MODIFICATIONS IN THE SEDIMENTATION TEST FOR THE EVALUATION OF SMALL SAMPLES OF WHEAT 1

Martin Wise, E. Marie Sneed, and W. K. Pope 2

A MICRO milling and modified sedimentation technique was developed in response to requests by Idaho wheat breeders for quality tests on five-gram samples of wheat selections.

As far as possible, standard procedures, reagents, and equipment were used as in the regular sedimentation test as outlined by Cereal Laboratory Methods. 3

1. The 5-gram samples of wheat are milled on a Bradbender quadruplex laboratory mill after being tempered overnight to 12-13% moisture. The stock from each of 4 samples is sifted simultaneously through 9x9 cloth on a small rebolt sifter constructed to have 4 compartments, 3½ inches square, and with a receiving pan under each compartment. The resulting flour from each initial 5-gram wheat sample weighs about 1 gram.

2. Stopped 10-ml graduated glass cylinders are substituted for the standard 100-ml cylinders. Ten samples can be run simultaneously on a laboratory mechanical shaker.

3. The mechanical shaker used for regular sedimentation is modified by an insert which alters the depth of the rack to accommodate the 10 ml. cylinders. Operation of the shaker and all timing intervals follow the recommendations for standard sedimentation testing.

4. Five ml. of distilled water is placed in each 10-ml cylinder and then a 0.32-g. sample of flour is added. If the flour is placed in the cylinder first, the small diameter of the cylinder prohibits a thorough wetting of the flour. The flour and water are thoroughly swept into suspension by a brisk up-and-down shaking motion of the cylinder while the stopper is held in place with the thumb. The cylinders are then placed in the shaker for the usual five-minute interval.

5. Two and a half ml. of the isopropyl-lactic acid reagent are then added to each cylinder. The 5-minute shaking and 5-minute settling time intervals are standard.

6. At the end of the 5-minute settling period, the volume of the sediment is read to 0.01 ml. The sedimentation value of the sample is determined by multiplying the reading by ten.

Correlation of Micro and Standard Sedimentation

Comparative tests on wheat samples embracing a wide range of sedimentation show that sedimentation values obtained from micro testing closely parallel the values derived from the standard procedure, with the micro values being slightly lower than the corresponding standard values. In any series of sedimentation tests, a given selection remains in the same rank in both testing methods (Table 1).

Summary and Conclusion

Modifications in the sedimentation test are described which permit the use of only 5 grams of wheat instead of 25 grams in the standard test. Through this method, an index of quality characteristics may be determined in the F2 generation of wheat breeding—much earlier than hitherto thought possible. This will save the breeder considerable time and expense.

A MODIFIED UDY ANALYZER PROTEIN METHOD 1

Martin Wise, E. Marie Sneed, and W. K. Pope 2

A MODIFICATION of the standard Udy Protein Analyzer procedure 3 has been developed that saves 60% of the time expended in protein determinations. Variations from the standard procedure are as follows:

1. A 20-g. grain sample is ground in a Weber pulverizing mill using a .024-in. screen instead of the Udy React-R-Mill.

2. The ground samples are agitated in the Udy reagent dye solution in groups of 66. Ground samples of 0.8-g. each are placed in numbered 125-ml screwtop polyethylene filter bottles which have previously been filled with 40 ml. of the dye solution. The bottles are handled in trays, and the dispensing of the dye solution is facilitated by the use of a Schuco pipette.

3. The bottles are capped, given a cursory hand shaking, and placed in an Eberbach reciprocating shaker. A 12" X 18" rack has a capacity of 66 samples. They are agitated for 1 hour at 120 excursions per minute.

4. At the end of the shaking period filter caps are placed on each bottle and a few drops of solution filtered into the cuvette of the Lumetron colorimeter. The reading and conversion to percent protein are as in the standard method.

Granulation and Agitation Time

The Udy Protein Analyzer is based on the principle of the dye-binding capacities of wheat proteins. This reaction will not terminate if the agitation time is restricted or if the wheat particle are too coarse. The effect of increasing agitation time from 30 to 75 minutes on duplicate

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1 Contribution from the Wheat Quality Laboratory, Department of Agricultural Chemistry, Idaho Agricultural Experiment Station Research Paper No. 576. Received April 28, 1964.

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