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CORRELATION AND PATH COEFFICIENT ANALYSIS FOR WHEAT YIELD VARIATIONS OF SOME GENOTYPES UNDER DROUGHT AND SOIL SALINITY CONDITIONS

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ABSTRACT

This investigation was carried out at Demo Research station, Fayoum Governorate, Egypt during 2002/2003 and 2003/2004 growing seasons. The two local commercial cultivars of wheat (Giza 168 and Sakha 93) as well as six promising wheat lines were compared under soil salinity levels of 1600, 3100 and 7900 ppm and three irrigation treatments i.e. normal irrigation, no irrigation at heading and at dough -ripe stage. Grain yield and its components were measured as well as correlation and path coefficient for the yield and its components.

Two of the promising lines 5 and 1 were significantly surpassed Giza 168, Sakha 93 and the other lines in yield and its components (i.e. number of spikes, main stem spike length, number of spikelets/main stem spike, number of kernels/ main stem spike and kernels weight / main stem spike).

Correlation studies showed a significant positive relations between wheat grain yield and each of plant height, number of spikes/plant, main stem spike length, number of spikelets/ main stem spike, number and weight of kernels/ main stem spike, seed index, straw yield/plant and harvest index under both of soil salinity and drought.

Path coefficient analysis revealed that number of spikes/plant, straw yield/plant and number of kernels/ main stem spike were the traits with most influence on grain yield variation through its direct and indirect effect and may be primary importance in selection for grain yield. Kernels weight/ main stem spike and main stem spike length came in the next order in respect. This was true under the studied ecological conditions of soil salinity as well as drought.

Key words: ***Wheat, Genotypes, Soil Salinity, Drought, Correlation, Path Coefficient.***

INTRODUCTION

Improving wheat grain yield is one of the most important national goals in Egypt to face the increasing population demands. Therefore, great efforts have been made to minimize the gab between production and consumption. Grain yield of wheat is a complex quantitative character. Selection based on grain yield may not be as rewarding in enhancing yield as selection for some yield components and other related traits. Several workers revealed the importance of the relationships between grain yield and its components (El-Gayar *et al* 1985, Amin *et al* 1992, Abd El-Moneim 1993, El-Marakby *et al* 1994 b, Hassan *et al* 1995, Aly 1998, Abd El-Moneim 1999 and Elsabbagh *et al* 2002). Some studies reported positive and significant correlations between grain yield and most yield components, as well as between individual yield components. In contrast, others reported insignificant correlations. El-Marakby *et al* (1994 b) reported that grain yield of wheat was correlated positively and significantly with spikes/plant, kernels/spike, kernels weight/spike, 100-kernel weight and spike length. However, grain yield was not correlated with spikelets/spike and plant height. Positive and significant correlations were found between grain yield and spikes/m^2, weight of kernels/spike and 1000-kernel weight under different irrigation intervals (Elsabbagh *et al* 2002) and high soil water stress (Belay *et al* 1993).

Path coefficient analysis is useful for determining the relative importance of yield components to grain yield variation. In several studies, the greatest positive direct effect on grain yield was expressed by number of spikes/plant (Eissa and Awaad 1994, El-Marakby *et al* 1994 b, Dokuyucu and Akkaya 1999 and Tammam *et al* 2000). However, Ibrahim (1994) and Ben Amar (1999) reported that number of kernels/spike had the highest positive direct effect on yield variation. The relation between yield and its components and their influence on yield variation appears to change with growing conditions. Under saline conditions El-Gayar *et al* (1985) and Hassan and Afiah (2002) showed that the main source of grain yield variation was 1000-kernels weight followed with number of kernels/spike and number of spikes/plant. Under different soil water stress levels, kernels/spike had the highest direct effect on grain yield variation followed by number of spikes/m^2 (Abd El-Moneim 1993 and El-Hawary 2000).

The aim of this study was to use path coefficient analysis in examining the role of yield components in wheat grain yield variation for wheat genotypes grown under variable soil salinity levels and irrigation treatments.

MATERIALS AND METHODS

Three field experiments were carried out at Demo Research station, Faculty of Agriculture, Cairo University, Fayoum Governorate, during the two successive seasons 2002/2003 and 2003/2004. Each experiment represent soil salinity levels of 1600, 3100 and 7900 ppm and included 24 treatments which were the combination between three irrigation treatments (normal irrigation, no irrigation at heading and at dough-ripe stages) and eight wheat genotypes (*Triticum aestivum* L.). Genotypes used were Giza 168, Sakha 93 cultivars and six F_9 promising wheat lines derived from crosses between Giza 160, Giza 157 and three Mexican varieties i.e. (MD 689/B/chere "S", Bow "S"//YD "S" / ZZ "S" and KvZ//con/pj bg62. The selected lines were kindly supplied by EL-Marakby of Aim Shams University (see EL-Marakby *et al* 1994a).

Each experiment was arranged as split plot design with three replicates. Irrigation treatments were allocated in the main plots and genotypes in sub- plots. The experimental plot was consisted of three rows of two meters long with 20 cm apart. Plants individually spaced at 10 cm within row. Recommended cultural practices of growing wheat in the experimental location were followed. At harvest, data were recorded on 10 guarded plants from each plot for plant height, number of spikes/plant, main stem spike length, number of spikelets/main stem spike, number of kernels/main stem spike, kernels weight/main stem spike, grain yield/plant, seed index (weight of 100 kernels), straw yield/plant, tillering index (TI) was calculated as number of fertile tillers per plant / total number of tillers per plant X 100 and the harvest index (HI) was calculated as grain yield per plant / biological yield per plant X 100.

Combined analysis of the three soil salinity levels experiments of both seasons and least significant difference test was done according to Snedecor and Cochran (1992). Pooled data of both seasons were used to estimate the simple correlation coefficient between all possible pairs of the studied traits according to Snedecor and Cochran (1992) under cases of: 1- Genotypes plants grown under lesser soil salinity level of 1600 ppm and normally irrigated (control, C), 2- Genotypes plants grown under low salinity level of 1600 ppm exposed to the drought treatments (drought effect, D), 3- Genotypes plants grown under the three soil salinity levels and irrigated normally (soil salinity effect, S) and 4- Genotypes plants grown under the effect of three soil salinity levels and three drought treatments (soil salinity X drought, SD).

Path coefficient analysis for the highly correlated traits and induced the largest effect on grain yield under the different studied cases (number of spikes/ plant, main stem spike length, number of kernels/main stem spike, kernels weight/main stem spike and straw yield/plant).

As well as partitioning of the simple correlation and the relative importance of the traits for grain yield was conducted as illustrated by Li (1956) and Dewey and Lu (1959) and as following formula.

The path coefficients were obtained by the simultaneous of the following equations.

$ry_2 = Py_2 + r_{23}Py_3 + r_{25}Py_5 + r_{26}Py_6 + r_{28}Py_8.$

$ry_3 = r_{23}Py_2 + Py_3 + r_{35}Py_5 + r_{36}Py_6 + r_{38}Py_8.$

$ry_5 = r_{25}Py_2 + r_{35}Py_3 + Py_5 + r_{56}Py_6 + r_{58}Py_8.$

$ry_6 = r_{26}Py_2 + r_{36}Py_3 + r_{56}Py_5 + Py_6 + r_{68}Py_8.$

$ry_8 = r_{28}Py_2 + r_{38}Py_3 + r_{58}Py_5 + r_{68}Py_6 + Py_8.$

Assuming that total grain yield variation per plant equals 1, then

$$1- P^2y_0 + P^2y_2 + P^2y_3 + P^2y_5 + P^2y_6 + P^2y_8 + 2Py_2\, r_{23}\, Py_3 + 2Py_2\, rs_{25}\, Py_5 + 2Py_2\, r_{26}\, Py_6 + 2Py_2\, r_{28}\, Py_8 + 2Py_3\, r_{35}\, Py_5 + 2Py_3\, r_{36}\, Py_6 + 2Py_3\, r_{38}\, Py_8 + 2Py_5\, r_{56}\, Py_6 + 2\, Py_5\, r_{58}\, Py_8 + 2Py_6\, r_{68}\, Py_8$$

The relative importance (RI %) of each variable to the total yield variation was estimated according to the following formula:

$$RI\ \% = \frac{ICDiI}{\sum i\ ICDiI} \times 100$$

Where:

r = Simple correlation.

P = Path coefficient.

ry_2, ry_3 ...etc = Simple correlation between yield and X2, yield and X3 .etc

Py_2, Py_3 ...etc = Path coefficient of X2, X3 etc on individual grain yield (y).

CDi: Coefficient of determination.

RESULTS AND DISCUSSION

Performance of genotypes

Data in Table (1) showed the mean performance of the studied genotypes for yield and its components. It appears a significant difference between the studied genotypes due to the determined characters of the yield and its components. The check varieties, i.e. Giza 168 and Sakha 93 gave lesser measurements than the other compared lines. This was true for all of the studied yield and its components. Lines 5 and 2 were surpassed the others significantly in main stem spike length. According to seed index and harvest index, the superiority of line 3 than the others was obtained. The mean plant height, number of spikelets/ main stem spike, number and weight of kernels/ main stem spike were shown as greater in line 1 comparable with the other checked genotypes. Greater number of spikelets/ main stem spike was attained in lines 1 and 5 in respect in comparison with the other studied genotypes. Line 5 surpasses the others in number of spikes/plant, main stem spike length, number of spikelets/ main stem spike and grain yield/plant. The above mentioned lines i.e. 1, 2, 3 and 5 were come whether in the second or the third rank in respect for the studied characters.

Table 1. Means of the studied traits for eight wheat genotypes grown under three soil salinity levels and three drought treatments (combined analysis of 2002/2003 and 2003/2004 growth seasons).

Studied characters	Genotypes								LSD
	Line 1	Line 2	Line 3	Line 4	Line 5	Line 6	Giza 168	Sakha 93	
1- Plant height (cm).	92.4	82.3	77.8	79.4	83.8	83	80.1	76.1	2.07
2- No. of spikes/plant.	7.5	6.8	7	7.3	7.9	7	6.5	6.9	0.82
3- Main stem spike length (cm).	10.6	11.8	10.3	10.9	12.1	12	11.6	10.7	0.51
4- No. of spikelets/main stem spike.	22	21.3	18.3	20.2	21.9	21.5	20.7	20.1	0.69
5- No.of kernels/main stem spike.	57	55.3	47.3	49.5	55.8	54.7	53.6	44.9	3.52
6-Main stem spike kernels weight (g).	2.97	2.82	2.69	2.54	2.82	2.73	2.53	2.38	0.24
7- Seed index (g).	5.24	5.19	5.68	5.15	5.19	5.06	4.86	5.33	0.39
8- Grain yield/plant (g).	16.7	14.9	14.4	13.9	17.5	14.9	12.2	11.8	3.37
9- Straw yield/plant (g).	27.9	24.4	21.5	23.5	28.6	24.8	21.1	21.8	-
10- Tillering index %.	94.9	97	93.6	95.2	95.2	95.5	96.8	96.8	-
11- Harvest index %.	31.7	32.7	33.5	31.7	32.6	32	30.2	29.2	1.74

(C) Plants grown under lesser soil salinity level of 1600 ppm and irrigated normally.
(D) Plants grown under lesser soil salinity level of 1600 ppm and exposed to drought treatments.
(S) Plants exposed to salinity levels and irrigated normally.
(SD) Plants grown under drought and soil salinity.

The above results obtained revealed that wheat grain and straw yield/plant depend more or less mainly on some yield components, which could act positively or negatively. This indicates the importance of defining these relations in order to use it in wheat breeding programs. Measuring correlation coefficient and partitioning it through path coefficient analysis could lead to that.

Correlation studies

Phenotypic correlations between all possible pairs of studied characters were made on pooled data of both seasons in order to get assurance to what was the main characters could affect mach the grain yield of wheat plants.

The determinations were done in case of plants grown under lesser soil salinity levels i.e. 1600 ppm and irrigated normally (control, C), exposed to drought conditions and lesser soil salinity level (effect of, D), exposed to soil salinity levels and irrigated normally (effect of, S) and that which grown under different soil salinity levels and drought irrigation treatments (effect of, SD). The results obtained were shown in Table (2).

It was worthy to note that positive and highly significant correlations were found between grain yield/plant and each of plant height, number of spikes/plant, main stem spike length, number of spikelets/ main stem spike, number of kernels/main stem spike, kernels weight/main stem spike, straw yield/plant and tillering index. This was true under conditions of control, drought, salinity and salinity X Drought. This indicates that the possibility of improving grain yield/plant could attain through the selection for one or more of these traits since it was occurred under wide spectrum of ecological conditions such as drought and salinity. Similar results were found by El-Gayar *et al* (1985), Amin *et al* (1992), Abd El-Moneim (1993), Belay *et al* (1993), El-Marakby *et al* (1994 b), Hassan *et al* (1995), Aly (1998), Abd El-Moneim (1999) and El-Sabbagh *et al* (2002).

Harvest index was shown to get lesser and insignificant correlation coefficient with the studied grain yield/plant and other characters. This was true mainly under the different investigated ecological conditions. This indicates that this character considered invaluable one in wheat breeding programs.

Tillering index appeared a highly significant and negative correlation through number of spikes/plant, number of kernels/main stem spike and straw yield/plant under the studied ecological conditions of drought and soil salinity.

Table 2. Phenotypic correlation (rp) between wheat yield and its components under control (C), drought (D), salinity (S) and salinity X drought conditions (SD) (combined analysis of 2002/2003 and 2003/2004 seasons).

Studied characters	Condition	2	3	4	5	6	7	8	9	10	Grain yield
1- Plant height (cm).	C	0.60*	0.25	0.74**	0.74**	0.73**	-0.54*	0.64**	-0.32	0.47	0.71**
	D	0.17	0.27	0.65**	0.50**	0.66**	0.05	0.39**	0.09	-0.14	0.32*
	S	0.58**	0.67**	0.66**	0.84**	0.87**	-0.04	0.72**	-0.08	0.07	0.68**
	SD	0.65**	0.71**	0.63**	0.84**	0.87**	0.05	0.79**	-0.10	0.20*	0.74**
2- No. of spikes/plant.	C		0.62*	0.63**	0.83**	0.73**	-0.71**	0.99**	-0.80**	0.14	0.98**
	D		0.24	0.05	0.63**	-0.03	-0.56**	0.86**	-0.56**	0.06	0.91**
	S		0.70**	0.55**	0.75**	0.65**	-0.39**	0.95**	-0.53**	0.36*	0.97**
	SD		0.69**	0.55**	0.75**	0.67**	-0.23**	0.95**	-0.41**	0.32**	0.96**
3- Main stem spike length (cm).	C			0.86**	0.82**	0.66**	0.85**	0.72**	-0.17	0.31	0.67**
	D			0.73**	0.60**	0.22	-0.35*	0.47**	-0.13	-0.17	0.39**
	S			0.74**	0.83**	0.77**	-0.25	0.82**	-0.20	0.03	0.75**
	SD			0.76**	0.81**	0.75**	-0.14	0.79**	-0.16	0.21*	0.76**
4- No. of spikelets/ main stem spike.	C				0.80**	0.65**	-0.80**	0.71**	-0.23	0.28	0.73**
	D				0.49**	0.40**	-0.13	0.30*	0.12	-0.30*	0.17
	S				0.63**	0.57**	-0.24	0.65**	-0.22	-0.07	0.59**
	SD				0.59**	0.52**	-0.16	0.63**	-0.11	0.09	0.60**
5- No. of kernels/main stem spike.	C					0.94**	-0.83**	0.88**	-0.56*	0.55*	0.89**
	D					0.26	-0.68**	0.81**	-0.41**	-0.08	0.76**
	S					0.91**	-0.33*	0.87**	-0.23**	0.11	0.80**
	SD					0.90**	-0.21*	0.86**	-0.23**	0.29**	0.83**
6- Main stem Spike kernels weight (g)	C						-0.58**	0.79**	-0.57*	0.66**	0.91**
	D						0.51**	0.16	0.31*	0.08	0.19
	S						0.08	0.78**	-0.14	0.13	0.74**
	SD						0.20*	0.80**	-0.15	0.33**	0.77**

Table 2. cont.

	C	-0.76**	0.37	0.26	0.74**
7- Seed index (g).	D	-0.58**	0.59**	0.11	-0.52**
	S	-0.34*	0.29*	-0.07	-0.31*
	SD	-0.18*	0.21*	0.05	-0.15
	C		-0.74**	0.23	0.96**
8- Straw yield (g).	D		-0.58**	-0.25	0.88**
	S		-0.45**	0.19	0.96**
	SD		-0.37**	0.23**	0.97**
	C			-0.04	-0.69**
9- Tillering index%.	D			0.05	-0.55**
	S			-0.20	0.44**
	SD			-0.12	-0.38**
	C				0.46
10- Harvest index%.	D				0.23
	S				0.42**
	SD				-0.43**

*and** denote significance at 0.05 and 0.01 level of probability, respectively.
(C) Plants grown under lesser soil salinity level of 1600 ppm and irrigated normally.
(D) Plants grown under lesser soil salinity level of 1600 ppm and exposed to drought treatments
(S) Plants exposed to salinity levels and irrigated normally.
(SD) Plants grown under drought and soil salinity

Positive and highly significant correlation coefficient was attained between straw yield and mean plant height, number of spikes/plant, main stem spike length, number of spikelets/main stem spike, number and weight of kernels/main stem spike as well as seed index. This was mostly occurred under the studied ecological conditions of drought, salinity and their interaction.

Seed index was shows to acts only through number of spikes/plant and number of kernels/main stem spike since it was get highly negative correlation coefficient under drought, salinity and both.

Highly and positive correlation was obtained for number of spikelets/main stem spike, number and weight of kernels/main stem spike between themselves as well as with plant height, number of spikes/plant and main stem spike length. This was true mostly under drought, soil salinity and their interaction.

The correlation between plant height and that of number of spikes/plant was shown as positively and highly significant under salinity and salinity X drought.

Path coefficient analysis

The obtained results of correlation coefficient between wheat grain yield and the studied components as well as between the studied components themselves showed different responses. Determination of the most important characters affecting the wheat grain yield whether directly or indirectly was worked out. This can be attained through the partitioning of the simple correlation coefficient and the relative importance of grain yield components as shown in Tables (3) and (4).

The determinations was done using the highly significant correlated components with yield as presented in Table (2) under the different ecological conditions of control, soil salinity, drought and soil salinity X drought, in which acts as maximum influence on grain yield variation, since the residual effect be lesser (Table 4). The chosen yield components as highly correlated with grain yield represent 99.91%, 91.17%, 97.80% and 96.36% Of the yield variations under control, drought, soil salinity and drought X soil salinity conditions, in respect.

Table 3. Partitioning of simple correlation coefficients between grain yield/plant and some other plant characters in wheat (combined of 2002/2003 and 2003/2004 seasons) under different ecological conditions.

Source of variation	C	D	S	SD
1- No. of spikes/plant *vs.* grain yield/plant Direct effect	1.28	0.74	0.70	0.54
Indirect effect via main stem spikes length	-0.02	0.01	0.01	0.02
Indirect effect via no. of kernels/ main stem spike	0.27	0.13	-0.10	-0.01
Indirect effect via main stem spike kernels weight	0.16	0.00	0.14	0.09
Indirect effect via straw yield/plant	-0.71	0.03	0.22	0.32
Total correlation	0.98	0.91	0.97	0.96
2- Main stem spike length *vs.* grain yield/plant Direct effect	-0.03	0.04	0.02	0.03
Indirect effect via no. of spikes/plant	0.84	0.17	0.49	0.37
Indirect effect via no. of kernels/ main stem spike	0.28	0.13	-0.12	-0.01
Indirect effect via main stem spike kernels weight.	0.13	0.03	0.17	0.11
Indirect effect via straw yield/plant	-0.55	0.02	0.19	0.26
Total correlation	0.67	0.39	0.75	0.76
3- No. of kernels/ main stem spike *vs.* grain yield/plant Direct effect	0.32	0.21	-0.14	-0.01
Indirect effect via no. of spikes/plant	1.10	0.47	0.52	0.41
Indirect effect via main stem spike length	-0.03	0.02	0.02	0.02
Indirect effect via main stem spike kernels weight.	0.17	0.03	0.20	0.13
Indirect effect via straw yield/plant	-0.67	0.03	0.20	0.28
Total correlation	0.89	0.76	0.80	0.83
4- Main stem spike kernels weight *vs.* grain yield/plant Direct effect	0.19	0.12	0.22	0.14
Indirect effect via no. of spikes/plant	1.10	0.00	0.45	0.36
Indirect effect via main stem spike length	-0.02	0.01	0.02	0.02
Indirect effect via no. of kernels/ main stem spike	0.28	0.05	-0.13	-0.01
Indirect effect via straw yield/plant	-0.64	0.01	0.18	0.26
Total correlation	0.91	0.19	0.74	0.77
5- Straw yield/plant *vs.* grain yield/plant Direct effect	-0.73	0.04	0.23	0.33
Indirect effect via no. of spikes/plant	1.25	0.63	0.66	0.52
Indirect effect via main stem spike length	-0.02	0.02	0.02	0.02
Indirect effect via no. of kernels / main stem spike	0.29	0.17	-0.12	-0.01
Indirect effect via main stem spike kernels weight	0.17	0.02	0.17	0.11
Total correlation	0.96	0.88	0.96	0.97

(C) Plants grown under lesser soil salinity level of 1600 ppm and irrigated normally.
(D) Plants grown under lesser soil salinity level of 1600 ppm and exposed to drought treatments.
(S) Plants exposed to salinity levels and irrigated normally.
(SD) Plants grown under drought and soil salinity.

Table 4. Percentage of relative importance (RI%) for grain yield variations in wheat (combined of 2002/2003 and 2003/2004 seasons) under different ecological conditions.

Source of variation	C	D	S	SD
No. of spikes/plant.(x_2)	26.59	54.70	32.08	28.21
Main stem spike length. (x_3)	0.01	0.16	0.03	0.09
No. of kernels/main stem spike.(x_5)	1.66	4.40	1.28	0.01
Kernels weight/main stem spike.(x_6)	0.60	1.44	3.17	1.90
Straw yield/plant. (x_8)	8.65	0.16	3.46	10.54
(x_2) x (x_3)	0.82	1.42	1.28	2.16
(x_2) x (x_5)	11.43	19.56	9.62	0.78
(x_2) x (x_6)	6.79	0.05	13.11	9.80
(x_2) x (x_8)	29.72	5.09	20.03	32.76
(x_3) x (x_5)	0.27	1.01	0.30	0.05
(x_3) x (x_6)	0.13	0.21	0.44	0.61
(x_3) x (x_8)	0.54	0.15	0.49	1.51
(x_5) x (x_6)	1.76	1.31	3.67	0.24
(x_5) x (x_8)	6.98	1.36	3.67	0.55
(x_6) x (x_8)	3.96	0.15	5.17	7.15
Residual factors	0.09	8.83	2.20	3.64
Total	100	100	100	100

(C) Plants grown under lesser soil salinity level of 1600 ppm and irrigated normally.
(D) Plants grown under lesser soil salinity level of 1600 ppm and exposed to drought treatments
(S) Plants exposed to salinity levels and irrigated normally.
(SD) Plants grown under drought and soil salinity

Results in Tables (2) and (3) indicated that grain yield/plant was affected much by straw yield/plant as well as number of spikes/plant as total correlation effect. This was true under C, D, S and SD. Main spike kernels weight, number of kernels/ main stem spike and main stem spike length came in the following ranks, in respect.

Concerning the direct effect of the chosen components on grain yield, number of spikes/plant appeared more important character could affect the grain yield variation (Tables, 3 and 4). This was true under the ecological conditions under investigation. Straw yield/plant, number of kernels/ main stem spike, kernels weight/ main stem spike and main stem spike length came in the following ranks of importance, in respect. Due to the indirect effect of the chosen yield components on grain yield, the effect of number of spikes/plant through straw yield/plant, number of kernels/ main stem spike, spike kernels weight/ main stem spike.

As well as the kernels weight/ main stem spike through straw yield/plant, represent the larger effect on grain yield, in respect (Table 4), under the different ecological conditions of C, D, S and SD, under investigation.

Accordingly, it could be concluded that number of spikes/plant, straw yield/plant and number of kernels/ main stem spike represent the most main yield components which affected much the wheat grain yield in comparison with the other studied characters, whatever its direct or (and) indirect effect. It is advisable for the breeders to keep this in consideration in wheat improving programs.

More spikes/plant and main stem spike kernels number as well as less straw yield/plant are considered as the most contributing to high grain yield, due to its correlation direction. In this regard, Eissa and Awaad (1994), El-Marakby *et al* (1994 b), Dokuyucu and Akkaya (1999) and Tammam *et al* (2000) reported that number of spikes/plant had the highest direct effect on yield variation. On the other hand, the greatest direct effect on grain yield variation was expressed by number of kernels/main stem spike (Ibrahim 1994, Ben Amar 1999 and El-Hawary 2000). Similar trends were obtained by Iskandar (2000). He reported that number of kernels/ main stem spike and main stem spike kernels weight had the highest indirect contribution to grain as well as direct effect through each other.

Due to the previously mentioned relations and as shown in Table (1), it could be concluded that lines 5 and 1 are the superior genotypes in yield, since they surpassed the others significantly in grain yield, number of spikes/plant, straw yield/plant, number and weight of kernels/ main stem spike. This was true under the studied ecological conditions, i.e. drought, soil salinity and their interactions. These promising lines could lead to produce more productive varieties tolerating drought and soil salinity.

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تحليل معامل الارتباط والمرور لتباين محصول بعض التراكيب الوراثية من القمح تحت ظروف ملوحة التربة والجفاف

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أجريت هذه الدراسة بمحطة أبحاث دمو– محافظة الفيوم خلال الموسمين الزراعيين ٢٠٠٢/٢٠٠٣و٢٠٠٣/٢٠٠٤ .لدراسة إنتاجية الصنفين جيزة١٦٨، سخا٩٣ مقارنة بستة سلالات مبشرة من القمح، وذلك تحت ظروف مستويات مختلفة من ملوحة التربة الطبيعية (١٦٠٠، ٣١٠٠، ٧٩٠٠ جزء فى المليون)، ومعاملات جفافية (ري عادى، منع الري عند طرد السنابل ، منع الري عند طور النضج العجينى)، وكذلك دراسة الارتباط بين محصول الحبوب والصفات المرتبطة به وبين بعضها تحت هذه الظروف البيئية المختلفة.

أظهرت النتائج المتحصل عليها تفوق السلالتين رقم ٥، ١ تفوقاً معنوياً عن باقي السلالات وكذلك الأصناف المحلية المنزرعة في محصول الحبوب ،عدد السنابل/نبات، طول سنبلة الساق الرئيسية ،عدد السنيبلات/سنبلة الساق الرئيسية ، عدد الحبوب/سنبلة الساق الرئيسية وكذلك وزن الحبوب/سنبلة الساق الرئيسية.

أظهرت دراسات معامل الارتباط تحت تأثير الملوحة و الجفاف والمقارنة(ري عادي تحت مستوى ملوحة للتربة ١٦٠٠ جزء في المليون) وجود ارتباط معنوي بين محصول الحبوب وكلا من ارتفاع النبات وعدد السنابل/نبات ،طول سنبلة الساق الرئيسية ،عدد السنيبلات/سنبلة الساق الرئيسية ،عدد الحبوب/سنبلة الساق الرئيسية ،وزن الحبوب/سنبلة الساق الرئيسية ، دليل البذرة ،محصول القش وكذلك دليل الحصاد إضافة إلى وجود ارتباطات معنوية بين مكونات المحصول وبعضها .

أظهر تحليل معامل المرور أن اكثر الصفات ارتباطا بتباين المحصول كانت صفة عدد السنابل /النبات ،وزن القش/النبات ،عدد الحبوب /سنبلة الساق الرئيسية على الترتيب يليهم وزن الحبوب/سنبلة الساق الرئيسية وطول سنبلة الساق الرئيسية وهم أكثر الصفات ارتباطاً بتباين المحصول بحيث يمكن استخدامهما في الانتخاب للمحصول العالي.