CROSSING STUDIES WITH MALE-STERILE BARLEY

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IN THE course of studies on fertility and crossability in a male-sterile barley certain information has been compiled concerning the habits and adaptabilities of this particular barley as a plant breeding tool. Such information will be particularly useful as a background for understanding the diverse uses of this plant character which makes cross fertilization necessary in a normally self-fertilized species. Many of the crosses and backcrosses whose seed stocks were used for these studies were made for genetic, agronomic, or pathologic studies not herein considered.

EXPERIMENTAL RESULTS

LONGEVITY OF FERTILITY IN FEMALE FLOWERS

The length of the period of stigmatic receptivity to pollen was established for two different treatments—for plants under cheesecloth cages and for plants unprotected except for glassine bag coverings on the individual spikes. The spikes concerned were all tagged on April 17, 1940, on which date certain florets in the center of the spikes were beginning to open from action of the lodicules. Previous and subsequent experience has shown that structural development of the female flower parts in male-sterile plants is normal up to the time of flowering. Subsequently, the lodicules remain functional, never allowing the glumes to completely close, and actually reopening them widely each morning for several days. This reopening, as well as the period of stigmatic receptivity, is no doubt strongly influenced by temperatures and humidity. During the normal flowering season covered by these experiments, fertilization occurred during a period of 5 to 8 days following the first flower opening, as shown in Table 1. Pollinations in this case were made by hand on each individual floret of five randomly chosen spikes on each date and for each treatment. For the early pollinations, fertility tended to be highest in the top and central florets, while the last vestige of fertility was in the younger basal and lateral florets of the spikes.

VARIATIONS IN NATURAL CROSSING

In actual practice, both climatic and plant variations influence cross fertility. Three types of plant material are compared in Table 2 and the effects of two seasons shown. Alternate rows of the pollen parent variety and male-sterile, when grown in rows 12 inches apart, proved least efficient. This resulted in part from row spacing, but more particularly from seasonal difference in the heading date of

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