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Evaluation of Heterosis in Durum Wheat (*Triticum durum* Desf.)

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Abstract

Development of hybrid durum wheat rests on the premise that there is heterosis in this crop. In deciding whether or not hybrids are producible, information is needed not only on the magnitude of heterosis but also on the types of gene action and their relative importance in the inheritance of all agronomic and quality traits. Unfortunately, there is no relevant durum-specific data available on the achievable heterosis level in F1 hybrids and their yield stability relative to pure lines in any environment. The main objectives of this study were: I. Evaluation of magnitude of heterosis in hybrid between durum wheat lines derived from two diverse germplasm pools. II. Identification of the nature of gene action controlling the inheritance of the investigated traits. Ten diverse parental lines, five German lines and five CIMMYT lines; were crossed following an incomplete diallel mating scheme to produce 45 F1 hybrids. The parents and their F1 hybrids were planted at Obregon, CIMMYT experimental station, in a replicated lattice design. Thirteen agronomic traits were investigated for the amount of heterosis, predominant gene action and for phenotypic correlation. Significant positive heterosis was observed in many traits. The superiority of inter-pool hybrids over intra-pool hybrids with respect to mean performance and heterosis for grain yield and other traits was observed in this study. However, the heterotic expression revealed by these hybrids was highly affected by unusual growing conditions, particularly the high temperature during grain filling period, and lack of adaptation of German lines to these conditions. It has been generally observed that hybrids between unadapted parents, exhibit more heterosis than hybrids between adapted ones. Heterosis for grain yield could be attributed to the yield components grains/spike, grains/spikelet and thousand grain weight. Both additive and non additive gene actions played a role in the inheritance of the investigated traits, however, additive gene action was predominant. None of the parents could be identified as a good general combiner for all traits studied, none the less, various best combiners for the most relevant characteristics were found.

Keywords: Additive gene action, durum wheat, Heterosis, Hybrid, Non additive gene action