Some Possible Modifications and Uses of the Sedimentation Test in a Wheat Breeding Program

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The application, and to some extent the interpretation, of the wheat sedimentation test by plant breeders and by those engaged in the buying, selling, storing, and processing of wheat differ considerably. At least part of the present controversy over the merits of the test can be attributed to the rather free substitution of the methods and objectives of the plant breeder, the commercial trade and the U.S. Department of Agriculture, when in many instances these methods and objectives are not readily interchangeable. The plant breeder is primarily concerned with the classification of breeding lines into broad sedimentation categories; consequently, his interest is in relative sedimentation values and large differences. Under the present price support system, in which premium payments are based on sedimentation, the USDA and commercial millers are very much interested in absolute sedimentation values and small differences. The breeder works with segregating material, often of wide genetic diversity. Numbers of individual selections are large and the seed supply of each is usually small. By contrast, the milling industry and USDA deal with large seed quantities and a comparatively limited number of varieties.

All three groups, however, share a keen interest in how accurately the sedimentation test reflects actual bread-making quality. This issue has received wide attention in the recent literature (1, 2, 4, 5, 6, 7, 8, 10, 12) and is a problem to be resolved by the cereal technologist rather than by the plant breeder; therefore, it is not the direct concern of this paper. The studies reported here were primarily undertaken to gain information on three specific questions relating to the use of the sedimentation test in a plant breeding program: (a) Since seed of breeding selections is limited, will samples smaller than the recommended 200 g. give reliable sedimentation readings? (b) Is there a carry-over effect from sample to sample if the grinder rolls are not cleaned between samples? (c) Does the time interval between grinding and testing influence sedimentation value?

The use of the sedimentation test as a possible indicator of dough-mixing tolerance is also briefly considered.

MATERIALS AND METHODS

The varieties and breeding selections used in each of the following studies were hard red winter (HRW) types that had been grown in dryland nurseries in Utah during 1961 and 1962.