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PERFORMANCE OF NEW FABA BEAN GENOTYPES UNDER DIFFERENT PLANT DENSITIES

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ABSTRACT

Two field experiments were conducted during the two winter growing seasons of 2005/2006 and 2006/2007at Gemmeiza Research Station to study the effect of three plant population density i.e 11,16 and 22 plants /m^2 on the performance of seven faba bean genotypes namely (Sakha1)، (1033/738/96)، (1557/920/2001) ، (1557 / 930 / 2001) ، (1557 / 1015 / 2001) ، (1644/ 731 / 2003) and (1644 / 734/ 2003) on seed yield productivity as well as yield quality. A split plot design with four replications was used.The main findings could be summarized as follows:

The results inducted that plant population density of 11 plants/m^2 resulted the highest values of number of branches /plant, number of dry pods /plant, number of seeds per plant, seed yield/plant (g) and 100-seed weight (g), while, plant population density of 22 plants /m^2 recorded significant increases in plant height (cm), height of first pod, number of seeds per pod, seed yield (Ardab / fad) and seed crude protein percentage.

Sowning G (1557/920/2001) resulted the heaviest 100-seed weight (g) in the first season, while, G (1644 / 734/ 2003) gave the heaviest 100-seed weight (g) in the second season. More, G (1557/930/2001) gave the highest seed yield/plant(g) in the first season, while, G (1644 / 734/ 2003)) resulted the heaviest seed yield/plant(g) in the second season. G (1644 / 734/ 2003) recorded the highest seed yield (Ardab / fad) in first season , while, G(1644 / 731 / 2003) gave the highest seed yield (Ardab / fad) in the second season. It could be concluded that the maximum seed yield was recorded by planting G (1644 / 731 / 2003) and G (1644/734/2003).

The interaction between plant population density and faba bean genotypes significantly affected seed yield (Ardab / fad), nmber of seeds per pod and number of seeds per plant.

It could be stated that for maximizing faba bean seed yield might recommend with sowning G (1557 / 1015 / 2001) and G(1644 / 731 / 2003) at higher plant density of 22 plant / m^2 under the conditions of Middle Delta.

INTRODUCTION

In Egypt, faba bean (vicia faba, L.) is the most important pulse crop grown due to a major protein source for human consumption. The productivity of this crop affected by many factors such as genotypes and plant density.

New faba bean genotypes performance play a majoyr rale. In this respect,Abd-Alla and Omran (2002) found that the differences between varieties were found to be significant on yield and yield components as well as protein percentage. Abou-Taleb (2002) In Egypt,found that cultivars were significantly different in plant height and number of branches per plant. Giza 429 cultivar surpassed Cairo 375 in number of branches/plant in the first season. Hussein *et al.* (2005) found that the differences between genotypes were significant for yield and yield components where 1706B/78/2003 genotype significantly recorded higher seed yield value (6.49 t/ha) followed

by Giza 40 (5.73 t/ha) and 1706B/39/2003 (5.53 t/ha). Fadl (2006) found that Giza 429 variety gave the highest seed weight / plant (40.00 and 45.60 g) followed by Giza 843 (36.30 and 38.57g) and Sakha 1 (35.03 and 33.62g) in both seasons, respectively.

Different plant densities might increase genotypes yield and seed quality of faba bean, Pandey (1981) found that total plant dry weight increased linearly only up to a plant density of 33.3 plants/ m^2, and thereafter it leveled off. Moreover, the seed yield increased almost linearly from 11.1 to 33.3 plants/ m^2 in both genotypes. Amer *et al* .(1992) reported that sowing 27 or 33 plants/m^2 produced the highest seed yield per hectare, while sowing 17 plants /m^2 significantly reduced the seed yield. The numbser of branches, pods and seeds per plant as well as seed yield per plant were significantly higher under the lowest plant populations, while plant height and 100-seed weight were not affect. Eman Ahmed (2004) she found that sowing 33 plants/m^2 gave the highest values of seed yield/fad and 100-seed weight. Hussein *et al.* (2005) planting faba bean genotype 1706B/87/2003 at plant density of 33 plants/m^2 gave the highest seed yield/ha. Fadl (2006) showed that highest plant density (44 plants/m^2) gave the tallest plants (54.73 and 90.73 cm) in both seasons , respectively. On the other hand, the shortest plants (49.57 and 82.77 cm) were recorded with the lowest plant density (27 plants/m^2) in both seasons, respectively.

Concerning the interaction effect between faba bean genotypes and plant densities, Teama (1994) reported that plant density of 24, 33, 48 or 67 plants/ m^2 had no significant effect on seed yield of faba bean cultivar Giza population for Giza 461, Giza 716 and Giza Blanka.El-Murshedy *et al.* (2002) found that Giza 2 variety produced the highest seed yield /fad when planted with 33 plants/m^2, while Giza 716 gave the highest values of seed yield/fad were recorded when planted with 25 plants m^2. Fadl (2006) reported that the effect of plant density × varieties interaction on plant height was significant.

The objectives of this investigation was aimed to study the effect of plant population density on yield and yield components of seven faba bean genotypes.

MATERIALS AND METHODS

The present investigation was carried out at EL- Gemmiza Agric. Res. St.,A.R.C.,Egypt during the two growing successive seasons of 2005/ 2006 and 2006 / 2007 to study the performance of seven faba bean (Vicia faba, L.) genotypes under three plant densities (i.e.11,16 and 22 plant / m2). This genotypes selection was based on the productivity and diseases resistant collected from different sources.

The three plant densities were :-

1- 11 plants / m2 (46667 plants / fad) was obtained from planting on one ridge side and one plant per hill and 15 cm apart.
2- 16 plants / m2 (70000 plants / fad) was obtained from planting two ridge sides and one plant per hill and 20 cm apart.
3- 22 plants / m^2 (93333 plants/ fad) was obtained from planting two ridge side and one plant per hill and 15 cm apart.

Table1: Tested genotypes and their source, pedigree and code numbers.

No	Genotype	Source	Pedigree	Code numbers
1	G_1	ARC FCRI FLS*	620 /283 / 85 x716 / 724 /88	(Sakha1)
2	G_2		667/ 153/ 87×composite 66 / 1882 / 87	(1033 / 738 / 96)
3	G_3		Giza Blanca X x-908	(1557 / 920 / 2001)
4	G_4		Giza Blanca X x-908	(1557 / 930 / 2001)
5	G_5		Giza Blanca X x-908	(1557 / 1015 / 2001)
6	G_6		x-1001 X EL-fashn $_2$	(1644 / 731 / 2003)
7	G_7		x-1001 X EL-fashn $_2$	(1644 / 734 / 2003)

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A split plot design with four replications was used in both seasons .The main plots occupied by the three plant densities, while the seven faba bean genotypes were assigned to the sub- plots. The experimental unit consisted of five ridges 60 cm in width and 3.5 meters long. The plot size was (3 x 3.5) = 10.5 m^2 (i.e 1/400 faddan). The soil was uniformly fertilized with 30 kg P_2O_5 / fad in the form of calcium super phosphate /(15% P_2O_5) during seedbed preparation. Nitrogen fertilizer at 15 kg N / fad as starter dose was applied in the form of ammonium nitrate (33.5% N) after 35 days from sowing. Potassium sulphate (48% K_2O)was added to soil at 24kg K_2O /fad in two equal portions ,before the first and second irrigations. The sowing date of faba bean seeds was on the 17th and 20thof November in the first and second seasons, respectively. The preceding cop was maize in both seasons of the study . Harvesting was achived in April 23th and 27th in the 1st and 2nd seasons, respectively. Other agricultural practices were performed as commonly followed in the district.

At harvest, a random sample of 10 guarded plants were taken from each plot and the following traits were recorded : plant height (cm), height of first pod, number of branches /plant, number of dry pods /plant, number of seeds per pod, number of seeds per plant, seed yield / plant(g) , 100-seed weight (g), seed yield (Ardab / fad) and Seed crude protein percentage.

The results of the split plot design were computed according to the procedures out lined by Sendecor and Cocharan (1980).

RESAULTS AND DISCUSSION

A- Plant density effects:

1- Plant height (cm)

It could be seen in both seasons, that there were a significant increase in plant height due to different plant density treatments on faba bean plants (Table2).Regarding the effect of plant densities on plant height of different faba bean genotypes, plant height significantly increased when the plant density increased. Increasing faba bean density from 11 through 22 plants / m2 markedly resulted in statistical increase in faba bean height, respectively in both seasons. These results are in harmony with those of Ibrahem (2000) and Eman Ahmed (2004).

2-Height of first pod .

The results in Table 2 showed that significant increase in the mean values of height of first pod gradually of the genotypes under study in both seasons. The effect of plant density on height of first pod under the highest plant density (22 plants/m^2) recorded the heighest values of height of first pod which were 32.2 cm and 21.4 cm in 2005/2006 and 2006/2007 seasons, respectively. Similar results were obtained by Eman Ahmed (2004).

3- Number of branches /plant.

Number of branches /plant was significantly increased by the lowest plant density (11 plants/m^2) which recorded the highest number of branches /plant which were 4.4 and 3.2 in 2005/2006 as well as 2006/2007 seasons, respectively. On the other hand, the lowest number of branches /plant (3.2 and 2.7) were recorded with the highest plant density (22 plant/m^2) in 2005/2006 and 2006/2007 seasons, respectively (Table 2). These finding came of the same point view of Pandey (1981).

4-Number of dry pods /plant.

Concerning the effect of plant density on number of dry pods / plant (Table 2), the lowest plant density at 11 plants / m^2 significantly recorded the highest number of dry pods / plant compared with the dense plant population at 16 or 22 plants / m^2 in both seasons . The decrease in number of pods /plant with increased plant density was associated with the reduction in number of branches which was the result of increased competition among plants for water , nutrients and light at dense population . These results are in coincidence with those reported by Amer *et al.*(1992) and Bakheit (2001).

5- Number of seeds per pod.

Data in Table 3 indicated that increasing plant density from 11 through 22 plants / m^2 significantly increased number of seeds / pod in both seasons. Similar result was obtained by Ibrahem (2000).

6-Number of seeds per plant.

Data in Table 3 showed that plant density (11 plants/m^2) gave the highest values of number of seeds per plant which were averaged 26.4 and 54.9 in both seasons, respectively. The decrease in number of seeds per plant with increasing plant density may be due to the decrease in number of pods per plant or failing ovules fertilization as a result of low temperature. These findings are in accordance with those reported by Amer *et al* .(1992)and Abd-Alla and Omran (2002) .

7- Seed yield (g) / plant .

Data in Table 3 indicated that the lightest density (11plants / m^2) recorded the highest seed yield per plant, while the heaviest plant density (22plants/m^2) recorded the lowest seed yield / plant. These results are in the same trend with those of Ibrahem (2000) and Bakheit *et al.* (2001).

8- 100-seed weight (g).

Concerning the effect of plant density on 100-seed weight, results in Table 3 showed that plant densities had a significant effect on weight of 100-seed in both seasons. 100-seed weight, increased by plant density (11 plants /m^2) which gave the heaviest 100-seed weight which averaged 91.48 and 76.36 in 2005/2006 as well as 2006/2007 seasons, respectively.

Table 2: Plant height, height of first pod ,number of branches/plant and number of pods/plant as affected by plant density and some genotypes performance of faba bean during 2005/2006 and 2006 /2007 seasons.

Characters / Treatments	Plant height (cm)		Height of first pod (cm)		No.of branches/plant		No.of pods/plant	
	2005/2006	2006/2007	2005/2006	2006/2007	2005/2006	2006/2007	2005/2006	2006/2007
A:Plant density								
D1 (11 plants/m^2)	89.8	73.9	21.7	18.0	4.4	3.2	24.7	21.0
D2 (16 plants/m^2)	94.5	76.1	26.1	19.9	3.9	2.9	19.7	19.7
D3 (22 plants/m^2)	100.3	77.8	32.2	21.4	3.2	2.7	16.4	18.7
F- Test	*	*	*	*	*	*	*	*
LSD 5%	0.7	1.1	1.0	0.6	0.1	0.1	1.6	1.6
B: Genotypes								
G1	96.2	75.3	24.8	19.0	3.5	2.1	21.6	19.6
G2	96.3	71.4	24.3	20.3	3.6	2.9	17.9	19.4
G3	91.8	72.2	25.5	18.2	4.1	2.5	20.8	18.5
G4	94.7	79.8	27.9	20.2	3.5	2.7	21.5	18.3
G5	98.1	79.4	29.5	19.9	3.8	3.5	22.4	23.3
G6	89.1	72.2	27.6	20.0	4.5	3.1	19.2	18.0
G7	97.8	81.4	27.3	20.8	4.0	3.6	18.3	21.6
F- Test	*	*	*	NS	*	*	*	*
LSD 5%	3.2	3.0	2.5	-	0.6	0.5	1.6	1.5
C:Interaction								
F- Test	NS	NS	NS	NS	NS	NS	NS	NS

On the other hand, the lightest 100-seed weight 85.81 as well as 73.71 were recorded with the highest plant density (22 plants /m^2) in 2005/2006 and 2006/2007 seasons. These results are in full agreement with those obtained by Hassan *et al.* (1997) and Bakheit *et al.* (2001) .

9- Seed yield (Ardab / fad).

Increasing plant density from 11 to 16 plants / m^2 increased seed yield by 58.1 % and 65.3 % in the first and second season, respectively (Table 4) .More, increasing number of plants / m^2 from 16 to 22 plants / m^2 increased seed yield by 77.4 % and 80.1 % in the first and second seasons, respectively .This yield increases from dense populations could be due to more even distribution of plants which resulted in more effective use of water, nutrients and light in the field. The dense population recorded with highly significant record the highest seed yield of faba bean. Similarity results were noted by Abdel-Aziz and Shalaby (1999) and Bakheit *et al.* (2001).

10-Seed crude protein percentage .

Data given in Table 4 showed that differences in seed crude protein percentage due to plant density were significant in both seasons. Seed crude protein percentage increased with increasing plant density. The highest seed crude protein percentage 26.60 and 27.10 % was obtained from the highest plant density (22plants/m^2) in both seasons, respectively. These results support the results of Hammam (1995) who reported that seed crude protein increased with increasing plant density.

B- Performance of new genotypes effects :

1- Plant height (cm) :

Results in Table 2 indicate that in both seasons, the performance of genotypes 1, 5 and 7 significatly posse the most marked increase in plant height as compared with the genotypes 3 and 6. The differences in plant height due to various genotype may be related to the genetic factors and its constitutions make-up. Similar results were also reported by Wafaa Mohamed (2000).

2-Height of first pod .

Data in Table 2 showed that the performance of genotypes 4,5,6 and 7 significantly posse the most marked increases in height of first pod as compared with the genotypes 1 and 2 in the first season . The performance of all genotypes was insignificant in the second season. It is worthy to mention that, "G 5" genotype had the most increase in height of first pod plants. The differences between genotypes in height of first pod per plant may be attributed to the differeces in their genetical constitution since they represent varied ecological regions. Similar trend was obtained by Ashmawy *et al.* (1998) .

3- Number of branches /plant.

Data in Table 2 showed that in both seasons faba bean genotypes 6 and 7 markedly have the most marked increase in number of branches/ plant if compared with genotypes 1 and 2. Such results agree with those of Amer *et al.*(1992) and Abou-Taleb (2002).

Table 3: Number of seeds/pod ,number .of seeds/plant ,seesd yield/plant (g) and 100-seed weight (g) as affected by plant density and some genotypes performance of faba bean during 2005/2006 and 2006 /2007 seasons.

Characters / Treatments	No.of seeds/pod		No.of seeds/plant		Seed yield/plant (g)		100-seed weight (g)	
	2005/2006	2006/2007	2005/2006	2006/2007	2005/2006	2006/2007	2005/2006	2006/2007
A:Plant density								
D1 (11 plants/m^2)	2.5	2.6	62.4	54.9	57.00	41.97	91.48	76.36
D2 (16 plants/m^2)	2.6	2.7	51.0	53.4	45.33	40.09	88.89	75.07
D3 (22 plants/m^2)	2.7	2.7	43.5	51.0	37.21	38.47	85.81	73.71
F- Test	*	*	*	*	*	*	*	*
LSD 5%	0.1	0.1	3.7	0.8	3.48	1.12	0.49	0.91
B: Genotypes								
G1	2.5	2.4	53.5	47.0	42.62	36.67	79.41	77.96
G2	2.8	2.6	49.6	50.6	44.60	35.88	89.50	71.07
G3	2.6	2.5	53.3	45.9	50.52	34.97	94.48	77.06
G4	2.8	2.7	60.3	48.9	53.77	34.92	88.83	70.79
G5	2.5	2.8	55.5	65.4	47.89	47.63	85.83	71.23
G6	2.5	2.9	48.1	51.6	42.98	39.69	89.09	76.32
G7	2.5	2.9	45.8	62.4	43.21	51.49	93.94	80.93
F- Test	*	*	*	*	*	*	*	*
LSD 5%	0.2	0.2	3.3	4.1	3.07	3.01	1.78	1.78
C:Interaction								
F- Test	**	NS	*	NS	NS	NS	NS	NS

4-Number of dry pods /plant .

The obtained results showed clearly that there were significant differences between faba bean genotypes in number of pods /plant in both seasons (Table 2). In the first season, faba bean genotypes i.e. 1, 3, 4 and 5 markedly posse the most statistical increase in number of pods / plant if compared with the genotypes 2, 6 and 7. The differences in number of pods /plant due to various genotypes may be related to the gentic factors and constitutions. These results are supported by the findings Abdel-Aziz, E.A. and F.H. Shalaby (1999).

5- Number of seeds per pod.

Data in Table 3 showed that in the first season, the performance of genotypes 2 and 4 significantly posse the most marked increase in number of seeds per pod as compared with the rest of different genotypes. In the second season, the genotypes 5, 6 and 7 statistically have the most significant increase in number of seeds / pod if compared with genotypes 1,2 and 3 without significant differences between each other . These data are in line with those of Teama (1994) and Hussein *et al.* (2005) .

6-Number of seeds per plant.

The results tabulated in Table 3 indicated that there were significant differences between genotypes in number of seeds per plant in both seasons. In the first season, genotype 4 markedly recorded the most highest increase in number of seeds/plant compared with the rest of other genotypes. In the second season, G5 and G7 markedly improved the number of seeds / plant compared with the rest of other genotypes . These results stand in harmony with those recorded by Hussein *et al.*(2005).

7- Seed yield / plant (g).

It is evident from the data presented in Table 3 that there were significant differences between genotypes in seed yield per plant in both seasons. In the first season, the genotype of faba bean 4 significantly posses the most marked increase in seed yield per plant as compared with the genotype 3 as well as different genoypes. In the second season, G7 markedly have the most significant increase in seed yield/plant(g) compared with different genotypes. These results are in the same trend with those of Amer *et al.*(1992) and Abd-Alla and Omran (2002).

8- 100-seed weight (g).

Results in Table 3 showed clearly that there were significant differences between genotypes in 100-seed weight in both seasons. In the first season, the performance of G3 and 7 markedly recorded the highest significant increase in 100-seed weight if compared with the rest of different faba bean genotypes . In the second season, the genotypes attitude different trend .In this respect, G.7 markedly recorded the most increase in 100-seed weight as compared with the rest of different genotypes . These results are in good agreement with those obtained by Amer *et al.* (1992)and Abou-Taleb (2002).

9- Seed yield (Ardab / fad).

In the first season, the results in Table 4 indicated that there were no significant differences were recorded between different faba bean genotypes indicating equal responses in seed yield per fad. However, the highest seed yield was realized by faba bean genotype 7 followed by G6 but the lowest

seed yield was recorded by G1 and G4. In the second season , the obtained results indicated that there were marked differences between genotypes in seed yield . The genotype 6 markedly posse the most significant increase in seed yield as compared with the rest of different genotypes . The differences between both seasons in seed yield/fad of different genotypes might related to the genetic make up or the metrological changes in day , night temperature or relative humidity and rain full averages . Similarity results were noted by Amer *et al* .(1992) and Abdel-Aziz and Shalaby (1999).

10-Seed crude protein percentage .

Data in Table 4 showed that the differences in seed crude protein percentage among the genotypes were significant in both seasons. G_3 had the highest seed crude protein percentage 27.2 and 27.8 % followed by G_6 26.6 and 27.1 % in 2005/2006 and 2006/2007 seasons, respectively. Similar results were reported by Abdel-Aziz and Shalaby (1999).

C. Interaction :-

1 - Number of seeds per pod.

The results in Table 5 indicated that the interaction between the faba bean genotypes and plant densities on number of seeds per pod were significant in 2005/2006. The interaction indicated that the genotypes 2 and 4 posses the most marked increase in number of seeds / pod under different plant population densities as compared with the rest of different genotypes . These results are in line with those reported by Bakheit *et al*. (2001).

2 - Number of seeds per plant.

Data in Table 6 showed that In the first season, the genotype 4 posses the most marked increase in number of seeds / plant under different plant population densities compared with the rest of different genotypes . Similar results were found by Bakheit *et al* .(2001).

3- Seed yield (Ardab / fad).

Data in Table 7 show that the interaction between the two factors studied on seed yield was significant in both seasons. The highest means were indicated that the interaction between the plant density (D) and genotypes (G) were obtained from (D_3 X G_7) for seed yield and (D_3 X G_6) in both season, respectively . The interaction between faba bean genotypes and plant density indicated that the seed yield of different faba bean genotypes increased under increasing plant population density in both seasons at the highest plant density (22 plants / m^2) . Similarity was noted by El-Murshedy *et al*. (2002).

Table 4: Seed yield (Ardab/ fad) and protein % as affected by plant density and some genotypes performance of faba bean during 2005/2006 and 2006 /2007 seasons.

Characters / Treatments	Seed yield (Ardab/ fad)		Protein %	
	2005/2006	2006/2007	2005/2006	2006/2007
A: Plant density				
D1 (11 plants/m^2)	5.77	6.71	25.6	26.2
D2 (16 plants/m^2)	9.93	10.28	26.0	26.6
D3 (22 plants/m^2)	12.83	12.83	26.6	27.1
F- Test	*	*	*	*
LSD 5%	0.39	0.24	0.2	0.2
B:Genotypes				
G1	9.28	9.04	26.0	26.6
G2	9.53	8.67	25.1	25.7
G3	9.50	10.41	27.2	27.8
G4	9.31	10.49	25.1	25.7
G5	9.55	10.01	26.2	26.9
G6	9.61	10.81	26.6	27.1
G7	9.78	10.16	26.2	26.8
F- Test	NS	*	*	*
LSD 5%	-	0.23	0.3	0.2
C:Interaction				
F- Test	*	*	NS	NS

Table 5: Number of seeds per pod as affected by the interaction between genotypes and plant density of faba bean during 2005/2006 seasons .

P. Density / Genotypes	2005/2006		
	D_1	D_2	D_3
G1	2.5	2.4	2.6
G2	2.6	2.9	2.8
G3	2.4	2.6	2.8
G4	2.8	2.7	3.0
G5	2.7	2.4	2.4
G6	2.2	2.7	2.7
G7	2.4	2.6	2.5
F- Test		*	
LSD 5%		0.29	

Table 6: Number of seeds per plant as affected by the interaction between genotypes and plant density of faba bean during 2005/2006 seasons .

P. Density / Genotypes	2005/2006		
	D_1	D_2	D_3
G1	65.6	49.3	45.6
G2	60.7	49.3	38.7
G3	62.7	53.5	43.8
G4	73.2	58.9	48.9
G5	68.1	51.6	47.0
G6	54.1	47.1	43.2
G7	52.9	47.4	37.1
F- Test		*	
LSD 5%		5.6	

Table 7: Seed yield (Ardab /fad) as affected by the interaction between genotypes and plant density of faba bean during 2005/2006 and 2006 /2007 seasons .

P. Density / Genotypes	2005/2006			2006/2007		
	D_1	D_2	D_3	D_1	D_2	D_3
G1	5.48	10.02	12.35	5.20	10.04	11.90
G2	5.73	9.75	13.11	5.38	7.94	12.69
G3	5.62	10.22	12.67	7.94	10.76	12.54
G4	5.70	10.07	12.14	8.14	10.63	12.69
G5	5.76	9.69	13.21	6.08	10.25	13.70
G6	5.93	9.66	13.24	6.81	12.05	13.56
G7	6.15	10.07	13.12	7.43	10.28	12.76
F- Test		*			*	
LSD 5%		0.63			0.04	

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أداء بعض التراكيب الوراثية الجديدة للفول البلدي تحت كثافات نباتية مختلفة

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أقيمت تجربتان حقليتان بمحطة البحوث الزراعية بالجميزة خلال موسمي ٢٠٠٥/٢٠٠٦ و ٢٠٠٦/٢٠٠٧ بهدف دراسة أداء بعض التراكيب الوراثية الجديدة للفول البلدي (١،٢،٣،٤،٥،٦،٧) تحت كثافات نباتية مختلفة (١١ ،١٦ و ٢٢ نبات / م [٢]) على المحصول ومكوناته وتم تنفيذ التجارب في تصميم القطع المنشقة مرة واحدة ، وفيما يلي ماخص لأهم النتائج المتحصل عليها :

١.اشارت النتائج الى ان ١١نبات/م٢ اعطت اعلي قيم في صفات عدد الفروع والقرون بالنبات ، وزن المائة بذرة ومحصول النبات. بينما اعطت الكثافة ١٦ نبات/م٢ اعلى زيادة في اتفاع اول قرن ثمري ولكن الكثافة ٢٢ نبات/م٢ سجلت اعلى زيادة معنوية في محصول البذور للفدان . لقد ادت زيادة معدل الكثافة النباتية من ١١ نبات/ م٢ الى ٢٢نبات/م٢ الى نقص في صفات عدد الفروع والقرون بالنبات – وزن ١٠٠بذرة- ومحصول البذور للنبات .

٢. اشارت النتائج الخاصة بالنسبة لصفة عدد القرون/ النبات ان التراكيب الوراثية (١،٣،٤،٥) اعطت زيادة معنوية فى عدد القرون على النبات وذلك مقارنة بالتراكيب (٢،٦،٧) وذلك في الموسم الاول ، بينما فى الموسم الثانى اعطت التراكيب الوراثية (٢،٦،٧) زيادة معنوية لهذة الصفة مقارنة بباقى التراكيب الاخرى .بينما اعطي التركيب الوراثي (٤) زيادة معنوية في محصول البذور/النبات (جم) وذلك في الموسم الاول ، بينما في الموسم الثاني اعطى التركيب الوراثي (٧) زيادة معنوية لهذة الصفة مقارنة بباقى التراكيب الاخرى .

٣.سجل التفاعل بين التراكيب الوراثية والكثافات النباتية تأثيرا معنويا على صفات عدد البذور في القرن ، محصول البذور(جم) / نبات ، محصول البذور (اردب / فدان) .

يمكن التوصية بزراعة التراكيب الوراثية (٦ و ٧) بالكثافة النباتية ٢٢ نبات /م [٢] وذلك للحصول على اعلى انتاجية لمحصول البذور في الفول البلدي وذلك تحت ظروف منطقة وسط الدلتا .