

Nassib *et al.* (1982); Zahran and Ibrahim (1982); El-Shandidy *et al.*, (1983); Salem *et al.*, (1984); Hussein *et al.*, (1985) on faba bean; Rizk *et al.*, (1986b) on chick pea; Hassanein *et al.* (1987) on faba bean and Sary *et al.* (1988b) on lentil. They reported that hand weeding as well as chemical treatments have the same effect on controlling weeds.

Table (3): Effect of weed control treatments on number and weight of weeds/m² in faba bean fields. (Combined analysis of 1985/86 and 1986/87 seasons).

Weed control treatments	Weed characters		
	Number of weeds	Fresh weight of weeds (gm)	Dry weight of weeds (gm)
At 45 days from sowing			
Prometryn	26.67 ab	35.54 ab	5.77 a
Terbutryn	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			
Prometryn	24.15 a	326.90 b	39.97 bc
Terbutryn	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

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 efficiency 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., prometryn at 1.0

kg/fed. and terbutryn at 1.25 kg/fed. Also, it is obvious from the above mentioned results that topogard and prometryn were the best herbicides in controlling 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 herbicides, which includes two herbicides (terbutryn and terbuthylazin). 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. Similar results were obtained by 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); Hassanein *et al.*, (1987) and Sary *et al.*, (1988a and b).

4- Effect of the interaction:

The effect of the interaction on all studied characters under this investigation was not statistically significant except the interaction between sowing methods and weed control treatments on number of weeds/m² after 45 and 90 days from sowing.

Results in Table (4) demonstrated that the effect of weed control treatments did not behave similarly on number of weeds/m² under the two methods of sowing at 45 and 90 days from sowing. At 45 days from sowing, topogard under Heraty method significantly depressed the number of weeds/m² more than hand-weeding under Afir method, while topogard and prometryn under the two methods of planting at 90 days from sowing were superior than the hand-weeding under Afir method. Data indicate clearly that all weed control-treatments were most effective in controlling 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 and Heraty method at 45 and 90 days from sowing, followed by the other chemical weed control treatments without any significant differences, while the greater number of weeds/m² was obtained by Afir method and un-weeded treatment at 45 and 90 days from sowing. Also, data indicate that topogard under Heraty method at 45 days from sowing, while topogard and prometryn under the planting method significantly decreased the number of weeds/m² as compared with hand weeding.

Table (4): Effect of interaction between planting methods and weed control treatments on number of weeds/m².
(Combined analysis of 1985/86 and 1986/87 seasons).

Planting methods Weed control treatments	No. of weeds at 45 days from sowing		No. of weeds at 90 days from sowing	
	Afir method	Heraty method	Afir method	Heraty method
Prometryn	28.08 ab	25.25 ab	25.58 a	22.71 a
Terbutryn	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

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تأثير طرق الزراعة والكثافة النباتية ومقاومة الحشائش على الفول البلدي والحشائش المصاحبة

١ - التأثير على مقاومة الحشائش

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- أجريت تجربتان حقليةتان في مركز البحوث الزراعية، كلية الزراعة بمشهر وذلك خلال موسم ١٩٨٦/٨٥ ، ١٩٨٧/٨٦ لدراسة تأثير طرق الزراعة ، الكثافة النباتية ومقاومة الحشائش على نمو الحشائش المصاحبة لمحصول الفول البلدي . أشتملت كل تجربة على ثلاثين معاملة هي عبارة عن التوافق بين طريقتي الزراعة الحراثة والعقير وثلاث كثافات نباتية هي ٩٣ ، ١٤٠ ، ٢٨٠ ألف نبات فول بلدي/فدان وخمس معاملات لمقاومة الحشائش (برومترين ١كجم ، تريوترين ٢٥راكجم ، توبوجارد ٥راكجم/فدان ، نقاوه يدوية ومعاملة المقاومة) وكان عدد المكررات أربعة وتتلخص أهم النتائج فيما يلي :-
- ١ - أدت طريقة الزراعة الحراثة الى تقليل عدد الحشائش/م^٢ وذلك بعد ٩٠،٤٥ يوم من زراعة الفول البلدي بالمقارنة بطريقة الزراعة العفير ولكن لم يكن هناك فرق معنوي على وزن الحشائش الغض والجاف .
 - ٢ - أدت زيادة كثافة نباتات الفول البلدي الى ٢٨٠ ألف نبات/فدان الى تقليل عدد الحشائش كذلك وزنها الغض والجاف بعد ٤٥ ، ٩٠ يوم من الزراعة حيث أعطت الكثافة المرتفعة أقل قيمة مقارنة بالكثافات المنخفضة (١٤٠،٩٣ ألف نبات/فدان) .
 - ٣ - قللت جميع معاملات مقاومة الحشائش المستخدمة (مبيدات عشبية ونقاوه يدوية) أعداد ووزن الحشائش الغض والجاف /م^٢ وذلك بعد ٤٥ ، ٩٠ يوم من الزراعة .
 - ٤ - كان أقل عدد ووزن غص وحاف للحشائش /م^٢ بعد ٤٥ يوم من الزراعة نتيجة المعاملة بالمبيد العشبي توبوجارد كذلك المبيد العشبي برومترين .
 - ٥ - كان أفضل النتائج في مقاومة الحشائش بعد ٩٠ يوم هي النقاوه اليدوية مرتين كذلك المبيد العشبي توبوجارد .
 - ٦ - كان للتفاعل تأثير معنوي فقط على عدد نباتات الحشائش /م^٢ وكان أقل عدد لها نتيجة المعاملة بالمبيد العشبي توبوجارد والزراعة والحراثة وذلك بعد ٤٥ يوم من الزراعة وبعد ٩٠ يوم مع التوبوجارد وطريقتي الزراعة الحراثة والعقير .

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

BY

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ABSTARCT

Two field experiments were carried out at the Argiculatural Research and Experimental Center, Fac. 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, plant densities and weed control treatments on controlling the associated weeds with faba bean. Each experiment included 30 treatments which were the combination of two planting methods, three plant densities and five weed control treatments.

The results indicated that Herati (wet) method decreased number of weeds/m² at 45 and 90 days from faba bean planting, but did not affect fresh and dry weight of weeds/m² compared with Afir (dry) method. Increasing plant densities up to 280000 plants/fed. decreased number, fresh and dry weight of weeds especially, after 90 days from planting.

The lowest number, fresh and dry weight of weeds/m² at 45 days from planting was recorded by topogard (1.5 kg/fed.) and prometryn (1.0 kg/fed.), while the hand weeding treatment gave the best controlling effect after 90 days from planting followed by topogard. The effect of interactions were significant only on number of weeds/m² and topogard with Herati which gave the lowest number of weeds/m² after 45 and 90 days from planting.

INTRODUCTION

Faba bean (*Vicia faba* L.) is considered the most important legume food crop. The ministry of Agriculture in Egypt is pressing hard to increase the yield and seed quality of faba bean through improving agricultural practices to face the increasing demand of the population. Weed control is one of the important cultural practices to increase faba bean yield.

Sowing method, plant density and controlling weeds have important role on weed population and growth in field crops. Hassanein *et al.* (1987) and Sary *et al.* (1988a and b) showed that Herati (wet) method decreased growth and number of weeds compared with Afir (dry) method in faba bean, soybean and lentil. Increasing plant density resulted in a significant decrease in dry weight of weeds grown in legume crops (Simon, 1970; Chan & Tsaur, 1973; Nassib *et al.*, 1982 and Moshtohory, 1983).

Weed control treatments, i.e. hand hoeing, prometryn, terbutryn and topogard reduced populations and growth of weeds associated with faba bean (Zahran & Ibrahim, 1982; Salem *et al.*, 1984; Zahran *et al.*, 1984; Hussein *et al.*, 1985 and Hassanein *et al.*, 1987).

In this study it was intended to investigate the effect of sowing methods, plant density and weed control treatments on weed growth in faba bean fields.

MATERIALS AND METHODS

Two experiments were carried out at the Research and Experimental Station of the Faculty of Agric., at Moshtohor, Zagazig Univ., during 1985/86 and 1986/87 growing season. The objective of this study was to investigate the effect of some weed control treatments and plant densities under two planting methods on weed growth in faba bean fields. The soil in which the experiments were undertaken was caly-loamy with pH value of 7, 9 and 1.5% organic matter. Each experiment included 30 treatments which were the combination of 2 planting methods, 3 plant densities and 5 weed control treatments. The levels of the factors under this study were as follows:

- 1- Planting methods; Afir (dry method) and Harati (wet method).
- 2- Plant densities; the distance between rows was fixed at 30 cm. with 2 plants/hill, but the distance between hills in the same row was different as follows:
 - a- 10 cm. i.e. 280000 plants/fed.
 - b- 20 cm. i.e. 140000 plants/fed.
 - c- 30 cm. i.e. 93000 plants/fed.
- 3- Weed control treatments were as follows:
 - a- Prometryn (Gesagard 80%) at 1.0 kg/fed. [2, 4-bis (iso-propylamino)-6-methyl thio-S-triazine].

- b- Terbutryn (Igran 80%) at 1.25 kg/fed. [4-ethylamino-2-tert, butylamino-6-methylthio-S-triazine].
- c- Topogard 50% (Igran 35% + Gardoprim 15% (terbuthylazine) at 1.50 kg/fed. [Terbuthylazine: 2-tert, butylamino-4-chloroethylamino-S-triazine].
- d- Hand-weeding twice at 35 and 70 days from sowing.
- e- Control (unweeded).

The herbicides were sprayed before the pre-sowing irrigation in Heraty (wet method) and before the sowing irrigation in Afir (dry method). The spray volume was 400 liters/fed. in all cases.

The treatments were arranged in split-split-plot design in four replications. The planting methods were assigned at random in the main plots, and the plant densities were arranged at random in the sub-plots, while the weed control treatments were randomly distributed in the sub-sub-plots. The area of sub-sub-plot was 12 m² (1/350 fed.) containing 10 rows.

Faba bean variety Giza 2 seeds were sown on November 18th and 26th in 1985/86 and 1986/87 seasons, respectively. The plants were thinned to secure two plants/hill after 30 days from sowing in both seasons. The preceding crop was maize in both seasons. The normal practices for growing faba bean were followed as recommended for the region. Weeds were hand pulled from one square meter of each plot at two times namely 45 and 90 days from sowing data in both seasons. All existing weeds were identified into broad leaves weeds. Number, fresh and dry weights of weeds were recorded per square meter.

Data were statistically analyzed according to the procedures outlined by Snedecor and Cochran (1967). The combined analysis of variance was performed for the data of the two years. Duncan's multiple range test was used to compare between means (Duncan, 1955). Means followed by the same alphabetical letters were not significantly different at the 5% level of probability.

RESULTS AND DISCUSSION

1- Effect of planting methods:

Weeds prevailing in the different samples during the two growing seasons in unweeded plots of faba bean were; weather grass (Anagallis arvensis), bur clover weed (Medicago hispida), wild beat (Beta vulgaris), wild mustard (Brassica nigra), bind weed (Convolvulus arvensis), bishops weed (Ammi majus), whereas, spurge (Euphorbia sp.) and sow thistle (Sonchus oleraceus) were rarely existing.

The results in Table (1) 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 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 weights of weeds data presented in Table (1) indicate that Heraty method reduced both fresh and dry weights of weeds than the Afir method, but the difference was not great enough to reach the significant level at 5%. It could be concluded that the Heraty method was effective in depressing weed density, where in this method the most germinated weed seeds were removed at the time of sowing faba bean seeds. It is worthy to note that in spite of the reduction in weeds number in Herati method, the fresh and dry weight of weeds in both planting methods did not differ significantly. Such result is due to a better growth for the remaining weeds in Heraty method as a result of the reduced competition among the lower number of weeds per unit area. Similar results were obtained by Hassanein *et al.*, (1987) and Sary *et al.*, (1988a).

Table (1): Effect of planting methods on number and weight of weeds/m² in faba bean fields.
(Combined analysis of 1985/86 and 1986//87 seasons).

Planting methods	Weed Characters		
	Number 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

2- Effect of plant densities:

Data in Table (2) 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 280000 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. However, differences among the fresh and dry weight of weeds and number of weeds at 45 and 90 days from sowing, respectively 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 with 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 Moshtohor (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 of faba bean from 178.0 to 238.0 kg/ha. did not show any effect on the number and dry weight of weeds in faba bean field. Also, Rizk *et al.*, (1986b), on chick pea stated that increasing plant density up to 560000 plants/fed. did not affect the weed characters.

Table (2): Effect of plant density on number and weight of weeds/m² in faba bean fields.
(Combined analysis of 1985/86 and 1986/87).

Planting methods	Weed characters		
	Number of weeds	Fresh weight of weeds (gm)	Dry weight of weeds (gm)
At 45 days from sowing			
280000 plants/fed.	41.54 a	37.43 a	5.92 a
140000 plants/fed.	55.60 ab	49.42 a	6.64 a
93000 plants/fed.	64.16 b	52.09 a	7.31 a
At 90 days from sowing			
280000 plants/fed.	61.67 a	360.93 a	38.96 a
140000 plants/fed.	63.92 a	472.01 ab	52.83 b
93000 plants/fed.	62.76 a	508.27 a	61.92 b

3- Effect of weed control treatments:

The available results in Table (3) 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 recorded by using topogard at 1.5 kg/fed. followed by prometryn at 1.0 kg/fed., terbutryn at 1.25 kg/fed. and hand-weeding (twice). The decreases in number of weeds due to 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 agreement with those obtained by Zahran and Ibrahim (1982); El-Shandidy *et al.* (1983), on faba bean, Hassan (1984); Rizk *et al.* (1986a) on lentil and Rizk *et al.*, (1986) on chick pear. They found that using herbicides and hand weeding were the best treatments in depressing number of weeds compared with un-weeded treatment.

Regarding the effect of weed control treatments on fresh weight of weeds/m², data showed significant differences among treatments at 45 and 90 days from sowing. It is obvious that the lowest fresh weight was recorded by applying topogard at 1.5 kg/fed. followed by hand weeding and prometryn at 1.0 kg/fed. as well as terbutryn 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 prometryn at 1.0 kg/fed. were superior at the late stage of growth (90 days from sowing). The reduction in the fresh weight of weeds due to the topogard, hand weeding, prometryn and terbutryn 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, prometryn and terbutryn at 90 days from sowing, respectively. It is clear from the results in Table (3) that topogard at 1.5 kg/fed. gave the best weed control in the early stage, while hand-weeding was superior in the late stage of growth. The available results reveal that terbutryn at 1.25 kg/fed. gave the poorest weed control with regard to fresh weight at the different periods at growth as compared with other herbicides.

Concerning the dry weight of weeds as affected by some weed control treatments, data in Table (3) 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