Effect of foliar application of zinc on some new genotypes of faba bean.

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Abstract

The study was carried out to determine the effect of foliar application of zinc sulphate (Zero,0.4% and 0.8%) on four new pure lines of faba bean as well as the check variety i.e (Shebeen El-Koom 1, Moshtohor 5,8,40 and Giza 3). The characters studied were plant height (cm), number of branches/plant, number of pods/plant, number of seeds/pod and per plant, weight of pods/plant (g), weight of 100 seed (g), weight of seeds/plant (g) and seed yield/(kg/fed).

The results indicated that there were significant differences between foliar application of zinc sulphate treatments in all traits studied in the first season, the second season and the combined analysis except number of branches/plant and number of seeds/pod in the first season only.

The differences among genotypes were significant for all the studied traits in separate season as well as the combined analysis except number of seeds/ pod, number of seeds/plant and weight of seeds/plant in the first season, plant height, number of branches/plant , number of pods/plant, number of seeds/ plant, weight of pods / plant, 100-seed weight and weight of seeds/plant in the second season and number of branches/plant, 100-seeds weight and weight of seeds / plant in the combined analysis. The highest mean value for seed yield/fed were was recorded by G3 followed by Moshtohor 5 without significant in separate season and the combined analysis.

Insignificant effect of interaction between genotypes and foliar application of zinc sulphate was detected for all traits except number of seeds/plant, weight of pods/plant and seed yield/fed in the combined analysis. The highest seed yield/fed was obtained from Moshtohor 5 when plants received 0.8% foliar zinc application .

Significant positive phenotypic correlation values were detected between seed yield/fed and each of other traits in the combined analysis.

The direct effect of seed yield/plant, indirect effect of seed yield/plant through number of seeds/plant and through number of pods/plant were count for approximately 89.91% of seed yield/fed variation.

Introduction

Faba bean *(Vicia faba L.)* is an important feeding crop grown in winter season . It's seed not only provide a cheep source of protein but also a food of high calorific and nutritive value especially in the diet of low income people . Egyptian Government is pressing hard to increase the yield and quality of faba bean plant through improving agricultural practices such as fertilization with macro and micronutrients and new pure lines selection.

Studies on the effect of foliar application and soil application of zinc on yield and yield components of broad bean plants reported different results (farrag, 1978; farrag, et al, 1981, Farrag, et al, 1983; Gomaa, et al , 1986; Allam, 1993; Ahmed and Zaki, 1994 and Hassanein and Ahmed, 1996).

Many investigators had reported high variability among faba bean genotypes and varieties for growth characters, yield and yield components (El-Hosary, 1981;El-Mott, 1982; Naidu, et al, 1984; Salwau and El-Hosary, 1989; El-Hosary and Sedhom, 1990; Dawwam and Abdel-Aal , 1991; and Gomaa, 1996).

The purpose of this study was to evaluate the effect of foliar application of zinc sulphate on yield and yield components of four new pure lines and the check variety of faba bean in the south Delta region of Egypt.

Materials and Methods

This study was conducted in the Research and Experimental Center of the Faculty of Agriculture at Moshtohor, during the two successive growing seasons 1995/96 and 1996/97. Four new pure lines of faba bean i.e. (Shebeen I, Moshtohor 5,8 and 40) and the check variety Giza 3 were evaluated to foliar application of zinc sulphate. The soil type was clay loam with pH 7.8 and contained 1.23 ppm of zinc. The preceding crop was corn in both seasons. The pedigree and origin of the new pure lines are shown in Table (1)

Table (1) : Pedigree and origin of the four faba bean lines used in this work:

Pure line	Pedigree	Origin
Shebeen El-Koom 1	Giza 1 x Pakistani	Shebeen El-Koom
Moshtohor 5	NEB 319 x 131	Moshtohor
Moshtohor 8	NEB 319 x 131	Moshtohor
Moshtohor 40	Aquodols x Giza 2	Moshtohor

Split plot design with three replications was used in the two seasons. The foliar application of zinc sulphate were assigned at random in the main plots. Faba bean genotypes were arranged at random in sub-plots .The treatments were as follows (A) foliar application of zinc (Zero, 0.4%,0.8%Zn So_4) Foliar application of zinc was sprayed at 50 days after sowing. The spray volume was 400 l/fed (B) Faba bean genotypes (Shebeen 1, Moshtohor 5,8 , 40 and Giza3).

Each sub, plot consisted of five ridges 3.5 m long and 60 cm apart (10.5m^2) . Planting was carried out on 9th Nov. 1995/96 and 19th Nov. 1996/97 seasons. Calcium super phosphate (15.5% P_2O_5) at a rate of 100 kg/fed was applied befor sowing. Other cultural practices were followed as recommended.

At harvest, ten guarded plants were taken at randon from the central ridges to estimate plant height (cm), number of branches/plant, number of pods/plant, number of seeds/pod, number of seeds/plant, weight of pods/ plant (g) , weight of 100-seed (g) and seed yield /plant (g) . Seed yield kg/fed was determined from the three central ridges. Susceptibility index for foliar application of zinc was calculated independently for each of 0.0% and high rate 0.8% Zn so_4 from origin data for seed yield/fed. The origin data from each replicate were transformed before analysis using a generalized formula (Ali Dib et at 1990).

Foliar susceptibility index (FSI) = (Yi – Yni)/Yi

were Yi and Yni are the seed yield of foliar and non-foliar plants, respectively.

Data for each season were subjected to the analysis of variance procedure (Snedecor and Cochran, 1981). Combined analysis was done for the data of both seasons , when the homogeneity test was not significant, according to (Cochran and Cox, 1957), simple correlation coefficients and path analysis

were calculated using the method given by Wright (1921, 1923 and 1934). Duncan's (1955) multiple range lest was used for comparison between means.

Results and Discussion

A-Effect of growing season.

Results in Table (2) show that the seasonal effect was significant for all traits under study except number of branches plant. Higher mean values for all characters were detected in the first season except plant height. It could be concluded that the increase of seed yield and other characters in the first season may be due to early planting date accompanied with low percentage for choclate spot and rust disease.

Table (2) Mean values of seasonal effect.

Season	Plant height cm	No. of branches /plant	No. of pods /plant	No. of seeds / pod	No. of seeds/ Plant	wt. of pods /plant g	wt. of 100-seed g	wt. of seeds/ plant g	Seed yield kg/fed
1995/96	78.73b	3.28a	14.99a	3.19a	47.75a	30.78a	58.64a	27.94 a	1496.1a
1996/97	87.74a	3.21a	13.78b	3.11a	41.23b	24.78b	56.53b	23.74 b	1307.1b

B-Effect of zinc level.

Data in Table (3) indicate clearly that there were no significant differences in the number of branches per plant and number of seeds per pod in the first season. However, the other traits significant increase by increasing level of zinc sulphate as foliar application in both seasons as well as the combined analysis. The maximum values of seed yield per plant and per fed were 31.35g and 1657.3 kg, respectively, and were obtained when plants received 0.8% zinc sulphate. Seed yield per fed significantly increased by increasing zinc level from 0.0 to 0.8% (Table 3) . The increase in seed yield/fed was 17.33% and 41.30% when

Table(3)Effect of foliar zn application on yield and yield components of faba bean in both seasons as well as combined analysis.

Zinc level	Plant height cm	No.of branches /plant	No.of pods/ plant	No.of seeds/ pod	No.of seeds /plant	wt.of pods/ plant g	wt.of 100-seed g	wt.of seeds/ plant g	Seed yield Kg/fed
1995/96 season									
Zero	75.37c	3. a	13.33c	3.13 a	41.72c	26.52c	56.35b	23.50c	1294.6c
0.4%zn	78.44b	3.29 a	15.22b	3.18 a	48.40b	31.70b	59.34a	28.56b	1531.4b
0.8%zn	82.38a	3.38 a	16.44 a	3.28 a	53.15a	34.13a	60.23a	31.67a	1662.3a
1996/97 season									
Zero	80.53c	2.91 b	12.35c	2.86 b	33.57c	20.48c	53.55c	18.40c	1049.8c
0.4%zn	88.41b	3.26 a	13.71b	3.20 a	41.29b	24.13b	56.48b	21.80b	1219.4b
0.8%zn	94.30a	3.46 a	15.30a	3.27 a	48.84a	29.73a	59.56a	31.02a	1652.3a
Combined									
Zero	77.95c	3.04 c	12.84c	3.00 b	37.84c	23.50 c	54.95c	20.95c	1172.2c
0.4%zn	83.42b	3.27 b	14.46b	3.19 a	44.84b	27.92b	57.91b	25.22b	1375.4b
0.8%zn	88.34a	3.42 a	15.87a	3.28 a	51.00a	31.93a	59.90a	31.35a	1657.3a
Fxs	* *	* *	n.s	* *	n.s	*	n.s	* *	* *

faba bean plants were sprayed by 0.4% and 0.8% zinc sulphate relative to control respectively in the combined analysis.

From these results it could be concluded that zinc played an important role in metabolic processes and in turn affected the plant growth. Also the increased zinc sulphate than 0.8% may increase plant growth whereas this percentage gave the highest values for all traits under test. The same results were previously

obtained by Farrag, 1978; Farrag, *et al*, 1981, Farrag, *et al*, 1983; Gomaa, *et al* , 1986; Allam, 1993; Ahmed and Zaki, 1994 and Hassanein and Ahmed, 1996).

C.Effect of genotypes:-

The differences among genotypes were significant for all the studied traits in separate season as well as the combined analysis except number of seeds/ pod and per plant and weight of seeds/plant in the first season, plant height, number of branches/plant, number of pods/plant, number of seeds/plant, weight of pods/plant, weight of 100 – seed and seed yield/plant in the second season and number of branches/plant, weight of 100-seed and seed yield/plant in the combined analysis (Table 4).

In the combined analysis, Moshtohor 5 gave the highest mean values for plant height , number of branches/plant , number of pods/plant, weight of pods/ plant, seed yield/fed and foliar susceptibility index (FSI) for zinc levels. Moshtohor 5,8 and G3 had the highest values for plant height , number of pods/plant and weight of pods/plant in the combined analysis. Also , Moshtohor 5,8,40and G3 gave the highest values for number of seeds/plant. The highest mean values for seed yield/fed were recorded by G3 followed by Moshtohor 5. The high seed yield/fed of both genotypes could be attributed to the high seed yield/plant and some of its components and may be due to the high number of survival plants till harvest .For (FSI) the two lines Moshtohor 40 followed Moshtohor 8 gave the best genotypes for low foliar zinc (zero).Previous studies came to similar results (El- Hosary , 1981 ; El-Mott, 1982; Naidu, et al , 1984; Salwau and El-Hosary, 1989; El-Hosary and Sedhom, 1990; Dawwam and Abdel-Aal , 1991; and Gomaa, 1996).

Tabel (4) Effect of genotypes on yield and yield components of faba bean in both seasons as well as combined analysis.

Genotypes	Plant height cm	No.of branches /plant	No.of pods / plant	No.of seeds / pod	No.of seeds/ plant	wt.of pods / plant g	wt.of 100– seed g	wt.of seeds / plant g	Seed Yield (kg/fed)	FSI
1995 / 96 season										
Shebeen 1	78.55ab	3.13 b	14.27b	3.22 a	45.99a	29.53b	60.84 a	27.77a	1473.6bc	0.20b
Moshtohor 5	82.08a	3.51 a	15.60a	3.08 a	48.33a	32.15a	59.07 a	28.36a	1520.5ab	0.30a
Moshtohor 8	78.50ab	3.23 b	15.31a	3.17 a	48.41a	32.88a	58.86 a	28.43a	1495.4ab	0.19b
Moshtohor 40	75.35 b	3.14 b	14.68b	3.28 a	47.27a	29.84b	55.89 b	26.59a	1440.3c	0.19b
Giza 3	79.35 a	3.38 a	15.12b	3.23 a	48.78a	29.51b	58.54a	28.54a	1550.8a	0.19b
1996 / 97 Season										
Shebeen 1	86.08 a	3.18 a	13.22 a	3.05 b	39.34 a	23.05 a	56.02 a	23.31 a	1285.2b	0.35bc
Moshtohor 5	88.02 a	3.23 a	14.16 a	2.9 c	40.50 a	26.06a	57.73 a	24.22 a	1343.8a	0.46 a
Moshtohor 8	91.60 a	3.16 a	13.96 a	3.10 b	42.39 a	25.32 a	56.93 a	23.54 a	1279.2b	0.32 c
Moshtohor 40	87.24 a	3.30 a	12.98 a	3.17 b	40.87 a	24.14 a	56.35 a	22.13 a	1257.5c	0.27 d
Giza 3	85.80 a	3.16 a	14.61 a	3.34 a	43.72 a	25.33 a	55.63 a	25.50 a	1370.2a	0.39 b
Combined										
Shebeen 1	82.32 b	3.16 a	13.75 c	3.13 b	42.67 b	26 .29 b	58.43 a	25.54 a	1379.4b	0.28 bc
Moshtohor 5	85.05 a	3.37 a	14.88 a	2.99 c	44.42ab	29.11 a	58.40 a	26.29 a	1432.2a	0.38 a
Moshtohor 8	85.05 a	3.10 a	14.63ab	3.13 b	45.4o a	29.10 a	57.90 a	25.98 a	1387.3b	0.26 c
Moshtohor 40	81.30 b	3.22 a	13.83 b	3.23 ab	44.07ab	26.99 b	56.12 a	24.36 a	1348.9c	0.23 d
Giza 3	82.47 a	3.27 a	14.86 a	3.28 a	46.25 a	27.42ab	57.09 a	27.02 a	1460.5a	0.29 b
Geno x s	* *	*	n,s	n.s	n.s	n.s	n.s	n.s	n.s	n.s

D- Effect of interaction

Table (3) shows that the effect of interaction between foliar application of zinc sulphate and season were significant for all traits except number of pods / plant, number of seeds / plant and weight of 100 – seed. These results indicate

that response of these traits to foliar zinc sulphate application in the two seasons were different.

Table (4) shows that the effect of the interaction between genotypes and seasons was statistically insignificant for all traits except plant height and number of branches/plant. This result indicates that genotypes performance was constant from season to season .For the exceptional both traits, significant effect of this interaction, revealed that the tested genotypes ranked differently from season to season. Mohtohor 5 had the highest values for both traits in the first season. While, Moshtohor 8 and 40 gave the highest values in the second season for plant height and number of branches/plant, respectively.

Insignificant effect of interaction between genotypes and foliar zinc sulphate was obtained for all the studied traits except number of seeds / plant, weight of pods/plant and seed yield/fed in the combined analysis (Table 5). This result indicates that the genotypes responded similarly to the different foliar zinc sulphate. For the three exceptional traits, significant interaction indicates that factors were not independent of one another, the simple effects of a factor differ and the magnitude of any simple effect depends upon the level of the other factor of the interaction term. Where factors interact, a single factor experiment will lead to disconnect and possibly misleading information. For number of seeds/plant, Moshtohor 40 gave the highest number followed by G3 at zero of zinc sulphate, while all genotypes gave similar number of seeds at 0.4% zn. However, the genotype Moshtohor 5 had the highest number of seeds/plant followed by Moshothor 8 and then by Moshtohor 40 at 0.8% zn. For all genotypes the highest values were detected at 0.8% zn followed by 0.4% zn .The significant of this interaction may be a difference in magnitude of response of

Table (5) Effect of the interaction between foliar Zn application and genotypes on number of seeds/plant, weight of pods/plant and seed yield /fed of faba bean in the combined analysis..

Genotypes / **Zn level**	**Shebeen 1**	**Moshtohor 5**	**Moshtohor 8**	**Moshtohor 40**	**Giza 3**
Number of seeds/ plant					
Zero zn	36.19B ab	36.0 1 C b	38. 07Cab	40 ,25 C a	38.68C ab
0.4% zn	45.71 A a	43.60 B a	45.07 B a	46.07 B a	43.76 B a
0.8% zn	46.10 A b	53.63 A a	53.06 A a	52.43 A a	49.76A ab
weight of pods / plant (g)					
Zero zn	22,68B ab	21.90C b	24.59C ab	23.23 C ab	25.09B a
0.4% zn	26.76A b	30.36B a	29.01B ab	26.80 B b	26.64AB b
0.8% zn	29.43A cd	35,06A a	33.69A ab	32.23 A abc	29.23A d
seed yield (kg/fed)					
Zero zn	113.2C cd	1117.7C d	1185.7C b	1250.8C a	1175.7C bc
0.4% zn	1430.3B a	1383.6B ab	1378.0B b	1345.0B b	1340.2B b
0.8% zn	1576.8Abc	1795.3 A a	1598.2A b	1785.7A a	1530.8A c

each genotype to different levels of foliar zinc sulphate (Table .5). For weight of pods / plant , G3 gave the highest weight followed by Moshtohor 8 and then by Moshtohor.40 at zero foliar of zinc sulphate , Whereas, Moshtohor 5 gave the

highest value followed by Moshtohor 8 at 04% and 0.8%. For all genotypes the highest values were detected at 0.8% Zn followed by 0.4%. Zn. (Table.5).

For seed yield/fed the highest value was obtained from Moshtohor 5 when plants received 0.8% zinc sulphate followed by Moshtohor 40 in same treatment of zinc sulphate (Table.5).

From the previous results, it could be concluded that 5 and 0.8% zinc sulphate is almost the optimal combination under the conditions of this study.

E-Correlation study

1. Simple phenotypic correlation

The simple correlation coefficients between each two traits were estimated in the combined analysis. The association between seed yield / fed and main yield components gives very useful information for the plant breeder who wants to incorporate desirable characters.

Table (6) shows significant positive phenotypic correlation values between seed yield / fed and each of other traits in the combined analysis .

Table(6)Correlation coefficient between yield and yield component of faba bean combined over the two growing seasons 1995/96 and 1996/97.

Yield Components	No. of pods/ plant	No. of seeds/ pod	No of seeds / plant	wt. of pods/ plant (g)	wt. of 100-seed (g)	wt. of seeds/ plant(g)	seed yield kg/fed
No. of pods/ plant	1.00	0.57*	0.96**	0.94**	0.73**	0.93**	0.93**
No. of seeds/ pod		1.00	0.74**	0.54*	0.44	0.67**	0.68**
-No. of seeds/ plant			1.00	0.93**	0.72**	0.95**	0.95**
-wt. of pods/ plant (g)				1.00	0.80**	0.92**	0.92**
-wt. of 100 seed(g)					1.00	0.84**	0.83**
-wt. of seeds /plant(g)						1.00	0.99**

Therefore., selection for each of higher number of pods or seeds/plant, number of seeds/pod, 100-seed weight, weight of pods / plant and seed yield/ plant is more effective for obtaining new higher yielding varieties.

Significant positive correlation coefficient values were detected between seed yield/plant and each of 100 – seed weight, weight of pods/plant, number of seeds/plant , number of seeds/pod and number of pods/plant at the combined over two seasons. These results indicate that high seed yield/plant would be due to increasing number of seeds/pod and per plant, number of pods/plant and 100-seed weight.

Significant positive correlation coefficients were detected between 100 – seed weight and each of number of pods/plant , number of seeds/pod and per plant and weight of pods/plant . This result indicates that of selection for high number of pods or seeds/plant and weight of pods/plant would be due to increasing heavy 100 – seed weight.

Significant positive phenotypic correlation coefficient values were found between weight of pods/plant and each of number of seeds/pod and per plant

and number of pods/plant . High weight of pods/plant might be accompanied by higher number of seeds/pod or plant and number of pods/plant .

Significant positive correlation values were showed between number of seeds/plant and each of number of seeds/pod and number of pods/plant . Increasing of seeds/plant may be accompanied by higher number of seeds/pod and number of pods/plant , that is logic .

Significant positive correlation value was detected between number of seeds/pod and number of pods/plant . This result indicates that selection for high number of seeds/pod would be accompanied by high number of pods/plant.

2. path coefficient.

Partitioning of simple correlation coefficients between seed yield /fed and some other yield components at the combined analysis are presented in Table (7).

Seed yield / plant had the most direct effect on seed yield / fed followed by direct effect of number of seeds/plant. However , the other direct effects were not effective on yield of faba bean . Also, indirect effects were of little importance for seed yield/fed.

Table (7) Direct and indirect effect of some yield attributes to faba bean yield over two seasons.

Yield Components	No. of pods/ plant	No. of seeds/ pod	No of seeds / plant	wt. of pods/ plant (g)	wt. of 100 seed (g)	wt. of seeds/ plant(g)	Seed yield (kg/fed)
- No. of pods/ Plant	-0.061	-0.007	0.080	-0.002	-0.026	0.94	0.93**
- No. of seeds/pod	-0.034	-0.012	0.062	-0.001	-0.015	0.68	0.68**
- No. of seeds/plant	-0.058	-0.009	0.084	-0.002	-0.025	0.96	0.95**
-wt. of pods /plant (g)	-0.057	-0.007	0.078	-0.002	-0.028	0.94	0.92**
- wt.of 100-seed (g)	-0.040	-0.005	0.061	-0.001	-0.035	0.85	0.83**
- wt. of seeds /plant (g)	-0.056	-0.008	0.080	-0.002	-0.029	1.00	1.00**

The coefficient of determination one are calculated for the direct effects of the six factors studied and transformed into percentages in order to evalnate these factors as to their importance as sources of variation in seed yield /fed. The combined analysis are prsented in Table (8) . From this table it could be conclded that the most important sources of variation in seed yield /fed . The direct effect of seed yield/plant followed by indirect effect of seed yield/ plant through number of seeds/plant and indirect effect of seed yield / plant through number of pods/plant .

The three previous factors constituted for 89.91% of seed yield/fed variation at the combined analysis . Other sources of variation are negligible as shown in table (8).

Table (8) Direct and indirect effect of some yield attributes to faba bean yield over two seasons.

Source of variation	C.D	RI%
- Direct effect of No. of pods/plant	0.003721	0.2628
Indirect effect via No. of seeds /pod	0.0008344	0.0589
Indirect effect via No. of seeds/plant	-0.0098380	0.6948
Indirect effect via wt. of pods / plant	0.0002293	0.0161
Indirect effect via seed index	0.0031171	0.2201
Indirect effect via seed yield / plant	-0.11346	8.0139
- Direct effect of seeds/pod	0.000144	0.0101
Indirect effect via no. of seeds /plant	-0.0014918	0.1053
Indirect effect via wt. of pods / plant	0.0000259	0.0018
Indirect effect via seed index	0.0003696	0.0261
Indirect effect via seed yield / plant	-0.01608	1.1357
- Direct effect of no. of seeds/ plant	0.7056	0.4983
Indirect effect via wt. of pods/plant	-0.0003124	0.0220
Indirect effect via seed index	-0.0042336	0.2990
Indirect effect via seed yield / plant	0.15960	11.2728
- Direct effect of wt. of pods / plant	0.000004	0.0003
Indirect effect via seed index	0.000112	0.0079
Indirect effect via seed yield / plant	-0.00368	0.2599
- Direct effect of seed index	0.001225	0.0865
Indirect effect via seed yield / plant	-0.0588	4.1531
- **Direct effect of seed yield plant**	1.0000	70.6319
- **Residual**	0.031457	2.2219

CD : Coefficient of setermination
RI: Relative importance .

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تأثير الرش بالزنك على بعض التراكيب الوراثية الجديدة من الفول البلدى

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أجريت هذه الدراسة بمركز البحوث الزراعية بكلية الزراعة بمشتهر جامعة الزقازيق خلال موسمى ١٩٩٦\٩٥ ، ١٩٩٧\٩٦ م بهدف دراسة تأثير ١٥ معاملة عبارة عن التوافيق بين ٣ معدلات للرش بالزنك وهى (٠ – ٠.٤ %و ٠.٨%) وأربعة سلالات جديدة وهى (شبين ١ ومشتهر ٥،٨،٤٠ و الصنف التجارى جيزة ٣) وذلك فى تصميم القطع المنشقة مرة واحدة فى ثلاثة مكررات والصفات التى درست هى : طول النبات (سم) – عدد الفروع/نبات–عدد القرون /نبات – عدد بذور القرن – عدد بذور النبات – وزن قرون النبات (جم) وزن الـ١٠٠ بذرة (جم) – وزن بذور النبات (جم) – محصول الفدان (كجم).

وتتلخص أهم النتائج فيما يلى :

– أظهرت النتائج أن هناك اختلافات معنوية لتأثير معدلات الرش بالزنك على جميع الصفات المدروسة خلال الموسم الأول والثانى وكذلك التحليل المشترك فيما عدا عدد الفروع / نبات وعدد بذور النبات فى الموسم الأول فقط وجد أن الاختلاف غير معنوى .

–كان هناك اختلافات معنوية بين السلالات لجميع الصفات المدروسة ما عدا عدد بذور القرن والنبات ومحصول النبات فى الموسم الأول . بينما فى الموسم الثانى تأثرت كل من عدد بذور النبات ومحصول البذور للفدان معنويا وفى التحليل المشترك تأثرت جميع الصفات تأثرا معنويا ما عدا صفات عدد الفروع / نبات ووزن الـ ١٠٠ بذرة وكذلك محصول النبات .وكان أعلى محصول للفدان من البذور للصنف جيزة ٣ والسلالة مشتهر ٥ فى كلا الموسمين والتحليل المشترك.

–لم يكن للتفاعل أى تأثير معنوى على جميع الصفات المدروسة فيما عدا صفات عدد البذور للنبات ووزن قرون النبات ومحصول الفدان وذلك للتحليل المشترك وكان أعلى محصول للفدان للسلالة مشتهر ٥ مع أعلى رش من الزنك ٠.٨% .

- أظهرت نتائج الارتباط أن هناك ارتباط معنوى وموجب بين المحصول وصفات مكونات المحصول تحت الدراسة.
- أظهرت نتائج معامل المرور أن التأثير المباشر لمحصول النبات من البذور والتأثير الغير مباشر لمحصول النبات من خلال عدد بذور النبات وعدد قرون النبات يكون مقدار ٨٩.٩١% من مصادر الاختلاف فى محصول الفدان من البذور.