

AGRONOMIC, MILLING AND BAKING CHARACTERISTICS
OF HYBRID SPRING WHEATS (TRITICUM AESTIVUM L.)

By

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SUMMARY

The F_1 's, F_2 's and parents of a diallel cross involving the varieties, Justin, Chris, Selkirk, Penjamo 62, Lathrop, Magnif 41 and the lines, Minn. II-54-30 and ND-363, were grown at Fargo and Langdon, North Dakota, in 1965. Fourteen agronomic and nine quality characters were investigated.

Heterosis (percent increase over the higher parent) for yield was displayed for 26 of the 28 F_1 's and 12 of the 28 F_2 's. This yield increase was as high as 31.6% over the best parent in the cross. Eighty-two percent of the F_1 's had higher 200 kernel weights, and 75% had more heads per unit area than their highest parent. None of the hybrids had significantly more kernels per head than their best parent.

The highest frequency of heterosis was detected for plant weight with 27 of the 28 F_1 's weighing more than their heavier parent.

For the F_1 's significant or highly significant variances for general combining ability were obtained for number of days to heading, number of tillers, 200 kernel weight, plant height, spikelets per head, plant weight, days to maturity, grain yield and kernels per head. Specific combining ability variances were highly significant for 200 kernel weight, plant height and number of kernels per head and significant for yield and number of days to heading.

Narrow-sense heritabilities (F_1 --midparent regression values) were high for 200 kernel weight (.944) and number of kernels per head (.647), and intermediate for yield (.598).

Among the F_1 's significant correlations were obtained between yield and number of kernels per head but not between yield and 200 kernel weight or yield and number of tillers.

High F_1 -- F_2 heritabilities for some agronomic and quality characters indicated that bulk F_2 's could be used to predict F_1 performance. However, it was concluded that this method had limited practical usefulness since midparent values estimated hybrid performance as well as or better than the bulk F_2 's.

Slight heterosis was observed in a few hybrids for each of the quality characters. However, for most hybrids, quality was within the range of the two parents.

General combining ability variances for test weight, protein content, flour yield, loaf volume, and mixogram pattern were highly significant. The only significant specific combining ability variance was for crumb color.

Heritabilities of 1.01 for test weight, 0.98 for loaf volume, 1.08 for absorption, 1.23 for mixogram pattern, 0.95 for protein content, 0.72 for flour yield, and 0.36 for crumb color were, with the exception of crumb color, high. These values plus the high general and low specific combining ability variances indicate that, for these varieties, quality is controlled predominantly by additive gene action.

A negative association was found between protein content and yield ($r = -.643^{**}$).

The most frequently encountered quality faults for both the parents and hybrids (using the varieties, Chris, Justin and Selkirk, as standards) were loaf volume, mixogram pattern, crumb color and protein. In general, parental performance was a good indication of the hybrid's quality.