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STUDIES ON SOME WHEAT CROSSES UNDER SALINE CONDITIONS

Hassan, A .I. A and S .A. Omar
Plant Breeding Unit, Plant Genetic Resources Dept., Desert Research Center (D.R.C), Mataryia, Egypt.

ABSTRACT

Five F_4 and F_5 selected families of five bread wheat crosses were evaluated at Ras Sudr Research station of Desert Research Center, south- Sinai Governorate in two growing seasons 2001 / 2002 and 2002 / 2003 winter under salinity of irrigation water (about 10000 and 11000 ppm around the two seasons respectively.) .At 80 days after sowing, 10 guarded plants were selected randomly to measure chemical contents in composite sample leaves of each F_4 and F_5 families i. e. praline (in fresh samples), K/Na ratio, Mg, Ca and SO_4 (in dry sample). At harvest, fifteen competitive plants from each plot were selected to record observation on plant height. NO. of spikes / plant, NO. of grains/ spike, 1000 – grain weight and grain yield / plant , Simple correlation , genotypic coefficients of variability , hertability and path analysis were calculated .

The obtained results can be summarized as follows:

1- Interrelationships among the studied characters under such saline conditions varied in magnitude according to the F_4 and F_5 populations.

2- Correlation between grain yield / plant and each of leaves chemical contents and yield attributes were positive and significant in most cases correlated to grain yield /plant, for improving grain yield under such saline conditions. Heavy grains, high NO. of grains / spike , high content of praline in fresh leaves and high SO_4 content in dry leaves considered to be a suitable selection criteria .

3- Hertability values varied among traits and between populations studied therefore, selection for the yield attributes may be effective for improving grain yield which had moderate to high (GCV) values among F_4 and F_5 selected families .Hence, the direct selection for improving yielding ability was effective and path analysis must be done to detect the joint effects .

4- The total contribution of each leaves chemical contents showed that praline and SO4 contents were the most shurefull characters of grain yield for the studied wheat crosses of F_4 and F_5 families as it contributed by 24.09 and 33.87% respectively. In general, chemical contents could be arranged over all studied F_4 and F_5 populations as follows: SO_4, praline, Mg, K /Na and Ca.

5- The main source of grain yield variation was 1000 - grain weight followed by NO. of grains / spike and Grain yield / plant under saline conditions in three or more F_4 and F_5 families . Such highly contributed traits easily measured and gave a valuable idea for selection to yield improvement under saline conditions.

Keywords: Bread wheat *(Triticum aestivum L.)* . Segregating, generation, salinity stress, genotypic correlation, hertability, variability, path coefficient analysis.

INTRODUCTION

Improvement cereal crops as wheat under saline water irrigation is more difficult than breeding under favorable conditions. The greater degree of difficulty is due to complexity of genotype – environment interactions associated with yield and its contributing traits. An effective breeding program for improving wheat under saline such as south Sinai depends not only on amount of variability among the divers genotypes, but also on hertability for the traits under consideration. The breeder can reduce the time required for improving promising genotypes. If they have significant genotypic variability, In this respect.

Most genetic analysis methods in wheat concentrate on elucidating the mode of characters separately. However, it is equally of great importance to study the genetic relationship between different characters on the performance of another characters, which can be predicted. The genetic relationship between pairs of characters. The correlation coefficient functionally, significant relationship implies the pleiotropic effect of the genes linkage controlling the separate characters.

The progress in research for developing wheat genotypes for stress tolerance and good agronomic procedures has not been commensurate with the needs because the used narrow base of germplasm and inadequacy of the selection methods to detect genotypes superior under stress environments. At the Meantime many reports identified lines with wide adaptation and ability to with stand the aimed environments outlined using early segregation generations. Hence, many investigators used correlation analysis to as certain relationships between variables and tested various path analysis models to determine the relative importance of the yield components contributing to grain yield under saline conditions and found that path analysis is among useful these one Dhanda and Sethi (1996) , Deswal *et . al* (1996) ,uddin *et al.* (1997) , Krishnawat and sharma (1998) , Afiah (1999) ,Khan *et al,* (1999) , Thakur *et al.* (1999) , Vijai *et al.* (1999) and Tammam *et al.* (2000) .

The percent studied mainly aimed to assess variation, association heritability and path coefficients analysis for grain yield and its components and leaves mineral contents of F_4 and F5 bread wheat families derived from crosses grown under saline conditions of Ras Sudr, south Sinai during two winter growing 2001 / 2002 and 2002 / 2003.

MATERIAL AND METHODS

Six genetically divers wheat genotypes i . e Sakha - 8 (S_8) as local cultivar I_2 . I_4 , I_5 ,I_7 and I_8 (Introduced from ICARDA) were crossed using sakha -8 as a male parent with the other ICARDA lines i . e (S_8 x I_2) , (S_8 x I_4) , (S_8 x I_5),(S_8 xI_7),(S_8 x I_8) . Pedigree and origin of the studied parental genotypes are shown in table (1). Such salt tolerance genetic materials were chosen after estimating the characters related to salt tolerance in sixteen local and exotic bread wheat genotypes by Hassan (1996) .

Table (1): ICARDA line number (No) , Origin , Entry name and pedigree and origin of the studied parental wheat genotypes

No.	Origin	Entry Name	Pedigree
-	Egypt	Sakha -8	PK3418-6S-1SW-0S
2	ICARDA	Rbs /Anza	SWM12008-2AP-1AP-3AP-1AP-0AP
4	ICARDA	SS.1744/7c	SWM11625 -15AP – 6AP -1AP – 0AP
5	ICARDA	Tsi /Vee"s"	CM64335 -3AP -1AP-4AP-1AP-0AP
7	ICARDA	Maya 74 / Son	CM58924 -1AP-4AP -1AP-0AP
8	ICARDA	Bove "s" / Buc "s"	CM58804 -6AP -2AP-1AP -0AP

ICARDA: international center for Agriculture Research in dry area, Aleppo, Syria

The crosses were made by hand in winter growing season of 1997 / 1998 at the nursery field of plant Genetic Resources Dept. Desert Research Center (DRC). The F_1 hybrids grains and the parental genotypes were sown using randomized complete blocks design with three replication on 10[th] November 1998 at Ras Sudr Research Station of (DRC), south – Sinai Governorate. The experiment unit consisted of 7 rows i.e. 3 rows for each female parent, One row for F_1 hybrids and 3 rows for the male parent (S_8). At harvesting time 60 F_2 plants were selected from each replicate and threshed and sown separately in 3[rd] season (1999 / 2000). Grains of each F_2 selected plants were represented by one row 1m length, 20 cm apart and 5 cm between plants (20 plants / row in each replicate) . Also, the check cultivar (Sakha 8), five female parents and F_2 bulk population were grown in three replicates. From each of the 5 crossing F_3 sets, the family was selected according to its superiority in growth behavior, yield and one or more of its components obtain. At F_3 selected families were sown in 19[th], November 2000 following the last experimental procedures in November 2001 following grown the different plants were selected from F_3 to F_4 Also, the same steps on the different plant of the family was selected according to its superiority in growth, behavior, leaves chemical contents and yield as well as one or more of its attributes. All F_5 through F_4 selected families were sown in November 2002. Each experimental unit area was 7.5 m^2 (3 x 2.5 m) consisted of the two parents and its F_3 selected family . During this program the genetic materials were evaluated under soil salinity conditions (ranged from 10000 to 11000ppm with 43.8% $CaCO_3$ and artesian irrigation water that started by about 8000 ppm (in the first season, 1998 / 1999) and increased by 1000 ppm every year through out the study (lasted in 2002 / 2003). Normal agricultural practices for wheat production under desert conditions were following during each growing seasons. At 80 days after sowing, 10 guarded plants were selected randomly to measured chemical contents in a composite sample of each F_5 and F_4 family leaves i.e., praline (in fresh sample) , K / Na ratio , Mg , Ca and SO_4 (in dry sample) . At harvest, fifteen competitive plants from each plot were selected to record observation on plant height, number of spikes / plant, spike length (cm), Number of grains / spike , 1000 – grain weight and grain yield / plant (gm) . Data of the three replications were pooled to use statistical interpretations for each F_5 and F_4 families.

Biometrics assessment for genotypic correlation, genotypic coefficients of variability, hertability and path coefficient analysis:
Associations among various characters studied were expressed as genotypic (rg) correlation coefficients. They were calculated according to the covariance analysis as described by Harvey (1990)

Estimating genotypic of variability for the studied characters were done according to Comstock and moil (1963).
Hertability in broad sense (Hb) was estimated all studied characters using equation as follows:
Hertability in according = Genotypic variation / phenotypic variation.

Path coefficient analysis was caused to calculate the coefficient of determination (CD) and percentage of total contribution of leaves chemical components and yield and its attributes on genotypic feature according to Dewey.

RESULTS AND DISSCUSIONS

Genotypic associations:

The genotypic (rg) correlation coefficients were estimated from individual F_4 and F_5 plants data of the five wheat crosses:Sakha 8 (S_8) x ICARDA , 2(I_2) , (S_8 x I_4) , (S_8 x I_5) ,S_8 x I_7),and (S_8 x I_8). Estimates of (rg) between grain yield and leaves chemical contents are presented in Table(2) .

The results of genotypic correlation coefficient indicted strong inherent association among grain yield and each of the studied traits. Simple correlation values varied in magnitude and sign of some cases among characters in each F_4 and F_5 families.

The obtained results in Table (2) revealed that grain yield / plant was positively correlated at genotypic with each of leaves chemical contents i.e. proline , K/Na , Mg^{++} , Ca^{++} and SO_4 in F_4 and F_5 families derived from the wheat crosses under study and this was true in every crosses through out F_4 and F_5 . Also, grain yield /plant was significantly positive associated with each of the studied leaves chemical content. The genotypic association among yielding ability and each of such traits suggested that genes controlling grain yield / plant is linked with those controlling the correlated traits. The earlier results reported by Hassan (1996) are harmony with these findings. At the results indicated that under saline soil condition and water could be used leaves chemical content as a selection criteria in the late wheat generation families i.e., F_4 and F_5 to improve wheat grain yield.
The association among grain yields and its contributing characters measured as genotypic (rg) correlation coefficients are presented in Table (3).

It could be seen from the presented data that the inter – relationship among the studied characters under such saline conditions varied in magnitude according to the F_4 and F_5 families. Response to environments depend on mean performance of studied traits, the previous studied traits. However, the previous studies Deswal *et al.* . *(*1996) , Uddin *et.al* .(1997 and Tamman *et al* . (2000) Also reported that grain yield was positively and significantly associated at genotypic level with each of number of spikes / plant, NO. of kernels /spike , 1000 – kernel weight and spike length in bread wheat under varying environments .

Table (2): Genotypic correlation coefficients (rg) between grain yield / plant of F_4 and F_5 wheat families and each leaves chemical Contents measured at 80 day after sowing (DAS) under saline soil conditions at Ras Sudr , south Sinai

Chemical contents	Genotypic correlation coefficient (rg) for F_4 and F_5 families									
	S_8 x I_2		S_8 x I_4		S_8 x I_5		S_8 x I_7		S_8 x I_8	
	F_4	F_5	F_4	F_5	F_4	F_5	F_4	F_5	F_4	F_5
Praline	0.66**	0.71**	0.07**	0.76**	0.73**	0.76**	0.81**	0.84**	0.69**	0.07**
K^+/Na^+ ratio	0.62**	0.71**	0.76**	0.78**	0.07**	0.69**	0.71**	0.75**	-0.41**	0.51**
Mg**	0.68	0.70**	0.49**	0.55**	0.82**	0.90**	0.89**	0.90**	0.79**	0.82**
Ca**	0.52	0 .56*	0.062*	0.65**	0.70**	0.74**	0.67**	0.70**	0.59**	0.64**
SO_4	0.41	0 .46	0.49	0.50*	0.61 *	0.64*	0.50*	0.51*	0.61*	0.68**

*& ** Denote significant at 0.05 and 0.01 levels of probability, respectively.

Table (3): Genotypic correlation coefficients (rg) between grain yield / plant of F4 and F5 wheat families and each of yield components recorded at harvesting date under soil saline conditions at Ras Sudr south Sinai

Yield components	Genotypic correlation coefficient (rg) for F_4 and F_5 families									
	S_8 x I_2		S_8 x I_4		S_8 x I_5		S_8 xI_7		S_8 x I_8	
	F_4	F_5	F_4	F_5	F_4	F_5	F_4	F_5	F_4	F_5
Spike length	0.51*	0.56*	0.50*	0.53*	0.69**	0.71**	0.49	0.51*	0.62**	0.65**
NO. of spikes/ plant	0.61**	0.68**	0.51*	0.52*	0.45	0.48*	0.54*	0.61**	0.60**	0.63**
NO. of grains / plant	0.68**	0.68**	0.52*	0.60**	0.50*	0.52*	0.50*	0.53*	0.05*	0.56*
1000.grain weight	0.72**	0.74**	0.42	0.50*	0.71**	0.76**	0.52*	0.56*	0.64**	0.70**

Data in Table (3) revealed that yield attribute and components i.e. spike length, NO. of spikes/ plant , NO. of grains /spike and 1000- grain weight had positive and significant simple correlation coefficient values with grain yield / plant in most wheat crosses families for F_4 and F_5 .It could be note that NO. of grains / spike , 1000 - grain weight and NO. of spikes/ plant were highly significant and positive correlated to grain. Yield in S_8 x I_2 and S_8 x I_8 in both of F_4 and F_5 families. Generally, the inter-relationships of grain yield / plant and chemical content of leaves (at 80 days after sowing) as well as yield components were positive and significant in most cases. For improving grain yield under soil saline water conditions .The studied wheat genotypes characterized by some traits as heavy grains, high number of grains / plant, high content of praline in fresh wheat leaves and high Mg^{++} and K^{+}/Na^{+} ratio in dry leaves. These findings are more less in accordance with those reported by Hassan (1996) and Afiah (1999).

Hertability and genotypic variations:

Estimates of broad sense hertability percentage (Hb%), genotypic variability coefficients for the studied chemical contents of leaves, yield and yield components of five F_4 and F_5 families under saline conditions are illustrated in Table (4).

Over all the studied F_4 and F_5 families, K/Na ratio and SO_4 content, 1000- grain weight and grain yield / plant had the highest values of Hb % among the F_4 and F_5 selected families. However, spike length the lowest value for broad sense hertability Praline content had a relatively high and constant (Hb) percentage among all studied F_4 and F_5 families . Data in Table (4) clearly shown that, all character had high values of broad sense hertability, slightly differences noticed genotypic coefficients of variability suggesting a small effect of environmental factors on these characters. Also it is hertability values varied among traits and between populations studied, thus selection for such characters may be effective for improving grain yield of wheat under saline conditions. However, the traits had relatively low values of genotypic coefficients of variability and hertability suggesting little scope for improving grain yield through such traits.

The studied characters, which, exhibited great amount of genetic variability, could be considered adequate for improving breeding programs. Moreover, grain yield had high values among the F_4 and F_5 selected families in this respect. Hence, the direct selection for improving yielding ability effective ingeneration late i.e. F_4 and F_5 and path analysis must be done to detect the joint effects.

Several investigators suggested that knowledge of genetic variability is helpful in selection a suitable plant type for salt affected regions in Sinai . Hassan (1996) and Afiah (1999) .

Path coefficient analysis: -

The direct and joint effects of the studied leaves chemical content for five F4 and F_5 selected families measured as genotypic variation to grain yield / plant are presented in Table (5).

Table (4): hertability in broad (Hb) sense and genotypic (GCV) variability coefficients for the studied chemical contents of leaves. Yield and yield components of five F_4 and F_5 families of wheat crosses under saline soil conditions.

Wheat Crosse	S_8 x I_2				S_8 x I_4				S_8 x I_5				S_8 x I_7				S_8 x I_8			
Generations	F_4		F_5		F_4		F_5		F_4		F_5		F_4		F_5		F_4		F_5	
Parameters	Hb	Gcv	Hb	Gcv	Hb	Gcv	Hb	Gcv	Hb	Gcv	Hb	Gcv	Hb	Gcv	Hb	Gcv	Hb	Gcv	Hb	Gcv
1-chemical content																				
Praline	86	36	91	55	84	55	88	61	80	46	87	55	81	47	90	60	79	33	87	41
K^+/Na^+	89	40	93	70	89	75	92	76	87	41	90	54	84	50	91	65	83	37	91	51
Mg^{++}	86	49	94	71	86	75	90	80	83	42	91	51	90	43	92	57	90	39	94	50
Ca^{++}	86	84	96	75	90	76	94	78	90	41	94	51	91	36	93	50	91	50	94	57
SO_4^{--}	84	53	95	65	88	80	91	81	87	40	94	60	91	50	94	60	90	54	93	60
2- Yield and yield components																				
Spike length (cm)	84	55	94	60	78	55	84	65	86	37	89	53	85	49	90	61	86	53	91	61
NO .of spike/ plant	89	39	95	46	79	39	84	50	84	46	91	61	89	54	94	64	87	41	90	46
NO .of grains/plant	87	54	91	70	80	50	88	64	85	40	94	56	91	47	94	60	90	43	92	51
1000.grain weight (g)	88	55	96	70	85	60	90	69	88	50	93	61	89	50	93	64	90	40	91	49
Grain yield/ plant (g)	94	53	97	70	90	41	93	60	89	44	94	60	87	46	90	70	89	45	94	51

Table (5): Direct and joint effects of the studied leaf chemical contents combined data for the five F_4 and F_5 families of wheat crosses measured at 80 days after sowing (DAS) as to grain yield / plant .

Source of variation	Crosses									
	S_8 x I_2		S_8 x I_4		S_8 x I_5		S_8 x I_7		S_8 x I_8	
	F_4	F_5	F_4	F_5	F_4	F_5	F_4	F_5	F_4	F_5
1- Direct effect										
Praline	0.04	0.05	0.04	0.04	0.05	0.06	0.06	0.06	0.07	0.07
K/Na ratio	0.01	0.02	0.01	0.02	0.03	0.04	0.05	.050	0.02	0.02
Mg content	0.01	0.02	0.03	0.03	0.04	0.04	0.03	0.04	0.03	0.03
Ca content	0.01	0.07	0.01	0.02	-0.03	0.03	-0.03	-0.04	-0.04	0.05
SO4 content	0.15	0.14	0.15	0.02	0.03	0.03	0.03	0.04	0.03	0.04
2- Joint effects										
Praline × K/Na	0.03	0.04	0.05	0.07	0.06	0.06	0.05	0.05	0.07	0.07
Praline × Mg	0.06	0.06	0.08	0.08	0.07	0.07	0.09	0.09	0.06	0.06
Praline × Ca	0.02	0.04	0.04	0.05	0.04	0.05	0.06	0.06	0.07	0.08
Praline × SO_4	0.13	0.11	0.15	0.14	0.06	0.06	0.04	0.04	0.08	0.08
K/Na × Mg	0.01	0.05	0.03	0.04	0.04	0.05	0.04	0.05	0.06	0.06
K /Na × Ca	0.01	0.02	0.01	0.02	0.02	0.03	0.03	0.04	0.08	0.08
K/Na × SO_4	0.05	0.05	0.05	0.07	0.07	0.08	0.06	0.07	0.04	0.05
Mg × Ca	0.01	0.04	0.01	0.05	0.08	0.09	0.07	0.07	0.05	0.06
Mg × SO_4	0.08	0.08	0.08	0.08	0.09	0.09	0.07	0.07	0.08	0.08
Ca × SO_4	0.01	0.04	0.03	0.04	0.09	0.10	0.08	0.09	0.08	0.08
R^2	0.63	0.82	0.79	0.91	0.87	0.87	0.79	0.87	0.84	0.91
Residual	0.37	0.18	0.22	0.09	0.13	0.13	0.20	0.13	0.16	0.09
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3-Total contribution %										
Praline	16.28	17.83	20.13	20.44	24.09	20.10	19.45	17.76	18.49	21.11
K/Na ratio	5.63	9.53	8.31	11.34	15.28	16.45	12.63	11.49	10.00	12.35
Mg content	9.35	12.74	12.57	14.65	17.17	18.00	15.63	18.80	19.59	18.70
Ca content	3.28	13.94	6.95	10.24	10.12	14.16	10.95	12.59	14.50	15.01
SO_4 content	28.67	28.31	31.83	33.87	19.91	18.27	20.87	26.39	21.62	23.56

The highest direct effect was exerted by SO_4 followed by praline content in most F_4 and F5 studied families. Regarding the indirect effects on grain yield variation was recorded for, Mg via K/Na , Mg via Ca over all F_4 and F_5 population . It is evident to mention that, the studied chemical content accounted by 63.79, 86.79 and 84 of the total grain yield variation for the F_4 families, while in F_4 families the studied chemical content accounted by 82 , 90 , 86 , 87 and 90 derived from all wheat crosses under these studied i.e. $S_8 \times I_2$, $S_8 \times I_4$, $S_8 \times I_5$, $S_8 \times I_7$ and $S_8 \times I_8$ respectively . That total contribution of each chemical contents in leaves showed that SO_4 with the most powerful determination of grain yield in $S_8 \times I_8$ showed F_4 and F_5 family as it contributed ranged from 18.27 to 33.87 %. In general, the basis of total contribution of the determined chemical contents could be arranged over all studied F_4 and F_5 population as follows: SO_4 , praline , Mg , K/Na and Ca contents . Theses findings are in partial harmony with that reported by Hassan (1996) .

Table (6) presented the direct and joint effects of studied yield components for the selected F_4 and F_5 families measured as genotypic variations to grain yield / plant.

All sources of yield variations were positive whereas, largest contribution was detected for number of spikes. Plant in most of the studied 3 families as direct effect. The indirect (joint) effects of different characters recorded towards grain yield revealed that spike length via 1000- grain weight, number of grains / spike, NO. of spikes / plant via plant height and number of grain / spike via 1000- grain weight had an important positive effected in almost the studied F_4 and F_5 families .

Total contribution percentage showed that the main source of grain yield variation was 1000- grain weight followed by number of grains / spike and number of spikes / plant in three or more of F_4 and F_5 families. Such highly contributed traits easily measured and gave a valuable idea for selection to yield improvement under saline environment either soil or water. Finding of (Afiah (1999) , Narwal *et.al* (1999) and Jag –Shoran *et.al* .(2000) mentioned that number of grains /spike and weight had the most direct and joint effects in grain yield variation and considered as important selection criteria for improving bread wheat under saline conditions .

Table (6): Direct and joint effects of the studied leaves yield and yield components (combined data) for the five F_4 and F_5 families of wheat crosses to grain yield / plant for wheat crosses.

Source of variation	$S_8 \times I_2$ F_4	$S_8 \times I_2$ F_5	$S_8 \times I_4$ F_4	$S_8 \times I_4$ F_5	$S_8 \times I_5$ F_4	$S_8 \times I_5$ F_5	$S_8 \times I_7$ F_4	$S_8 \times I_7$ F_5	$S_8 \times I_8$ F_4	$S_8 \times I_8$ F_5
Direct effect										
Plant height (cm)	0.002	0.020	0.051	0.061	0.068	0.070	0.081	0.081	0.058	0.062
NO .of spikes/plant	0.050	0.051	0.071	0.071	0.050	0.061	0.051	0.061	0.062	0.065
Spike length (cm)	0.051	0.061	0.050	0.054	0.042	0.051	0.041	0.050	0.033	0.044
NO .of grain / spike	0.030	0.041	0.040	0.050	0.090	0.090	0.050	0.051	0.050	0.057
1000.grain weight	0.044	0.050	0.025	0.035	0.069	0.070	0.064	0.072	0.062	0.065
Plant height ×NO .of spike	0.003	0.040	0.070	0.072	0.050	0.054	0.064	0.070	0.071	0.070
Plant height × spike length	0.057	0.060	0.051	0.059	0.061	0.066	0.057	0.060	0.050	0.061
Plant height × NO .of grain	0.002	0.030	0.057	0.060	0.057	0.060	0.051	0.061	0.070	0.071
Plant height × 1000.grain weight	0.027	0.030	0.050	0.061	0.060	0.062	0.070	0.072	0.070	0.000
NO. of spike × spike length	0.095	0.097	0.060	0.068	0.071	0.080	0.054	0.060	0.052	0.061
NO .of spike × NO .of grains	0.049	0.050	0.060	0.070	0.061	0.070	0.042	0.050	0.071	0.075
NO. of spike × 1000. grain	0.008	0.018	0.090	0.091	0.058	0.061	0.080	0.080	0.051	0.059
Spike length × NO. of grain	0.011	0.021	0.061	0.070	0.058	0.061	0.057	0.061	0.060	0.062
Spike length × 1000. grain	0.095	0.096	0.090	0.097	0.052	0.061	0.061	0.071	0.072	0.080
NO .of grain × 1000. grain	0.051	0.061	0.065	0.071	0.050	0.052	0.071	0.080	0.060	0.071
R^2	0.576	0.727	0.892	0.989	0.986	0.969	0.895	0.978	0.892	0.903
Residual	0.425	0.273	0.108	0.010	0.104	0.031	0.105	0.022	0.109	0.098
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Total contribution %										
Plant height (x_1)	9.02	8.01	17.91	20.29	19.57	15.12	22.33	17.38	15.95	16.39
Spike length (x_2)	11.96	20.52	16.31	21.80	18.37	15.88	17.06	25.23	16.70	19.77
NO .of spike (x_3)	10.53	15.63	20.11	22.19	18.96	17.62	19.13	17.11	20.67	20.01
NO. of grain/ plant (x_4)	14.20	11.34	20.33	20.11	21.6	18.31	17.13	15.65	18.01	20.56
1000.grain weight (x_5)	11.84	17.17	14.51	14.59	11.1	29.84	13.87	22.41	17.88	13.52

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دراسات علي بعض هجن القمح تحت ظروف الملوحة

أحمد إبراهيم عبد الحميد – سيد عبد السلام عمر

قسم الأصول الوراثية النباتية – وحدة تربيه النباتات – مركز بحوث الصحراء – مصر

تهدف هذه الدراسة إلى تقييم خمسه عائلات منتخبة فى الجيل الرابع والخامس من قمح الخبز تحت الظروف الملحية (حوالي ١٠٠٠٠و١١٠٠٠ جزء فى المليون بمياه الري) السائدة بمحطة البحوث التابعة لمركز بحوث الصحراء – جنوب سيناء خلال موسم النمو ٢٠٠١ / ٢٠٠٢ و ٢٠٠٢ / ٢٠٠٣ ، حيث تم أخذ عينه من أوراق عشره نباتات عشوائيا من كل عائله بعد ٨٠ يوم من الزراعة لتقدير نسبه البرولين والبوتاسيوم والماغنسيوم والصوديوم والكالسيوم والكبريتات كما تم تسجيل بيانات على خمسه عشر نباتا منتخبا من كل مكرره عند الحصاد لصفات : (طول النبات – عدد سنابل النبات – طول محور السنبلة – عدد حبوب السنبلة – وزن ١٠٠٠ حبه ومحصول النبات الفردي) .

تم تقدير معامل الارتباط والاختلاف على المستوى الوراثي والكفاءة التوريثية وتحليل معامل المرور لبيانات كل عائله منتخبه على حده ويمكن تلخيص أهم النتائج فى الأتي : –

١– اختلفت قيمه معاملات الارتباط بين الصفات تحت الدراسة باختلاف التراكيب الوراثية لعشائر الجيل الرابع والخامس موضوع الدراسة .

٢– بالنسبة للمكونات الكيميائية فى عينات أوراق النباتات بعد ٨٠ يوم من الزراعة وكذلك الصفات المساهمة فى محصول حبوب النبات كانت معاملات الارتباط بينها وبين الكفاءة المحصولية موجبة ومعنوية فى جميع الحالات ، حيث أمكن توصيف التركيب الوراثي من القمح المناسب للزراعة تحت مثل هذه الظروف الملحية بصفات كبر حجم وزيادة عددها فى السنبلة مع ارتفاع المحتوى البرولينى وانخفاض الكالسيوم بالأوراق .

٣– تباينت قيم معامل التوريث على حسب الصفات المدروسة وبين عشائر الجيل الرابع والخامس المنتخبة وعليه فيمكن تحسين المحصول من خلال الصفات الأكثر مساهمة بعد تحليل معامل المرور حيث كان معامل الاختلاف الوراثي متوسطاً ومرتفعا بالنسبة لمحصول الحبوب بالنبات مما يؤكد على أهميه الانتخاب المباشر لمحصول النبات الفردي .

٤– بدراسة مجموع المساهمات الكلية (مباشرة وغير مباشرة) لمكونات الأوراق الكيميائية كان المحتوى من البر ولين والكبريتات بالإضافة إلى الماغنسيوم من أقوى محددات المحصول فى عشيرة الجيل الرابع والخامس المنتخبة من انعزالات الهجين فى معظم الهجن تحت الدراسة حيث كانت المساهمة أكثر من ٢٠% لهذه الصفات فى الجيل الرابع والخامس ، ولكن بنظرة عامه إلى كافه العشائر تحت الدراسة يمكن ترتيب المكونات الكيميائية حسب درجة مساهمتها فى محصول الحبوب على النحو التالي : نسبة الكبريتات يليها البرولين ثم الماغنسيوم نسبة البوتاسيوم إلى الصوديوم (K/Na) وأخيرا الكالسيوم .

٥– كان المكون الرئيسي فى اختلاف محصول النبات من الحبوب هو وزن ١٠٠٠ حبة متبوعاً بعدد حبوب السنبلة ثم عدد النبات فى ثلاثة أو أكثر من عائلات الجيل الرابع والخامس تحت الدراسة وعليه يمكن اعتبار هذه الصفات سهله القياس من الدلائل الانتخابية المهمة لتحسين المحصول تحت الظروف الملحية .