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INDUCTION OF SALT TOLERANCE MUTANTS IN FABA BEAN (*Vicia faba L.*) 1-PROMISING LINE MUTANTS UNDER SALINE AND NORMAL SOIL CONDITIONS

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ABSTRACT: **This investigation was carried out at El-Gemmeiza, Agricultural research station, ARC, Egypt during 1999/2000,2000/2001 and 2001/2002 winter seasons to induce salt tolerance mutants in Faba bean (*Vicia fıba L.*). Two mutagens [gamma ray and sodium azide (NaN_3)] were used in this study. The gamma ray doses were 30,60,90 and 120 Gy, while the concentrations of sodium azide were 0.001M and 0.003M at pH 3. Four faba bean varieties, i.e. Giza 2, Improved Giza 3,Giza 714 and Giza 716 were used in this study. The mutants belong any apparent morphological characters change of seed yield, yield attribute characters and seed shape were screened to isolate 180 mutants at M_2 generation. These mutants affect, plant height (dwarf and semi-dwarf), Flowering date (early flowering), seed shape (small seeds and large seeds), pod shape (long pod), seed yield (high seed yield, high number of seeds), 100-seed weight (heavy seeds), branching capacity (high no. of branches), height of first pod on the stem (low height of first pod) and fire of tip leaf. In the M_3 generation the selected mutants from M_2 generation were sown under normal and salinity conditions and 100 mutant lines were stable at M_3 generation. The stable of early flowering (E.F), dwarf (D), semi-dwarf (S.D) and low height of first pod (L.I.P) at M_3 generation suggested that the genetic controlling of these mutants may be recessive genes with one or two pair of genes only, as well as littl effects of environmental conditions. Five promising mutant lines under salinity conditions were recorded as follows: H.N.S-6 mutant line from Giza 2 variety, Long P-7, LongP-5 and D-5 from Improved Giza 3 variety and S.S-17 from Giza 716 variety. These promising mutants consider as a very important for breeding to salt tolerance and development of salt tolerant new variety, especially mutants that derived**

from Improved Giza 3 variety. In contrast, dwarf and semi-dwarf mutants appeared very important mutants under normal condition, S.D-1 from Giza 2, D-3 from improved Giza 3 and S.D-7 from Giza 714. A peliotropic effect of dwarf gene were recorded in these mutant lines, this gene not only affect of plant height, but its affecting on seed yield components especially seed ai d pod shape. Moreover four elite,promising mutant lines had higher seed yield and related traits of it under both saline and normal conditions, i.e, L.S-1 from Giza 2, L.F.P-6 and S.S-15 from Giza 714 and Long P-7 from Giza 3. The last mutant line (Long P-7) could be considered as a very important genotype compared with all mutants and mother varieties under study, especially under saline condition therefore, this mutant could be directly used in comparative experiments for releasing of it as a new variety which possess high yielding under salinity and normal soil conditions.

INTRODUCTION

Faba bean (*Vicia faba L.*) is the first pulse crop grown in Egypt. It is used in daily diets, especially, for lower income peoples. This is due to the high nutritive value of seeds which contain about 30% protein (Atia et al., 1995). Therefore, the investigators in Egypt and in many other developing countries have tried to improve yield and seed quality of this important crop (Kumari, 1996; Rabie, et al., 1996 and Omar et al., 1999).

Mutation breeding using physical and chemical mutagens is considered to be one of the useful tools for plant improvement. Therefore It is very important for induce of new genetic resources (Kharkwal, 2000; Hassan, et al., 2001; Mihov, et al., 2001 and Wani, et al., 2001).

Artificial induction of mutations proved to be a useful tool for increasing of genetic variability in many plant species, especially the self-fertilized plants (Fahmy, et al., 1997;Geetha and Vaidyanathan, 1998; Hajduch, et al., 1999and Solanki and Sharma, 1999). Leguminous plants were the target of great deal of investigation concerning induced variability using either irradiation or chemical mutagens (El-Sagi, 1993; Fahmy et al., 1997; Hajduch et al., 1999; Omar et al.; 1999).

Salinity has been recognized as a major agricultural problem in arid and semi-arid regions (Pessarakil, 1991). Salt tolerance of plants is of great economic and scientific importance. The economic impetus for research and development derives from the fact that salt effected soils occupy about 10% of the world's arable land (Tanji 1990).

Rush and Epstein (1976) have argued at crop production could be greatly enhanced by selecting strains resistant to salinity. Difference in salt tolerance among species has been significantly limits productivity (Delgado, et al., 1994). In general, legumes are either sensitive or moderately tolerant to salinity (Mass and Hoffman 1977). Broad bean (*Vicia faba* L.) is moderately tolerant (El-Karauri 1979), or considered moderately sensitive to salinity (Cordovilla, 1996).

In Egypt, the faba bean is very important crop because it cultivated in newly recognized lands which suffering of salinity as a main problem. The local varieties are moderately sensitive to moderately tolerant to salinity. The productivity of these varieties is severe decreasing under salinity. Therefore, the present study aimed to obtain salt tolerant mutants for using in cross breeding program.

MATERIALS AND METHODS

This investigation was carried out at El-Gemmeiza Agricultural research station, ARC, Egypt during the three winter seasons of 1999/2000, 2000 /2001 and 2001/2002. Faba bean varieties Giza 2,Improved Giza 3, Giza 714 and Giza 716 were obtained from Legume Crop Research Department, Institute of Field Crops, ARC, Giza Egypt. A sample of 100 dry will filled seeds from each variety were subjected to the acute doses 30,60,90 and 120 Gy. Irradiation was achieved in season (1999) at the National Center for Research and Radiation Technology, Naser city, Cairo, Atomic Energy Agency, Egypt. 100 dry will filled seeds from each representing variety were soaked in water for four hours prior to soaking in sodium azide concentrations for two hours which was dissolved in phosphate buffer at pH 3.

The treated and untreated (control) seeds were sown to obtain M_2 seeds which were planted under normal condition to release the M_2generation. The M_2 plants were individually screened or any apparent morphological change. The morphological changes observed were those affecting plant height [dwarf (D) and semi-dwarf (S.D) mutants], pod length [long pod (Long P.)], leaf shape [fire tip leaf (F.T.L), flowering time [early flowering (E.F.)] and branching capacity of the plant [high no. of branches (H.N.B)]. In addition, 50 plants for each treatment randomizly selected for change determines no. of seeds [high no. of seeds (H.N.S)], seed yield [high seed yield (H.S.Y)], 100-seed weight [heavy seeds (He.S)] and seed size [small seeds (S.S) and large seeds (L.S.)]. The classification of different mutants assessed on z-test and consideration of all M_2 plants for each variety as population. and selection of 0.01 from the population of each character. The mutant types were determined on the basis of main changeable character. In the season (2001/2002), the selected mutants from M_2 generation were sown under normal and salinity conditions (Table. 1) in three replicates. Each replicate consisted of fifteen seed in one raw

(3m. length and 0.6m. width)at the rate of one seed per hill a spacing of 20 cms. between plants at normal soil, while at salinity soil each replicate consists of five seeds in one raw (one m. length and 0.6m. width)at the rate of one seed per hill a spacing of 20 cms. between plants. The obtained data were illustrated in table 4 and 5 that revealed the means ± S.E as well asL.S.D.

Table (1): Chemical analysis of the nonmal and salinity soils at M_3 generation.

Soil treatment	EC mmhos / cm.	Anionic and cationic compisition (meq/100g soil)							
		Anions				Cations			
		Ca^{+2}	Mg^{+2}	Na^{+}	K^{+}	Cl^{-}	HCO_3^{-}	CO_3^{--}	SO_4^{2-}
Normal	2.60	0.55	0.53	0.85	0.03	0.79	0.42	-	0.75
Salinity	5.31	3.80	2.55	1.95	0.01	0.84	0.25	-	7.22

RESULTS AND DISCUSSION

Screening and isolation of mutants with any apparent morphological characters and change in seed yield, yield attribute characters and seed shape started in M_2 generation. A large number of mutants carrying one or more basic changes as compared to the mother variety. The induced morphological changes in the mutants were classified according to the main alteration brought about through a mutational event. Mutants affecting plant height (dwarf and semi-dwarf), Flowering date (early flowering), seed shape (small seeds and large seeds), pod shape (long pod), seed yield (high seed yield, high number of seeds), 100-seed (weight heavy seeds), tillering capacity (high no. of tillers), height of first pod on the stem (low height of first pod) and fire of tip leaf were obtained in M_2 generation (Figure 1,2). Large number of these mutants were recorded in Improved Giza 3, followed by Giza 2. Meanwhile the number of mutants were equal approximately in Giza 714 and Giza 716 and lower than the above varieties (Table 2). These results indicates that the difference responses for these genotypes (varieties) may be due to the differential sensivity of different genes to the γ-ray and sodium azide as suggested by Yasin,1996; Omar et al., 1999 and Kharkwal, 2000.

.In addition, high yield of mutations were obtained by 60 gray of γ-ray followed by 0.001 Mole (M) of sodium azide (Table 3). These results confirmed with many investigators. (Mohan et al., 1980; Hajduch, 1999 and Mihov et al., 2001). Many of these mutants bred true through M_2 generation, except some segregants

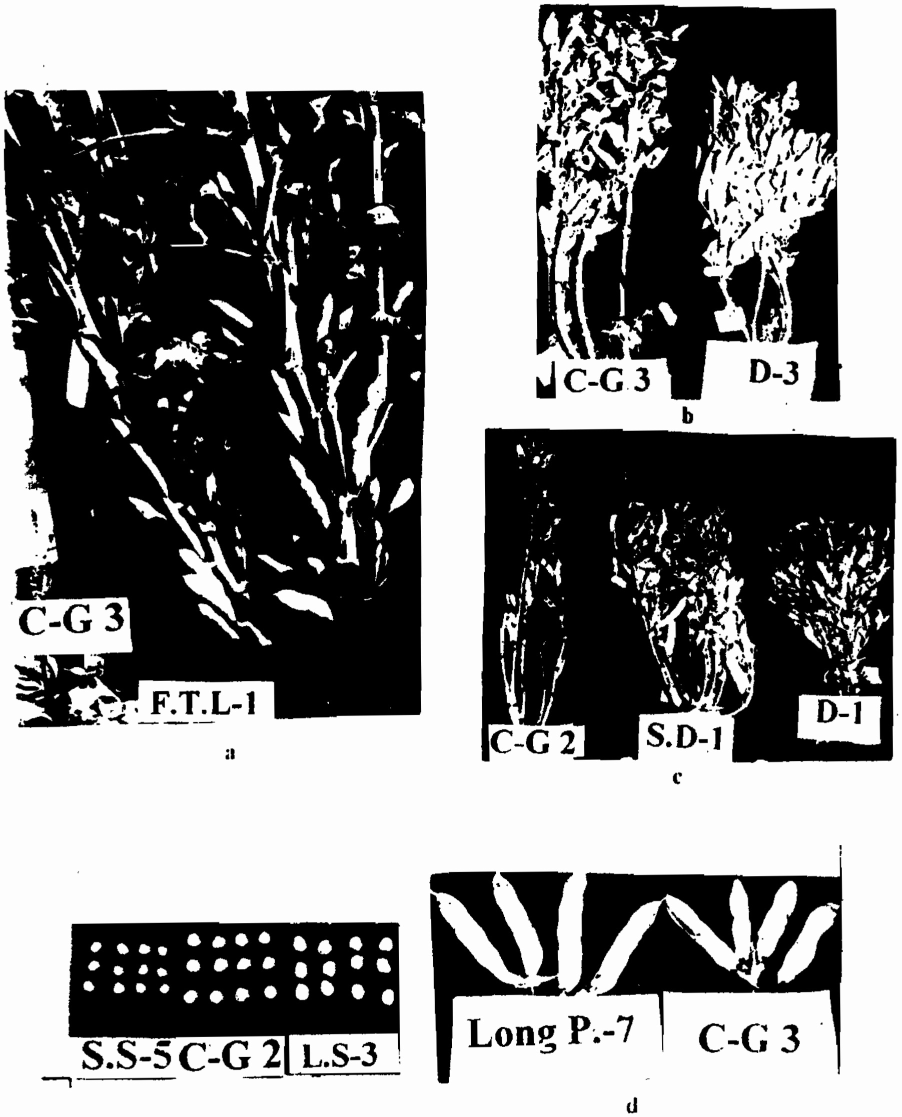

Figure 1: Mutant lines at M_3 generation, i.e., (a) Fire of tip leaf (F.T.L-1) from Improved Giza 3 . (b) Dwarf-3 from Giza 3, (c) Dwarf-1 and Semi dwarf-1 from Giza 2, (d) Long P.-7 from Giza 3 and (e) L.S-3 and S.S-5 from Giza 2 under normal soil condition.

Figure 2: Mutant lines at M_3 generation, i.e., (a) H.N.S-6 and H.N.S-10 from Giza 2, (b) H.N.B-8 and H.N.S-25 from Giza 3, (c) S.S-15 and L.F.P-6 from Giza 714 , and (d) H.S.Y-11 and H.N.B-19 from Giza 716 under saline soil condition.

Table (2): Type and number of mutant lines studied in M_2 and maintained in M_3 generation.

Mutant lines	Varieties									
	G-2		Improved G-3		G-714		G-716		Total	
	M_2	M_3	M_2	M_3	M_2	M_3	M_2	M_3	M_2	M_3
E.F	-	-	3	3	-	-	-	-	3	3
D	1	1	5	5	4	4	1	1	11	11
S.D	4	3	-	-	3	3	3	3	10	9
H.N.B	6	-	8	2	4	3	4	2	22	7
L.F.P	3	3	2	2	2	2	-	-	7	7
H.N.S	12	6	14	5	8	7	17	3	51	21
H.S.Y	5	3	1	-	1	1	4	2	11	6
He.S	3	1	4	3	1	1	-	-	8	5
Long P.	2	-	9	4	3	-	2	2	16	6
S.S	6	1	7	6	2	2	3	3	18	12
L.S	3	2	7	4	4	1	3	3	17	10
F.T.L	-	-	4	3	2	-	-	-	6	3
Total	45	20	64	37	34	24	37	19	180	100

Table (3): Number of mutants at M_2 and M_3 generations for different doses of γ-rays and sodium azide.

Mutagen and dose	Varieties								Total	
	G-2		Improved G-3		G-714		G-716			
	M_2	M_3	M_2	M_3	M_2	M_3	M_2	M_3	M_2	M_3
γ-30 Gy	10	3	10	10	9	7	6	3	35	23
γ-60 Gy	16	9	12	6	7	6	7	3	42	24
γ-90 Gy	4	2	10	3	2	2	3	1	19	8
γ-120 Gy	3	-	6	4	5	4	2	2	16	10
0.001 M	6	3	14	9	5	3	13	7	3	22
0.003 M	6	3	12	5	6	2	6	3	30	13
Total	45	20	64	37	34	24	37	19	180	100

which carrying the main characteristic feature of the mutant had recovered (Table 2). The stability of selected mutants at M_2 generation were studied at M_3 generation. All early flowering (E.F), dwarf (D), semi-dwarf (S.D) and low height of first pod (L.F.P) mutants at M_3 gave the same feature of it at M_2 generation. These mutants may be recessive mutants and controlled by one or two gene pairs only, as well as low effects of environmental conditions. Therefore, it could be possible to use these stable mutants directly as new varieties or in breeding programs. These results confirmed with Filippetti and Marzano, 1984; Soliman, 1984; Filippetti, 1988 and Hajduch et al., 1999. Many mutants segregated at M_3 generation especially high no. of branches/plant, high no. of seeds/plant and long pod mutants, but some of these mutants were stable and consider as promising line mutants for high seed yield. The present results appeared in coincidence with the fact that the seed yield and its attributed characters consider as a quantitative traits and subsequently large affected with environmental conditions and controlling with many gene pairs (polygenes). The present results confirmed with El-Kady, 1978; Vandana and Dubey, 1992 and Omar and Singh, 1997.

Fire of tip leaf mutants appeared in Improved Giza 3 and Giza 714 but stable in the most of it at M_3 generation only for Giza 3.This mutant considers as a marker gene for some important traits such as high no. of seed, high seed yield and high 100-seed weight. Eighty hundred morphological mutants were isolated on the basis of the performance of plants from sowing to harvesting at M_2 generation. The behavior of these mutants were studied at M_3 generation and showed that 100,stable mutants and others were unstable under saline and normal soil conditions. These stable mutants occurred under stress selection on the basis of seed yield and yield attributes characters under saline and normal soil conditions. The final mutant promising lines were recorded at (Table 4 and 5). The different responses of mother varieties and mutant lines under salinity were recorded as seed yield and its attribute's characters under normal and saline soil conditions were 28.97, 35.17, 12.64 and 12.13 for Giza 2 and Improved Giza 3 respectively. But severe decrease was reported of Giza 714 and Giza 716, i.e. 31.27 and 35.29 under normal and 4.68 and 6.37 under salinity conditions. Therefore the varieties Giza 2 and Improved Giza 3 consider as moderately tolerance and Giza 714 and Giza 716 moderately sensitive to salinity.

The response of final selected mutant lines for salinity was highly different (7.04 to 23.81 for seed yield/plant comparing with the range of mother varieties of final selected mutant lines under salinity was 4.68 to 12.64 under salinity soil condition).

Table (4): Means ± S.E for studied characters of promising mutant lines maintain at M_3 generation under salinity condition.

Mutant	Plant height cm.	First pod height cm.	No. of branches/ Plant	No. of pods/plant	No. of seeds/plant	100-seed weight	Seed yield /plant gm.
			Giza 2				
Control	50.00±2.89	21.67±6.68	1.67±0.33	7.33±2.19	20.00±7.22	70.01±16.62	12.64±3.75
H.N.S-6	45.00±0.00	15.00±0.00	1.33±0.33	14.67±0.33	31.00±2.31	57.36±9.60	17.53±0.38
H.N.S-10	58.33±3.33	23.33±1.67	2.67±0.33	9.33±1.20	16.33±1.77	63.35±16.22	10.68±2.48
L.S-1	46.67±1.67	16.67±3.33	3.00±0.58	14.33±1.20	31.00±5.57	49.58±14.31	14.64±2.02
			Giza 3				
Control	43.33±6.01	15.00±0.00	1.67±0.33	7.67±2.60	15.00±5.69	78.13±15.99	12.13±5.57
D-5	42.67±1.45	15.00±0.00	2.00±0.58	11.00±1.73	28.00±4.62	54.10±15.06	18.98±0.80
He.S-6	59.67±3.72	23.33±6.02	2.00±0.58	7.33±0.33	14.67±0.33	78.29±7.42	11.46±0.40
F.T.L-1	56.67±1.67	25.00±0.00	2.00±0.00	9.00±1.53	18.33±0.66	77.02±5.67	14.16±1.09
F.T.L-3	53.33±4.26	21.67±3.33	1.67±0.33	10.33±0.88	22.67±6.02	57.65±11.70	13.64±4.20
Long P.-5	58.33±4.38	17.33±1.45	2.00±0.58	11.33±0.66	28.67±2.03	76.16±20.70	21.40±2.36
Long P.-7	55.00±5.01	23.33±1.67	2.00±0.00	8.67±2.34	24.33±4.06	99.34±9.48	23.81±3.17
S.S-9	48.33±1.67	20.00±0.00	2.33±0.33	9.67±2.60	27.33±5.79	72.08±3.42	19.93±4.71
L.S-7	55.00±2.89	21.67±1.67	2.33±0.33	8.33±1.20	16.33±1.76	81.05±1.62	13.39±1.41
L.S-8	67.33±1.45	26.67±6.02	2.33±0.33	9.67±1.20	20.67±5.93	75.23±19.74	14.80±3.60
E.F -2	45.00±2.89	13.33±1.67	2.00±0.58	5.33±0.76	16.33±1.20	89.70±8.49	14.53±0.32

Cont. (4):

Mutant	Plant height cm.	First pod height cm.	No. of branches/ Plant	No. of pods/plant	No. of seeds/plant	100-seed weight	Seed yield /plant gm.
				Giza 714			
Control	40.00±2.89	20.00±2.89	1.67±0.88	7.67±2.4	8.67±2.67	42.08±8.41	4.68±1.47
S.D-5	45.00±2.89	16.67±1.67	2.00±0.58	4.67±0.88	11.00±2.09	65.37±20.01	7.04±1.76
S.D-6	50.00±2.89	16.67±1.67	2.33±0.33	8.33±1.45	18.33±2.34	61.29±5.48	11.10±0.95
H.N.B-16	50.00±0.00	15.00±0.00	2.67±0.33	8.67±0.33	20.00±1.15	95.87±4.93	11.91±0.13
L.F.P-6	43.33±1.67	16.67±1.67	1.33±0.33	7.00±1.00	15.00±1.53	64.87±20.59	9.38±0.69
H.S.Y-7	48.33±4.41	16.67±1.67	2.33±0.33	5.67±2.03	15.00±4.73	92.67±61.78	11.51±2.38
S.S-15	53.33±5.33	21.67±1.67	2.00±0.00	7.67±0.88	17.33±1.20	63.36±5.82	10.92±0.52
				Giza 716			
Control	35.00±0.00	15.00±0.00	1.33±0.33	5.67±0.33	13.67±1.20	48.69±22.8	6.37±1.25
S.D-8	48.33±3.33	18.33±3.33	1.67±0.66	5.67±2.34	10.67±3.67	67.87±1.67	8.16±2.82
S.D-10	61.67±6.68	20.00±5.01	2.00±1.15	6.67±2.91	17.67±7.46	60.07±11.39	10.86±5.28
H.N.B-19	48.33±3.33	20.00±5.01	2.00±0.58	6.33±1.45	15.33±4.34	77.65±9.63	11.53±2.54
H.S.Y-8	41.67±4.41	16.67±4.41	1.33±0.33	6.67±2.19	13.67±5.18	73.84±14.09	9.33±2.47
H.S.Y-11	46.67±1.67	20.00±0.00	1.67±0.33	8.67±2.73	21.33±5.90	77.75±8.58	16.17±3.76
L.P.-16	51.67±3.33	23.33±3.33	1.33±0.33	7.33±1.20	19.00±2.64	65.17±7.46	12.56±2.46
S.S-17	45.00±2.89	18.33±1.67	3.33±0.33	9.00±0.58	25.67±1.45	67.93±3.96	17.42±1.08
L.S-15	63.33±4.41	28.33±3.33	1.67±0.33	6.67±2.60	16.67±5.46	79.39±2.99	13.15±4.31
$L.S.D_{0.05}$	9.30	6.32	0.79	4.44	11.07	27.16	7.68
$L.S.D_{0.01}$	12.37	8.40	1.06	5.90	14.72	36.12	10.21

Table (5): Means ± S.E for studied characters of promising mutant lines maintain at M_3 generation under normal condition.

Mutant	Plant height cm	First pod height cm.	No. of branches/ Plant	No. of pods/ plant	No. of seeds/ plant	100-seed weight gm.	Seed yield /plant gm.
				Giza 2			
Control	52.22±1.69	18.89±1.39	4.78±0.28	14.76±1.41	35.78±4.03	81.98±3.17	28.97±3.04
S.D-1	51.67±2.04	15.22±1.60	4.55±0.75	20.00±2.20	46.78±4.46	89.55±9.00	41.57±5.77
S.D-3	52.22±1.88	13.22±1.12	6.00±0.67	17.67±2.05	48.67±5.92	76.39±3.54	37.46±5.06
H.N.S -4	65.00±3.44	13.33±1.67	4.33±0.50	18.33±1.31	49.67±3.21	81.45±2.75	40.48±3.11
H.N.S -8	55.00±2.36	13.33±0.83	6.22±0.72	17.78±2.06	45.22±5.86	89.17±4.60	39.61±4.84
H.N.S -9	53.33±1.86	14.44±2.12	5.00±0.53	18.00±4.17	43.33±10.07	85.13±2.99	37.35±9.74
H.N.S -10	57.22±2.78	16.11±1.11	4.78±0.43	16.22±2.07	31.11±3.64	95.39±4.19	28.97±2.94
S.S-4	66.11±3.31	17.44±1.44	6.33±0.50	24.56±2.57	61.89±5.11	73.58±4.0	45.42±4.29
L.S-1	57.78±1.21	13.33±3.00	5.67±0.87	21.44±2.39	45.78±5.66	93.27±4.69	42.00±4.49
L.S-2	60.56±1.00	16.11±2.00	5.00±0.62	7.89±1.87	51.78±5.56	88.23±2.50	45.49±4.71
				Giza 3			
Control	61.11±1.62	22.78±0.88	5.44±0.44	15.00±1.20	38.22±4.11	94.18±3.95	35.17±2.93
D-3	56.67±2.64	15.56±1.3	4.78±0.74	15.00±2.37	39.44±5.57	100.55±6.57	47.15±7.89
F.T.L-1	61.11±2.32	26.67±1.67	5.78±0.57	17.33±1.39	43.67±4.64	99.77±2.41	43.76±4.97
Long-P-7	62.78±1.69	18.33±1.18	6.78±0.55	13.44±1.30	36.56±3.72	118.61±6.40	42.14±3.03

Cont. (5):

Mutant	Plant height cm	First pod height cm.	No. of branches/ Plant	No. of pods/ plant	No. of seeds/ plant	100-seed weight gm.	Seed yield /plant gm.
				Giza 714			
Control	60.00±2.76	22.78±1.21	5.44±0.58	12.33±1.61	32.44±3.50	98.86±5.85	31.27±3.08
D-7	47.22±2.37	17.22±1.47	3.44±0.41	17.56±2.99	45.56±5.79	78.23±2.87	35.73±4.79
S.D-7	54.44±2.27	19.44±0.56	4.67±0.41	14.89±1.07	38.67±3.40	92.96±4.13	36.11±3.66
L.F.P-6	55.00±2.36	20.00±1.44	4.11±0.48	17.11±1.68	45.22±4.68	85.13±2.36	38.59±4.35
H.N.S-29	59.44±1.30	19.44±1.00	4.44±0.58	18.11±1.32	47.44±3.91	82.78±4.10	39.37±3.90
H.N.S-32	53.33±2.50	14.44±1.30	5.22±0.68	18.78±1.21	40.33±2.92	89.10±3.08	35.57±2.18
H.S.Y-7	57.22±1.69	17.78±1.47	3.67±0.37	13.00±1.20	40.44±3.21	82.22±2.84	33.33±3.01
S.S-15	64.44±2.56	21.11±2.00	5.44±0.44	20.22±1.98	50.00±4.81	81.71±4.96	41.34±5.19
L.S-12	63.33±2.36	20.00±1.44	4.56±0.38	15.11±1.74	40.78±4.20	103.43±2.7	41.86±4.05
				Giza 716			
Control	64.44±2.27	26.11±1.62	4.89±0.39	13.11±1.06	37.78±2.85	94.14±4.19	35.29±2.53
H.N.S-50	62.22±2.37	21.11±2.17	5.22±0.68	15.44±2.14	41.11±6.27	92.36±2.89	37.49±5.33
L.S-17	56.67±1.18	25.00±1.18	7.00±0.44	16.22±1.43	35.11±3.62	111.13±4.23	38.58±3.71
$L.S.D._{0.05}$	6.29	4.32	2.68	2.32	7.69	11.76	8.03
$L.S.D._{0.01}$	14.71	5.76	3.58	3.09	10.23	15.68	10.68

These differences were recorded also for yield attributes characters, i.e., 100-seed weight, no. of seeds/plant, no. of branches/plant, no. of pods/plant and plant height (Table 4). Wide difference between stable mutant lines is penfit for selection of salt tolerance lines. H.N.S-6 mutant line considers as promising line induced from Giza 2 variety. It has seed yield and other economic characters larger than the mother variety. Elite promising mutant lines were recorded in Improved Giza 3 namely Long p. -7 and Long p.-5. These mutants gave twice seed yield than the control under salinity, as well as for other important characters. D-5 mutant alone from dwarf and semi-dwarf groups possessed higher seed yield than the mother Improved G-3 variety. These promising mutants consider a very important for breeding of salt tolerance and development of salt tolerant new variety, especially Improved Giza 3 (mother variety) which showed more adaptability than other Egyptian varieties in most different soils and environmental conditions. The stable mutants from Giza 714 gave twice seed yield than the mother variety, but no increase of the Giza 2 and Improved Giza 3 under salinity. These results showed that the choose of mother varieties for induction of salt tolerant mutants should be possess a higher salinity tolerance between pool genotypes and confirmed that the genetic controlling of salt tolerance depends mainly upon polygene inheritance (Mysklyakov.

1987). Which gave 17.42 grams in comparison for mother variety, that gave 6.37gm. Also this mutant possessed over attributes than the mother variety.

Contrary results were recorded belong dwarf and semi-dwarf group which possessed promising mutant lines under normal soil condition. S.D-1 from Giza 2 which higher seed yield (41.57) than mother variety (28.97) and D-3 from improved Giza 3 possessed a higher seed yield than the other promising mutant lines for all treated varieties S.D-7 mutant line from Giza 714 was promise also. Peliotropic effect of dwarf gene was recorded in these mutants. This gene not only affects plant height, but also affect the seed yield components especially seed and pod shape. These results appeared in agreement with finding of Vik, 1964; Soliman. *et al.*. 1993; Kharkwal, 2000; Ramesh,et al. 2001; Silva *et al.*, 2001and Wani *et al.*, 2001.Elite promising mutant lines, with high seed yield and related traits under both (saline and normal) conditions, namely L.S-1 from Giza 2. L.F.P-6 and S.S-15 from Giza 714 were recorded. Long P-7 promising mutant line consider as a very important genotype from all mutants and mother varieties under study. especially under saline condition and normal soil also. This mutant could be directly used to produce a new variety programs.

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استحداث طفرات تتحمل الملوحة فى الفول البلدى
ا-الطفرات المبشرة تحت ظروف التربة الملحية والطبيعية.

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أجرى هذا البحث بمحطة البحوث الزراعية بالجميزة- أعوام ١٩٩٩/٢٠٠٠،٢٠٠٠/٢٠٠١،٢٠٠١/٢٠٠٢ بهدف استحداث طفرات تتحمل الملوحة فى الفول البلدى. أستخدم مطفران هما أشعة جاما(٣٠و٦٠و٩٠و١٢٠جراى)، صوديوم آزيد NaN_3(٠,٠٠١ – ٠,٠٠٣ مول عند PH ٣) وذلك على أربعة أصناف من الفول البلدى وهى: جيزة ٢ ،جيزة ٣ محسن، جيزة ٧١٤، جيزة ٧١٦ وكانت النتائج كالتالى:-
أ-فى الجيل الثانى الطفرى شوهد ت تغيرات واضحة فى الصفات المورفولوجية وصفات المحصول وشكل البذرة وتم انتخاب ١٨٠ طفرة.
ب- لوحظ أن هناك ثبات وراثى فى الجيل الثالث لطفرات التبكير فى التزهير ،والتقزم و شبه التقزم ، وانخفاض ارتفاع أول قرن على الساق، ومن الأرجح أن هذه الصفات يتحكم فيها زوج واحد أو أثنين من الجينات المتنحية وتتأثر بدرجة قليلة بالظروف البيئية.
تم الحصول على ٥ سلالات طفرية مبشرة تحت ظروف الزراعة فى التربة الملحية وهى: سلالة H.N.S-6 من الصنف جيزة ٢ ، سلالات Long p.-7,Long p.-5,D-5 من الصنف جيزة ٣ محسن و سلالة S.S-17 من الصنف جيزة ٧١٦، وتعتبر هذه الطفرات مهمة جدا فى مجال التربية لمقاومة الملوحة وخاصة الطفرات المنتخبة من الصنف جيزة ٣ محسنو على النقيض من ذلك كانت طفرات التقزم وشبه التقزم هامة جدا تحت ظروف التربة العادية وطفرة S.D-1 من صنف جيزة ٢، طفرة D-3 من صنف جيزة ٣ محسن وطفرة S.D-7 من صنف جيزة ٧١٤، اتضح وجود تعدد الأثر peliotropic effect لجين التقزم فى هذه السلالات الطفرية حيث لا يؤثر هذا الجين على طول النبات فقط بل تؤثر على مكونات المحصول خاصة شكل البذرة و القرن . أكثر من ذلك انتخبت ٤ طفرات مبشرة ممتازة ذات صفات محصول بذور عالى تحت ظروف التربة الملحية وظروف التربة العادية وهى : سلالة L.S-1 من الصنف جيزة ٢ ، سلالتين L.F.P-6 ,S.S-15 من الصنف جيزة ٧١٤ و سلالة Long P.-7 من الصنف جيزة ٣ محسن.
وتعتبر السلالة الأخيرة (Long P.-7) أفضل السلالات من حيث التركيب الوراثى مقارنة بالسلالات الأخرى والأصناف تحت الدراسة وخاصة تحت ظروف الملوحة و كذلك الظروف الطبيعية و لذلك يمكن إدخال هذه الطفرة فى تجارب مقارنة المحصول المبكرة لاعتمادها كصنف جديد يتفوق فى المحصول تحت الظروف الملحية و الطبيعية.