Breeding bread wheat of drought and earliness

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5. SUMMARYThe breeding materials used herein included six parental Sids 1 (P 1), Line 2D (P2), Line 3D (P3), Gemmiza9 (P4), Giza168 (P5), Sham6 (P6).- This investigation was carried out at in Agric. Research at station of Kafer El-Hamam, Al-Sharkya Governorate, Egypt during two successive seasons 2004 / 2005 and 2005/2006 .In the first season, the six parents were sown at a various planting dates in order to overcome the differences in time of heading during this season. All possible parental combinations without reciprocals were made between the six genotypes. In the second season, two experiments where conducted.Crossing among the parental material by half diallel system was initiated at 2004 /2005 season. In 2005/2006 growing season, two experiments were conducted. Each experiment included the six parents and their fifteen possible crosses, which were sown on 26th November, in a randomized complete blocks design with three replication. The first experiment was irrigated only once after planting irrigation and the second one was normally irrigated. Each plot consisted of two rows, each row was two meters long and 30cm apart. Plants within row were 20cm apart. Dry method of planting was used in this concern. The other cultural practices of growing wheat were properly practiced.Data were recorded on 10 individual plants chosen at random from each plot for heading date, maturity date, physiological and chemical traits (Relative water content,Suminary-125-osmotic pressure, membrane integrity, total sugars protein content and total amino acid).Agronomic characters (Flag leaf area, plant height, no. of spikes /plant, no. of kernels /spike, 1000-kernel weight, biological, grain and straw yields and harvest index). and susceptibility index for straw, grain and biological yields by method out lined by All Dib et al (1990).An ordinary analysis of variance was firstly performed for each experiment, and than a combined analysis was carried out whenever homogeneity of error variance was realized. Bartlett's test of homogeneity of variance was used.Heterosis was computed mean squares and as the percentage deviation of F 1 mean performance from either the mid-parent or the better parent mean (BP) average values for each individual cross. General and spicific combining ability estimates were obtained by employing Griffing (1956) diallel cross analysis disignated as a model -1 method-2.The results obtained can be summarized as follows: A-1-Growth, yield and yield components:1-Irrigation treatments mean squares were significant for all traits.2-Significant genotypes were obtained for all traits except no.of spikes /plant in both environments as well as the combined analysis .3-Significant mean squares due to parents were obtained for all studied traits except no.of spikes /plant in both irrigation treatments as well as the combined analysis. Significant meanSummary -126-squares due to intraction between parental genotypes and irrigation treatments were detected for all traits except heading date, plant height, no.of spikes /plant, maturity date, flag leaf area, biological and straw yields.4-The parental variety Sids 1 (P1) gave the desirable values for maturity date and grain yield/plant. While, the parental variety Gemmeiza 9 (P4) gave the highest mean values for heading and maturity dates (late maturity), biological and straw yields and harvest index. However, the parental variety Gizal68 (P5) expressed the highest values for no.of grains /spike and grain yield /plant.5-Significant mean squares due to crosses were detected for all trait, under both environments as well as the combined analysis except no.of spikes /plant in both environments as well as the combined data and the harvest index in the normal irrigation.6-The two crosses P 1 xP3 and P 1 xP6 in the the combined analysis had the highest grain yield /plant.7-Mean squares for parents vs. crosses as indication to average heterosis over all crosses was significant for all traits in both treatments as well as the combined analysis, except no. of grains/spike, no. of spikes/plant in

both irrigation treatments as well as the combined analysis, biological yield /plant. in both irrigation treatments and maturity date in stress irrigation treatment. Insignificant mean squares due to interaction between parents vs. crosses and irrigation treatments were detected for all traits except maturity date.Summary-127-8-The single cross P4xP6 (Gemmiza9 x Sham6) expressed the most desirable heterotic effects for earliness relative to mid — parent -7.05, -8.21 and — 7.62%) and better parent (-6.48, - 7.34 and —6.93 in normal, stress irrigation treatments as well as the combined analysis, respectively.9- The cross P 1 xP3, P 1 xP4, and P 1 xP6 expressed significant positive heterotic effects relative to better parent and gave the highest desirable heterotic effects in the same order (for grain yield/ plant).10-Significant general combining ability (GCA) mean squares were detected for all the studied traits in both irrigation treatments as well as the combined analysis for harvest index in normal irrigation. whereas, significant mean square for specific combining ability (SCA) were obtained for all traits in both irrigation treatments and the combined analysis, except for plant height ,no. of grains/spike and straw yield /plant in stress condition and biological yield /plant in stress condition and the combined analysis.11-The interaction between both general and specific combining ability and irrigation treatments was significant for number of grains/spike, grain yield /plant and harvest index.12-The parental variety Sids 1 (P1) exhibited significantly positive gi effects for; plant height, straw and biological yield in both irrigation treatments as well as the combined analysis, grain yield and flag leaf area in normal irrigation and the combined analysis and number of grains/spike in the combined data.Summary -128-13-Significant desirable gi effects were detected by variety Sids 1 (P1) for plant height, straw and biological yields in both irrigation treatments as well as the combined analysis, grain yield and flag leaf area in normal irrigation and the combined analysis, Line 2 D (P2) and Line 3D (P3) for heading and maturity dates and short plant, Gemmeiza 9 (P4) for biological and straw yield in both irrigation treatments and the combined analysis, grain yield in normal irrigation and the combined analysis and (P6) Sham 6 for harvest index and grain yield /plant in stress condition and the combined analysis .14-The cross P 1 xP3 followed by cross P4xP5 in both irrigation treatments as well as the combined data for grain yield /plant , and two crosses P1 xP6 and P3xP4 in normal irrigation, the three crosses P3xP6, P4xP5 and P4xP6 in stress irrigation treatment , and the three crosses PlxP6, P3xP6 and P4x P6 in the combined analysis gave the most desirable St; effects.A-2- Drought measurements:Analysis of variance, mean and heterosis:1-Irrigation mean squares were significant for all the studied traits.2-Mean squares for genotypes, parents, crosses and parents vs crosses were significant for all traits in both environments as well as the combined data, except parent mean squares for OP in both environments and the combined analysis, crosses mean squears for MI in the combined analysis and parent vs. crosses for MI% in both environments as well as the-Summary-129-combined analysis, K+ in stress irrigation and the combined analysis, TAA in the combined analysis, and RWC% in normal irrigation .3-Genotypes x irrigation, parent x irrigation, F1 x irrigation and parent vs. crosses x irrigation were significant for all traits except F 1 x irrigation for K+, parents vs. crosses x environments for MI% and parent x environment and parents vs. crosses x environment for OP.4-The minimum reduction was in Sids 1 (P1), Line 2D(P2) ,Line 3D(P3), Giza 168 (P5) and Sham 6 (P6) and crosses P 1 xP2, P3xP6 ,P2xP4 and P4xP5 for (RWC).5-Line 3D(P3), Line 2D (P2) and Line 3D (P3) for OP, Line3D (P3), Giza 168 (P5)and Giza 168 (P5) for MI, expressed the highest mean values at normal, stress irrigation treatments as well as the combined analysis, respectively. Also, the parental P1 , P2 and Sham6 P6 expressed the highest value for K+.The parental variety Gemm.9 P4 expressed the highest value of TS in stress condition. While, Giza 168 gave the highest protein content in stress irrigation as well as the combined analysis and TAA in stress condition.6-Mean squares for parents vs. crosses as an indication to average heterosis over all crosses were significant for all drought measurements in both irrigation treatments as well as the combined analysis except MI in both irrigation treatments and the combined analysis and TAA in the combined analysis.Summary -130-Summary-131-it7- The cross P4xP6 for 0.P, P 1 xP2 for potassium content (IC) and TS, P2 xP5 for TAA, and Plx P3 for protein content gave the most desirable heterotic effects.B- Combining ability:1-The mean squares associated with general combining ability (GCA) and specific combining ability (SCA) were significant for all drought measurements in both irrigation treatments as well as the combined analysis except GCA for IC in

stress irrigation , OP in normal and the combined analysis and MI in stress condition and the combined analysis, and SCA for MI in normal irrigation.2-For most cases, low GCA/ SCA ratios of less than unity were detected.3-The interaction between both general and specific combining ability irrigation treatments was significant for all the studied traits except K+ potassium content.4- The parent PI for protein content, P2 for protein content and RWC, P3 for TAA, P4 for RWC and TS, P5 for RWC and OP and P6 for TAA and OP, gave significant desirable gi effects.5-The most desirable Ski effects were recorded by crosses P4xP6 for OP, PlxP2 and P I x P3 for protein content, P3x P6 for TS in both irrigation treatments as well as the combined analysis; by P2x P5 and P2x P6 for by P 1 xP3, P2x P5, and P3 x P4 for TAA and PlxP4 and Plx P3 for MI in stress irrigation and the combined analysis.C- Susceptibility index (DSI)1-Mean squares for genotypes (DSI) were significant for straw, grain and biological yields.2-Sham 6 (P6) for (DSI) straw yield, P3 for grain yield , and P6 for biological yield followed by (P5) and than by P3, had high tolerant to irrigation stress.Combining abilityThe mean squares associated with SCA were insignificant along with significant of SCA for the three DSI measurements (straw, grain and biological yields),Summary -132-