

INSTITUTE OF PLANT BREEDING, SEED SCIENCE AND POPULATION GENETICS

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Evaluation of heterosis in durum wheat (*Triticum durum* Desf.)

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SUMMARY

Concern regarding the exploitation of heterosis in wheat to foster durum wheat hybrid as an approach to raise the grain yield potentiality and stability have promoted this investigation. Ten diverse parental lines, five German lines and five CIMMYT lines; were crossed following incomplete diallel mating scheme to produced 45 F₁ hybrids. The parents and their F₁ hybrids were planted in a replicated lattice design. Thirteen agronomic traits were investigated for amount of heterosis, predominant gene action and for phenotypic correlation. Heterosis was assessed as a relative mid parent and high parent heterosis. Analysis concerning the predominance of gene action for each trait was conducted using Griffing's method-4 and applying the fixed model.

Significant positive heterosis was observed in many traits. The RMPH for grain yield ranged from -0.1 to 84.2% with an average of 40.8% for German intra-pool hybrids, 14.2% for CIMMYT intra-pool hybrids and 36.2% for 45 F₁ hybrids. Magnitude of RHPH varied from -21.1 to 75.4%. Average RHPH for grain yield was 32.0% for German hybrids, 11.8% for CIMMYT hybrids and 17.2% for 45 F₁ hybrids. 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 hybrid was highly affected by unusual growing conditions, particularly the high temperature during grain filling period, and unadaptability of German lines to these conditions. It has been generally observed that hybrid between unadapted parents, exhibit more heterosis than hybrid between adapted ones. Heterosis for grain yield could be attributed to grains/spike, grains/spikelet and TGW via HI.

Both additive and non additive gene actions played a role in inheritance of investigated traits, however, additive gene action was predominant. Non of the parents were good general combiner for all traits studied. However, Duk is the best combiner for HI, grains/spike, grains/spikelet, days to heading and maturity, plant height and culm weight. Line 2716 had the highest positive general combining ability for biomass and spike/m². For grain yield Cado was the best combiner. Meg exhibited maximum positive general combining ability effect for grains/m² and spikelets/spike. Snt is the best combiner for TGW. Among 45 F₁ hybrids, hybrid Dur x Plat was the best hybrid for grain yield, whereas Meg x 2716 was the best for HI and TGW.