and 90 days from sowing.

It is clear that increasing plant densities of faba bean up to 280 000 plants/fed. caused a reduction in number, fresh and dry weight of associated weeds. These results are true at the different periods of growth i.e. 45 and 90 days from sowing, in spite of the differences among the fresh and dry weight of weeds and number of weeds at 45 and 90 days from sowing, were not great enough to reach the level of significance at 5 %. The lowest number, fresh and dry weight of weeds were recorded by planting 280000 plants/fed. This may be due to the increase of inter-specific competition under high plant population.

These results are in general agreement with those obtained by Simon (1970) on faba bean, Mc Whorter and Barrentine (1972) on soybean ,Chan and Tasaur (1973), Nassib et al., (1982) on faba bean and Moshtohory (1983) on soybean. They reported that increasing plant density decreased number, fresh and dry weight of weeds. On the contrary Hassanein et al., (1987) found that increasing seeding rate from 178.0 to 238.0 kg/ha. did not show any effect on the number

Table (6) : Effect of plant densities on weeds/m² in faba bean fields (Combined analysis of 1985/86 and 1986/87 seasons).

Weed characters / Plant densities	No. of weeds	Fresh weight of weeds (gm)	Dry weight of weeds (gm)
	At 45 days from sowing		
280 000 plants/fed.	41.54 a	37.43 a	5.92 a
140 000 plants/fed.	55.60 ab	49.42 a	6.64 a
93 000 plants/fed.	64.16 b	52.09 a	7.31 a
	At 90 days from sowing		
280 000 plants/fed.	51.67 a	360.93 a	38.96 a
140 000 plants/fed.	63.92 a	472.01 ab	52.83 b
93 000 plants/fed.	62.76 a	508.27 b	61.92 b

and dry weight of weeds in faba bean field. Also Rizk et al., (1986b) on chick pea stated that increasing plant density up to 560 000 plants/ fed. did not affect the weed characters.

2. Number of absent hills of faba bean :

The results in Table (7) indicate clearly that there is no difference in the number of absent hills of faba bean due to the effect of the three plant densities, i.e., 280 000, 140 000 and 93000 plants/fed.

Table (7) : Effect of plant densities on number of absent hills of faba bean plants at 30 days from sowing (combined analysis of 1985/86 and 1986/87 seasons).

Plant densities	No. of absent hills/plot
280 000 plants/fed.	8.12 a
140 000 plants/fed.	7.50 a
93 000 plants/fed.	7.39 a

3. Growth characters of faba bean plants :

The present data in Table (8) demonstrate the effect of plant densities on some growth characters of faba bean i.e., plant height, Number of branches, leaves and pods/plant, L.A.I. and dry weight of branches, leaves, pods/plant and total airial parts of plant.

The available results reveal clearly that plant height was significantly increased with increasing plant densities up to 280 000 plants/fed. at the different periods of growth i.e., 70, 100 and 130

Table (8) : 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.	45.54 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

days from sowing. At the late stage, the tallest plant (81.75 cm.) was obtained by high density (280 000 plants/fed.). This increase in plant height at the high plant density may be attributed to the competition among plants for light. These results are in harmony with those obtained by Ahmed (1973), Rizk (1973) and Kamel (1978 b) on chick pea, El-Assily (1980) on lentil, Lisiewska and Kmiecik (1981 b) on faba bean and Pandy (1981) on faba bean. They reported that plant height increased by increasing plant density. Whereas Shaalan et al., (1977) on faba bean and Srivastiva (1979) on lentil reported that plant height was not affected by increasing plant population. On the contrary Abd El-Wahab et al., (1982) found that the increase in plant density decreased the plant height of faba bean.

Concerning the effect of plant densities on the number of branches, leaves and pods/plant, it is clear from data in Table (8) that these characters were significantly affected to different extents by plant population. The three studied characters take the same trend 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. This competition was greater in dense planting than thin one.

These results are in agreement with those obtained by Ahmed (1973), Shaalan et al., (1977), Shalaby and Mohamed (1978 a), Pandy

(1981) and Abd El-Wahab et al., (1982) on faba bean. On the other hand, Rizk (1973) on faba bean and Kamel et al., (1978 b) on chick pea obtained an adverse trend. Whereas, Srivastiva (1979) and El-Assily (1980) on lentil found no effect due to the plant densities on the same former studied characters of faba bean plants.

With regard to leaf area index (L.A.I.), data in Table (8) indicate clearly that this character tended to increase as the plant density increased. This result is true at the different periods of growth i.e., 70, 100 and 130 days from sowing. This result may be due to the greater number of plants grown per unit area in case of higher densities, which is considered as the main factor for increasing the value of L.A.I.. Thus, shows a good closeness of high density and a good benefit of using light to accumulate the dry matter.

In this respect, Shalaby and Mohamed (1978 a) on faba bean showed that L.A.I. value decreased as plant population was increased.

The effect of plant densities on the dry weight of plant organs i.e., dry weight of branches, leaves pods/plant and total plant are shown in Table (8). Increasing plant density caused significant decreases in the dry weight of the different organs and total plant throughout the growing season except the dry weight of branches/plant at 70 days from sowing.

At 100 and 130 days from sowing the dry weight of branches/ plant tended to increase by decreasing plant population up to 140000 plants/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 high population (280 000 plants/fed.) of faba bean plants.

Means value 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 140 000 and 280 000 plants/fed.. This trend in the dry weight of different organs and total plant was expected since number of branches, leaves and pods/plant increased by decreasing the plant population in unit area and thus caused the vigorousness of plant. Similar trend was reported by Kamel et al., (1978 b) on chick pea and Shalaby and Mohamed (1978 a) on faba bean. On the other hand Ahmed (1973) on faba bean, Saxena and Krishnomurthy (1979) on chick pea and Pandy (1981) on faba bean found an increase in the dry weight by using the highest plant density of faba bean plants.

4. Yield/plant and its components :

Available data in Table (9) reveal the effect of plant density on the seed yield/plant and some of its components i.e. no. of pods, no. of seeds, weight of straw and weight of pods/plant. The results indicate clearly that the above mentioned characters as well as seed yield/plant take the same trend and were significantly affected

Table (9) : Effect of plant densities on yield and its components/plant of faba bean.

(Combined analysis of 1985/86 and 1986/87 seasons).

Characters / Plant densities	No. of pods/plant	No. of seeds/plant	Weight of straw/plant (gm)	Weight of pods/plant (gm)	Weight of seeds/plant (gm)	Weight of 100 seed (gm)
280 000 plants/fed.	4.78 a	12.67 a	4.97 a	9.72 a	7.73 a	59.67 a
140 000 plants/fed.	7.27 b	19.13 b	6.46 b	14.26 b	11.15 b	59.07 a
93 000 plants/fed.	8.20 c	21.65 c	6.98 b	16.20 c	12.72 c	58.65 a

by plant density. Increasing plant population in unit area up to 280000 plants/fed. caused a significant decrease in the seed yield/plant and its components namely; no. of pods, no. of seeds, and pods and straw weight/plant. The reduction of seed weight/plant obtained by dense plant (280 000 plants/fed.) amounted to 11.98, and 40.00% as compared with plant population at 140 000 and 93 000 plants/fed. respectively.

This was expected since the high population of plants increases the competition between plants for growth factors i.e. water, nutrients and light. These results may be attributed to the decrease in dry matter accumulation per plant with increasing plant density Table (8) and thus caused decreasing in the yield components of plant namely, no. of pods, no. of seeds, weight of straw and pods per plant. These findings are in general agreements with many investigators El-Saeed (1968), El-Beheidi and Salem (1971), Rizk (1973) on faba bean, Kamel et al., (1978 a) on chick pea, Day et al., (1979), Lisiewska and Kmiecik (1981 a & b), Pandy (1981), Hussein et al., (1982) on faba bean, Rizk et al., (1986 b) on chick pea and Ali (1987) on faba bean. They found that decreasing plant density increased number and weight of pods, seed and straw yield/plant. Whereas, Shaalan et al., (1977) and Abo El-Zahab et al., (1981) found that the number and weight of pods and seeds/plant were not significantly affected by plant densities.

Concerning the 100—seed weight, results indicate clearly that it was not significantly affected by the three plant densities.

These results are in harmony with those obtained by Saxena and Krishamurthy (1979) on chick pea, Lisiewska and Kmiecik (1981 a&b), Pandy (1981) and Salih (1983) on faba bean who found the same trend. Whereas, Shaalan et al., (1977) found that 100 seed weight was significantly increased by increasing plant density.

5. Yield of faba bean kg/fed. :

Results in Table (10) show clearly that plant densities had a significant effect on, seed yield, straw yield, biological yield and protein yield/fed.. It is apparent that the foure yield characters increased gradually and significantly with increasing plant density up to 280 000 plants/fed. The increases due to planting 280 000 and 140 000 plants/fed. amounted to 49.9 and 24.3 % in seed yield, 27.9 and 28.9 % in straw yield, 62.3 and 26.8 % in biological yield and 44.8 and 23.8 %, in protein yield (kg/fed.) as compared with the lowest density of 93 000 plants/fed.. The available results indicate that the highest yields/fed. were recorded by planting 280 000 plants/fed.. The increases in seed, straw, biological and protein yield/fed. due to increasing plant density may be attributed to the following:

1. The best weed control by increasing the plant population(Table 6) as well as the more benefit of photosynthesis owing to the increase in L.A.I..

2. Increasing the number of faba bean plants/unit area could compensate the reduction in dry accumulation (Table 8) of seed yield/plant and its components.

Table (10) : Effect of plant densities on yield of faba bean Kg/fed.

(Combined analysis of 1985/86 and 1986/87 season).

Characters / Plant densities	Seed yield kg/fed.	Straw yield kg/fed.	Biological yield kg/fed.	Protein yield kg/fed.	Harvest index	Crude protein %
280 000 plants/fed.	1641.74 c	2207.07 c	3848.81 c	424.80 c	42.46 a	25.83 a
140 000 plants/fed.	1361.29 b	1645.82 b	3007.12 b	363.11 b	45.07 a	26.62 a
93 000 plants/fed.	1094.91 a	1276.44a	2371.34 a	293.41 a	45.97 a	26.73 a

These results are in agreement with those obtained by El-Saeed (1968), Gabbar (1970) Kostrinski (1974), Shaalan et al., (1977), Shalaby and Mohamed (1978 b), Keller and Burkhard (1981), Lisiewska and Kmiecik (1981 a & b), Nassib et al., (1982), Salih (1983), Ali (1987) and Hassanein et al., (1987), who reported that the seed and straw yield increased by increasing plant density. On the other hand, Newton (1979) found that increasing plant population reduced the seed yield of faba bean. Then, according to the available results recorded in the present study, it could be concluded that the population of 280000 plants/fed. recomended under such condition.

Concerning the harvest index and crude protein percentage, data reveal that no relevance between studied plant densities and these characters was observed. These results are in accordance with those obtained by Nassib et al., (1982), who found that the protein percentage was not affected by plant densities. Saxena and Krishamurthy (1979) reported that harvest index did not differ with different densities.

III. Effect Of Weed Control Treatments :

1. Number, fresh and dry weight of weeds :

Data presented in Table (11) show the effect of weed control treatments on number, fresh and dry weight of weeds.

The available results indicate clearly that chemical weed control as well as hand weeding treatments significantly decreased the number, fresh and dry weight of weeds as compared with the control (un-weeded) treatment. The lowest number of weeds was

Table (11) : Effect of weed control treatments on weeds/m^2 in faba bean fields (Combined analysis of 1985/86 and 1986/87 seasons) [All weeds were broad-leaved].

Weed characters / Weed control treatments	No. of weeds		Fresh weight of weeds (gm)		Dry weight of weeds (gm)	
At 45 days from sowing						
Prometryne	26.67	ab	35.54	ab	5.77	a
Terbutryne	29.37	ab	43.41	b	6.52	a
Topogard	16.71	a	18.31	a	3.01	a
Hand-weeding	42.98	b	22.43	ab	3.24	a
Control	153.10	c	111.87	c	14.59	b
At 90 days from sowing						
Prometryne	24.15	a	326.90	b	39.97	bc
Terbutryne	34.29	ab	474.85	c	54.93	c
Topogard	16.17	a	237.48	ab	27.55	ab
Hand-weeding	56.08	b	121.19	a	12.56	a
Control	166.58	c	1074.92	d	121.16	d

recorded by using topogard at 1.5 kg/fed. followed by prometryne at 1.0 kg/fed., terbutryne at 1.25 kg/fed. and hand-weeding (twice). The decreases in number of weeds due to the previous treatments amounted to 89.1 % , 82.6 %, 80.8 % and 71.9 % at 45 days from sowing and 90.3 %, 85.5 %, 79.4 % and 66.3 % at 90 days from sowing compared with the un-weeded treatment respectively. These results are in full agreement with those obtained by Singh and Chowdhury (1970), Kshnikatkin (1977) on lentil, Ahlawat et al., (1979 b) on chick pea, Zahran and Ibrahim (1982), El-Shandidy et al., (1983) on faba bean, Hassan (1984), Rizk et al., (1986 a) on lentil and Rizk et al., (1986 b) on chick pea. They found that using herbicides and hand-weeding were the best treatments in depressing number of weeds compared with un-weeded treatment.

Regarding to the effect of weed control treatments on fresh weight of weeds/m^2, data showed significant differences among treatments at 45 and 90 days from sowing. It is obvious that the lowest fresh weight was recorded by applied topogard at 1.5 kg/fed. followed by hand weeding and prometryne at 1.0 kg/fed. as well as terbutryne at 1.25 kg/fed. in the early period at 45 days from sowing. Whereas the hand weeding treatment followed by topogard at 1.5 kg/fed. and prometryne at 1.0 kg/fed. at the late stage of growth (90 days from sowing). The depressed values in the fresh weight of weeds due to the topogard, hand weeding, prometryne and terbutryne were 83.6 %, 80.0 %, 68.2 % and 61.2 % at 45 days from sowing, while this depression amounted to 88.7 %, 77.9 %, 69.6 % and 55.8 % by hand weeding, topogard, prometryne and terbutryne

at 90 days from sowing respectively. It is clear from the results in Table (11) that the topogard at 1.5 kg/fed. gave the best weed control in the early stage, while the hand-weeding treatment was superior in the late stage of growth. The available results reveal that terbutryne at 1.25 kg/fed. gave the poorest weed control with regard to fresh weight at the different periods of growth as compared with other herbicides.

Concerning the dry weight of weeds as affected by some weed control treatments, data in Table (11) illustrated clearly that chemical weed control treatments as well as hand weeding (twice) decreased significantly the dry weight of weeds as compared with the un-weeded treatments. These results hold fairly true at 45 and 90 days from sowing. These results were in agreement with those obtained by Ahlawat et al., (1979 b) on chick pea, Nassib et al., (1982), Zahran and Ibrahim (1982), El-Shandidy et al., (1983), Salem et al., (1984) on faba bean, Hassanein et al., (1985) on lentil, Hussein et al., (1985) on faba bean, Rizk et al., (1986 b) on chick pea and Hassanein et al., (1987) on faba bean. They reported that hand weeding as well as chemical treatments have the same effect on controlling weeds.

From these data, it could be noticed that differences between weed control treatments were not significant at 45 days from sowing, while these differences were significant at 90 days from sowing. The highest depression in dry weight of weeds after 90 days from sowing was obtained by hand weeding treatment (twice) followed

by topogard at 1.5 kg/fed. The depression in the dry weight of weeds by these two treatments amounted to 89.6 % and 77.3 % as compared with the control. The effeciancy of these two treatments in controlling weeds was much more superior than those of all the other herbicidal treatments.

From the previous results it is clear that the applied weed control treatments with regard to fresh and dry weight of weeds could be arranged in descending order as follows, hand weeding, topogard at 1.5 kg/fed., prometryne at 1.0 kg/fed. and terbutryne at 1.25 kg/fed.. Also it is obvious from the above mentioned results that topogard and prometryne were the best herbicides in controlling the weeds in faba bean in this investigation. The superiority of topogard in controlling weeds in faba bean fields at different periods of growth i.e., 45 and 90 days from sowing may be due to the structure of this herbicide, which consists of two herbicides (terbutryne and terbuthylazine). This mixture increased the effectiveness of chemical weed control and broadened the weed control spectrum. In addition, it was more pronounced at the later stages of growth than at the early stages, suggesting that the persistence of topogard in soil lasted for longer period than the other herbicides. These former results in decreasing both fresh and dry weight of weeds as a result of using herbicides and hand weeding were obtained by Ramirez de Vallejo and Martin (1970), Himme and Stryckers (1975), UK, Processors' and Growers' research organisation (1976), Covarelli and Bianchi (1979), Pope (1980), Nassib et al., (1982), Zahran and Ibrahim (1982), El-Shandidy et al., (1983), Salem et al., (1984), Zahran

et al., (1984), Hussein et al., (1985) and Hassanein et al., (1987).

On the other hand Portugal, Laboratorio De Fitofarmacologia (1977) reported that using nitralin and prometryne, both at 1 kg/ha. failed to control the weeds in peas fields.

In general, according to the present results, it could be concluded that hand weeding (twice) and topogard at 1.5 kg/fed. followed by prometryne at 1.0 kg/fed. are considered as the most promising treatments for controlling weeds in faba bean in similar condition.

2. Number of absent hills of faba bean plants :-

The results in Table (12) show clearly that there are no differences among the effect of chemical weed control treatments as well as hand weeding on the germination of faba bean seeds. These results indicate that the applied herbicides had no harmfull effect on the seeds of faba bean through the germination stage. These results were in agreement with those obtained by Vulsteke and Bockstaele (1974), Himme and Stryckers (1975), Portugal, Laboratorio De Fitofarmacologia (1977) on peas, Pope (1980) on faba bean, Kumar et al., (1981) on chick pea and Salem et al., (1984) on faba bean. they found that the chemical weed control treatments did not cause any harmful effect on germination.

Table (12) : Effect of weed control treatments on number of absent hills of faba bean plants at 30 days from sowing (combined analysis of 1985/86 and 1986/87 seasons).

Weed control treatments	No. of absent hills/plot
Prometryne	7.31 a
Terbutryne	7.52 a
Topogard	8.04 a
Hand-weeding	7.50 a
Control	7.98 a

3. Growth characters of faba bean plants :-

Available data in Table (13) reveal the effect of chemical weed control treatments as well as hand weeding treatment on plant height, number, dry weight of different organs and L.A.I. of faba bean plants. The results indicate clearly that there was no significant effect for all weed control treatments on plant height of faba bean plants at the different periods of growth i.e., 70, 100 and 130 days from sowing. The same former results were reported by Eweida and Fayed (1978) on soybean, Pope (1980), Nassib et al., (1982) and Hussein et al., (1985) on faba bean.

The present data in Table (13) indicate clearly that the number of branches, leaves, pods/plant were significantly affected by the weed control treatments comparing with the un-weeded ones. These results hold fairly true at the different periods of growth 70, 100 and 130 days from sowing except the number of leaves at

Table (13) : 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									
Prometryne	37.87 a	1.61 ab	18.02 b	-	1.27 ab	1.79 ab	1.87 ab	-	3.67 a
Terbutryne	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									
Prometryne	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
Terbutryne	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									
Prometryne	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
Terbutryne	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

the late stage. It is obvious that the differences in number of three different parts of faba bean plant namely, branches, leaves and pods due to control treatments were not significant.

With regard to the number of leaves at the later stage (130 days from sowing), data reveal that there are no significant difference between the three chemicals weed control and the un-weeded one, while the hand weeding treatment gave the highest number of leaves as compared with the control. This finding confirm with those obtained by Moshtohry (1983), who found the same trend in increasing number of branches, leaves and pods/plant as a result of applying weed control treatments (linuron and prometryne). 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.

Concerning the L.A.I. results demonstrate that all weed control treatments significantly increased L.A.I. at 100 days from sowing than the control. At early stage only, topogard treatment gave the high value of L.A.I., while topogard and hand weeding treatments recorded the high values at the later stage of growth (130 days from sowing).

With regard to the dry weight of different organs of faba bean plant, data in Table (13) at 70 days from sowing, reveal that topogard treatment recorded the greatest values of dry weight of branches and leaves/plant. On the other hand, the other chemical weed control i.e., prometryne and terbutryne as well as hand weeding

had no statistical significant effect on the two mentioned characters as compared with the control treatment except the effect of terbutryne on the weight of leaves/plant. In this respect at 70 days from sowing, data indicate clearly that the increase of total dry weight of faba bean plant due to chemical weed control as well as hand weeding treatments was not great enough to reach 5 % levels of significance.

At 100 days from sowing the available results show that the dry weight of branches and leaves as well as total dry weight/ plant take the same trend. It is clear that all weed control treatments significantly increased the different parts of dry weight/plant than the control treatment. 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, terbutryne and prometryne treatments as compared with the control treatments respectively.

Regarding the dry weight of pods at 100 days from sowing data reveal that topogard treatment recorded high value than the other treatments.

At the later stage of faba bean growth (130 days from sowing), it is clear from the results in Table (13) that the high values of dry weight of branches, leaves, pods/plant and whole plant were recorded by topogard and hand weeding treatments. 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. Also, the second two

treatments (prometryne and terbutryne) caused a significant increase in dry weight of pods and whole plant, while these increases were not great enough to reach 5 % levels of significance in dry weight of branches and leaves/plant. Similar results were reported by Domanska et al., (1975) who pointed out that terbutryne increased the foliage growth of faba bean. Whereas Hussein et al., (1985) on faba bean found that chemical weed control treatments terbutryne did not affect on the dry weight of plant.

Generally, it is clear from the obvious results on the mentioned growth characters in this investigation that the studied chemical weed control treatments with the rates applied to faba bean fields seemed to have no deleterious effect on the growth of faba bean. Also, it should noticed that there was effective weed control by applying these treatments.

It can be concluded that the favourable effect of controlling weeds on the growth of faba bean is mainly attributed to the depression in the growth of weeds, which compete with faba bean plants for light, water and nutrients.

In conclusion, the results in this study indicate that the best treatments were the topogard and hand weeding Table (13).

4. Yield/plant and its components :

Data presented in Table (14) demonstrate clearly that all weed control treatments had statistically significant effect on number of pods, seeds, straw and pods weight and weight of seeds per plant.

Table (14) : Effect of weed control treatments on yield and its components/plant of faba bean (Combined analysis of 1985/86 and 1986/87 seasons).

Characters / Weed Control treatments	No. of pods/plant	No. of seeds/plant	Weight of Straw/plant (gm)	Weight of pods/plant (gm)	Weight of seeds/plant (gm)	Weight of 100 seed (gm)
Prometryne	6.82 b	17.73 b	5.94 b	13.61 b	10.71 b	58.80 a
Terbutryne	6.91 b	18.57 bc	6.26 bc	13.84 bc	10.91 bc	58.57 a
Topogard	7.13 bc	18.88 bc	6.41 bc	14.05 bc	11.11 bc	59.32 a
Hand-weeding	7.60 c	20.05 c	6.66 c	15.04 c	11.86 c	59.95 a
Control	5.31 a	13.85 a	5.40 a	10.43 a	8.08 a	59.01 a

The results indicate clearly that hand weeding treatment was superior and gave the heighest mean value of all studied characters except the weight of 100 seeds. These results are in agreement with those obtained by Hussein et al., (1985) on Faba bean and Rizk et al., (1986 b) on chick pea, while Ahlawat et al., (1979 b) on chick pea and Nassib et al., (1982) on faba bean showed that 100 seed weight was increased by using weed control treatments. The difference in these mentioned characters due to applying herbicides under investigation were statistical insignificant. The highest values in these traits were recorded by hand weeding followed by topogard and the two other herbicides prometryne or terbutryne.

Concerning the weight of 100-seed (seed index) no significant differences were obtained by weed control treatments. These results are in harmony with those obtained by Hussein et al., (1985) on faba bean, who found that weed control treatments did not affect 100-seed weight, whereas Ahlawat et al., (1979 b) on chick pea and Nassib et al., (1982) on faba bean observed an increase in 100-seed weight by using weed control treatments.

5. Yield of faba bean kg/fed. :

The available data in Table (15) reveal clearly that all weed control treatments significantly increased the seed yield, straw yield, biological yield and protein yield/fed. as well as the harvest index. as compared with the control treatments. It is obvious that the hand weeding treatment was the best one, where it gave the greatest values of all mentioned characters. These results are in

Table (15) : Effect of weed control treatments on yield of faba bean Kg/fed. (Combined analysis of 1985/86 and 1986/87 seasons).

Characters / Weed Control treatments	Seed yield kg/fed.	Straw yield kg/fed.	Biological yield kg/fed.	Protein yield kg/fed.	Harvest index	Crude protein %
Prometryne	1390.42 b	1706.66 b	3097.07 b	368.93 b	45.07 bc	26.58 a
Terbutryne	1379.16 b	1760.63 bc	3139.79 bc	364.70 b	44.13 b	26.49 a
Topogard	1428.04 b	1742.68 bc	3170.72 bc	375.10 b	45.22 bc	26.31 a
Hand-weeding	1544.63 c	1853.06 c	3397.70 c	413.80 c	45.64 c	26.83 a
Control	1087.65 a	1485.86 a	2573.51 a	279.67 a	42.44 a	25.77 a

line with those obtained by Prakash and Pahwa (1975) on peas, Saxena and Yadav (1975) on chick pea, Glasgow et al., (1976) on faba bean, Gruzdev and Berezkin (1976) on peas, Volodin and Larionova (1977) on peas, Ethiopia Arssi Rural Development Unit, Crop and Pasture Section (1987 a & b) on peas and faba bean, Ahlawat et al., (1979 a & b) on lentil and chick pea, Yadav (1979), Saxena and Wassimi (1980), Hassanein et al., (1981), Gardos et al., (1982) on lentil, Nassib et al., (1982), Zahran and Ibrahim (1982) on faba bean, El-Shandidy et al., (1983) and Rizk et al., (1986 b) on chick pea. who found that weed control treatments including prometeryne, simazine, atrazine, terbutryne and topogard increased seed, straw, biological and protein yields/fed. Whereas, Zahran and Ibrahim (1982), Salem et al., (1984) and Hussein et al., (1985) revealed that the application of terbutryne or topogard did not gave any significant influence on seed and straw yield/fed.

The increas due to hand weeding treatment amounted to 42.0 %, 24.7 %, 32.0 %, and 48.0 % in seed, straw yield, biological yields and protein yield as compared with the control treatment respectively.

Also topogard treatment recorded the high values than the other two herbicides. The increases by applying topogard, terbutryne and prometryne in seed yield were 31.3 %, 26.8 % and 27.8 % as compared with the control respectively.

These results may be attributed to the effect of hand weeding and topogard on the depression of weeds and consequently the increase

in the growth and yield component of faba bean plants namely; number of branches, number of pods, number of seeds, weight of pods and seeds/plant.

Concerning the effect of weed control treatments on crude protein percentage Table (15), it is clear that there is no significant effect between weed control treatments and the un-weeded treatment. The hand weeding gave the highest value in crude protein percentage followed by the chemical herbicides while the un-weeded treatment gave the lowest value. These results are in agreement with those obtained by Goncharov (1976) on seeds of yellow fodder lupin, Yadav (1979) on lentil, Nassib et al., (1982) on faba bean, Moshtohry (1983) on soybean, Rizk et al., (1986 b) on chick pea and Hassanein et al., (1987) on faba bean. They found that using topogard, prometryne and terbutryne did not affect crude protein percentage of seeds. On the contrary Singh et al., (1973) found an increase in crude protein percentage in seeds of peas by using prometryne at a rate of 1.0 kg/ha.

IV. Effect of interactions:

1. Effect of interaction between planting methods and plant densities :

The results in Table (16) show the F-test of the interaction between planting methods and plant densities on the all studied characters on weeds as well as faba bean plants. It is clear that the effect of this interaction on all characters i.e., weeds, germination, growth characters and yield and its components was not statistically significant

Table (16) : Effect of interaction between planting methods and plant densities on some characters of faba bean and associated weeds (Combined analysis of 1985/86 and 1986/87 seasons).

Characters	Days after sowing					
	45	70	90	100	130	At harvesting
Number of weeds/m²	N.S.		N.S.			
Fresh weight of weeds gm/m²	N.S.		N.S.			
Dry weight of weeds gm/m²	N.S.		N.S.			
Number of absent hills at 30 days from sowing			N.S.			
Plant heght (cm)		N.S.		N.S.	N.S.	
Number of branches/plant		N.S.		N.S.	N.S.	
Number of leaves/plant		N.S.		N.S.	S	
Number of pods/plant				N.S.	N.S.	N.S.
Number of seeds/plant						N.S.
Dry-weight of branches gm/plant		N.S.		N.S.	N.S.	
Dry weight of leaves gm/plant		N.S.		N.S.	N.S.	
Dry weight of pods gm/plant		N.S.		N.S.	N.S.	
Dry weight of airial part gm/plant		N.S.		N.S.	N.S.	
Leaf area index		N.S.		N.S.	S	
Weight of straw gm/plant						N.S.
Weight of pods gm/plant						N.S.
Weight of seeds gm/plant						N.S.
Weight of 100 seeds (gm)						N.S.
Seed yield kg/feddan						N.S.
Straw yield kg/feddan						N.S.
Biological yield kg/feddan						N.S.
Protein yield kg/feddan						N.S.
Harvest index						N.S.
Crude protein %						N.S.

Table (17) : 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 / Plant 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

except on number of leaves and L.A.I. This finding reveal that the methods of planting and plant densities act independently in this respect.

Number of leaves/plant and L.A.I. :

Concerning the number of leaves/plant and L.A.I. data in Table (17) indicate clearly that the previous interaction was statistically significant. These results 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 (93.000 plants/fed.) under heraty method, while the lowest one was recorded by the highest plant density (280 000 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.

2 Effect of the interaction between planting methods and weed control treatments :

The statistical analysis in Table (18) show that the interaction between the two planting methods and weed control treatments had no significant effect on the all studied characters of weeds and faba bean plants except the number of weeds/m^2 at 45 and 90 days from sowing.

Number of weeds/m^2 :

Results in Table (19) demonstrate that the effect of weed control treatments did not behave similarly on the number of weeds/m^2 under the two methods of planting at 45 and 90 days from sowing.

Table (18) : Effect of interaction between planting methods and weed control treatments on some characters of faba bean and associated weeds (Combined analysis of 1985/86 and 1986/87 seasons).

Characters	Days after sowing					
	45	70	90	100	130	At harvesting
Number of weeds/m²	S		S			
Fresh weight of weeds gm/m²	N.S.		N.S.			
Dry weight of weeds gm/m²	N.S.		N.S.			
Number of absent hills at 30 days from sowing				N.S.		
Plant height (cm)		N.S.		N.S.	N.S.	
Number of branches/plant		N.S.		N.S.	N.S.	
Number of leaves/plant		N.S.		N.S.	N.S.	
Number of pods/plant				N.S.	N.S.	N.S.
Number of seeds/plant						N.S.
Dry weight of branches gm/plant		N.S.		N.S.	N.S.	
Dry weight of leaves gm/plant		N.S.		N.S.	N.S.	
Dry weight of pods gm/plant				N.S.	N.S.	
Dry weight of airial part gm/plant		N.S.		N.S.	N.S.	
Leaf area index		N.S.		N.S.	N.S.	
Weight of straw gm/plant						N.S.
Weight of pods gm/plant						N.S.
Weight of seeds gm/plant						N.S.
Weight of 100 seeds (gm)						N.S.
Seed yield kg/feddan						N.S.
Straw yield kg/feddan						N.S.
Biological yield kg/feddan						N.S.
Protein yield kg/feddan						N.S.
Harvest index						N.S.
Crude protein %						N.S.

Table (19) : Effect of interaction between planting methods and weed control treatments on number of weeds/m^2 (Combined analysis of 1985/86 and 1986/87 seasons).

Weed characters	No. of weeds at 45 days from sowing		No. of weeds at 90 days from sowing	
Planting methods / Weed control treatments	Afir method	Heraty method	Afir method	Heraty method
Prometryne	28.08 ab	25.25 ab	25.58 a	22.71 a
Terbutryne	27.58 ab	31.17 ab	35.08 ab	33.50 ab
Topogard	19.46 ab	13.96 a	16.75 a	15.58 a
Hand-weeding	45.50 b	40.46 ab	75.42 bc	36.75 ab
Control	226.83 d	79.37 c	237.50 d	95.67 c

At 45 days from sowing topogard treatment under heraty method significantly depressed the number of weeds/m^2 than hand-weeding under afir method, while topogard and prometryne under the two methods of planting at 90 days from sowing were superior than the hand-weeding treatments under afir method. Data indicate clearly that all weed control treatments were most effective in controling weeds under heraty method than afir method. These results hold fairly true at 45 and 90 days from sowing.

Generally the lowest number of weeds was recorded by topogard treatment and heraty method at 45 and 90 days from sowing, followed by the other chemical weed control treatments without any significant differences,while the greatest number of weeds/m^2 was obtained by afir method and un-weeded treatment at 45 and 90 days from sowing. Also, data indicate that topogard treatment under heraty method at 45 days from sowing, while topogard and prometryne under the planting method significantly decreased the number of weeds/m^2 as compared with hand weeding treatment (twice).

3. Effect of the interaction between plant densities and weed control treatments on :

a. Weeds :

The statistical analysis in Table (20) indicate that the interaction between plant density and weed control treatments had no significant effect on weed attributes assesed at 45 and 90 days from sowing. This suggests that both plant densities and weed control treatments

Table (20) : Effect of interaction between plant densties and weed control treatments on some characters of faba bean and associated weeds (Combined analysis of 1985/86 and 1986/87 seasons).

Characters	Days from sowing					
	45	70	90	100	130	At harvesting
Number of weeds/m^2	N.S.		N.S.			
Fresh weight of weeds gm/m^2	N.S.		N.S.			
Dry weight of weeds gm/m^2	N.S.		N.S.			
Number of absent hills at 30 days from sowing				N.S.		
Plant height (cm)		N.S.		N.S.	N.S.	
Number of branches/plant		N.S.		S	S	
Number of leaves/plant		N.S.		S	S	
Number of pods/plant				N.S.	S	S
Number of seeds/plant						S
Dry weight of branches gm/plant		N.S.		S	S	
Dry weight leaves gm/plant		N.S.		S	N.S.	
Dry weight of pods gm/plant				N.S.	S	
Dry weight of airial part gm/plant		N.S.		S	S	
Leaf area index		S		N.S.	N.S.	
Weight of straw gm/plant						N.S.
Weight of pods gm/plant						S
Weight of seeds gm/plant						S
Weight of 100 seeds (gm)						N.S.
Seed yield kg/feddan						N.S.
Straw yield kg/feddan						N.S.
Biological yield kg/feddan						N.S.
Protein yield kg/feddan						N.S.
Harvest index						N.S.
Crude protein %						N.S.

Table (21) : 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.	Prometryne	1.26	a	16.12	a	4.39	ab	2.84	ab	8.14	ab
	Terbutryne	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-weed ing	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.	Prometryne	2.11	cd	29.56	cd	6.40	c	5.05	d	12.66	d
	Terbutryne	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-weed ing	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.	Prometryne	2.30	d	27.86	c	5.90	c	5.28	d	12.42	d
	Terbutryne	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-weed ing	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 (22) : 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													
Plant densities	Weed control treatments	No. of branches/plant		No. of leaves/plant		No. of pods/plant		Dry weight (gm/plant)					
								Branches		Pods		Airial part	
280 000 plants/ fed.	Prometryne	1.31	a	10.60	a	4.92	a	5.05	ab	7.39	a-c	14.31	a
	Terbutryne	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.	Prometryne	1.92	b-d	16.29	b	8.14	c-e	6.68	c-e	11.14	ef	21.03	bc
	Terbutryne	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.	Prometryne	2.21	ef	17.50	bc	9.45	e-g	7.17	c-f	11.98	ef	22.84	c
	Terbutryne	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 (23) : 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.	
Prometryne	1.92	cd	1.13	b	0.76	a
Terbutryne	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

act independently on total number, fresh and dry weight of weeds.

b. Number of absent hills :

The interaction between plant densities and weed control treatments had no significant effect on number of absent hills of faba bean. This finding sugests that each factor behaved similarly under the different levels of the second factor.

c. Growth of faba bean :

The results in Table (20) show the F-test of the interaction between plant densities and weed control treatments on the studied growth characters of faba bean plants at the different periods of growth i.e. 70, 100 and 130 days from sowing.

With regard to the effect of this interaction on number and dry weight of different parts of plants throught the growing season, it was noticed that there is no significant effect at the early stage at 70 days from sowing of growth except L.A.I. .

Results in Table (21) indicate clearly that weed control treatments did not behave the same 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 plants/fed. or the second density 140000 plants/fed. While the lowest values were obtained by all weed control treatments as well as un-weeded one when planting with the highest density 28000 plants/fed..

Concerning the effect of this interaction on the number of branches, leaves and pods/plant as well as the dry weight of branches, pods and total plants at 130 days from sowing, data in Table (22) indicate that the same 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.

It is clear from these results that increasing plant density up to 280000 plants/fed. caused a decrease in these characters to different extents with all weed control treatments. These findings reveal that weed control treatments were more effective on growth of faba bean plants under the low population of plants.

The available results in Table (23) show the significant effect of this interaction on the L.A.I. at 70 days from sowing. Data indicate clearly that the L.A.I. increased with increasing plant density up to 280000 plants/fed. with all weed control treatments. These results take the opposit trend of the previous growth characters affected by this interaction.

d. Yield and its components :

The statistical analysis in Table (20) show that the interaction between weed control treatments and plant densities had no significant effect on weight of straw/plant, weight of 100 seed, seed yield, strow yield, biological yield/fed., harvest index, crude and protein yield/fed.. On the other hand, the number and weight of pods and number and weight of seeds were significantly affected by this interaction. Results in Table (24) indicate that the effect of the interaction

Table (24) : Effect of interaction between plant densities and weed control treatments on some yield components of faba bean plant at harvesting.
(Combined analysis of 1985/86 and 1986/87 seasons).

Characters		No. of pod/plant		No. of seeds/plant		Weight of pods gm/ palnt		Weight of seeds gm/ plant	
Plant densities	Weed control treatments								
280 000 plants/ fed.	Prometryne	4.71	ab	12.22	ab	9.59	ab	7.63	a
	Terbutryne	4.92	ab	13.39	a-c	9.80	ab	7.80	a
	Topogard	4.59	ab	12.19	ab	9.44	ab	7.56	a
	Hand-weedlng	5.38	a-c	14.36	bc	11.08	ab	8.78	a
	Control	4.31	a	11.18	a	8.68	a	6.87	a
140 000 plants/ feds.	Prometryne	7.67	de	20.41	d	15.19	cd	11.92	bc
	Terbutryne	7.31	d	19.80	d	14.55	c	11.44	b
	Topogard	7.83	de	20.11	d	15.03	cd	11.75	bc
	Hand-weeding	7.95	de	20.48	d	15.35	cd	11.96	bc
	Control	5.59	bc	14.86	bc	11.21	b	8.69	a
93 000 plants/ fed.	Prometryne	8.07	de	20.57	d	16.04	c-e	12.58	b-d
	Terbutryne	8.49	ef	22.54	de	17.17	d-f	13.48	c-e
	Topogard	8.47	ef	24.35	e	17.70	ef	14.01	de
	Hand-weeding	9.46	f	25.30	e	18.68	f	14.83	e
	Control	6.02	c	15.50	c	11.39	b	8.69	a

between plant densities and weed control treatments on these four characters did not behave similarly under the three levels of plant densities. Decreasing plant population up to 93000 plants/fed. showed increases to different extents in number, weight of pods, number and weight of seeds/plant with all weed control treatments.

The highest means of these components/plant were recorded by hand-weeding (twice) and topogard treatments under low density 93000 plant/fed. followed by the other treatments under the low population of plants. Also, the results indicate that the weed control treatments were more effective on the previous components of faba bean plants.

4. Effect of the interaction between planting methods, plant density and weed control treatments :

Data in Table (25) indicate that the effect of this interaction on all studied characters under this investigation was not statisticaly significant except the plant height and L.A.I. of faba bean plants at 70 days from sowing as well as the seed yield/fed.

a. Plant height :

Concerning the effect of this interaction on plant height at 70 days from sowing, results in Table (26) reveal that weed control treatments did not behave the same effect on this character under the different levels of plant densities and the two planting methods.

The tallest plant at 70 days from sowing was recorded by using topogard treatment at 1.5 Kg/fed. at the high population of

Table (25) : Effect of interaction between planting methods, plant densities and weed control treatments on some characters of faba bean and associated weeds (Combined analysis of 1985/86 and 1986/87 seasons).

Characters	Days after sowing					
	45	70	90	100	130	At harvesting
Number of weeds/m^2	N.S.		N.S.			
Fresh weight of weeds gm/m^2	N.S.		N.S.			
Dry weight of weeds gm/m^2	N.S.		N.S.			
Number of absent hills at 30 days from sowing				N.S.		
Plant height (cm)		S		N.S.	N.S.	
Number of branches/plant		N.S.		N.S.	N.S.	
Number of leaves/plant		N.S.		N.S.	N.S.	
Number of pods/plant				N.S.	N.S.	N.S.
Number of seeds/plant						N.S.
Dry weight of branches gm/plant		N.S.		N.S.	N.S.	
Dry weight of leaves gm/plant		N.S.		N.S.	N.S.	
Dry weight of pods gm/plant				N.S.	N.S.	
Dry weight of airial part gm/plant		N.S.		N.S.	N.S.	
Leaf area index		S		N.S.	N.S.	
Weight of straw gm/plant						N.S.
Weight of pôds gm/plant						N.S.
Weight of seeds gm/plant						N.S.
Weight of 100 seeds (gm)						N.S.
Seed yield kg/feddan						S
Straw yield kg/feddan						N.S.
Biological yield kg/feddan						N.S.
Protein yield kg/feddan						N.S.
Harvest index						N.S.
Crude protein %						N.S.

Table (26) : 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.
Prometryne	43.27 c	35.49 ab	32.80 a	46.82 cd	35.60 ab	33.24 a
Terbutryne	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
L.S.D.	4.58					

plants (280 000 plants/fed.) by using afir method, whereas the shortest one was obtained by hand weeding treatment (twice) at the low population (93000 plants/fed.) by using the heraty method.

b. Leaf area index (L.A.I.) :

Results in Table (27) show that the effect of the previous interaction on L.A.I. was statistically significant. This suggest that the behaviour of weed control treatments was not similar at different plant densities and planting methods. Increasing plant density showed a significant increase in the value of L.A.I. to different extents with all weed control treatments and two planting methods. The height L.A.I. value was obtained by topogard treatment at the high plant density (280 000 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.

c. Seed yield :

Results in Table (28) indicate that weed control treatments did not behave the same effect on the seed yield/fed. under the three plant densities and two planting methods. Increasing plant density resulted in a significant increase in seed yield to different extents with all weed control treatments and two planting methods.

The highest seed yield was recorded by prometryne treatment and planting with 280 000 plants/fed. using heraty method, whereas the lowest one was obtained by un-weeded treatment at low population (93 000 plants/fed.) and afir method

Table (27) : 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.	
Prometryne	1.90	e-g	1.26	d	0.78	ab	1.93	e-g	1.01	bc	0.74	a
Terbutryne	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	0.87	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
L.S.D.	0.30											

Table (28) : Effect of interaction between planting methods, plant densities and weed control treatments on seed yield kg/fed. 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.
Prometryne	1557.1 h-m	1411.0 e-j	1091.6 b-d	1883.2 n	1338.4 d-i	1061.2 b-d
Terbutryne	1591.7 h-m	1326.1 d-i	1072.9 b-d	1665.6 j-n	1390.1 e-j	1228.5 d-g
Topogard	1658.1 j-n	1486.6 g-k	1191.1 c-f	1610.7 i-n	1464.9 f-j	1156.7 c-e
Hand-weeding	1771.4 L-n	1315.3 d-h	1308.7 d-h	1757.8 k-n	1785.8 mn	1328.7 d-i
Control	1496.1 g-L	918.2 bc	651.1 a	1425.6 e-j	1176.4 c-f	858.5 ab
L.S.D.	341.16					