

5. Heterosis for Grain Yield and Its Components in Winter Wheat F_1 Hybrids.

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An evaluation of heterosis in F_1 hybrids of soft red winter wheat (SRWW) and hard red winter wheat (HRWW) was conducted to estimate heterosis in grain yield, yield components, total dry weight, height, test weight, protein quantity, and protein quality. Six SRWW hybrids and seven HRWW hybrids were evaluated at two locations in the 1981-82 crop season, and six SRWW hybrids and nine HRWW hybrids were evaluated at a single location in the 1982-83 season. Eight hybrids at College Station and Temple in 1982 and six hybrids at Temple in 1983 showed 35 to 575 kg/ha yield advantages above the best pure line entry at these locations. However, most hybrids failed to significantly outyield the best pure line entries in these experiments. High-parent heterosis for grain yield was moderate in several hybrids.

Weight per seed was the yield component which showed the greatest and most consistent heterosis during the two growing seasons. Some hybrids also were found to exhibit significant high-parent heterosis for seeds per spike, height, total dry weight, and test weight. Heterosis generally was greater for grain yield than for yield components. High grain yields of hybrids appeared to result from a favorable combination of parental yield components acting in a multiplicative manner.

Path coefficient analyses were conducted within entries to determine yield component contribution to the total yield variation. Direct effect and total correlation of individual components on grain yield indicated number of tillers to be the components contributing the most to total yield variation at Temple in 1983. However, seeds per spike was the yield component showing the greatest yield contribution for entries grown in all three test "environments".

Protein content and mixograph properties of most SRWW and HRWW hybrids were between those of their parents. Increased yields of F_1 hybrids which exhibited heterosis did not adversely affect quality. Although fungicide treatment improved test weight, flour protein content and mixograph properties were not affected significantly.