THE INHERITANCE OF THREE GENES THAT INFLUENCE TIME OF FLORAL INITIATION AND MATURITY DATE IN MILO

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Sorghum, Sorghum vulgare, Pers., although apparently indigenous to tropical Africa is now grown in latitudes as high as 45 degrees. Since sorghum is a short-day plant according to the classification of Garner and Allard (10), which means that maturity is hastened by growing under short photoperiods, the varieties that are adapted to the higher latitudes of long summer days must have arisen at some time in the past as the result of mutation of genes that control response to photoperiod.

Since the duration of the vegetative period in a grass is controlled by the time of floral initiation, a study of the inheritance of maturity in sorghum is actually a study of the inheritance of the genes that influence the biochemical changes that bring about floral initiation. This paper reports on the inheritance of three genes that influence maturity date in milo and which cause profound changes in plant growth.

REVIEW OF LITERATURE

In a plant with a terminal inflorescent like sorghum, duration of the vegetative period and ultimate plant size are dependent upon the time that floral initiation takes place. In a grass, a delay in the initiation of a floral bud results in a larger number of internodes and leaves which brings about a delay in flowering and maturity. There are illustrations and an excellent discussion of the developmental morphology of the growing point in certain grasses by Evans and Grover (9). Sinnott (29) has reported that the size of any organ depends upon the size of the growing point out of which it develops, and Abbe, Randolph, and Einset (1), using Zea mays, have shown that the relative size of a leaf is determined at the time the leaf primordium is laid down. These things being true, it follows that the large leaves that appear towards the top of a plant result from the greater circumference of the growing point as it grows older, and stalk diameter is positively correlated with number of nodes and the duration of growth prior to floral initiation. Earliness of maturity is associated with small plant growth and lateness of maturity with large plant growth, but the determining factor in both maturity and ultimate plant size within a species is the duration of the period prior to floral initiation. Sieglinger (28) recognized in sorghum the association between number of leaves and leaf size, diameter and height of stalk, and vigor of plant, and showed that varieties have different numbers of leaves, and that a change in planting date which changes both the photoperiod and temperature brings about differences in leaf number.

Hamner (14, 15), in discussing the biochemical nature of photoperiodism, has assumed that substances of a hormone-like nature must be involved in the differentiation that ultimately leads to flowering. Yarnell (37) has discussed and reviewed the literature that is concerned with the influence of environment on the expression of hereditary factors. It is apparent that the genes which influence growth and differentiation in plants are themselves influenced in expression by

1Contribution No. 901 from the Division of Agronomy, Texas Agricultural Experiment Station, College Station, Tex. Published by permission of the Director of the Texas Agricultural Experiment Station. Received for publication June 11, 1945.

2Agronomist and Agronomist in Charge of Sorghum Investigations, respectively.

3Figures in parenthesis refer to “Literature Cited”, p. 935.