A Study of Quality, as Measured by the Pearling Test, in Between Hard and Soft Wheats

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CROSSES to combine desirable features of Kawvale, a semihard, and Pawnee, a hard red winter wheat, with those of adapted soft red winter varieties have been made at the Missouri Agricultural Experiment Station. Segregates selected from these crosses vary widely in quality. The pearling test has been used as a preliminary screening test to evaluate the hardness of these segregates in an early generation. This study was undertaken to determine (1) the proportion of soft segregates, as measured by the pearling test; (2) if head selections from the segregating generations could be classified for hardness by visual observation of the kernels; and (3) if the pearling test would classify selected strains similarly in successive years.

LITERATURE REVIEW

The pearling test, originated by Taylor, Bayles, and Fifield (12) measures the kernel hardness of wheat by subjecting the grain to the abrasive action of a revolving stone in a commercial barley pearler. High correlations between results of the pearling test and tests measuring gluten strength in soft wheats have been reported by Bayfield et al. (2, 3), Morris et al. (9) and Bowman et al. (5).

The inheritance of gluten strength, hardness, and other aspects of quality in bread wheats has been reported by Biffen (4), Saunders (10, 11), Hayes, Immer and Bailey (7), Ausemus et al. (1) and Zinn (16), while Clark, Florell and Hooker (6), Worzella (13, 14, 15) and Kellnargar and Swenson (8) studied inheritance of quality in soft wheats. The inheritance of quality seems to vary with the varieties of hard and soft wheats studied and with the method used to measure it. Worzella (13) in a cross between Trumbull, a soft red winter, and Michikof, a hard red winter wheat, reported inheritance of gluten strength to be trigenic. Each factor had a cumulative effect, with strong gluten dominant. In later studies (15) he reported a four factor difference between American Banner, a soft white wheat, and Michikof, with strong gluten dominant.

The pearling test was used by Kellnargar et al. (8) to measure hardness in an inheritance study with varieties of white wheats.

1. Proportion of Soft Segregates from Kawvale and Pawnee with Soft

MATERIALS AND METHODS

Two hard parent varieties, five soft parent varieties, and five crosses were studied (table 1). While Kawvale, as a semi-hard wheat, its texture as measured by the pearling test, was similar-to that of Pawnee, a hard wheat, soft wheats were selections from complex crosses at the Indiana Agricultural Experiment Station and two were selections from the variety Mediterranean.

Head selections were taken at random from each parent variety and from an unselected bulk planting of the three Kawvale crosses in the F3 generation, and all Pawnee crosses in the F2 generation. The head selections were planted in 1-foot rows in the fall of 1950. All rows were harvested and the threshed grain was stored in a dry room for several days before pearling to reach a uniform moisture content.

The pearling tests were made with a Strong-Scott barley pearler equipped with a 10 by 10 mesh bronze wire 0.041-inch diameter wires. A charge of 10 gr. of grain was pearled for 2 minutes at a speed of 1435 r.p.m. Results are expressed as the percentage pearled off, which is called the pearling-index.

RESULTS

The pearling-index was determined on parent varieties and the selections from crosses harvested in 1951 and the distribution of the samples into pearling-index classes is presented in table 1. The Kawvale and Pawnee hard parent varieties approximated the range of the parent varieties in table 1. The Kawvale and Pawnee hard parent varieties are stated into three classes with over one-half of the soft segregates in the 26.0 to 28.9% pearling-index class. All other soft variety samples were distributed in pearling-index classes of less than the highest pearling-index of the hard parent varieties. The pearling-index of the Kawvale and Pawnee crosses approximated the range of the soft variety groups. The pearling-index of the Kawvale and Pawnee crosses approximated the range of the soft variety groups. The pearling-index of the Kawvale and Pawnee crosses approximated the range of the soft variety groups.