

CONTENTS

Subjects	Page
Introduction	1
Review of Literature	2
I- The performance of traits under drought stress	2
II- Genetical studies	4
Materials and Methods	16
Results and Discussion	25
A- Mean performance of parents and F ₁ 's	25
A-1- Days to heading (days)	25
A-2- Plant height (cm)	28
A-3- Spike length (cm)	28
A-4- Number of spikes/plant	30
A-5- Biological yield/plant (g)	30
A-6- Grain yield/plant (g)	31
A-7- Number of grains/spike	33
A-8- Grain weight/main spike (g)	33
A-9- 1000-grain weight (g)	34
A-10- Harvest index	34
B- Stress susceptibility index	35
C- Combining ability analysis	37
C-1- Days to heading	41
C-2- Plant height	43
C-3- Spike length	43
C-4- Number of spikes/plant	44
C-5- Biological yield/plant	44
C-6- Grain yield/plant	45
C-7- Number of grains/spike	45
C-8- Grain weight/main spike	46
C-9- 1000-grain weight	46
C-10- Harvest index	47
D- Hayman analysis	49
D-I- Graphical analysis	52
D-II- Genetic components	59
D-II-1- Days to heading	59
D-II-2- Plant height	60
D-II-3- Spike length	61
D-II-4- Number of spikes/plant	62
D-II-5- Biological yield/plant	63
D-II-6- Grain yield/plant	66
D-II-7- Grain weight/main spike	67
D-II-8- Number of grain/spike	68
D-II-9- 1000-grain weight	69
D-II-10- Harvest index	70
Summary	71
References	74
Arabic Summary	-

SUMMARY

The present study was carried out during 2001/2002, 2002/2003 and 2003/2004 seasons at the Experimental Farm of Faculty of Agriculture, to obtain information on the nature of the genetic system governing the inheritance of earliness, yield and its attributes in wheat under favorable and moisture stressed conditions.

This study was conducted under two irrigation regimes (favorable and stress). 15 F₁'s obtained from a half diallel crossing system of six bread wheat parents that varied in their days to heading and yielding ability were genetically analysed to detect the type of gene action governing the heading date, yield and its attributes. A Randomized Complete Block Design with three replications was adopted for each experiment.

Results obtained will be summarized as follows:

- 1 - The mean squares due to irrigation regimes were significant for all traits, indicating the presence of significant differences between the two regimes. Mean squares due to genotypes, as well as components (i.e. parents and crosses) reached the significance level for all studied traits at both conditions and in the combined analysis.
- 2 - Stress condition reduced number of days to heading, plant height, spike length, yield and its components as compared with non-stress condition.
- 3 - The reductions in biological yield/plant from non-stress to stress as percentage were 19.98 and 29.19% for parents and F₁

- generation, respectively. Also, the reductions in grain yield/plant were 35.05% for parents and 32.25% for F₁ crosses.
- 4 - For number of grains/spike and 1000-grain weight the reductions were 14.31 and 15.15% for parents and 8.21 and 12.83% crosses, respectively.
 - 5 - The calculated water stress susceptibility index (S) based on yield and its components revealed that Giza 160, Sonora 64 and Leningradka and the hybrids (Giza 160 x Sonora 64), (Sonora 64 x Leningradka) and (Giza 160 x Chenab 70) could be considered as relatively water-stress tolerant.
 - 6 - Mean squares due to general and specific combining abilities were also significant for all traits under both conditions. High GCA/SCA ratios that exceeded unity were detected for all studied traits except days to heading under favorable condition.
 - 7 - Estimates of GCA effects revealed that the parental genotypes Sonora 64 and Sakha 8 seemed to be the best general combiners for earliness and Leningradka for grain yield/plant and yield components under both conditions. The cross combinations (Leningradka x Sakha 8), (Sakha 8 x Chenab 70) and (Sonora 64 x Leningradka) showed high SCA effects for the mentioned traits.
 - 8 - The dominance gene effects accounted for the most part of the total variation for all traits except days to heading at favorable condition, resulting in $(H1/D)^{1/2}$ more than one. Both positive and negative alleles were not equally distributed among parents for the studied traits except harvest index. Dominance genes

seemed to be acting in positive direction for most studied traits in both conditions.

- 9 - Heritability estimates in broad sense were high for all studied traits except spike length in favorable (0.40) and number of grains/spike (0.49) in stress condition. Heritability values in narrow sense were low except days to heading and ranged from 0.08 to 0.38.
- 10- Graphical analysis revealed also the importance of over-dominance gene effects for the most studied traits in both conditions.

The distribution of dominant and recessive genes among parental genotypes varied from trait to another and from parent to another in both conditions.

With respect to days to heading the distribution of parental genotypes showed that the genotypes Giza 160, Leningradka and Chenab 70 in favorable and Sakha 69 in stress condition possessed excess of recessive genes whereas Sakha 8 (favorable) and Sonora 64 (stress) had excess of dominant genes. The remaining genotypes showed different proportions of both dominant and recessive ones.

The wheat genotypes Sonora 64 for spike length and Leningradka for spikes/plant, Giza 160 and Leningradka for plant height and number of grains/spike and Giza 160 for grain weight/spike and harvest index and Giza 160 and Sakha 8 for biological yield and grain yield/plant and Chenab 70 for harvest index possessed excess of recessive genes for these traits under favorable condition.