Performance of Some Faba Bean (*Vicia faba* L.) Cultivars Sown at Different Dates

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ABSTRACT

The present investigation was conducted in the winter seasons of 2013/2014 and 2014/2015 at the Agricultural Research Station, Faculty of Agriculture, Alexandria University, Abis, Egypt, to study the effect of three sowing dates (Oct. 20th Nov. 10th and Dec. 1st) on the performance of eleven faba bean cultivars in a randomized complete block design, with three replications, in a split-plot arrangement. The investigation aimed to determine the best combination between genotypical and environmental factors for high yield, and evaluate seed yield and its related characters in faba bean (*Vicia faba* L.), cultivars sown at different dates. The results showed that most of the studied yield and quality characters were significantly influenced both by sowing date cultivars and their interaction. The present investigation emphasized the importance of sowing at the appropriate sowing date to fulfill the potential yield of faba bean cultivars. The best sowing date was October 20th which gave the highest productivity for all studied faba bean genotypes, especially Misr 1, RenaMora, Nubariah 3, Sakha 3 and Giza 843. The study, also, indicated the possibility of delaying sowing to November 10th, but, a reduction in seed yield would be expected that would vary, according to cultivar.

Keywords: **Faba bean (*Vicia faba* L.) cultivars, sowing date, seed, yield components**

INTRODUCTION

Faba bean (*Vicia faba* L.) is one of the most important legume crops in the world, and an essential food crop in Egypt due to its high protein content (26 to 32%). Its role in maintaining soil fertility, as a host for nitrogen fixing bacteria, is well documented. The total planted area in Egypt reached about 0.1 million hectares in 2012/2013 season with a total seed production of 269400 tons and an average of 3.2 tons/ha. (FAO, 2014). Productivity of faba bean is affected by several factors, including cultivars, cultural practices and environmental conditions. Adoption of high yielding cultivars may contribute to the increase in seed yield with application of suitable practices, such as sowing date, fertilization, irrigation and crop protection.

Several studies reported the need to determine the appropriate sowing date for the grown cultivars. Sharaan *et al.* (2004) reported that delayed sowing, beyond November 5th, decreased seed number per plant and seed yield per feddan, while early sowing on October 15th or November 5th, increased seed weight per plant and harvest index. They, also, reported significant cultivar × sowing date interaction where Giza 2 and Giza 429 gave the highest seed yield with early sowing. Similar findings were reported by Hussein *et al.* (2002) and Mohammed (2003) who found that early sowing (late October to early November) significantly increased vegetative growth and seed yield. Attia *et al.* (2009) and Badran and Ahmed (2010) found that sowing around November produced the highest values for seed yield and its components, compared to earlier (around mid-October) or later (end of November and early December) sowing dates. Similarly, Badr *et al.* (2013), Abido and Seadh (2014) and Hegab *et al.* (2014) reported that early November sowing date gave the best values for seed yield and its components, vegetative growth characters and growth parameters.

In addition, cultivars may play an important role in increasing seed yield through their response to applied cultural practices and environmental conditions. Several studies reported significant variations among tested cultivars in vegetative and yield characters (Mohammed and EL-Abbas, 2005; Bakry *et al.*, 2011; Kandil *et al.*, 2011; Mulualem *et al.*, 2012 and Abido and Seadh, 2014).

The objectives of the present study were to investigate the effect of three sowing dates, eleven cultivars and their interactions on faba bean growth, seed yield and yield components.

MATERIALS AND METHODS

Two field experiments were executed during 2013/ 20134 and 2014/ 2015 winter seasons at the Agricultural Research Station, Faculty of Agriculture, Alexandria University, Egypt, to evaluate seed yield and its related characters of faba bean (*Vicia faba* L.) cultivars sown at different dates.

The experimental design was a randomized complete block design, with three replications in a split-plot arrangement, in the two seasons of study. The main plots were devoted to the sowing dates (October 20th, November 10th and December 1st). Eleven faba bean genotypes (Giza 461, Giza 429, Sakha 3, Giza 3, Giza 716, Giza 843, Nubaria 3, RenaMora, Misr 1 ,ILB 450, ILB 648) were allocated to the sub-plots. Each sub-plot consisted of five ridges, 3 m long and 0.6 m apart.

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All other cultural practices were applied, as recommended, for the experimentation site. Mono-super phosphate (15.5% P_2O_5), potassium sulfate (48% K_2O) and ammonium sulfate (20.5% N) fertilizers were applied, as recommended in both seasons at the rate of 31.0 kg P_2O_5/ fed., 50 kg K_2O/ fed and 15 kg N/ fed., respectively.

The studied characters included: (1) Leaf area index, recorded as an average of five random plants from each sub-plot, for the area of leaves at 50% podding stage, using leaf area meter divided by ground area, (2) Number of days to physiological maturity, which was calculated from the day of sowing till the helium acquired a dark colour. (3) Plant height, calculated as an average of two readings per sub-plot, taken from the soil surface till the tip of plant. At harvest, a random sample of five plants was taken from each sub-plot to measure; (4) Number of branches/ plant, (5) Number of pods/ plant and (6) Number of seeds/ pod and were recorded as an average of the five plants, (7) 100-seed weight was calculated as an average of two random one-hundred seed samples, taken from each sub-plot and (8) Seed yield was calculated from harvesting and threshing the inner three ridges of each sub-plot, then, converted to (ton/ ha).

Data were statistically analyzed and polynomial fitting equations were drawn, using the analysis of variance procedures for the split plot design, as outlined by Gomez and Gomez (1984), using SAS (ver. 8.1, 2008) and graphs were drawn and fitted, using Curve Expert. (ver 1.3, 2003). Means were compared, using the LSD test (Steel and Torrie, 1980), at 5% level of probability.

RESULTS AND DISCUSSION

Analysis of variance, in both seasons, indicated that all studied vegetative and yield characters were significantly affected by the first order interaction; i.e., sowing date * cultivars. Hence, the value recorded for characters will be influenced by the combined effect of both studied factors.

Concerning date of sowing, means presented in (Tables 1, 2, 3 and 4) indicated a significant decrease in all studied characters, in the two seasons, with delaying sowing of faba bean cultivars from October 20th to November 10th and December 1st. However, the decrease in studied characters ranged from 11%, for number of days to physiological maturity, to 30% for number of branches per plant, when sowing was delayed to November 10th, while the percentage decrease ranged from 15% for days to physiologic maturity to 43% in seed yield when sowing was delayed from November 10th to December 1st, as an average of the two seasons. The decrease was more pronounced for seed yield and its components, compared to phenologic and vegetative characters. Regression analysis for measured traits, in the two seasons, indicated a negative linear reduction in values of all traits with delaying sowing from October 20th to December 1st in the two seasons (Figures 1 and 2). The magnitude of reduction varied, for the measured traits, according to the "b", value recorded in the linear regression equation. Similar trends were reported by Hegab *et al.* (2014). That reduction in measured traits with delaying sowing date might be attributed to the unfovarable environmental conditions with late sowing, including higher temperature at podding and seed formation stages, higher susceptibility to *Orobanche* parasitism, diseases and insects and shortened growth period, which all contribute to substantial reduction in seed yield components; i.e., number of pods per plant, number of seeds per pod and 100-seed weight, and finally seed yield. These findings were in accordance with the results reported by Bakheit *et al.* (2001), Abuldahab *et al.* (2002), Mekky (2003), Amer *et al.* (2008), Ibrahim *et al.* (2009), Abou EL-Yazied (2011), EL-Metwally *et al.* (2013) and Attia *et al.* (2014) who reported that, delaying of faba bean sowing beyond late October or early November, reduced vegetative growth of faba bean plants and seed yield components, resulting in a decrease in faba bean seed yield.

Concerning faba bean cultivars, data presented in (Tables 1, 2, 3 and 4), indicated significant differences among the studied cultivars and entries in all studied characters. Giza 843, Nubariah 3, RenaMora, Misr 1 and ILB 450 were among the highest genotypes in seed yield in both seasons. Moreover, Giza 843 and Misr 1 were the highest cultivars in the number of pods per plant; Nubriah 3 and RenaMora were the highest in 100-seed weight; whereas Sakha 3, Giza 843 and ILB 450 were the highest in number of seeds per pod. With regard to number of days to physiological maturity, Sakha 3, Giza 843, Misr 1 and ILB 450 were the earliest in maturity, compared to the other entries, in the two seasons. The same cultivars recorded the shortest plant heights in the two seasons. Leaf area index values revealed that Nubariah 3 and Misr 1 were among the highest in LAI, along with Sakha 3, which may explain, in addition to the values recorded for yield components, the superiority of these two cultivars in seed yield. These variations among cultivars may be attributed to the genetic constitution of genotype and the response of genotype to environmental conditions. Similar variations, among genotypes, were reported by Abou-Taleb (2002), Salama and Awad (2005),

Table 1. Means of the leaf area index and No. of branches per plant as influenced by sowing dates, cultivars and their interaction in 2013/2014 and 2014/2015 winter seasons

Sowing date Cultivar	Leaf area index								No. of branches/ plant							
	2013/ 2014				2014/2015				2013/ 2014				2014/2015			
	D1[1]	D2	D3	Mean[2]	D1	D2	D3	Mean	D1	D2	D3	Mean	D1	D2	D3	Mean
Giza 461	3.85	2.23	2.14	2.74 f	3.74	3.22	2.50	3.15 cde	5.29	5.22	4.67	5.06 ab	3.33	2.58	2.42	2.77 cd
Giza 429	4.25	2.82	2.03	3.03 g	4.23	3.65	2.05	3.31 bcd	8.11	3.67	3.44	5.07 ab	3.42	3.00	2.17	2.86 cd
Sakha 3	3.67	3.54	2.93	3.38 cde	5.33	3.51	2.49	3.78 a	8.0	5.00	3.11	5.37 a	3.75	2.83	2.33	2.97 bc
Giza 3	3.27	3.64	2.65	3.19 e	4.30	2.55	2.57	3.14 cde	7.11	4.33	3.55	5.00 ab	4.42	2.42	2.00	2.95 bc
Giza 716	4.22	3.51	2.70	3.48 cd	4.27	3.34	2.61	3.41 bc	7.0	4.44	4.22	5.22 a	4.67	3.08	2.42	3.39 ab
Giza 843	4.67	3.61	2.29	3.52 bcd	4.06	3.57	2.73	3.45 b	8.0	4.78	3.33	5.37 a	4.42	3.83	2.08	3.44 a
Nubaria 3	4.38	3.98	2.88	3.75 ab	4.31	3.30	2.90	3.50 ab	8.07	4.22	3.33	5.21a	3.08	2.25	2.92	2.75 cd
RenaMora	4.79	2.88	2.60	3.42 cde	3.76	2.75	2.46	2.99 e	5.22	4.76	3.89	4.62 abc	3.50	2.58	2.08	2.72 cd
Misr 1	4.34	3.98	3.33	3.88 a	4.00	3.97	2.71	3.56 ab	7.11	4.55	4.45	5.37 a	3.83	2.50	2.33	2.89 cd
ILB450	4.18	3.37	3.17	3.57 bc	4.78	2.96	2.10	3.28 bcd	4.33	3.56	3.22	3.70 bc	3.83	3.00	2.67	3.16 abc
ILB648	3.91	3.41	2.56	3.29 de	3.70	3.06	2.61	3.12 de	4.55	3.44	3.50	3.38 c	3.00	2.25	2.08	2.44 d
Mean	4.14 a	3.36 b	2.66 c		4.23 a	3.26 b	2.52 c		6.62 a	4.36 b	3.70 c		3.75 a	2.75 b	2.32 c	
$L.S.D_{0.05}$	0.26				0.28				2.58				0.780			

1. October 20 (D_1) November 10(D_2) December 1 (D_3)
2. Means followed by the same letter(s) are not significantly different at 0.05 level of probability.

Table 2. Means of the plant height (cm) and physiological maturity (days) as influenced by sowing dates, cultivars and their interaction in 2013/2014 and 2014/2015 winter seasons

Sowing date / Cultivar	Plant height (cm)								Physiological maturity (days)							
	2013/2014				2014/2015				2013/2014				2014/2015			
	D1[1]	D2	D3	Mean[2]	D1	D2	D3	Mean	D1	D2	D3	Mean	D1	D2	D3	Mean
Giza 461	96.00	78.00	74.00	82.67 bcd	98.17	76.25	57.50	77.31 ab	170.00	145.33	126.33	147.22 ab	143.67	133.33	113.00	130.00 a
Giza 429	101.00	83.00	64.00	82.66 bcd	82.33	76.25	62.91	73.83 abc	156.33	141.67	126.67	141.55 bc	142.33	128.00	110.67	127.00 b
Sakha 3	91.67	73.33	68.33	77.78 d	76.50	70.83	60.00	69.11 c	160.00	137.67	120.33	139.33 c	139.33	125.67	106.00	123.67 d
Giza 3	124.00	80.33	69.67	91.33 a	96.00	70.25	56.50	74.25 abc	163.00	148.67	129.67	147.11 ab	142.00	132.67	112.67	129.11 a
Giza 716	96.00	88.00	73.00	85.67 abc	82.50	79.00	58.75	73.42 abc	162.67	143.33	124.33	143.44 abc	140.33	128.00	109.33	125.89 bc
Giza 843	91.00	77.67	76.33	81.67 cd	82.50	66.67	59.58	69.58 c	160.67	137.67	121.00	139.78 c	139.67	125.33	105.67	123.56 d
Nubaria 3	89.67	88.00	73.00	83.55 bcd	84.00	71.25	60.83	72.03 bc	159.33	141.33	124.33	141.66 bc	141.00	128.33	111.00	126.78 b
RenaMora	93.00	83.67	80.67	85.78 abc	94.17	75.42	64.17	77.92 a	172.00	147.00	127.67	148.89 a	144.33	131.67	113.33	129.78 a
Misr 1	94.67	81.33	68.33	81.44 cd	83.75	72.92	59.17	71.95 c	161.67	140.00	112.67	138.11 c	140.00	126.33	106.33	124.22 cd
ILB450	121.00	89.33	73.33	84.05 bc	80.00	66.25	61.67	69.31 c	160.67	136.33	119.33	138.77 c	138.00	125.33	108.33	123.89 d
ILB648	100.00	88.67	75.33	88.00 ab	75.58	77.00	60.42	71.00 c	164.33	146.33	120.00	143.55 abc	142.00	127.33	110.00	126.44b
Mean	99.82 a	82.85 b	72.36 c		85.05 a	72.92 b	60.14 c		162.79 a	142.30 b	122.94 c		141.15 a	128.36 b	109.67 c	
$L.S.D_{0.05}$		10.83				9.28				11.17				3.16		

1. October 20 (D_1) November 10(D_2) December 1 (D_3)
2. Means followed by the same letter(s) are not significantly different at 0.05 level of probability.

Table 3. Means of the No. of pods per plant and No. of seeds per pod as influenced by sowing dates, cultivars and their interaction in 2013/2014 and 2014/2015 winter seasons

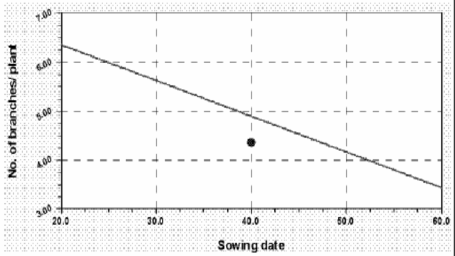
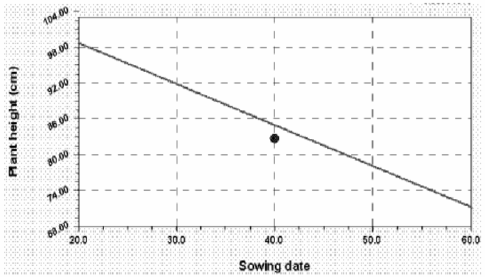
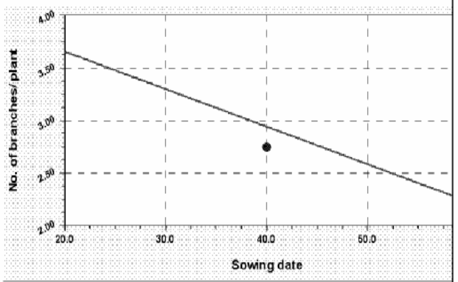
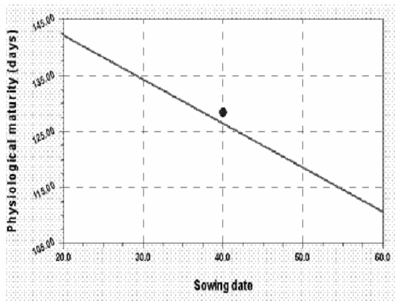
Sowing date	No. of pods/ plant								No.of seeds\pods							
	2013/2014				2014/2015				2013/2014				2014/2015			
Cultivar	D1[1]	D2	D3	Mean[2]	D1	D2	D3	Mean	D1	D2	D3	Mean	D1	D2	D3	Mean
Giza 461	26.33	23.70	16.12	22.05 h	20.23	16.18	7.77	14.73 g	3.33	3.00	2.04	2.79 d	1.99	1.59	0.76	1.45 c
Giza 429	34.89	28.61	19.45	27.65 f	26.78	21.69	13.45	20.64 e	3.75	3.08	2.09	2.97 bcd	2.23	1.81	1.12	1.72 abc
Sakha 3	37.89	31.07	18.02	28.99 ef	29.09	23.27	13.50	21.95 d	4.33	3.55	2.06	3.31 abc	2.59	2.07	1.20	1.95 ab
Giza 3	30.44	23.74	15.19	23.12 gh	23.38	15.90	7.63	15.64 g	3.97	3.10	1.98	3.02 bcd	2.38	1.62	0.78	1.59 bc
Giza 716	43.33	33.80	19.60	32.24 cde	33.29	30.63	20.83	28.25 ab	3.96	3.09	1.79	2.95 bcd	2.38	2.19	1.49	2.02 a
Giza 843	48.00	36.96	21.44	35.47 bc	36.86	33.17	15.92	28.65 ab	4.33	3.33	1.93	3.20 bcd	2.59	2.33	1.12	2.01 a
Nubaria 3	42.33	38.94	26.48	35.92 b	32.52	30.24	20.56	27.77 b	4.00	3.68	2.50	3.39 ab	2.40	2.23	1.52	2.05 a
RenaMora	40.66	35.37	21.22	32.42 cd	31.22	25.60	13.31	23.38 c	3.67	3.19	1.91	2.92 cd	2.21	1.81	0.94	1.65 abc
Misr 1	48.89	44.49	32.48	41.95 a	37.54	30.03	20.42	29.33 a	4.33	3.94	2.88	3.72 a	2.59	2.07	1.41	2.02 a
ILB450	33.44	30.10	24.08	29.21 def	25.68	22.60	15.82	21.37 de	3.6	3.24	2.59	3.14 bcd	2.16	1.90	1.33	1.80 abc
ILB648	30.77	27.39	21.09	26.42 fg	23.64	17.02	11.91	17.52 f	3.33	2.96	2.28	2.86 d	1.99	1.43	1.00	1.47 c
Mean	37.91a	32.20 b	21.38 c		29.11 a	24.21 b	14.65 c		3.87 a	3.29 a	2.19 b		2.32 a	1.91 b	1.15 c	
$L.S.D_{0.05}$	5.755				2.235				0.766				0.689			

1. October 20 (D_1) November 10(D_2) December 1 (D_3)
2. Means followed by the same letter(s) are not significantly different at 0.05 level of probability.

Table 4. Means of the 100-Seed weight (g)and Seed yield (S Y, ton/ ha)as influenced by sowing dates, cultivars and their interaction in 2013/2014 and 2014/2015 winter seasons

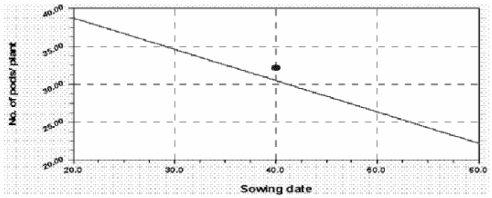
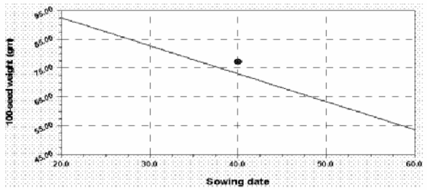
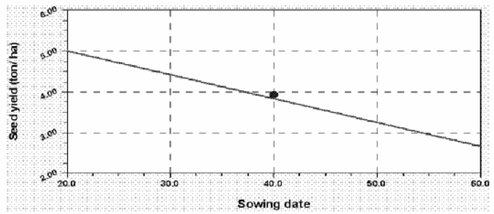
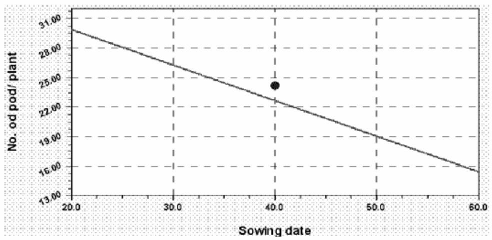
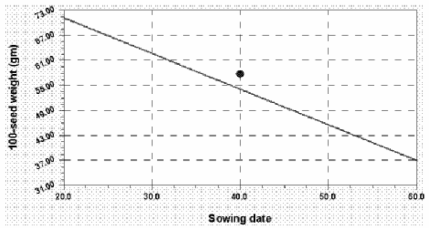
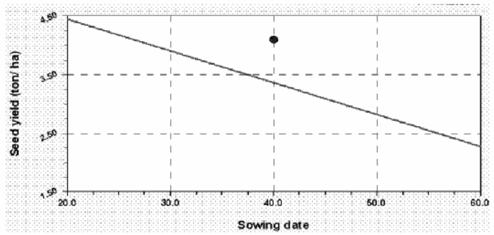
Sowing date Cultivar	100 Seed weight(gm)								Seed yield (S Y, ton\ha)							
	2013/2014				2014/2015				2013/2014				20142015			
	D1[1]	D2	D3	Mean[2]	D1	D2	D3	Mean	D1	D2	D3	Mean	D1	D2	D3	Mean
Giza 461	75.6	68.04	46.27	63.30 f	58.06	46.45	22.30	42.27 f	4.4	3.1	2.8	3.433 bc	4.03	3.17	1.37	3.186 cde
Giza 429	67.5	55.35	37.64	53.50 h	51.84	41.99	26.03	39.95 f	4.13	3.02	1.92	3.023 c	3.63	2.9	1.82	2.920 e
Sakha 3	93	76.26	44.23	71.16 e	71.42	57.14	33.14	53.90 c	5.9	3.05	2.27	3.740 abc	4.94	3.22	1.27	3.484 bcde
Giza 3	65.5	51.09	32.70	49.76 i	50.30	34.20	16.42	33.64 g	4.84	3.36	2.08	3.427 bc	3.23	3.14	1.82	3.128 de
Giza 716	104.00	81.12	47.05	77.39 d	79.87	73.48	49.97	67.77 b	5.38	4.26	2.04	3.893 abc	3.06	2.77	1.01	3.202 bcde
Giza 843	78.4	60.37	35.01	57.93 g	60.19	54.17	26.00	46.79 e	4.99	3.86	2.37	3.740 abc	3.77	3.06	2.62	3.487 bcde
Nubaria 3	122.00	112.24	76.32	103.52 a	93.70	87.14	59.26	80.03 a	5.45	5.33	2.75	4.510 ab	3.62	3.23	1.3	3.741 bcd
RenaMora	119.00	103.53	62.12	94.88 b	91.39	74.94	38.97	68.43 b	4.91	4.2	2.2	3.770 abc	4.82	4.61	2.23	3.820 b
Misr 1	87.33	79.47	58.01	74.94 d	67.08	53.66	36.49	52.41 cd	5.64	5.26	3.78	4.893 a	5.14	4.66	2.72	4.585 a
ILB450	94.5	85.05	68.04	82.53 c	72.58	63.87	44.71	6.39 h	4.2	3.73	2.99	3.640 abc	3.98	3.49	2.5	3.504 bcde
ILB648	87.3	77.70	59.83	74.94 d	67.06	48.28	33.80	49.71 de	4.71	4.07	3.58	4.120 abc	4.62	3.17	2.32	3.799 bc
Mean	90.38 a	77.29 b	51.57 c		69.41a	57.75 b	35.19 c		4.96 a	3.93 b	2.62 c		4.08 a	4.10 b	1.91 c	
$L.S.D_{0.05}$	5.772				5.763				1.30				0.63			

1. October 20 (D_1) November 10(D_2) December 1 (D_3)
2. Means followed by the same letter(s) are not significantly different at 0.05 level of probability.

	No. of branches/ plant	Plant height (cm)	Physiological maturity (days)
2013	S.E = 0.65 r^2= 0.90 Y= 7.81 – 7.3 X 	S.E = 2.64 r^2= 0.98 Y= 1.124 – 6.86 X 	S.E = 0. 46 r^2= 0.98 Y= 1.825 – 9.96 X 
2014	S.E = 0.23 r^2= 0.94 Y= 4.3 – 3.57 X 	S.E = 0.265 r^2= 0.98 Y= 9.76 – 6.22 X 	S.E = 2.4 r^2= 0.98 Y= 1.58 – 7.87 X 

* On X-axis: October 20 (D_1) November 10(D_2) December 1 (D_3)

Figure 1. Relationship between sowing date* and number of branches per plant, plant height (cm) and physiological maturity (days) in 2014 and 2015 winter seasons

	No. of pods/ plant	100-seed weight(gm)	Seed yield
2013	S.E = 2.08 r^2= 0.96 Y= 4.7 – 4.13 X 	S.E = 5.156 r^2= 0.96 Y= 1.11 – 9.7 X 	S.E = 0.11 r^2= 0.98 Y= 6.17 – 5.85 X 
2014	S.E = 1.91 r^2= 0.96 Y= 3.7 – 3.61 X 	S.E = 4.44 r^2= 0.96 Y= 8.83 – -8.55 X 	S.E = 0.90 r^2= 0.73 Y= 5.53 – 5.43 X 

* On X-axis: October 20 (D_1) November 10(D_2) December 1 (D_3)

Figure 2. Relationship between sowing date* and No. of pods/ plant, 100-seed weight (g) and seed yield (ton/ha) in 2014 and 2015 winter seasons

Attia *et al.* (2009) and Osman *et al.* (2010) who reported significant differences among faba bean cultivars in vegetative growth, seed yield and yield components characters.

The two-factor interaction was significant for all studied characters indicating that cultivars differently responded to sowing date. Since all characters showed reduced values, with delaying sowing date, the interaction effect might be in the magnitude of reduction in each cultivar, with delaying sowing, from D_1 to D_2, and from D_2 to D_3. For example, in seed yield, Nubariah 3, RenaMora and Misr 1 cultivars showed a lower reduction in seed yield with delaying sowing from D_1 to D_2 compared to delaying sowing from D_2 to D_3 in the two seasons. On the other hand, Giza 461 and Sakha 3 cultivars showed a higher reduction in seed yield when sowing was delayed from D_1 to D_2, compared to delayed sowing from D_2 to D_3 in 2013 season. Similar variations in magnitude of reduction, in the other studied characters could be observed for delaying sowing in each cultivar. Similar significant first order interaction, i.e., sowing date* variety, were reported by Sharaan *et al*. (2002), Attia *et al.* (2009), Osman *et al.* (2010), Bakry *et al.* (2011), Ali and Al-Shebani (2012) and Hegab *et al.* (2014).

The present investigation emphasized the importance of sowing at the appropriate sowing date to fulfill the potential yield of faba bean cultivars. The best sowing date was October 20th, which gave the highest productivity for all studied faba bean genotypes, especially Misr 1, RenaMora, Nubariah 3, Sakha 3 and Giza 843. The study, also, indicated the possibility of delaying sowing to November 10th, but, a reduction in seed yield would be expected that might vary, according to cultivar.

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الملخص العربي

سلوك بعض أصناف محصول الفول البلدي تحت مواعيد زراعية مختلفة

حسام الدين محمد ابراهيم

أجريت هذه الدراسة أثناء موسمى ٢٠١٤/٢٠١٣، ٢٠١٥/٢٠١٤ بهدف دراسة تأثير مواعيد زراعة مختلفة وهى (٢٠ أكتوبر، ١٠ نوفمبر، وأول ديسمبر) على أحد عشر تركيباً وراثياً من محصول الفول البلدى وهى (Sakha 1, Sakha 2, Sakha 3, Giza 3, Giza 716, Giza 843, Nubaria 1, RenaMora, ILB 450, ILB 312, Misr 1) وذلك بمحطة البحوث الزراعية التابعة لكلية الزراعة- جامعة الإسكندرية- بأبيس- مصر.

ويهدف البحث إلى تحديد ميعاد الزراعة الأمثل من الناحية الإنتاجية وكذلك تأثير الصنف فى الإنتاج الكمى وأيضاً التفاعل للأصناف المنزرعة وأثر ميعاد الزراعة فى إنتاجية المحصول الكمية وبعض الصفات الأخرى.

وأوضحت الدراسة أن هناك اختلافات معنوية بين معاملات ميعاد الزراعة فى كل من: معامل المساحة الورقية وعدد الأفرع بالنبات وارتفاع النبات وعدد الأيام حتى النضج وعدد القرون بالنبات وعدد البذور بالقرن ووزن المائة بذرة والإنتاج الكلى للبذور بالهكتار وكانت هناك اختلافات معنوية عند مستوى ٠,٠٥ وتفوق ميعاد الزراعة الأول عن كلا الميعادين الأخرين فى كلا الموسمين. كما وجدت فروق معنوية بين الأصناف المدروسة عند مستوى ٠,٠٥ فى كل من: معامل المساحة الورقية وعدد الأفرع بالنبات وارتفاع النبات وعدد الأيام حتى النضج وعدد القرون بالنبات وعدد البذور بالقرن ووزن المائة بذرة، والإنتاج الكلى للبذور بالهكتار وتميزت الأصناف Giza 843, Nubaria 3, RenaMora, Misr 1 and ILB 450 حيث كانت أعلى الأصناف فى الصفات المحصولية فى كلا الموسمين، وكان الأثر معنوياً المشترك للأصناف المنزرعة وميعاد الزراعة على إنتاجية المحصول والصفات الخضرية فى جميع الصفات المدروسة عند مستوى ٠,٠٥ وكان الانخفاض الحادث فى ميعاد الزراعة معتمداً على الصنف المنزرع. وواضح تحليل الانحدار أن هناك انخفاضاً حاداً أومعنوياً عند مستوى ٠,٠٥ فى ميعاد الزراعة فى جميع الصفات المدروسة فى كلا الموسمين.