

Evaluation of General and Specific Combining Ability of Bread Wheat Quantitative Traits in Normal and Moisture Stress Conditions

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Abstract: Ten bread wheat cultivars were crossed in a half-diallel scheme in spring 2000. Parents and their 45 F_1 hybrids were planted in field and greenhouse, in a randomized complete block design with 6 replications, in 2001. Both in the field and in greenhouse, two moisture schemes were applied: three of the replications in each set were under normal irrigation condition, and three of them were under moisture stress. Several quantitative traits were studied in the field; however, in the greenhouse experiment only root dry weight was measured. Analysis of variance of the data revealed significant differences between genotypes for majority of traits. Additive and non-additive gene effects were found for the traits under study. Heritabilities of various traits were calculated. General combining ability (GCA) for parents and specific combining ability (SCA) for the F_1 hybrids, as well as the ratio of GCA variance to SCA variance, were estimated. In the normal moisture conditions, non-additive gene effects were observed for number of spikelets, biomass, seeds per spike, seed yield, seed weight, 50% heading date, flag leaf area, number of stomata and harvest index. However, for other traits, namely peduncle length, spike length and root weight, additive gene effects play a good role. In the moisture stress condition, non-additive gene actions were found for most traits except for peduncle length, which showed additive gene effect. One aim of this research was evaluation of the genetics control of the related traits to drought resistance and calculating of the ratio of GSA to SCA variation in normal and moisture condition.