Early-Generation Selection for Flour-Absorption and Dough Mixing Properties in a Lemhi x Thatcher Wheat Cross

F. H. McNeal, M. A. Berg, R. K. Bequette, C. A. Watson, and E. J. Koch

CHANGING flour and bread production methods, coupled with a decreasing acreage of hard red spring wheat, *Triticum aestivum* L., have made improved milling and baking quality a primary objective of the Montana hard red spring wheat improvement program.

Evaluation of hybrid populations for milling and baking quality has been a common practice with plant breeders for years, but different evaluation procedures have been proposed and used by many workers. In the past, breeders often have been confused and dismayed over the seemingly contradictory definitions of the elusive term "quality", which must be defined in relation to the use made of a given wheat sample. Cooperation between breeders, cereal technologists, and processors in recent years has resulted in much clearer definition of the qualities desired in the various wheat classes and wheat regions.

New techniques and equipment are now available for accurately evaluating small samples of wheat for some quality attributes. These techniques and equipment permit testing earlier in a breeding program, but little information is available on the actual value of early-generation quality tests.

The objective of the present study was to answer these two questions: (1) how successful is selection for quality and (2) in which generation should selection for certain components of quality be started? The farinograph, a recording dough mixer, was employed to determine the water absorption, mixing requirement, and mixing tolerance of selections from a Lemhi X Thatcher wheat cross.

REVIEW OF LITERATURE

Early workers were limited by quality-testing techniques although pearling and particle-size indexes, test weight, and kernel weight were measures employed in studies designed to determine the inheritance of kernel hardness and milling quality. Crude-protein content, kernel vitreousness, and gluten strength (as measured by wheat meal fermentation time, extensimeter, and swelling tests) were utilized to study the inheritance of baking quality. Most of the components of quality studied seem to be multigenically controlled (3, 4, 13, 16). A survey of the literature pertaining to the inheritance of quality in wheat led Beard and Poehlman (3) to conclude that "the inheritance of quality seems to vary with the varieties of hard and soft wheats studied and with the method used to measure it."

Significant interannual correlation coefficients have been reported for many components of quality (3, 6, 16). However, Clark and