Association Between Diastatic Power and Certain Visible Characteristics and Heritability of Diastatic Power in Barley

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IT IS a well established fact that diastatic power is a major criterion of malting quality in barley. Diastatic power has been shown to be (2, 4, 7) a strain or varietal characteristic, and therefore, barley breeders can select strains which have a consistent relative activity for this enzyme. One of the major obstacles in selecting barley strains with a desired diastatic power is the lack of an easy method for evaluating this characteristic in the early generations of a barley cross. Even the ferricyanide method for determining diastatic activity in barley grain, developed by Anderson and Sallans (1), it too laborious to be used on the large number of segregates that need to be analyzed in a barley improvement program. Selection for good agronomic barley strains with desirable diastatic activity would be greatly facilitated if an association could be established between certain morphological characters and high or low diastatic power.

Den Hartog and Lambert (3) studied the association between diastatic power and yield, bushel weight, and floret fertility, all of which are considered to be multigenically determined. They found several significant correlations but they were of low magnitude. There is some popular belief that blue aleurone barley varieties are lower in malting quality than white aleurone strains. However, this fact has been refuted by isogenic line studies.3

The study reported herein is an attempt to determine if an association existed between diastatic activity and certain visible characteristics in which a gene being studied. 'Homozygous' refers only to the gene being studied. The seed harvested from 'homozygous' F1 rows and parental selections, which were also grown in 1-row plots, 16 feet long. The ground to pass through a 20-mesh sieve and dialinized on each sample according to the method of Anderson and Sallans (1). Each sample was analyzed until the determinations agreed on titration to within 0.3 thiosulphate. A standard variety was included with each set of determinations. The difference between the mean diastatic activity of the two homozygous linkage groups from a cross was tested for significance by the "t" test. In order to compare naked with hulled barley of the naked kernel parent and the naked kernel adjusted for hulls using 13 as the average percentage on a 6-row barley.

RESULTS

Association of Diastatic Power with Visible Characteristics

The means of diastatic activity in degrees and the "t" values for each of the progenies of the parents are given in Table 1. In all five cases the II11 parents are given in Table 1. In all five cases the "t" values are highest in each comparison. It is evident from the table that there is an association between diastatic activity and the 2-row vs. 6-row characteristic. The progeny of the 2-row group had the higher diastatic activity, in contrast to expectation. If the linkage group 1 of the O.A.C. 21 parent contained diastatic activity, it would be expected that the progeny of the 6-row group would have a higher mean diastatic activity.