

EVALUATION OF PROMISING FABA BEAN (*Vicia faba* L.) GENOTYPES FOR AGRONOMIC AND SEED TECHNOLOGY CHARACTERS IN NORTH EGYPT

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ABSTRACT

Field and laboratory experiments were conducted at Gemmeiza Agric. Res. Station and Mansoura Seed Tech. Unit, Agricultural Research Center during 2011/2012 and 2012/2013 seasons to evaluate promising ten faba bean genotypes with three commercial cultivars; Giza 843, Misr 1 and Improved Giza 3. The main results cleared, Genotype 9 was the earliest in flowering and maturity dates. Genotypes 1,3,5 and 8 surpassed in number of pods/plant and number of seeds/plant. Genotypes 4,1,8 and 3 surpassed the other genotypes in 100-seed weight, seed weight/plant, germination percentage, seedlings vigor traits, meanwhile, recorded the lowest values for mean germination time and electrical conductivity compared with the three local commercial cultivars. There were positively and highly significant correlations between seed weight/plant and each of number of seed/plant, germination percentage, seedling length, seedling vigor index and germination rate, while, negatively and highly significant correlations between seed weight/plant both of electrical conductivity and mean germination time. Generally, under North Egypt conditions, we can sowing promising faba bean genotypes 4,1,8 and 3 (G.₄₆₁XG.₄₀₂, G.₄₆₁X Nubaria 1H.₈XG.₄₆₁ and G.₇₁₆XG.₄₀₂) to obtain high yield/plant and good seed quality as well as using them in breeding program.

INTRODUCTION

Faba bean (*Vicia faba* L.), is known to be an efficient nitrogen fixer about 80% of nitrogen from the atmosphere and that means 300 kg/h/year for a yield of 5000 kg ha⁻¹ (Huber *et al.*, 1987). Large-seeded faba bean seed is usually used as food, while medium-sized seed is used as food and feed, with small-sized grain mainly used as feed (Redden *et al.*, 2007). However, in spite of its great potential for being an important protein source in many countries, its area of cultivation has been decreasing over the years (Torres *et al.*, 2010). This reduction is mainly attributed to the unstable yielding ability of faba bean. In Egypt, faba bean is one of the main pulse crops grown for seed and the major problem of faba bean crop is the low and unstable yield from season to another. Alghamdi, (2007) studied the genetic behavior of six faba bean genotypes grown in central region of Saudi Arabia, he demonstrated that genotype Giza 402 showed the tallest plants, highest number of pods/plant, seed weight per plant and seed yield (t/ha) and significant positive correlations were detected between seed yield (t/ha) and each of number of pods/plant, number of seeds/plant and seed weight/plant, while, negative and significant correlations were observed between seed yield (t/ha) and each of flowering time, maturity date, number of branches per plant and 100-seed weight. Wally *et al.*, (2010), performance evaluation of five breeding lines of faba bean, they reported that Assiut 125 was

significantly better than all other lines for total dry seed yield in tons/fed, while, Assiut 104/2 and Romy 3 gave the lowest yield in both seasons. In addition, Assiut 125 was significantly better than all other lines in number of dry pods/plant and dry seed weight/plant. Haridy and Ameen (2011), studied some agronomic traits in five faba bean genotypes, they showed that Assiut 44 was the best combiner for number of pods/plant and weight of dry seeds/plant. Assiut 102/3 was the best combiner for days to 50% flowering and number of primary branches/plant. The genotype Assiut 39 was the best combiner for plant height and number of seeds/pod. Cecilia *et. al.*, (2013), found that pod yield differed among genotypes; 'Verde Bonita' and 'Retaca' genotypes had the highest pod yield (8%) higher than 'Alarga'. 'Retaca' had a higher pod number (26% and 41%) more than 'Verde Bonita' and 'Alarga', respectively, however, pod weight was the lowest in 'Retaca' as compared with the other two genotypes and pod number was the highest in this genotype.

Seed vigor is an important component of seed quality and satisfactory levels are necessary in addition to traditional quality criteria of moisture, purity, germination and seed health to obtain optimum plant stand and high production of crops. Vigor testing is important because it often gives a better prediction of field performance and is a more sensitive indicator of seed quality than the standard germination test (Younis, *et. al.*, (1990). Since a single test does not necessarily measure all aspects of seed vigor, several tests have been suggested (Hampton and Coolbear, 1990). EL-Emery (1997). found that genotypes differed in germination, seed and seedling vigor traits. Krystyna *et. al.* (2000), tested thirty-nine strains and cultivars of bean in the field and laboratory over 3 yr, they found that standard germination was above 80% and conductivity ranged from 7 to 45 $\mu\text{S cm}^{-1} \text{g}^{-1}$. Olasoji, *et. al.*, (2011), recorded that a wide genetic variation was observed among the cultivars in seed quality traits such as hundred seed weight, germination percentage and germination after ageing as well as bulk conductivity readings. Erkut, (2007), investigate the relationships among electrical conductivity of seed steep water in 15 faba bean (*Vicia faba* L.) cultivar/populations, he found that Faba bean cultivar/populations were differed for EC values at both 24th h. EC readings varied from 7.9 $\mu\text{S cm}^{-1} \text{g}^{-1}$ in Lara cultivar to 12.1 $\mu\text{S cm}^{-1} \text{g}^{-1}$ in Merzifon cultivar at 24th h. Ghassemi and Hosseinzadeh (2009) studied the changes in seed vigour of three faba bean (*Vicia faba* L.) cultivars Aquodolce, Barakat and Zohreh during development and maturity, they indicated that maximum seed weight, germination rate and minimum electrical conductivity (EC) were significantly affected by cultivar, but the effect of cultivar on maximum germination percentage was not significant. Cultivar Barakat had the highest seed weight and electrical conductivity, compared with other cultivars, in contrast, Zohreh had the smallest seeds with the lowest solute leakage and the highest germination rate.

Seed viability and vigor directly affect the performance of seeds planted to regenerate the crop. The objective of this study was to evaluate ten promising faba bean genotypes for agronomic and seed quality traits comparing with three commercial cultivars.

MATERIALS AND METHODS

Field and Laboratory experiments were conducted at Gemmeiza Agricultural Research Station, Gharbia Governorate and Laboratory of Seed Technology Research Unit El Mansoura, ARC, Egypt, during 2011/2012 and 2012/2013 seasons to study the performance of thirteen promising faba bean genotypes Table (1) for yield and its components as well as seed quality characters.

Table (1) Pedigree of origin studied faba bean genotypes.

Genotypes	Pedigree
G. 1	Giza 461 x Nubaria 1
G. 2	Treble Weight x Nubaria 1
G. 3	Giza 716 x Giza 402
G. 4	Giza 461 x Giza 402
G. 5	Nubaria 1 x Giza 2
G. 6	Giza 429 x Giza 2
G. 7	Giza 429 x Giza 40
G. 8	Hybrid 8 x Giza 461
G. 9	Hybrid 10 x Giza 461
G. 10	(Treble Weight x G. 461) x Misr ₁
Giza 843	L. 461/845/83 x L. 561/207b/85
Misr 1	G. 3 x 123A/45/76
Improved Giza 3	Selected from Giza 3 (Giza 1 x Introduction 29)

The field experiment arranged in randomized complete block design with three replications. The texture of experimental soil was salty clay loam. The soil was ploughed and calcium super phosphate (15% p₂ o₅) was incorporated into the soil at a rate of 150 Kg/ feddan before sowing. Sowing date was 15th November in the first season, while it was 25th November in the second season. Each plot consisted of five ridges, 60 cm a part and 4 m long. Seeds were inoculated and hand planted. Hand hoeing was practiced twice to control weeds. All the agronomic practices were conducted as recommended. Data of plant height (cm), number of branches/ plant, flowering and maturity time, number of pods/plant, number of seed/ plant, 100-seed weight (gm) and seed weight/ plant (gm) were estimated. Seeds of harvested genotypes were undergo to various laboratory testes for evaluating seed quality traits after drying and cleaning.

Standard germination test: was done according to the method outlined in the rules for seed testing (ISTA, 1999). Four replicates of 50 seeds were planted in boxes of (40x20x20 cm) dimension and contained sterilized sandy soil. The boxes were then watered and kept at 20±1° c in the germination chamber for 14 days. Normal seedlings, abnormal seedlings and ungerminated seed were counted. Germination percentage was defined as the number of normal seedlings after 14 days.

$$\text{Germination percentage} = \frac{\text{Number of normal seedlings} \times 100}{\text{Number of seeds}}$$

Germination rate: defined according to Bartlett (1937).

$$\text{Germination rate} = \frac{a + (a + b) + (a + b + c) + \dots + (a + b + c + m)}{a (a + b + c + \dots + m)}$$

Where (a, b, c, and m) number of seedlings emerged at the first count, second count and final count and (n) it is the number of counts.

Mean germination time and seedling vigor index: according to the recommendation outlined by Alvarado and Bradford (1987) and Ruan and Tylkowska (2002). These include the following:

$$\text{Mean germination time} = \frac{(N_1 \times T_1) + (N_2 \times T_2) + (N_3 \times T_3) + (N_4 \times T_4)}{N_1 + N_2 + N_3 + N_4}$$

N_1, N_2, N_3 and N_4 = First, Second, Third and Four Counts, respectively.

T_1, T_2, T_3 and T_4 = Time of First, Second, Third and Four Counts, respectively.

$$\text{Seedling vigor index} = S D W \times G. P.$$

S. D. W = Seedling dry weight.

G. P. = Germination percentage.

At the final count, ten normal seedlings from each replicate were randomly taken randomly to measure plumule and radical length in (mm), after then, the seedlings were dried in hot-air oven at 70 °C for 42 hours to obtain the seedling dry weight (g) according to Krishnasamy and Seshu (1990).

Accelerating Aging Test: was carried out according to ISTA rules (1999), where one hundred seeds each in four replicates are tied in a fine muslin cloth, then placed in a jar on a wire mesh. The lower part of the jar is filled with water. There were no direct contact between water in the jar and the seed in the muslin cloth. The jar was covered with the lid and sealed with paraffin wax to make it air tight. The jar was placed in an accelerated aging chamber maintain at 41 ± 2 c° for 72 hours. After this period the seed package was removed and cooled in a desecrator. Then the seeds were subjected to normal germination test.

Electrical conductivity: was evaluated according to the procedures outlined by Matthews and Alison (1987). The HANNA conductivity meter (Hi 80333) was used, where fifty seeds in three replications of tested samples were weighted to 2 decimal numbers and placed in 500 ml flask and 250 ml of distilled water was added. The flask was cover and placed in an incubator at a constant temperature of 20 c° for 24 hours after which the contents of the flask; were gently stirred. The electrical conductivity was measured in the solution after removing the seeds. The results were reported as (μ mhos/g seeds).

$$\text{Electrical conductivity} = \frac{\text{Reading of soaked seeds}}{\text{Weight of 50 seeds}}$$

Collected data for each season were statistically analyzed by the technique of analysis of variance and the least significant differences (L.S.D.) of treatments (Gomez and Gomez, 1984). Bartlett test was done to the homogeneity of error variances. The test was significant for all traits except plant height, number of pod/ plant, seed weight/ plant, ungerminated seed percentage, electrical conductivity and seedling length was insignificant, thus the data of both years were combined for these traits only. Simple coefficients were calculated to compare the association between values of agronomic and seed technology characters.

RESULTS AND DISCUSSION

Agronomic characters

Data in Table 2 show that significant differences among faba bean genotypes for all studied characters except plant height characters was insignificant effects in both seasons. Genotypes 1,2,3 and 10 recorded the highest means of branches number/plant in the first and second seasons, respectively. Genotypes 9,2 and 7 were the earliest in flowering dates recording averages of 47 to 49 days in the first and second seasons respectively, on the other hand, genotypes 1,8 and 10 were the latest in flowering dates recording average (51-53) and (51-55) days in both seasons, respectively. Regarding maturity date genotype 9 was the earliest (153 days) in the first and second season, while, genotypes 5 and 6 were the latest with

Table (2): Means of some agronomic attributes of faba bean promising genotypes evaluated in 2011/2012 and 2012/2013 seasons.

Genotypes	Characters	Number of tillers		Flowering date		Maturity date	
	Plant height (cm)	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013
G. 1	99.7	5	6	51	53	158	156
G. 2	97.3	6	6	48	47	157	157
G. 3	96.7	5	6	50	52	158	154
G. 4	102.5	4	4	50	51	157	157
G. 5	98.0	5	5	51	50	157	159
G. 6	103.2	4	5	50	52	157	159
G. 7	102.5	5	4	49	48	154	156
G. 8	102.2	5	2	51	55	157	155
G. 9	97.2	5	4	47	49	153	153
G. 10	94.2	5	5	53	51	154	154
Giza 843	97.3	5	3	51	53	156	153
Misir 1	96.2	3	3	49	51	156	153
Improved G. 3	101.8	3	2	53	54	157	156
L. S. D. at 5%	NS	2.0	1.0	2.0	2.0	2.0	2.0

G.1= Giza461 x Nubaria1

G.2= Treble weight x Nubaria1

G.3= Giza716 x Giza402

G.4= Giza416 x Giza402

G.5= Nubaria1 x Giza2

G.6= Giza429 x Giza2

G.7= Giza429 x Giza40

G.8= Hybred8 x Giza461

G.9= Hybred10 x Giza461

G.10= (Treble weight x Giza461) x Misr1

average (159 days) in both season, respectively compared with the other genotypes. These results are in agreement with these obtained by Hossam (2010), he recorded that Giza Blanca cultivar gave valuable moral for all the studied traits i. e. number of branches/ plant and flower set, while, ILB 450 genotype gave the highest values for plant height. Also, Alghamdi, (2007), demonstrated that genotype Giza 402 showed the tallest plants.

Data in Table 3, cleared that significant differences among faba bean genotypes for all studied characters. Genotype 8 continue to surpass other studied genotypes in number of pod/plant (28 pod) followed by genotypes 5,1,3 and 9 compared with local cultivars. Genotypes 1 and 8 produced the highest averages of number of seed/plant (69 and 75) and (77 and 83) with significant differences among them in the first and second seasons, respectively. Regarding 100-seed weight, genotype 1 had the heaviest weight of 100 seed weight (87.5 gm) followed by genotypes 4,6 and 2 (85.0, 81.5 and 80.8 gm) in the first season, whereas, genotypes 8 and 1 had the heaviest weight of 100 seed weight (61.3 and 61.2 gm) compared with the other genotypes in the second season. On the other hand, Genotypes 5 and 7 recorded the lowest weight of 100 seeds with average (61.2 and 56.6 gm) in both seasons, respectively. Genotypes 1 and 8 showed the highest seed weight/ plant (71.0 and 66.5), followed by genotype 4 (65.4 gm) with no significant differences among them. All these genotypes are promising and could be recommended for releasing. Similar results were obtained by Hossam (2010), he reveled that Giza Blanca cultivar recorded valuable moral for all the studied traits i. e. (pod set, 100 seed weight and seed yield/ plant) except number of pods per plant, while, ILB 450 genotype gave the highest values for number of pod/ plant, which underscores the importance of the use of cultivar Giza Blanka and ILB 450 genotype in breeding programs to work on increasing the 100 seed weight as well as the individual yield plant. Haridy

Table (3): Means of some agronomic attributes of faba bean genotypes evaluated in 2011/2012 and 2012/2013 seasons.

Genotypes	Characters	Number of pod/plant		Number of seed/plant		100-seed weight (gm)		Seed weight/plant (gm)
	Compound data	2011/2012	2012/2013	2011/2012	2012/2013	Compound data		
G. 1	24	69	75	87.5	61.2	71.0		
G. 2	23	59	67	80.8	50.2	61.1		
G. 3	24	66	72	78.9	53.0	63.0		
G. 4	22	59	65	85.0	52.4	65.4		
G. 5	25	65	69	71.7	50.7	60.4		
G. 6	20	48	52	81.5	41.5	60.0		
G. 7	19	52	53	73.3	40.0	57.0		
G. 8	28	77	83	76.6	61.3	66.5		
G. 9	24	57	58	80.0	47.1	63.4		
G. 10	21	57	57	72.7	42.5	58.2		
Giza 843	21	62	56	74.3	43.0	61.4		
Misr 1	23	66	65	73.9	48.1	61.2		
Improved G. 3	21	62	58	77.3	45.4	63.4		
L. S. D. at 5%	4.0	8.4	9.6	2.5	7.0	5.2		

and Amein, (2011), showed that Assiut 44 genotype was the best combiner for number of pods/plant and weight of dry seeds/plant. The genotype Assiut 39 genotype was the best combiner of number of seeds/pod.

Seed technology characters

High quality seed is an essential factor to ensure good crop establishment. The seed must be viable and possess physiological traits that allow rapid germination and seedling establishment. Seed germination and vigour are the main physiological quality attributes. The standard germination percentage, germination after aging and germination rate were significantly affected by studied genotypes faba bean as shown in (table 4). The acceptance level of germination percentage for certified faba bean seed should not be less than 85%. All genotypes reached to the acceptance level of certified seed except genotypes number 2 and 5 were 82% and 80%. Seed of genotypes 4,1,8 and 3 surpassed the other genotypes in germination percentage % (96, 95, 94 and 93%), respectively and it had minimum upnormal seedling % and ungerminated seed % as compared to local varieties Giza 843, Misr 1 and Improved Giza 3. On the other hand, seed genotypes 2 and 5 gave the lowest percentage of normal seedlings (82 and 80%) and highest percentage of upnormal seedlings % and ungerminated seed %. The highest averages of germination after aging (83, 83%), (80, 82%) and (80, 81%) and germination rate (0.818, 0.793 and 0.794), respectively were obtained from seed genotypes number 4,1 and 8 as compared to local varieties Giza 843, Misr 1 and Improved Giza 3. The possible reason of lower germination after aging test might be that tolerance

Table (4): Means of Standard germination and seed vigour characters of faba bean genotypes evaluated in 2011/2012 and 2012/2013 seasons.

Characters Genotypes	Standard germination test			Germination after aging (%)		Germination rate
	Germination (%)	Abnormal seedling (%)	Ungerminated seed (%)			
	Compound data	Compound data	Compound data	2011/2012	2012/2013	Compound data
G. 1	95	4	1	80	82	0.793
G. 2	82	11	7	68	70	0.722
G. 3	93	5	2	79	80	0.771
G. 4	96	2	2	83	83	0.818
G. 5	80	11	9	72	71	0.700
G. 6	87	10	3	70	75	0.749
G. 7	86	7	7	76	77	0.745
G. 8	94	4	2	80	81	0.794
G. 9	91	5	4	79	80	0.753
G. 10	90	7	3	78	78	0.744
Giza 843	88	9	3	73	73	0.713
Misr 1	90	7	3	78	79	0.743
Improved G. 3	88	8	4	75	74	0.719
L. S. D. at 5%	3	2	2	3	5	0.032

of subjected seed had declined in vigor leading to slower germination. These results are in agreement with Olasoji, *et. al.*, (2011), they found that Laboratory germination percentages ranged from 52.00 to 86.67% ($P < 0.01$) with overall means of 72.00%. The highest germination percentages were found in cultivars NSWSS 4 and NSWSS 45 accessions with 86.57% meanwhile, the lowest germination percentages were found in cultivars NSWSS 50 and NSWSS 57 accessions with 52.00 and 58.67% germination respectively, and added there was a significant difference between faba bean genotypes on seed vigor traits as measured by (germination percentage after aging and germination rate), they reported that all the cultivars with the exception of NSWSS 56 recorded accelerated ageing germination percentage of less than 50% which is significantly lower than laboratory standard germination. Also, Ghassemi and Hosseinzadeh (2009) said that Zohreh faba bean cultivar had the highest germination rate compared with Aquodolce and Barakat cultivars.

Data in Table (5) show more details about seed and seedling vigor traits. These include seed vigor (mean germination time, electrical conductivity), seedling vigor (seedling length, seedling dry weight) and seedling vigor index. Seed genotypes 4, 8 and 1 offers the lowest values of mean germination time (4.8, 5.1), (5.0, 5.1) and (5.0, 5.2) day, respectively and lowest reading of electrical conductivity to soaked seeds (13.1, 14.6 and 16.1 $mmoh/gm/seed$), respectively as compared to local varieties Giza 843, Misr 1 and Improved Giza 3. Genotypes of seed that show high levels of solute leakage are low vigor seeds and quality, this value could be as a result of hard seed coat that reduced seed exudates due to the impermeable nature of the coat. These results are in agreement with Ghassemi and Hosseinzadeh (2009) indicated that cultivar Barakat had the highest electrical conductivity compared with other cultivars, in contrast, cultivar Zohreh had the lowest solute leakage. Also Olasoji, *et. al.*, (2011), showed that, significant differences in conductivity values among the accessions, the conductivity values ranged from 11.24 to 119.45 $\mu Scm^{-1}g^{-1}$ with overall mean of 62.24 $\mu Scm^{-1}g^{-1}$, cultivar NSWSS 50 recorded the lowest conductivity value of 11.24 $\mu Scm^{-1}g^{-1}$. Seedling vigor traits as nominated by seedling length, seedling dry weight and seedling vigor index also significantly differed among the studied genotypes. Genotypes 8 and 4 surpassed another genotypes in seedling length, while, genotype 4 ranked the first in seedling dry weight and seedling vigor index. Similar results were obtained by Olasoji, *et. al.*, (2011), where they showed that, significant differences were observed for shoot length, seedling dry weight and seedling vigor index among all the genotypes, significant seedling vigor index was shown by cultivar NSWSS 4 due to its longer shoot length and seedling vigor index ranged from 1.16 to 2.58 with overall mean of 1.65.

Table (5): Means of some seed vigour and seedling characters of faba bean gnotypes evaluated in 2011/2012 and 2012/2013 seasons.

Characters Genotypes	Mean germination time (day)		Electrical conductivity (mmoh/gm / seed)	Seedling length (cm)	Seedling dry weight (gm)		Seedling vigor index	
	2011/2012	2012/2013	Compound data	Compound data	2011/2012	2012/2013	2011/2012	2012/2013
G. 1	5.0	5.2	16.1	25.3	10.3	8.5	984.3	792.5
G. 2	5.4	5.6	22.0	19.1	8.6	7.7	699.4	638.4
G. 3	5.1	5.2	16.7	24.0	10.0	8.6	929.6	789.3
G. 4	4.8	5.1	13.1	26.7	10.5	9.5	1009.5	897.7
G. 5	5.3	5.3	22.0	19.0	8.4	7.8	674.7	632.8
G. 6	5.2	5.3	19.8	22.3	9.1	7.8	793.2	691.8
G. 7	5.2	5.3	18.8	22.8	9.2	7.9	794.0	685.1
G. 8	5.0	5.1	14.6	27.0	10.0	8.2	936.9	758.7
G. 9	5.2	5.2	17.3	22.2	9.6	8.0	872.1	708.8
G. 10	5.3	5.2	18.3	22.1	9.7	8.4	873.1	760.6
Giza 843	5.5	5.7	21.2	21.7	9.2	7.5	810.7	645.2
Misr 1	5.2	5.4	17.9	22.9	9.6	7.7	867.9	691.7
Improved G. 3	5.6	5.6	21.4	21.1	9.3	7.5	821.5	654.9
L. S. D. at 5%	0.22	0.43	0.67	1.39	0.82	0.57	86.0	58.7

Relationships among studied characters:

The correlation coefficient for the relationships between the studied traits listed in Table 6. There were positively and highly significant correlations between number of seed weight/plant and each of number of seed/plant ($r=0.912$), germination percentage ($r=0.560$), seedling length ($r=0.567$), seedling vigor index ($r=0.526$) and germination rate ($r=0.584$) and highly significant negatively correlations between seed weight/plant and electrical conductivity ($r=-0.556$) and mean germination time (-0.531). Also positively and highly significant correlations between germination percentage and each of germination after seed aging ($r=0.909$), seedling length ($r=0.912$), seedling vigor index ($r=0.958$), germination rate ($r=0.877$) and seedling dry weight ($r=0.885$) and highly significant negatively correlations between germination percentage and mean germination time ($r=-0.647$) and electrical conductivity ($r=-0.897$). Also positively and highly significant correlations between 100-seed weigh and each of germination percentage (0.516), seedling vigor index (0.531), germination rate (0.539) and seedling dry weight (0.535). This results agreed with those reported by Alghamdi, 2007, he found that significant positive correlations were detected between seed yield (t/ha) and each of number of pods per plant, number of seeds per plant and seed weight per plant, while, negative and significant correlations were observed between seed yield (t/ha) and each of flowering time, maturity date, number of branches per plant and 100-seed weight. Furthermore, these results are in agreement with Makkawi, et. al., (1999), they recorded that standard germination showed significant negative correlation with electrical conductivity and significant negative correlation between electrical conductivity and 100 seed weight. They added that shoot length negatively with 100 seed weight, seedling dry weight and electrical conductivity. The electrical conductivity was negatively correlated with seedling weight.

Table 6: Simple correlation coefficients among all studied characters.

X	1- Seed weight/plant	2- Flowering date	3- Maturity date	4- No. of Seed/Plant	5-100- Seed weigh	6- Germ. percentage	7- Germ. after aging	8- Mean germ. Time	9- Electrical conductivity	10- Seedling Length	11- Seedling vigor index	12- Germination rate	13- Seedling dry weight
1	1.00												
2	0.363	1.00											
3	0.193	0.303	1.00										
4	0.912	0.328	0.154	1.00									
5	0.307	-0.021	0.236	-0.028	1.00								
6	0.560	0.320	-0.250	0.369	0.516	1.00							
7	0.401	0.174	-0.347	0.374	0.342	0.909	1.00						
8	-0.531	0.073	0.000	-0.393	-0.393	-0.647	-0.787	1.00					
9	-0.556	-0.098	0.188	-0.409	-0.424	-0.897	-0.934	0.881	1.00				
10	0.567	0.313	-0.075	0.439	0.413	0.912	0.870	-0.755	-0.940	1.00			
11	0.526	0.263	-0.133	0.353	0.531	0.958	-0.912	-0.763	-0.939	0.907	1.00		
12	0.584	0.117	0.003	0.386	0.589	0.877	-0.843	-0.856	-0.961	0.937	0.933	1.00	
13	0.496	0.130	-0.140	0.275	0.535	0.885	0.896	-0.828	-0.933	0.833	0.975	0.921	1.00

In conclusion, Evaluation and selection faba bean genotypes for agronomic and seed technology characters are important to get the same high seed yield and high seed quality cultivars. Accordingly, accumulated data of agronomic and seed quality characteristics that faba bean genotypes number 4,1,8 and 3 (G 461xGiza 402, Giza 461xNubaria 1, Hybrid 8xGiza 461 and Giza 718xGiza 402) combined high seed yield and yield components as well as good seed quality compared with the three local commercial cultivars, which underscores the importance of registration of these genotypes commercial varieties and using them in breeding programs to work on increasing the 100 seed weight and the individual yield plant as well as high seed quality and could be recommended for release to be grown in North Egypt.

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تقييم صفات المحصول و صفات جودة التقاوي لبعض سلالات الفول البلدى المبشرة في شمال مصر

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أقيمت تجارب حقلية ومعملية في محطة البحوث الزراعية بالجيزة ووحدة بحوث
تكنولوجيا البذور بالمنصورة - مركز البحوث الزراعية موسمي ٢٠١٢/٢٠١٣، ٢٠١١/٢٠١٢،
بهدف تقييم صفات المحصول و مكوناته و صفات جودة التقاوي لعشرة سلالات من سلالات الفول
البلدى المبشرة مقارنة بثلاث أصناف محلية (جيزة ٨٤٣، مصر ١، جيزة ٣ محسن). و صممت
التجربة في قطاعات كاملة العشوائية في ثلاث مكررات.
تشير أهم النتائج الى :-
أولاً :-

اختلفت السلالات معنويا فيما بينها في صفات المحصول ومكوناته حيث كانت السلالة
رقم ٩ (هجين ١٠ X جيزة ٤٦١) أكثر تكبيراً في كل من ميعاد التزهير و النضج. تفوقت
السلالات رقم ١٥، ٨، (جيزة ٤٦١ X نوبارية ١، جيزة بلانكا X جيزة ٢، هجين ٨ X جيزة
٤٦١) في عدد القرون/النبات وعدد البذور/النبات. في حين تفوقت السلالات رقم ٨، ٤، ٣، ١
(جيزة ٤٦١ X نوبارية ١، جيزة ٧١٦ X جيزة ٤٠٢، جيزة ٤٦١ X جيزة ٤٠٢، هجين ٨ X
جيزة ٤٦١) في كل من وزن ال ١٠٠ بذرة، وزن البذور/النبات.
ثانياً :-

اختلفت التراكيب الوراثية معنويا فيما بينها في صفات جودة التقاوي حيث سجلت
السلالات رقم ٨، ٤، ٣، ١ (جيزة ٤٦١ X نوبارية ١، جيزة ٧١٦ X جيزة ٤٠٢، جيزة ٤٦١ X
جيزة ٤٠٢، هجين ٨ X جيزة ٤٦١) أعلى المتوسطات في نسبة الإنبات و صفات قوة البذور و
البادرات مقارنة بالأصناف التجارية المحلية.
ثالثاً :-

كان هناك ارتباط معنوي موجب بين وزن البذور/النبات وكل من عدد البذور/النبات،
نسبة الإنبات، معدل الإنبات، طول البادرة والوزن الجاف للبادرة، في حين كان هناك ارتباط
معنوي سالب بين وزن البذور/النبات وكل من متوسط زمن الإنبات ودرجة التوصيل الكهربى
لمنقوع البذور. أيضا كان هناك ارتباط معنوي موجب بين وزن ال ١٠٠ بذرة وكل من نسبة
الإنبات، معدل الإنبات، دليل قوة البادرات والوزن الجاف للبادرة.

و يمكن التوصية بزراعة السلالات رقم ٨، ٤، ٣، ١ (جيزة ٤٦١ X نوبارية ١، جيزة
٧١٦ X جيزة ٤٠٢، جيزة ٤٦١ X جيزة ٤٠٢، هجين ٨ X جيزة ٤٦١) تحت ظروف شمال
مصر وكذلك استخدامها في برامج التربية للعمل على زيادة وزن ال ١٠٠ بذرة ومحصول النبات
الفردى وكذلك جودة البذور العالية.