WITHIN recent years an increasingly large portion of the oat acreage in the United States has been planted to varieties derived from crosses with Bond. Although the Bond crosses are generally high in quality, considerable differences in this respect have been observed among these varieties. In this study evaluation of quality of some varieties of Bond parentage was undertaken with regard to their utilization for feeding purposes. The influence of environment on quality was determined by testing samples of these varieties grown at four locations during 2 years.

**Review of Literature**

Hull percentage and per cent bosom kernels were considered by Atkins (1) to be the most reliable measures of oat quality. Secondary kernels averaged 4 to 6% lower in hull percentage than the primary kernels. The varieties tested responded differentially at 10 locations for all characters. Experimental selections having Bond as one of the parents were found to be equal or superior to Marion in quality. Peek and Poehlman (8) considered the combined percentage of large and stub grains and the hull percentages of these two sizes to be the minimum information of use in determining the quality of oats for milling. Test weight per bushel was considered to be of importance as a preliminary measure of quality, and they suggested more tedious methods could be used later in the testing program for accurate comparisons among varieties.

Considerable variation in quality from season to season and among varieties was reported by Stoa et al. (10). On the average, early oats appeared to be superior in quality to midseason maturing varieties, though the rust-resistant midseason varieties were equal to some early varieties. All rust-susceptible varieties were high in hull percentage. Oat varieties tested by Zavit (12) over a 20-year period maintained similar annual ranks in spite of considerable seasonal variation in hull percentage. As strains with high test weights per bushel were low in yield and had thick hulls, he considered too much emphasis was placed on test weight as a criterion of quality.

Although Surface and Zinn (11) considered kernel weight to be the most reliable indication of oat quality, this view is not shared by other authors. Love et al. (7) state that kernel size is no indication of quality as many large-seeded strains have thick hulls. Kernel size was also found by Barbee (2) to be a poor indication of quality. Kernel weights in grams per 100 kernels have been found to range from 1.05 to 4.73 (9), 1.91 to 4.14 (2), 1.81 to 3.34 (6), 2.85 to 4.46 (5), and 2.79 to 4.47 (12). Ranges in hull percentage reported were 22.7 to 32.1 (3), 21.0 to 33.6 (5), 26.1 to 41.0 (6), 25.0 to 36.0 (7), and 23.7 to 38.2 (12).

**Materials and Methods**

Nineteen varieties having Bond as one of the parents were tested at four locations for 2 years. Varieties grown in the uniform season oat nurseries at Fargo, N. D., Madison, Wis., and Kanawha, Iowa in 1947 and 1948 were evaluated. Clinton and Tama were included from both sets of varieties. In 1947 a 100-gram sample consisting of 1,000 kernels from the four replicates at each location was used for quality determinations. In 1948 the determinations were made on one 15-gram sample from each of three replicates at each location.

The samples were separated into primary and secondary kernels and the number of kernels in each size was counted. One hundred kernels of each of the primary sizes were counted out. After weight was obtained, the sample was dehulled and the weight of hulls obtained. Hull percentage and kernel weight for the 15-gram samples were used to calculate the number of primary and secondary kernels, which were determined by displacement in kerosene. Test weights per bushel were obtained at the locations at which the tests were grown. Per cent bosom kernels were calculated on the basis of the number of bosom kernels in each primary size. Shelly and Bonda were excluded from experiments as their identity was doubtful. Correlation coefficients between characters were obtained for each variety. These coefficients were used to calculate the coefficients among characters, which were calculated using the z transform of Fisher (4). The correlation coefficients were corrected for bias in the z values at extreme precision was not advantageous.

**Experimental Results**

Mean test weight per bushel, hull percentage, and per cent bosom kernels, and kernel weight for varieties tested at four locations for 2 years appear in Table 1. Among the Bond-derived varieties Zephyr, Bonda, and Mindo had higher hull percentages than Clinton, while Colo, Advance, Andrew, Sac, and Zinn were superior to Clinton in this respect. Of the Bond varieties having Bond as a parent only Marion was equal in quality to the other varieties of Bond parentage tested. The highest hull percentage of all varieties was considerably inferior to the other varieties. The latter condition was probably due to the susceptibility of Tama to Helminthosporium, the varieties having Bond as a parent. Bonda had fairly large amounts of hulls whereas the other varieties tested had considerably fewer.

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1 Contribution from the Iowa Agricultural Experiment Station, Project 654. Journal paper No. J-1755. Received for publication February 27, 1950.

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