CHARACTERS PERFORMANCE, VARIABILITY, RELATIONSHIPS AND PATH ANALYSIS OF SOME SESAME LINES IN LIGHT SALINE SOIL.

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Abstract: Summer season field experiment was conducted, during 1998 and 1999 seasons, on ten genotypes grown in loamy-sand saline soil at the Experimental Farm, Fac. Agric., Fayoum. This work was designed to cultivate these lines, and to study their phenotypic (PCV) and genotypic (GCV) variability as well as heritability of some characters under salt stress. Estimating yield contributor associations and their direct and indirect effects on seed yield was another aim of the study.

The data revealed that PCV's were higher than GCV's for all characters in both seasons. The two variability parameters were higher in the 2^{nd} season than those of the 1^{st} one for oil and yield characters, and vice versa for disease criteria. Habitability estimates were in the range of 60.08 for disease index and 96.96 % for seed oil content. L_{15} and M_7 lines exhibited good performance, where both showed salt and disease tolerance and out-yielded other genotypes including the check variety. Other three disease tolerant lines produced relatively high yield but still need further improvement.

Seed yield per plant exhibited significant associations; positively with numbers of capsules per main stem and per branches as well as with fruiting zone length, and negatively with disease index and infection percentage which were strongly correlated. Other positive associations were observed between fruiting zone length and both capsules numbers characters which were positively correlated interse. Path analysis revealed that the greatest direct effect on seed yield was due to number of capsules per main stem, and the greatest indirect effect was due to number of capsules per branches via fruiting zone length.

Introdction

Sesame (*Sesamum indicum L.*) is one of the oldest important edible oil crops in the world and Egypt. The local production, together with other oil crops, is still very lower than the national requirements. Sesame is planting during summer season in an area ranging between 60 and 70 thousand faddan. Its area is not expected to increase because of high competition from other summer crops such as rice, maize and cotton which are commonly cultivated and occupied most of the old land in the Nile valley.

So, the feasibility to increase sesame area and production lies only in new reclaimed land out side the valley But these lands mostly suffer from some constraints, especially salinity and disease. Therefore, it is needed to search for sesame genotypes tolerant to such constraints Several sesame investigators suggested that soil salinity usually affected the crop growth and yield Mahdy and Bakheit (1988), Datta et al (1990), Lyar et al (1992), Chakraborti and Bosu (1998) and Sharaan et al (2000).

Yield improvement of sesame lines to be grown in saline soil, needs enough information about phenotypic and genotypic variability of different characters and their heritability Because, the effectiveness of selection depends upon the existing variability in the tested genotypes and the magnitude of heritability. Variability, as primary bases for effective selection, were extensively studied by many sesame workers Osman and Khidir (1974), Solanki and Poliwal (1981), Chandramony and Nayar (1985), Mahy and Bakheit (1988), Ammar and El-Gwad (1996) and Ghallab and Sharaan (1998).

Further, for the rational improvement of seed yield by selection, knowledge on the magnitude and type of relationships among yield attributes are absolutely necessary to formulate an effective procedure. Numerous sesame authors reported positive and strong phenotypic and genotypic correlation of seed yield with plant height, number of capsules, Dixit (1975), Chavan and Chopde (1981), Bakheit and Mahdy (1988), Fathy (1995) and Sharaan et al (2000) However, the relation between seed yield and seed index was insignificant and negligible Ahmed (1988) or negative Rong and Wu (1989). Reddy and Priya (1991) stated that oil content was positively correlated with numbers of branches, capsules and seed yield per plant Fathy (1995) suggested that Fusarium infection percentage was negatively correlated with all traits studied except seed oil content.

Although genotypic correlations are helpful in determining the component of a multiplicative character such as seed yield, they do not give a true picture about the causal basis of the correlation of each components. Path coefficient technique, developed early by Wright (1921) has proved very helpful partitioning the correlation coefficient of each yield component into direct and indirect effects, and thereby specify the contribution of particular character to the yield This technique is widely used by various sesame investigators. Most of them suggested that number of capsules had the greatest direct effect on seed yield Yadava et al (1980), Ibrahim et al (1983), Pathirana et al (1988), Osman (1989) and El-Kadi et al (1999) Numbers of capsules per branches, plant height and seed index were also detected as important yield contributors Yadava et al (1980), Charma and Chauhan (1984) and Sharaan and Ghallab (1997).

The present investigation was designed to achieve the following aims. (1) Evaluation and studying the phenotypic performance, yielding ability and variability of nine sesame genotypes under sandy saline soil condition. (2) Furnishing information on the magnitude and type of yield-contributor relationships and estimating their direct and indirect effects through application of path coefficient in the analysis of these correlation, and thereby (3) Suggesting appropriate breeding procedure for improving seed yield of these sesame materials

Materials and Methods

An early multi-purposes breeding program conducted on large number of sesame genotypes with diverse origin, during the last two decades has resulted in some promising lines suitable for growing under different environmental stresses Ibrahim et al (1983), Sharaan and Hassan (1988), Mahrous (1991), and Ghallab and Sharaan (1998). Among them, nine genotypes were selected together with the local variety " Giza 32" as a check for the materials of the present study The names and pedigree of the these genotypes are shown in Table (1).

The study was carried out, during 1998 and 1999 seasons, through two field experiments in loamy-sand saline soil at the Experimental Farm of the faculty of Agriculture, Demo, Fayoum. Mechanical and chemical analysis of the field soils are presented in Table (2) Monocalcium phosphate (15.5% P_2O_5) and potassium sulphate (48% K_2O) at the rats of 200 and 50 kg/faddan respectively were added during field preparation The experimental design was complete randomized block with four replications The plot area was $18m^2$ (3x6), each having five ridges spaced 60 cm apart. Sowing dates were 1st of June and 26 May in the first and second seasons, respectively. Seeding was done in hills, 10 cm apart, thereafter thinned to secure two plants per hill, 20 days after sowing. Nitrogen fertilizer rate of 45 kg N / faddan was applied in three equal doses; at sowing, 20 and 30 days latter Other agricultural practices recommended for growing sesame were followed.

During growth season, Fusarium wilt infection percentage and disease index were recorded on the basis of individual plants according to Rivers et al (1965). At harvest time plant characters, i.e fruiting zone length (cm), numbers of capsules per main stem and per branches, seed index (1000 seed weight) and seed yield per plant (g) were determined as averages of ten plants randomly taken from each plot. Seed oil content was analyzed using Nuclear Magnetic Resonance (NMR) following the method described by Granlund and Zimmeren (1975).

The data were subjected to analysis of variance as illustrated by Snedecor and Cochran (1974). Phenotypic (PCV) and genotype (GCV) coefficients of variability were calculated according to Singh and Chaudhary (1997). Heritability (h^2) as well as phenotypic (r_p) and genotype (r_g) correlations were estimated using the method outlined by Johnson et al (1955). Path coefficient analysis was applied following the method of Dewey and Lu (1959).

Results and Discussion

A-Performance Of The Genotypes:

Character means of the nine selected sesame genotype together with the local variety "Giza 32" grown in saline soil during 1998 and 1999 seasons, are arranged in Table (3). Analysis of variance revealed highly significant differences among genotypes for all characters in both seasons, indicating their diverse genetic background. But, the yield character means in the first season were mostly higher than those of the second one, reflecting their affect by soil and climatic variations Where the increases in ECe, Na^+ and Cl^- in the soil during 1999 season Table (2) seemed to affect the growth and yield characters. However, disease characters showed reverse behavior, where their values were increased with increasing vegetative plant growth. Evidence confirming these observations was proved early by variability parameters, where phenotypic and genotypic coefficients were higher in the second season than the respective values in the first one for yield components and oil content, and vice versa for disease criteria.

Fruiting zone length, as a plant character of great importance to sesame breeder, showed clear genotypic differences Table (3). L_{15} possessed the tallest fruiting zone and surpassed other tested genotypes including the check variety "Giza 32". It exhibited least affect to soil salinity in the two seasons. Whereas, L_{14} in the first season and M_{48} in the second one had the shortest fruiting zone. Giza 32, M_{48} and H_1 were the most affected genotypes by climatic and soil conditions.

Number of capsules per main stem showed varied asymmetrically means of different genotypes in both seasons, indicating its great affect by non-heritable variation causes. L_{14} followed by L_{15}, M_7 and Giza 32 in the first season, as well as M_7 and L_{15} genotypes in the second one, produced the highest numbers of

Table (1): Names and pedigree of the tested sesame genotype

Genotype	Origin & Country	Genotype	Origin & Country
H_1	Margo X M_{48}, Egypt	L_{16}	UCR 82-16, NS, USA
H_{42}	M_{48} X Margo, Egypt	L_{19}	UCR 82-19, NS, USA
L_3	USR 82-3, NS, USA	M_7	Gamma irr. Progr., Fac. Agric., Cairo Univ
L_{14}	USR 82-14, NS, USA	M_4	Gamma irr. Progr., Fac. Agric., Cairo Univ
L_{15}	USR 82-15, NS, USA	Giza $_{32}$	Commer. var., Egypt

Table (2): Mechanical and chemical analysis of the experimental field

Soil properties	Values		Soil properties	Values	
	1998	1999		1998	1999
Mechanical analysis			**Soluble cations meq/100g soil**		
Course sand %	32.83	32.32	**Ca^{++}**	26.59	36.59
Fine sand %	47.17	47.68	**Mg^{++}**	71.28	81.28
Sitt%	12.00	11.70	**Na^{+}**	6.26	6.26
Clay%	8.00	8.30	**K^{+}**	1.02	1.53
Soil texture	Loamy Sand	Loamy Sand	**Soluble anions meq/100g soil**		
			Co_3	-	-
PH soil	7.21	7.31	**HCO_3**	6.31	5.66
ECe (m mohs/cm)	11.11	12.75	**Cl^-**	86.31	101.26
CEC meq/100g soil	12.13	11.95	**SO_4^{--}**	12.53	19.05
Organic matter%	0.63	0.75			
Ca CO_3	8.00	7.98			

capsules per main stem. Whereas, L_3 and H_1 lines gave the lowest numbers in the first and second season, respectively. It is worth to mention that each of L_{15} and L_7 lines showed almost similar numbers of capsules per main stem over the years, indicating their consistency, compared to the check variety which was clearly inconsistent in this character Table (3). Variation in capsules number per main stem between genotypes with distinct differences in branching habits was recorded by Yadava et al (1980), Ibrahim et al (1983), Sharaan and Hassan (1988), Fathy (1995) and El-Kadi et al (1999).

Number of capsules per branch may reflect the nature of branching habit of a plant. Theoretically this character may compensate number of capsules per main stem, but practically this is not always true, because of the different initial origins of the tested genotypes. As shown in Table (3), L_{15}, which produced high number of capsnles per stem, gave also the highest number of capsules per branches in both seasons L_5 and M_{48} surpassed most of other examined genotypes including the check variety. However, H_1 and L_3 carried the least numbers of capsules per branch in the first and second season, respectively, and showed together with M_{48}, L_{19} and L_{16} the greatest inconsistency over the two seasons. L_{14}, which showed fluctuated capsules number per main stem, gave almost similar numbers of capsules per branch in the two seasons. It was noticed that the seasonal variation of this character is higher than that of capsules number per main stem either within or between lines This is due to dense capsules developed on main stem, (which characterized most of these breeding lines) which is greater and more stable than capsules developed on branches. Consequently, capsules number per main stem is relatively more important and fruitful for achieving further improvement in this sesame materials Similar conclusion was previously reached by Shukla and Verma (1976), Sharaan and Hassan (1988) and Ghallab and Sharaan (1998).

Concerning seed index, it was found that H_1 genotype (3 48g) followed by L_{16}, L_{15} and L_{14} in the first season, and L_{14} line (3 61g) followed by L_3, L_{16} and L_{15} in the second season, gave the highest values in the first and second season, respectively Table (3) Only L_{16} surpassed the check variety and other tested lines It is interesting to mention that L_{16} and L_{15} gave the same seed index values in both seasons, reflecting their consistency in this character, compared to other genotypes Differences between sesame genotypes in seed index were previously reported by Yadava et al (1980), Ibrahim et al (1983), Yingzong (1997), Ghallab and

Sharaan (1998) and El-Kadi et al (1999).

In regard to seed yield per plant Table (3), it was noticed that L_{15} produced the highest seed yield in both first (7.79g) and second (8.29g) seasons. The following superior lines were M_7 (7.38 and 5.17g) followed by L_{14} (6.28 and 4.40g) in the first and second season, respectively. Except L_{14} in the second season, all these lines surpassed the check variety and most of other tested genotypes. The superiority of these lines may be attributed to their possessing of greater numbers of capsules either per main stem or per plant, taller fruiting zone, and their heaver seed weights, than other genotypes. These results are in harmony with those reported by sesame authors Ibrabim et al (1983), El-Yamani (1985), Osman (1988), Sharaan and Hassan (1988), Chandramony (1990), Fathy (1995), El-Kadi et al (1999) and Sharaan et al (2000).

As shown in Table (3), M_{48} had the highest seed-oil percentage (58.54 and 59.31%) followed by L_7 (56.78 and 57.24%) and H_1 (55.18 and 56.70%) and all surpassed the check variety "Giza 32" (51.12 and 53.11%) in the first and second season, respectively. However, L_{16} (49.16%) in the first season and L_{15} (48.81%) in the second one gave the lowest oil content percentages. It is worth mentioning that M_7 produced high seed yield per plant coupled with high seed-oil content. This relation, unfortunately, was not confirmed in the other tested genotypes. Such superiority in seed yield and oil content was detected by Ibrahim et al (1983) and El-Kadi et al (1999).

Concerning reaction to wilt disease, the data given in Table (3) revealed that H_{47} was the most affected line as expressed by its high infection percentages (70.87 and 40.77%) and disease indices (61.89 and 36.79) in the first and second season, respectively. However, L_{15} which produced the highest seed yield per plat, was the least affected line as expressed by its infection percentages (3.15 and 6.94%) and disease indices (2.26 and 5.09) in the first and second season, respectively. It is interested to note that most of the tested lines were less affected by disease attack under higher salt stress (in 1999) than the check variety "Giza 32". In general, the high seed yield, i.e. L_{15}, M_7 followed by L_{14}, M_{48} and H_1 showed decreased affection by disease. So, it could safely be concluded that at least L_{15} and M_7 are salt and disease tolerant and suitable for growing in sandy saline soil. The other lines which showed relative tolerance for wilt disease, could be subjected to yield improvement program depending on the characters showing high genetic variability and heritability as previously discussed.

B- Variability and heritability:

Phenotypic (PCV) and genotype (GCV) coefficients of variation, as common scales for measuring variability among genotypes, were higher in the first season for oil content as well as seed yield and its components than in the second season. However, the reverse was observed for disease criteria Table (3). These results, reflect the different genotypic as well as character responses to environmental conditions. This is logic, where the relative favorable conditions in the first season (including lower soil salt ECe) enhanced plant growth of all genotypes with lesser differences and encouraged disease attacks, compared to those of the second season.

In all characters, over all seasons, PCVs were higher than the respective GCVs. But, the differences between the two coefficients were at maximum for disease index and infection percentage followed by number of capsules per branch, indicating that non-heritable factors had an important role in the variation of these characters. However, oil content followed by seed index showed the minimum differences between PCV's and GCV's, indicating the importance of heritable factors in their variations. Ahmed (1988) found wide range of PCV and GCV for all characters studied by him except 1000 seed weight. The other remainder characters exhibited intermediate differences between PCV and GCV coefficients. These results are in general agreement with those obtained for sesame by Rai et al (1981), Chandramony and Nayar (1985), Ammar and El-Gwad (1996) and Ghallab and Sharaan (1998). Whereas, Fathy (1995) estimated approximately equal values of PCV and GCV for all characters studied by him.

The above-discussed data of variation, confirmed by heritability values estimated for different characters in the two seasons Table (3). The characters which showing great differences between their PCV's and GCV's had relatively low heritability values, whereas the characters exhibiting low PCV-GCV differences showed high estimates. In addition, as observed in variation parameters, the heritability values were different for a particular character in the two seasons, due to the relative magnitude of heritable and non-heritable variation. Where the values estimated in the second season were higher than those of the first one and yield characters, and vice versa for oil content for disease criteria. So, the heritability estimates, over all seasons, were in the range of 60.08 for seed index and 96.96% for oil content. These results are in line with those reported by Gupta and Chorpra

Table (3): Character means of the ten sesame genotypes as well as their variability parameters (PCV & GCV) and heritability (h^2) estimates, in the two seasons.

Lines	Fruiting zone length (cm)		No. of Capsules main stem		No of Capsules branches		Seed index (g)		Seed yield / plant (g)		Oil percent		Infection percent		Disease index	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
H_t	81.51	56.63	34.58	19.39	17 22	8 99	3 48	3.28	4.63	3.63	55.18	56.70	18.39	27.60	15.45	22.69
H_{42}	76.35	65.80	37 53	26 15	19 12	18.65	3 10	3.23	3 83	2.94	53 19	53 04	70.87	40 77	61.89	36.79
L_3	84.28	63.00	27.33	20 33	23.80	4.05	3.33	3.40	3.25	2.94	49.92	49 36	28.69	19.81	21 86	28.84
L_{14}	73.23	64.90	47.63	17 80	20.10	20.65	3.15	3 61	6.28	4.40	52 18	53 51	19.00	20.52	12.49	17 23
L_{15}	94.78	83.50	47.41	40 00	38.87	24 15	3.33	3.34	7.79	8.29	50.11	48.81	3.15	6.94	2.26	5.09
L_{16}	89.29	65.66	37.10	27.25	29.96	14.59	3.35	3.35	5.96	3.95	49.16	51 12	31.28	20.17	27 43	17 48
L_{19}	78.61	56 70	32.11	19 70	21.33	9 15	3 17	3.05	3.38	2.80	54 01	53.92	32 65	22 93	26.20	14.70
Giza32	88.62	62.36	44.24	21.15	18 00	16.75	3.20	3.32	4.31	3.23	51.12	53.11	5 50	36.47	7.92	32.25
M_7	74 66	63.70	46.81	41 50	23 10	13.80	3.06	3.32	7.38	5.17	56.78	57 24	33.40	14.99	30 27	12.12
M_{48}	87.41	56 57	37.25	30.00	36.05	5.50	3.25	3.34	5.66	3.69	58.54	59.31	12 45	13.08	11 87	11.87
Mean	82.87	63.88	39.20	26.33	24 75	13.63	3.24	3 32	5.25	4 10	53 02	53.61	25.54	22.33	21 76	19 90
LSD0.01	14 17	15.42	10 71	10 65	15.32	11.81	0.28	0 11	2 41	1.43	2.78	2.31	32 92	21 69	28 64	24.90
PCV	8 64	12.28	17.75	32 51	30 86	48.63	3 97	4 17	30.80	40.07	5 82	6.32	75.86	46.22	77 04	50 53
GCV	7.46	10.62	16 54	30 28	26.51	43.32	3.32	4.08	28 47	39.07	5.66	6.22	68.36	39 01	69 33	39 17
h^2	74 49	74.82	84 90	89 91	73 82	79 37	69 81	95 76	85 46	95 07	94.72	69 96	81 20	71.24	81 00	60 08

(1984), Ahmed (1988) and Ghallab and Sharaan (1988)

The aforementioned results on variability and heritability could be used in planning an effective selection program, practiced among and within these sesame lines, based on the characters which exhibiting high genetic variability and heritability values

C- Character relations and path analysis:

Correlation coefficients between character pairs are presented in Table (4) Most of the coefficients did not reach the level of significance, especially in the first season In the second season, significant and positive correlation were observed between fruiting zone length and both numbers of capsules per main stem and per branches which were positively correlated intense. Oil content, however, showed negative and significant correlation coefficients with each of fruiting zone length in both season and numbers of capsules per main stem and per branches in the second one In both seasons, infection percentage and disease index were strongly positively correlared.

The data given in Table (4) show that correlation coefficients between seed yield per plant with capsules number per main stem followed by those per branches were positively significant in both seasons, indicating the importance of these two characters as effective yield contributors. Several sesame workers found similar results Dixit (1975), Chavan and Chopde (1981), Bakheit and Mahdy (1988), Sharaan and Hassan (1988), Rong and Wu (1989) and Sharaan et al (2000). Seed yield had also positive and significant correlation coefficient with fruiting zone length in the second season. Whereas, seed yield showed insignificant correlation with seed index and oil content. These results support those obtained by Ahmed (1988) for seed index and Sharaan and Hassan (1988) for oil content. On the other hand, seed yield exhibited negatively significant correlation coefficients with both infection percentage and disease index, in the second season. The corresponding coefficients in first season were also negative but insignificant Negative correlation between seed yield and disease criteria were detected early by Fathy (1995).

The aforementioned results revealed the importance of number of capsules per main stem as a selection criterion for sesame yield improvement Where selection based on this trait would be more successful and increase seed yield through itself as well as through its positive association with both capsules number per branches and fruiting zone length observed in the second season.

Table (4): Correlation coefficients between all possible pairs of productive, oil and disease characters in sesame grown in saline soil during 1998 (up-diagonal) and 1999 (below diagonal) seasons.

Variable	Fruiting zone length (cm)	No of Capsules / main stem	No of Capsules / branches	Seed index (g)	Oil percent	Infection percent	Disease index	Seed yield / plant (g)
Fruiting zone length (cm)	1	-0.028	0.27	0.238	-0.301*	-0.276	-0.243	0.236
No. of Capsules / main stem	0.487**	1	0.041	-0.236	0.008	-0.16	-0.157	0.589**
No. of Capsules / branches	0.336*	0.345*	1	0.097	0.125	-0.203	-0.145	0.309*
Seed index (g)	0.283	0.072	0.275	1	-0.189	-0.246	-0.249	-0.04
Oil percent	-0.466**	-0.358*	-0.303*	-0.138	1	0.048	0.071	0.081
Infection percent	-0.199	-0.258	0.006	-0.144	0.022	1	0.987**	-0.217
Disease index	-0.209	-0.252	-0.055	0.054	-0.093	0.768**	1	-0.199
Seed yield / plant (g)	0.554**	0.645**	0.507**	0.284	-0.262	-0.485**	-0.446**	1

* and ** significaut at P- 0.05 or 0.01, respectively.

Path coefficient analysis Tables (5 and 6) showed that number of capsules per main stem had the highest relative importance and the greatest direct effect on seed yield in both seasons (0.595 and 0.446). Whereas, fruiting zone length in the first season and number of capsules per branches in the second one ranked as the second direct effects on seed yield. Several sesame workers ported similar results Ibrahim et al (1983). Shrief (1983), Sharaan and Hassan (1988), Ahmed (1988), Osman (1989) and Sharaan and Ghallab (1997) Over all the two seasons, it was observed that uumber of capsules per branches had the highest indirect effect on seed yield via fruiting zone length These results support the pervious conclusion concerning the importance of capsules number per main stem as selection criterion in breeding program for achieving further improvement in the present sesame materials.

Table (5): Direct and indirect effects of different yield contributors on seed yield of sesame plant in 1998 season.

Variable	Fruiting zone length (cm)	No. of Capsules / main stem	No. of Capsules / branches	Seed index (g)	Oil percent	Infection percent	Disease index
Fruiting zone length (cm)	**0.2258**	-0.0063	0.0610	0.0537	-0.0680	-0.0623	-0.0549
No. of Capsules / main stem	-0.0167	**0.5950**	0.0244	-0.1404	0.0048	-0.0952	-0.0934
No. of Capsules / branches	0.0575	0.0087	**0.2130**	0.0207	0.0266	-0.0432	-0.0309
Seed index (g)	0.0111	-0.0110	0.0045	**0.0465**	-0.0088	-0.0114	-0.0116
Oil percent	-0.0392	0.0010	0.0163	-0.0246	**0.1302**	0.0062	0.0092
Infection percent	-0.0575	-0.0333	-0.0423	-0.0512	0.0100	**0.2083**	0.2056
Disease index	0.0540	0.0349	0.0322	0.0553	-0.0158	-0.2193	**0.2221**
r_{y}	0.235	0.589	0.309	-0.040	0.079	-0.217	-0.198
Indirect total	0.009	-0.006	0.096	-0.087	-0.051	-0.425	0.021
Relative importance of yield	10.732	26.897	14.113	1.830	3.609	9.904	9.044

Bold writing figures denote direct effect and those of light writing denote indirect effect

Table (6): Direct and indirect effects of different yield contributors on seed yield of sesame plant in 1999 season.

Variable	Fruiting zone length (cm)	No. of Capsules / main stem	No. of Capsules / branches	Seed index (g)	Oil percent	Infection percent	Disease index
Fruiting zone length (cm)	**0.0485**	0.0236	0.0163	0.0137	-0.0226	-0.0097	-0.0101
No. of Capsules / main stem	0.2173	**0.4463**	0.1540	0.0321	-0.1598	-0.1151	-0.1125
No. of Capsules / branches	0.0728	0.0748	**0.2168**	0.0596	-0.0657	0.0013	-0.0119
Seed index (g)	0.0447	0.0114	0.0434	**0.1579**	-0.0218	-0.0227	0.0085
Oil percent	0.0917	0.0705	0.0597	0.0272	**-0.1969**	-0.0043	0.0183
Infection percent	0.0146	0.0190	-0.0004	0.0106	-0.0016	**-0.0735**	-0.0564
Disease index	0.0587	0.0708	0.0155	-0.0152	0.0261	-0.2158	**-0.2809**
r_{y}	0.548	0.716	0.505	0.286	-0.442	-0.440	-0.445
Indirect total	0.500	0.270	0.288	0.128	-0.245	-0.366	-0.164
Relative importance of yield	14.819	19.355	13.649	7.727	11.949	11.883	12.025

Bold writing figures denote direct effect and those of light writing denote indirect effect.

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الأداء والتباين والعلاقات الارتباطية وتحليل معامل المرور في بعض سلالات السمسم النامية في أرض خفيفة ملحية

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** قسم النبات – المركز القومي للبحوث – الجيزة

أقيمت تجربة حقلية لموسمين خلال عامين ١٩٩٨، ١٩٩٩ في أرض رملية طميية ملحية بمزرعة كلية الزراعة بالفيوم لتقييم سلوك عشرة تراكيب وراثية ودراسة التباين المظهرى والوراثى ودرجة التوريث لصفاتها المحصولية ونسبة الزيت والصفات المرضية كما تم دراسة العلاقات الارتباطية بين مختلف الصفات ومدى تأثيرها المباشر وغير المباشر على صفة محصول البذور.

واظهرت النتائج انه في كل الصفات وفي الموسمين كانت قيم معامل التباين المظهرى اعلى من الوراثى، وأن كلاهما كان اعلى في الموسم الثاني مقارنة بالموسم الاول لصفة محتوى الزيت والصفات المحصولية بينما ظهر العكس بالنسبة للصفات المرضية وتراوحت قيم معامل التوريث بين ٦٠,٠٨ للدليل المرضي و ٩٦.٩٦ % لمحتوى البذور من الزيت . واتضح تفوق السلالتين س ١٥ , ط٧ـ محصولا ومقاومة للامراض وتحملا للملوحة ـ على كل الطرز المختبرة بما فيها صنف المقارنة , كما أظهرت ثلاثة سلالات اخرى تحملا للملوحة ومقاومة نسبية للامراض ولكنها تحتاج إلى مزيد من التحسين.

وكان محصول النبات من البذور مرتبط ارتباط معنويا : موجبا مع عدد كبسولات الساق الأصلي وعددها علي الفروع وكذلك طول المنطقة الثمرية ، و سلبيا مع الدليل المرضي و نسبة الاصابة و هما شديدتي الارتباط إيجابيا ببعضهما. كما اتضح أن هناك ارتباط موجب بين طول المنطقة الثمرية بكل من عدد كبسولات الساق و عددها علي الفروع المرتبطين إيجابيا ببعضهما. و اظهر تحليل معامل المرور ان أكبر تأثير مباشر على صفة محصول النبات هو الراجع لعدد كبسولات الساق الأصلي و التي اظهرت أعلى أهمية نسبية في الموسمين. بينما كان اعلى تأثير غير مباشر هو الراجع لعدد كبسولات الأفرع من خلال طول المنطقة الثمرية.