Inheritance and Heritability of Heading Date in Barley

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TWO criteria, date of heading and date ripe, have been used by barley breeders to determine relative maturity of different barley varieties. Since the time interval between these two dates is quite constant for most varieties when grown under similar conditions, either is satisfactory for determining the maturity of a variety in relation to standard strains. Usually the breeder attempts to produce a variety with a desired maturity for his area or state, either early, midseason, or late. There is little need, therefore, to maintain strains which are not in the desired maturity bracket. Any method of eliminating strains with undesirable maturity dates in the early generations after a cross allows the breeder to evaluate a larger number of strains in the desired bracket for other agronomic characteristics. The earliest time when maturity or heading date can be evaluated is among F2 plants.

The study reported herein attempts to determine the reliability of heading date of individual F2 plants as a measure of this character in their respective F3 progenies. A second portion of the study deals with the inheritance of heading date in four barley crosses and the association of heading date with other plant characteristics.

LITERATURE REVIEW

The inheritance of date of heading in barley was found to be due to one factor pair by Griffie (2). He found an association between heading date and the two-row vs. six-row characteristic. Neatby (4) and Hehn (5) reported that three factor pairs determined earliness of heading in barley. The first author found earliness to be linked with the factor for short vs. long outer glume. Wexelsen (5) found two factor pairs determining date of heading in barley. He reported that heading date was associated with the two vs. six-row characteristic, with rough vs. smooth awn, and the number of barbs on the nerves of the lemma.

1 Joint contribution as journal paper 1591 from the Michigan Agr. Exp. Sta., East Lansing, Mich., and journal paper J-2411 from the Iowa Agr. Exp. Sta., Ames, Iowa, Project 1177. Received for publication Jan. 2, 1954. The research reported herein was initiated by the author when he was a staff member in the Farm Crops Department, Michigan State College and continued with the same plant material at the Iowa State College.

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METHODS AND MATERIALS

Individual plants in the F3 generation of four crosses and their parents were space-planted 8 inches long and 1 foot wide at East Lansing, Michigan. The crosses were Harlan X Ogallulta, Harlan X Jet, Harlan X Anoidium, and Jet X Anoidium. Heading date was noted on each plant when the first head was completely emerged from the flag leaf. Heritability of heading date was determined by the regression of F3 upon the parental F2 plants.

The data have been grouped into class intervals, the same manner, but the parent varieties were not crossed. The F3 generations of seven other barley crosses were Moore X (Dorsett X M49001), Harlan X Jet, Harlan X Anoidium, Dorsett X Ogallulta, Dorsett X Harlan, Harlan X Kindred X Bay, and Montcaltm (4). The parents were space-planted 8 inches, apart in rows 16 feet long and 1 foot wide at East Lansing, Michigan. In each of the latter case the 47 individuals which overlapped were divided 23 and 24 to the flag leaf. The midpoint between the nearest two parents of a cross was taken as the dividing point between the early and late segregates in the F3 generation of each cross. In this manner the early and late segregates did not overlap. The frequency distributions of the parents did not overlap. The frequency distributions of the parents did not overlap. The frequency distributions of the parents did not overlap. The frequency distributions of the parents did not overlap. The frequency distributions of the parents did not overlap.

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Inheritance of Heading Date

The frequency distributions of the heading dates of F3 plants in four barley crosses and of the parents are given in tables 1, 2, 3, and 4. In each of the crosses, Harlan X Ogallulta, Harlan X Jet, Harlan X Anoidium, the frequency distributions of the parents did not overlap. The midpoint between the nearest two parents of a cross was taken as the dividing point between the early and late segregates in the F3 generation of seven other barley crosses were Moore X (Dorsett X M49001), Harlan X Jet, Harlan X Anoidium, Dorsett X Ogallulta, Dorsett X Harlan, Harlan X Kindred X Bay, and Montcaltm (4). The parents were space-planted 8 inches, apart in rows 16 feet long and 1 foot wide at East Lansing, Michigan. In each of the latter case the 47 individuals which overlapped were divided 23 and 24 to the flag leaf. The midpoint between the nearest two parents of a cross was taken as the dividing point between the early and late segregates in the F3 generation of each cross. In this manner the early and late segregates did not overlap. The frequency distributions of the parents did not overlap. The frequency distributions of the parents did not overlap. The frequency distributions of the parents did not overlap. The frequency distributions of the parents did not overlap. The frequency distributions of the parents did not overlap.