Reciprocal Differences in Amylose Content in Corn Endosperm

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Starch from the endosperm of mature corn, Zea mays L., may vary in the ratio of amylopectin to amylose. The total endosperm starch of commercial dent hybrids consists of approximately 73% amylopectin and 27% amylose. Other proportions are possible, since the starch fraction is conditioned by a number of major genes. Cameron (4), Kramer and Whistler (11), and Dunn et al. (8) reported the effects of du, su, and sm on amylose content. In each instance, amylose content was negatively correlated with total starch production. However, Deatherage et al. (7) reported that the endosperm mutation ae gave a high proportion of amylose without a substantial reduction in total starch production. Modifier genes, in the presence of ae, may further alter the percent amylose along a nearly continuous scale. Amylose values of ae stocks have been reported within the 45 to 80% range. The relatively wide range of amylose values obtained provided the basis for attributing this variability to modifier genes (1, 16).

The development of high-amylose hybrids currently involves the elaboration of ae lines carrying modifier complexes conducive to high-amylose synthesis in hybrid combinations. Cyclical breeding systems have been initiated at the Missouri Agricultural Experiment Station to accumulate favorable modifier genes. A reservoir of genes with additive effects is assumed to be necessary for effective selection. The constitution of double-cross hybrids, with respect to individual inbred lines, would reflect the kinds of gene action inherent in the inbreds chosen, and the rela-