

**EFFECT OF SOWING DATES AND PLANTING METHODS ON  
GROWTH CHARACTERS, SEED YIELD AND ITS COMPONENTS OF  
FABA BEAN IN NEWLY RECLAIMED LANDS**

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**ABSTRACT**

Two field experiments were carried out, during 2009/2010 and 2010/2011 winter seasons, at the Experimental Station Farm of the Faculty of Agriculture, Damanhour University, El-Bostan Region, El -Behera Governorate, Egypt. The present study aimed to investigate the effect of four sowing dates (Oct. 16<sup>th</sup>, Oct. 31<sup>st</sup>, Nov.15<sup>th</sup> and Nov.30<sup>th</sup>) and six planting methods; i.e., sowing seeds at 14, 22 and 30 cm hill spacings ,on one and both sides of the ridges; on growth characters, seed yield and its components of faba bean cultivar “Sakha 1”. A split-plot design, with three replications, was used in each experiment. The sowing dates occupied the main plots, while, the planting methods were arranged in the sub-plots. The two studied factors; sowing dates, planting methods and their interaction; had a significant effects on all studied traits; i.e., number of days to maturity, plant height, number of branches/ plant, number of pods/ plant, number of seeds /pod, seed yield/ plant, one hundred seed weight and seed yield / ha, in both seasons. In general, it could be concluded that planting faba bean on Nov.15<sup>th</sup> at 55 -cm wide ridges with plants 22 cm apart on both sides of ridges improved growth characters; seed yield and its components of faba bean under newly reclaimed land; in El-Bostan Region; El -Behera Governorate; Egypt.

**Key words:** Sowing dates, planting methods, faba bean, newly reclaimed lands

## INTRODUCTION

Faba bean (*Vicia faba* L.) is one of the most important legume crops in Egypt. It is considered as a cheap source of available protein for human food and animal consumption. Faba bean seeds contain 20-41% proteins, so, it is considered as a good source of protein, as stated by Chavan *et al.* (1989). Increasing the productivity of faba bean seed yield, in Egypt, is one of the main Egyptian Government objectives. Since the growing area in Egypt, is limited; so the priority must be given by the Government as well as the Egyptian agricultural institutes towards the improvement of faba bean productivity. The attainment of maximum yield of faba bean from the unit area of land is greatly affected by different cultural practices in addition to environmental conditions. Sowing date is considered to be one of the most important factors, which may affect the timing and duration of the vegetative and reproductive stages, which mainly contribute to seed yield. Many farmers intend to sow faba bean at the beginning of October, while, the optimum sowing date, for the commercial cultivars is recommended to be at mid November, as reported by Amer *et al.*(1992), Hussein *et al.*( 1994),El-Galaly *et al.* ( 2002), El-Deeb *et al.* (2006),Hussein *et al.*(2006) and El-Galaly *et al.*(2008).

Moreover, planting methods play a major role in faba bean productivity by its impact on the efficiency of nutrients absorption, improving crop growth and utilization of the environmental factors (Adisarwanto and Knight, 1997; Tawaha and Turk, 2001; Turk and Tawaha, 2002; Thalji, 2006 and Ali and El-Sheikh, 2008).

The objective of the present study was to recognize the suitable combination for sowing dates and planting methods for maximizing faba bean seed yield and its components under the conditions of newly reclaimed lands; in El-Bostan Region; El - Behera Governorate; Egypt.

## MATERIALS AND METHODS

Two field experiments were carried out during the two successive winter growing seasons of 2009/2010 and 2010/2011 at the Experimental Farm of the Faculty of Agriculture, Damanhour University, El-Bostan Region, El- Behera Governorate, Egypt. The main objective of this work was to study the effect of four different sowing dates and six planting methods on growth characters, seed yield and its components of faba bean cultivar "Sakha 1" under sandy soil conditions. Soil samples, taken from the experimental site, were mechanically analyzed according to Piper, 1950, and presented in Table 1. Two faba bean seeds/hill were manually sown on four sowing dates; i.e., Oct. 16<sup>th</sup>, Oct. 31<sup>st</sup>, Nov.15<sup>th</sup> and Nov.30<sup>th</sup> ; in both seasons. The

faba bean plants were thinned to one plant/hill before the first irrigation. Six planting methods ;i.e., planting seeds at 14, 22 and 30 cm spacings ;on either one side or on both sides of the ridges; were tested, for each sowing date. A split-plot design, with three replications, was used. The sowing dates were randomly assigned to the main plots, while, planting methods were randomly distributed between the sub-plots. Each experimental unit consisted of seven ridges, 55 cm apart and 3.5m long. The recommended cultural practices, for commercial production of faba bean fields, in El-Bostan Region, were applied. Number of days to maturity was recorded as the number of days from sowing to harvest date. At harvest time, twenty guarded plants were randomly taken from each sub-plot to estimate plant height (cm), number of branches/ plant, number of pods/ plant, number of seeds/ pod, seed yield / plant (g) and one hundred seed weight (g). The five middle ridges were harvested from each sub-plot to estimate the seed yield in tons/ ha. The obtained data were statistically analyzed, according to Snedecor and Cochran (1982).

**Table 1: Soil mechanical analysis of the experimental filed sites before sowing.**

Characteristics	Seasons	
	2009/2010	2010/2011
Sand (%)	70.88	74.37
Silt (%)	6.77	4.19
Clay (%)	22.35	21.44
Texture class	Sandy	

## RESULTS AND DISCUSSION

### 1- Effect on growth traits:

#### 1-1: Number of days to maturity:

The number of days from sowing to maturity was significantly affected by sowing dates in both studied seasons. The earliest plants were recorded for faba bean planted on Nov.30<sup>th</sup> in both seasons over all planting methods. Data, also, revealed that planting methods significantly affected number of days from sowing to maturity in both seasons (Table 2). The highest mean values of this trait (142.8 and 142.3 days) were associated with sowing faba bean seeds at 30 cm hill spacing on one side of the ridges. These findings were consistent in both seasons. This means that the highest seeding rate might lead to decreasing the vegetative growth period and enhancing the translocation of metabolites to fruiting organs. The combination (the interaction) between the two studied factors significantly affected the number of days from sowing to maturity in both seasons. Sowing date on Nov.30<sup>th</sup> and planting seeds on both sides

of the ridges, at 14 cm hill spacing, recorded the lowest mean values of number of days to maturity stage in both seasons (Table 2), being 127.0 and 128.0 days, successively. While, the highest values were those of Oct 16<sup>th</sup> at 30 cm hill spacing on one side of ridges, being 149.0 and 147.0 days for the first and second seasons, respectively.

**Table 2: Mean values of the number of days to maturity of faba bean plants as affected by sowing dates (A), planting methods (B) and their interaction during 2009/2010 and 2010/2011 seasons.**

Season	Planting methods (B)		Sowing dates (A)					LSD <sub>0.05</sub>
			Oct.16 <sup>th</sup>	Oct.31 <sup>st</sup>	Nov.15 <sup>th</sup>	Nov.30 <sup>th</sup>	Mean	
2009/2010	Planting on one side of the ridges at	14 cm	141.0	137.0	134.0	132.0	136.0	A = 3.97 B = 0.55 AB = 0.77
		22 cm	144.0	140.0	138.0	133.0	138.8	
		30cm	149.0	144.0	143.0	135.0	142.8	
	Planting on both sides of the ridges at	14 cm	140.0	136.0	132.0	127.0	133.8	
		22 cm	144.0	141.0	135.0	131.0	137.8	
		30cm	146.0	143.0	140.0	134.0	140.8	
		Mean	144.0	140.2	137.0	132.0	138.3	
2010/2011	Planting on one side of the ridges at	14 cm	136.0	134.0	133.0	131.0	133.5	A = 1.47 B = 0.88 AB = 1.24
		22 cm	143.0	139.0	137.0	134.0	138.3	
		30cm	147.0	143.0	142.0	137.0	142.3	
	Planting on both sides of the ridges at	14 cm	137.0	131.0	130.0	128.0	131.5	
		22 cm	144.0	140.0	136.0	130.0	137.5	
		30cm	144.0	140.0	136.0	132.0	138.0	
		Mean	141.8	137.8	135.7	132.0	136.8	

### 1-2: Plant height:

Data in Table (3) indicated that plant height was significantly affected by sowing dates in both seasons. It is clear that sowing bean on Nov.15<sup>th</sup> gave the tallest plants (85.0 and 90.5 cm in the 1<sup>st</sup> and 2<sup>nd</sup> seasons, respectively), while, the respective shortest plants (65.4 and 69.1 cm,) were obtained by sowing on Nov. 30<sup>th</sup>. The increase in plant height of faba bean might be due to the role of photoperiod and light intensity that prevailed during growth period of early planting on Nov.15<sup>th</sup>, which may result in an increase in both number and length of plant internodes. Similar results were reported by Mohamed (2003) and Grenz *et al.* (2005). Concerning the six planting methods, data, also, revealed that the tallest plants (86.1 and 89.9 cm) were produced by planting faba bean at 14 cm apart on both sides of the ridges (Table 3) in the two successive seasons. This increase in plant height may be attributed to the high on plant-to-plant competition in the higher density treatments. Ali and El- Shaikh 2008, demonstrated that narrow spacings, in their works, lead to a reduction of light

intensity, which encouraged IAA concentration in stem tissues. Such increase in IAA concentration may reflect in cell enlargement and, hence, plant height. On the other hand, planting seeds, either on one side or both sides of the ridges, with increasing plant spacing more than 14 cm among hills, significantly decreased plant height in both seasons (Table 3). With respect to the interaction between the two studied factors, data in Table (3) indicate that such interaction significantly affected the plant height in both seasons. Planting faba bean on Nov.15<sup>th</sup> at 14 cm apart, on both sides of the ridges, gave the highest values (being 99.5 and 104.0 cm), while, the lowest ones were obtained for plants sown at 30 cm spacing on one side of the ridges on Nov.30<sup>th</sup>, being 57.6 and 60.6 cm.

**Table 3: Mean values of the plant height (cm) of faba bean plants as affected by sowing dates (A), planting methods (B) and their interaction during 2009/2010 and 2010/2011 seasons.**

Season	Planting methods (B)		Sowing dates (A)					LSD <sub>0.05</sub>
			Oct.16 <sup>th</sup>	Oct.31 <sup>st</sup>	Nov.15 <sup>th</sup>	Nov.30 <sup>th</sup>	Mean	
2009/2010	Planting on one side of the ridges at	14 cm	69.1	74.4	80.4	62.8	71.7	A = 8.59 B = 1.15 AB = 1.64
		22 cm	65.8	70.7	77.6	60.3	68.6	
		30cm	61.0	67.8	73.8	57.6	65.1	
	Planting on both sides of the ridges at	14 cm	81.2	86.4	99.5	77.2	86.1	
		22 cm	76.3	80.1	90.1	70.1	79.2	
		30cm	71.4	77.2	88.4	64.4	75.4	
		Mean	70.8	76.1	85.0	65.4	74.3	
2010/2011	Planting on one side of the ridges at	14 cm	74.3	77.8	86.2	69.8	77.0	A =10.44 B =1.71 AB=2.42
		22 cm	66.6	74.4	84.1	67.8	73.2	
		30cm	65.9	72.4	81.4	60.6	70.1	
	Planting on both sides of the ridges at	14 cm	89.1	90.2	104.0	76.3	89.9	
		22 cm	80.8	86.1	97.1	70.7	83.7	
		30cm	78.9	80.3	90.2	69.2	79.7	
		Mean	75.9	80.2	90.5	69.1	78.9	

### 1-3: Number of branches /plant:

Data in Table 4 reveal that sowing dates of faba bean significantly affected the number of branches per plant in both seasons. Sowing faba bean on Nov. 15<sup>th</sup> gave the highest values for this character (3.1 and 3.4) in the two seasons, respectively. With respect to planting method treatments, the highest numbers of branches per plant (3.3 and 3.8) were recorded by planting faba bean seeds 30 cm apart on one side of ridges in the first and second seasons, respectively. Similar results were obtained by Ali and El- Shaikh (2008), who attributed the highest

number of branches in the lower density to the less competition among plants for available radiant energy, water and limited nutrients in reclaimed lands. Regarding the interaction between the two studied factors, data in Table 4 indicate that such interaction significantly affected this trait in both seasons. The highest number of branches per plant (4.4 and 4.5) was achieved by planting bean seeds 30 cm apart on one side of ridges on Nov.15<sup>th</sup>, in the two successive seasons. The lowest values (1.1 and 1.2 branches ) were recorded when bean seeds were sown on both sides of the ridges at 14 cm hill spacing on Oct.16<sup>st</sup>, in the first and second seasons, respectively.

Table 4: Mean values of number of branches per faba bean plants as affected by sowing dates (A), planting methods (B) and their interaction during 2009/2010 and 2010/2011 seasons.

Season	Planting methods (B)		Sowing dates (A)					LSD <sub>0.05</sub>
			Oct.16 <sup>th</sup>	Oct.31 <sup>st</sup>	Nov.15 <sup>th</sup>	Nov.30 <sup>th</sup>	Mean	
2009/2010	Planting on one side of the ridges at	14 cm	2.4	2.6	2.7	2.3	2.5	A =0.70 B =0.18 AB=0.26
		22 cm	2.5	2.8	3.4	2.1	2.7	
		30cm	2.7	3.2	4.4	2.7	3.3	
	Planting on both sides of the ridges at	14 cm	1.1	1.9	2.2	1.7	1.7	
		22 cm	2.1	2.2	2.4	2.1	2.2	
		30cm	1.8	3.9	3.5	1.2	2.6	
		Mean	2.1	2.8	3.1	2.0	2.5	
2010/2011	Planting on one side of the ridges at	14 cm	2.5	2.6	3.2	1.7	2.5	A =0.54 B =0.16 AB=0.23
		22 cm	2.7	2.7	3.2	2.6	2.8	
		30cm	3.3	3.3	4.5	4.2	3.8	
	Planting on both sides of the ridges at	14 cm	1.2	2.0	2.8	1.8	2.0	
		22 cm	2.3	2.4	2.9	2.0	2.4	
		30cm	1.8	3.8	3.8	2.4	3.0	
		Mean	2.3	2.8	3.4	2.5	2.7	

## 2-Effect on seed yield and its components:

### 2-1: Number of pods /plant:

Data in Table (5) indicated that sowing dates had a significant effect on number of pods/ plant in the two studied seasons. The highest number of pods per plant (17.0 and 19.1) was achieved on Nov.15<sup>th</sup> in both seasons, compared to the lowest values, (13.0 and 13.8) which were recorded, with Oct.16<sup>th</sup> sowing date in the first and second seasons, respectively. These results are in general agreement with those reported by Abuldahab *et al.* (2002), Mohamed (2003), Zein *et al.* (2004), Grenz *et al.* (2005) and El-Degwy *et al.* (2010). Planting methods, also, significantly affected such trait in both seasons. Sowing faba bean on one side of the ridges at 30cm apart, gave the highest

number of pods/plant (19.8 and 21.5) in the first and second seasons, respectively. Meanwhile, the lowest values (11.5 and 12.3 pods) were those of planting on both sides of ridges at 14 cm hill spacing in both seasons, respectively. These results are in harmony with those mentioned by Turk and Tawaha (2002), Thalji (2006), Ali and El-Shaikh (2008) and El-Banna *et al.* (2009). Significant effect of the interaction between the two studied factors, on number of pods/plant was noticed in the two studied seasons (Table 5). The highest values were recorded by planting seeds on one side of the ridges at 30 cm hill spacing on Oct.31<sup>st</sup> (22.5) and Nov.15<sup>th</sup> (25.3) in both seasons, successively; while the lowest values (8.0 and 9.0 pods) were obtained on Nov.30<sup>th</sup> sowing date on the two sides of the ridges at 14 cm spacing, in both seasons, respectively.

**Table 5: Mean values of number of pods/ faba bean plant as affected by sowing dates (A), planting methods (B) and their interaction during 2009/2010 and 2010/2011 seasons.**

Season	Planting methods (B)		Sowing dates (A)					LSD <sub>0.05</sub>
			Oct.16 <sup>th</sup>	Oct.31 <sup>st</sup>	Nov.15 <sup>th</sup>	Nov.30 <sup>th</sup>	Mean	
2009/2010	Planting on one side of the ridges at	14 cm	12.1	16.3	16.5	14.1	14.8	A = 2.66 B = 0.73 AB= 1.04
		22 cm	14.3	16.2	18.6	14.3	15.9	
		30cm	16.2	22.5	22.1	18.2	19.8	
	Planting on both sides of the ridges at	14 cm	10.2	13.6	14.2	8.0	11.5	
		22 cm	11.3	13.1	15.9	10.3	12.7	
		30cm	13.9	13.0	14.2	13.5	13.7	
		Mean	13.0	15.8	17.0	13.1	14.7	
2010/2011	Planting on one side of the ridges at	14 cm	13.4	17.1	18.9	16.2	16.4	A = 2.27 B = 0.97 AB=1.37
		22 cm	16.2	18.4	20.3	16.9	18.0	
		30cm	17.0	23.2	25.3	20.3	21.5	
	Planting on both sides of the ridges at	14 cm	11.3	13.9	15.0	9.0	12.3	
		22 cm	10.9	14.1	17.0	11.3	13.3	
		30cm	14.0	13.0	18.0	11.1	14.0	
		Mean	13.8	16.6	19.1	14.1	15.9	

### 2-2: Number of seeds/ pod:

Data in Table (6) reveal that the number of seeds /pod was significantly affected by different sowing dates in both seasons. The highest numbers of seeds/ pod (3.2) were obtained on Nov.15<sup>th</sup>; meanwhile, the lowest numbers of seeds/pod (2.3 and 2.4) were produced on Oct.16<sup>th</sup> in both seasons, respectively. Abuldahab *et al.* (2002), Mohamed (2003) and Grenz *et al.* (2005) obtained similar results. Data, also, indicated that the number of seeds/ pod was significantly affected by planting methods in both

seasons. The highest values (3.4 and 3.3) were obtained by sowing plants on both sides of the ridges at 22 cm hill spacing. These results are in agreement with those reported by Turk and Tawaha (2002). The interaction between the two studied factors significantly affected this character in both seasons (Table 6). Sowing seeds on both sides of the ridges at 22 cm hill spacing on Nov.15<sup>th</sup> recorded the highest values of number seeds/plant (4.5 and 4.2) in the two successive seasons.

**Table 6: Mean values of number of seeds/ pod of faba bean plant as affected by sowing dates (A), planting methods (B) and their interaction during 2009/2010 and 2010/2011 seasons.**

Season	Planting methods (B)		Sowing dates (A)					LSD <sub>0.05</sub>
			Oct.16 <sup>th</sup>	Oct.31 <sup>st</sup>	Nov.15 <sup>th</sup>	Nov.30 <sup>th</sup>	Mean	
2009/2010	Planting on one side of the ridges at	14 cm	1.7	2.5	2.9	2.1	2.3	A = 0.32 B = 0.08 AB=0.12
		22 cm	2.2	2.7	2.0	2.5	2.4	
		30cm	2.5	2.9	3.4	2.8	2.9	
	Planting on both sides of the ridges at	14 cm	2.3	2.8	3.1	2.6	2.7	
		22 cm	2.8	3.1	4.5	3.0	3.4	
		30cm	2.3	3.4	3.5	2.6	3.0	
		Mean	2.3	2.9	3.2	2.6	2.8	
2010/2011	Planting on one side of the ridges at	14 cm	2.0	2.5	2.8	2.3	2.4	A = 0.37 B = 0.08 AB=0.12
		22 cm	2.4	2.9	3.1	2.8	2.8	
		30cm	2.4	3.1	2.4	3.7	2.9	
	Planting on both sides of the ridges at	14 cm	2.5	3.1	3.3	2.7	2.9	
		22 cm	2.8	3.2	4.2	3.0	3.3	
		30cm	2.5	2.0	3.4	3.5	2.9	
		Mean	2.4	2.8	3.2	3.0	2.9	

### 2-3: Seed yield / plant (g):

Results in Table 7 shows that seed yield / plant was significantly affected by the studied sowing dates in both seasons. The highest values (27.7 and 32.2 g) were resulted on Nov.15<sup>th</sup> for the first and second seasons, respectively. These results are in accordance with those found by Abuldahab *et al.* (2002), Mohamed (2003) and Grenz *et al.* (2005). Planting methods, also, significantly affected such trait in both studied seasons. The highest seed yield/plant (33.7and 34.8 g) was recorded by sowing faba bean seeds 30 cm apart on one side of the ridges in the first and second seasons, respectively. These results can be attributed to the increment induced in both number of branches and pods/ plant, achieved by such planting method. These results are in agreement with those reported by Turk and Tawaha (2002).Significant effects, for the interaction between the two studied factors, were recorded on seed yield/plant in both



seasons (Table 7). Planting bean plants on one side of the ridges at 30 cm hill spacing on Nov.15<sup>th</sup>, gave the highest yield/plant (42.8 and 43.6 g) in both seasons, respectively.

**Table 7: Mean values of seed yield/ plant (g) of faba bean as affected by sowing dates (A), planting methods (B) and their interaction during 2009/2010 and 2010/2011 seasons.**

Season	Planting methods (B)		Sowing dates (A)					LSD <sub>0.05</sub>
			Oct.16 <sup>th</sup>	Oct.31 <sup>st</sup>	Nov.15 <sup>th</sup>	Nov.30 <sup>th</sup>	Mean	
2009/2010	Planting on one side of the ridges at	14 cm	20.6	24.0	25.6	19.5	22.4	A = 6.23 B = 1.81 AB=2.56
		22 cm	24.1	33.5	35.6	22.9	29.0	
		30cm	26.2	38.8	42.8	26.9	33.7	
	Planting on both sides of the ridges at	14 cm	12.9	13.3	14.7	12.6	13.4	
		22 cm	21.1	22.5	22.9	20.3	21.7	
		30cm	19.8	23.2	24.8	18.7	21.6	
		Mean	20.8	25.9	27.7	20.2	23.6	
2010/2011	Planting on one side of the ridges at	14 cm	20.7	23.6	25.9	18.4	22.2	A = 7.23 B = 1.81 AB=2.57
		22 cm	25.2	34.8	37.1	22.9	30.0	
		30cm	28.3	40.5	43.6	27.0	34.8	
	Planting on both sides of the ridges at	14 cm	12.9	14.0	15.5	12.1	13.6	
		22 cm	20.9	22.7	24.5	19.8	22.0	
		30cm	22.0	24.3	26.8	36.6	27.4	
		Mean	21.7	26.6	28.9	22.8	25.0	

#### 2-4: One hundred seed weight (g):

Data in Table 8 show that 100- seed weight (g) was significantly affected by sowing dates in both seasons. The highest mean values for this characteristic (72.4 and 70.9 g) were recorded by sowing seeds on Nov. 15<sup>th</sup>, while, the lowest means (67.3 and 67.1 g) resulted on Oct.16<sup>th</sup>, in the two studied seasons; respectively. These results are in harmony with those mentioned by Abuldahab *et al.* (2002), Mohamed (2003) and Grenz *et al.* (2005). Data, also, indicated that the weight of 100 seeds was significantly affected by the planting methods in both seasons. The heaviest weight (72.4 and 71.0 g) was achieved by sowing faba bean seeds on one side of ridges at 30 cm hill spacing, as compared to the lowest values (66.3 and 67.0) that were produced by sowing seeds on both sides of the ridges at 30 cm hill spacing in the two respective seasons. These results are on line with those reported by Al-Rifaei (1999) and Ali and El- Shaikh (2008). The interaction, between the two studied factors for the weight of 100 seeds, showed a significant effect in both seasons (Table 8). Planting ridges on one side at 30

cm hill spacing on Nov.15<sup>th</sup>, gave the highest values (74.6 and 73.2 g) in both seasons, respectively.

**Table 8: Mean values of one hundred seed weight (g) of faba bean as affected by sowing dates (A), planting methods (B) and their interaction during 2009/2010 and 2010/2011 seasons.**

Season	Planting methods (B)		Sowing dates (A)					LSD <sub>0.05</sub>
			Oct.16 <sup>th</sup>	Oct.31 <sup>st</sup>	Nov.15 <sup>th</sup>	Nov.30 <sup>th</sup>	Mean	
2009/2010	Planting on one side of the ridges at	14 cm	67.9	69.5	74.0	68.2	69.9	A = 3.83 B = 0.63 AB=0.90
		22 cm	69.3	72.2	73.3	70.0	71.2	
		30cm	68.5	73.5	74.6	73.0	72.4	
	Planting on both sides of the ridges at	14 cm	65.3	68.1	69.1	66.3	67.2	
		22 cm	68.2	70.8	72.1	70.1	70.3	
		30cm	64.6	68.9	71.3	60.4	66.3	
		Mean	67.3	70.5	72.4	68.0	69.6	
2010/2011	Planting on one side of the ridges at	14 cm	66.3	68.1	70.1	67.5	68.0	A = 3.60 B = 0.51 AB=0.72
		22 cm	67.4	69.1	71.2	68.3	69.0	
		30cm	69.5	71.2	73.2	70.1	71.0	
	Planting on both sides of the ridges at	14 cm	67.4	68.0	72.5	68.1	69.0	
		22 cm	67.0	67.0	69.1	67.3	67.6	
		30cm	65.2	67.3	69.3	66.2	67.0	
		Mean	67.1	68.5	70.9	67.9	68.6	

### 2-5: Seed yield (t /ha):

Results in Table 9 showed that seed yield was significantly affected by the studied sowing dates in both seasons. Faba bean planted on Nov.15<sup>th</sup> produced the highest seed yields of 3.04 and 3.19 tons/ ha, while, the lowest seed yields of 2.26 and 2.24 tons/ ha was recorded on Nov. 30<sup>th</sup>; in the first and second seasons; respectively. The increments induced in component traits such as number of pods per plant, number of seeds per pod, seed yield/plant and one hundred seed weight caused an increase in seed yield/ha in both seasons. The increase in faba bean seed yield and its components, due to planting on Nov.15<sup>th</sup>, might be attributed to the seasonable environmental conditions during this period, such as temperature, day length and light intensity, which allowed plants to produce more photosynthesis products. The accumulation of such photosynthesis products, consequently; leads to an increase in both yield and its components and the growth attributes were negatively affected, compared to Nov.15<sup>th</sup> sowing date. These findings are in general agreement with those obtained by Abuldahab *et al.* (2002), Mohamed (2003) and Grenz *et al.* (2005). Planting methods significantly affected seed yield per unit land area in both seasons (Table 9). The highest seed yield

values (3.26 and 3.30 t /ha ) were obtained by sowing seeds on both sides of ridges at 22 cm hill spacing ,while, the lowest values ( 2.09 and 2.13 t/ha ) were recorded for the seeds, sown at 30 cm apart on one side of ridges in the two successive seasons. Such significant difference between the two planting methods could be attributed to the different plant densities for both treatments. Similar results were obtained by Amer *et al.* (1992) and El-Galaly (2008). The interaction between the two studied factors significantly affected this character in both seasons. The highest seed yields of 3.48 and 3.71 tons /ha were obtained from beans planted on both sides of ridges at 22 cm hill spacing on Nov.15<sup>th</sup> in the first and second seasons, respectively; meanwhile, the lowest seed yields/ha (1.62 tons) were produced by planting faba bean on one side of the ridges at 30 cm hill spacing on Oct.31<sup>th</sup> , in both seasons (Table 9).

**Table 9: Mean values of seed yield (t /ha) of faba bean as affected by sowing dates (A), planting methods (B) and their interaction during 2009/2010 and 2010/2011 seasons.**

Season	Planting methods (B)		Sowing dates (A)					LSD <sub>0.05</sub>
			Oct.16 <sup>th</sup>	Oct.31 <sup>st</sup>	Nov.15 <sup>th</sup>	Nov.30 <sup>th</sup>	Mean	
2009/2010	Planting on one side of the ridges at	14 cm	2.41	2.86	3.06	2.27	2.65	A = 0.36 B = 0.12 AB=0.16
		22 cm	1.83	2.60	2.77	1.73	2.23	
		30cm	1.70	2.39	2.65	1.62	2.09	
	Planting on both sides of the ridges at	14 cm	2.83	2.94	3.29	2.74	2.95	
		22 cm	3.16	3.38	3.48	3.03	3.26	
		30cm	2.31	2.75	2.96	2.17	2.55	
		Mean	2.37	2.82	3.04	2.26	2.62	
2010/2011	Planting on one side of the ridges at	14 cm	2.43	2.80	3.11	2.13	2.62	A = 0.14 B = 0.08 AB=0.12
		22 cm	1.92	2.71	2.90	1.71	2.31	
		30cm	1.71	2.50	2.70	1.62	2.13	
	Planting on both sides of the ridges at	14 cm	2.82	3.11	3.51	2.63	3.02	
		22 cm	3.13	3.42	3.71	2.94	3.30	
		30cm	2.60	2.90	3.22	2.41	2.78	
		Mean	2.44	2.91	3.19	2.24	2.69	

In general, it could be concluded that planting faba bean on Nov.15<sup>th</sup> at 55 -cm wide ridges with plants 22 cm apart on both sides of ridges improved growth characters; seed yield and its components of faba bean under newly reclaimed land; in El-Bostan Region; El -Behera Governorate; Egypt.

## REFERENCES

- Abuldahab, A.A.; W.A.El-Murshedy and G.O.Mahmoud. (2002).**Phonological response of faba bean to climatological effects under different sowing dates and plant distributions. J.Agric. Sci. 27(4):1989-2003 Mansoura Univ.,Egypt.
- Adisarwanto, T. and R. Knight. (1997).** Effect of sowing date and plant density on yield and yield components in faba bean. Australian J. of Agric. Res. 113-118.
- Ali, H.A.O. and K.A.A. El-Sheikh. (2008).**Yield and its components in faba bean genotypes as influenced by cultivation method in reclaimed soil. Minia J. of Agric. Res. & Develop.28 (1):67-82.
- Al-Rifae, M.K. (1999).**Effect of seed size and plant population density on yield and yield components of local faba bean. M.Sc. Thesis, Jordan Univ. of Sci. and Tech.Irbid, Jordan. (Cited after, Ali and El-Sheikh, 2008).
- Amer, M.I, M.A. EL-Borai and M.M. Radi. (1992).** Response of three faba bean (*Vicia faba* L.) cultivars to three sowing dates under different plant densities in North Delta. J.Agric. Res.18 (40):591-599.Tanta Univ., Egypt.
- Chavan, J.K., L.S. Kute and S.S. Kadam. (1989).** In: CRC Hand Book of World Legumes. P.223- 245. D.D. Salunkhe and S.S. Kadam (Eds.). Boca Raton, Florida, USA: CRC Press. (Cited after El-Banna *et al.*, 2009).
- El-Banna, M.N., F.I.Radwan, M.A.A. Nassar and T.F.M.El-Shshtawy. (2009).** Effect of plant density and biofertilization on the productivity and technological traits of some faba bean cultivars (*Vicia faba* L.).J.Agric. Res. 14(1):47-60 Fac.Agric. Saba Basha, Egypt.
- El- Deeb, M.A., A.H.A. Hussein, Kh.M. Yamani and T.S.A. El-Marsafawy. (2006).** Response of new faba bean genotypes to different sowing dates and plant densities in New Valley. First Field Crops Conf. Proceedings. 20-22 Aug.Vol. 6:358-362.
- El-Degwy, I.S., A.A.Glelah, A.El-Galaly and M.K. Mohamed. (2010).**Effect of sowing date and broomrape control on yield and yield related traits of some faba bean cultivars. Alex. Sci.Exch.J.31 (3):230-239.
- El-Galaly, O. A.M., M.I. Amer S.A. Mahmoud N. M. Abou- Zaid and N. M.A. Mahmoud. (2002).** Integrated control of certain foliage diseases on faba bean (*Vicia faba* L.). Egypt.J.Aric.Res.28 (2):301-311. Tanta Univ., Egypt.
- El-Galaly, O. A.M., M.I. Amer, S.A R.A.I. Abou-Moustafa and N.M.A. Mahmoud. (2008).** Response of two faba bean (*Vicia faba* L.) promising lines and Sakha 3 cultivar to different sowing dates and plant densities. J. Agric. Res. 34(3):647-661 Kafr El- Sheikh Univ., Egypt.

- Grenz,J., AM. Manschadi, FN.Uygun and J.Sauerborn. (2005).** Effects of environment and sowing date on assimilate competition between faba bean (*Vicia faba* L.) and the parasitic weed, *Orobanche crenata*. Field Crops Res.93: 300-313.
- Hussein, A.H., M.A. El-Deeb and Kh. El-Yamani. (2006).** Response of some new faba bean genotypes to different sowing dates and plant densities in the newly reclaimed lands in Upper Egypt. National Coordin. Meeting, Cairo, Egypt, 11-12 Sept., 2006.
- Hussein, A.H., R.F.Disautky, M.A. El-Deeb and M.M. Morsy. (1994).** Effect of sowing dates and plant densities on yield components of new faba bean cultivar (Giza Blanka) in newly reclaimed land. J.Agric. Sci. (19)2:447- 451. Mansoura Univ., Egypt.
- Mohamed, A.A. (2003).**Effect of planting date on growth and yield of some faba bean varieties. M.Sc.Thesis, Agron. Dep., Fac. of Agric., Cairo Univ., Egypt.
- Piper, C.S.(1950).****Soil and Plant Analysis.** Interscience Publishers Inc., p.151-172. New York, USA.
- Snedecor, G.W and W.B Cochran. (1982).** Statistical Methods. 7<sup>th</sup> ed. Iowa State Univ. Press, Ames, Iowa, U.S.A.
- Tawaha, A.M. and M.A. Turk. (2001).** Effect of date and rate of sowing on yield and yield components of narbon vetch under semi –arid conditions. Acta Agron. Hung. 49:103-105.
- Thalji, T. (2006).** Impact of row spacing on faba bean L. Growth under Mediterranean Rainfed conditions. J. of Agron. 5(3):527-532.
- Turk, M.A. and A.M. Tawaha. (2002).** Impact of seeding rate, seeding date, rate and method of phosphorus application on faba bean (*Vicia faba* L. minor) in the absence of moisture stress. Biotechnol. Agron. Soc. Environ. 6:171-178.
- Zein, A.A., M.M. Abd El-Hamide, M.F. Shady and M.E. Kenapar. (2004).** Effect of sowing date of broomrape (*Orobanche crenata* forsk) control and releasing *Phytomyza orobanchia*, kalt, on faba bean (*Vicia faba* L.) growth and productivity. J.Agric.Res. Res. 30(2):465-486 Tanta Univ., Egypt.

## الملخص العربي

### تأثير مواعيد وطرق زراعة الفول البلدى على صفات النمو والمحصول البذري ومكوناته في الاراضى حديثه الاستزراع

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أقيمت تجربتان حقليتان بالمزرعة البحثية لكلية الزراعة جامعه دمنهور- بمنطقة البستان بمحافظة البحيرة- جمهورية مصر العربية - خلال موسمي الزراعة 2010/2009 و 2011/2010 بهدف دراسة تأثير أربعة مواعيد للزراعة ( 16 أكتوبر و 31 أكتوبر و 15 نوفمبر و 30 نوفمبر) وستة من طرق الزراعة حيث تمت زراعة البذور على خطوط بعرض 55 سم وعلى مسافات بين الجور ( 14 و 22 و 30 سم على ريشة واحدة و على ريشتي الخطوط والخف على نبات واحد/جورة ) وذلك على صفات النمو والإنتاجية المحصولية للفول البلدي صنف " سخا 1 " وذلك تحت ظروف الاراضى الرملية حديثة الاستزراع. وقد نفذت هذه الدراسة بتصميم القطع المنشقة مرة واحدة في ثلاث مكررات، حيث خصصت القطع الرئيسية لمواعيد الزراعة، بينما خصصت القطع الفرعية لطرق الزراعة. وقد أظهرت النتائج أن كلا من عاملي الدراسة (مواعيد وطرق الزراعة) وكذا التفاعل بينهما كان لها تأثيرا معنويا على جميع الصفات التي تمت دراستها وهي عدد الأيام من الزراعة حتى مرحلة النضج وارتفاع النباتات وعدد الأفرع/نبات وعدد القرون/نبات وعدد البذور/قرن ووزن البذور/نبات ووزن المائة بذره والمحصول البذري/هكتار وذلك في كلا موسمي الدراسة. وعموما فانه بناءا على نتائج هذه الدراسة يمكن التوصية بزراعة الفول البلدي خلال منتصف شهر نوفمبر في جور على خطوط ( 22 سم بين الجور و 55 سم بين الخطوط ) وذلك على كلا ريشتي الخطوط مع الخف على نبات واحد/جورة حيث أعطى هذا التطبيق أفضل إنتاجية محصولية للفول البلدي تحت ظروف الاراضى الرملية حديثة الاستزراع بمنطقة البستان بمحافظة البحيرة بجمهورية مصر العربية.