

BREEDING WHEAT FOR TOLERANCE TO DROUGHT STRESS BY

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ABSTRACT

Seven drought measurements, i.e. relative water content(RWC), osmotic pressure (OP), membrane integrity (MI), total sugars (TS), total amino acids (TAA), potassium content(K^+) and protein content were estimated for six parental varieties or lines and their hybrids under two irrigation treatments (two experiments). The first experiment was irrigated once after planting irrigation and the second one was normally irrigated.

Irrigation mean squares were significant for all the traits studied. Mean squares for genotypes, parents, crosses and parent vs. crosses were significant for most traits in both environments as well as the combined data. Genotypes x irrigation, parent x irrigation, F1 x irrigation and parent vs. crosses x irrigation were significant for all traits except F1x irrigation for K^+ , parent vs. crosses x environments for MI and parent x environment and parents vs crosses x environment for OP. Line 3D (P3), Line2D (P2), and Line 3D (P3) for OP, Line 3D (P3), Giza168 (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 parents; Sids1 (P1), Line2D (P2), and Sham6 (P6) expressed the highest value for K^+ in the same order. The parental variety Gemmiza 9 (P4) expressed the high-test value of TS in stress condition. While, Giza 168 (P5) gave the highest protein content in stress irrigation as well as the combined analysis and TAA in stress condition. Mean squares for parent 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. The cross P4xP6 for OP, P1xP2 for (K^+) and TS, P2xP5 for TAA, and P1xP3 for protein content gave the most desirable heterotic effects

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 K^+ 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. For most crosses, low GCA/SCA ratios of less than unity were detected. The interaction between both general and specific combining ability and irrigation treatments was significant for all the studied traits except K^+ content.

The parental variety Sids1(P1) for protein content, Line2D (P2) for protein content and RWC, Line 3D (P3) for TAA, Gemm.9 (P4) for RWC and TS, Giza168 (P5) for RWC and OP and Sham6 (P6) for TAA and OP gave significant desirable g_i effects for these measurements.

The most desirable S_{ij} effects were recorded by crosses P4xP6 for OP, P1xP2 and P1xP3 for protein content, P3x P6 for TS in both irrigation treatments as well as the combined analysis; by P2x P5 and P2x P6 for K^+ by P1x P3, P2x P5, and P3x P4 for TAA, and P1 x P4 and P1x P3 for MI% in stress irrigation and the combined analysis.