SELF-FERTILITY STUDIES IN THREE SPECIES OF COMMERCIAL GRASSES

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ONE of the breeding methods with grasses used in Minnesota has been selection in self-pollinated lines. It has been found that there is a wide variation in seed setting from plant to plant and from year to year. This paper presents the results of a study made in 1943 and 1944 on the variability of seed setting of a number of clones in three species of cultivated grasses under various conditions of pollination. A study was made also of the relation between seed setting ability in these clones and pollen fertility, pollen size, and chromosome behavior at meiosis, including the production of micronuclei at the quartet stage.

MATERIAL AND METHODS

The species in which seed setting was studied were creeping brome grass, Bromus inermis Leyss, crested wheatgrass, Agropyron cristatum (L.) Beauv., and meadow foxtail, Alopecurus pratensis L. The material, supplied by the Division of Agronomy and Plant Genetics, University of Minnesota, consisted of 29 clones of brome grass, 34 clones of crested wheatgrass, and 24 clones of meadow foxtail. Twenty-seven of the brome grass clones were selected from S₂ and two from open-pollinated plants. The 34 clones of crested wheatgrass were of two types, forage and Fairway. The forage type comprised one clone selected in an S₂ generation, six of S₁ origin, and five open-pollinated plants. Twenty-two clones of the Fairway type of open-pollinated origin were studied. The meadow foxtail material consisted of 10 clones selected from S₁ plants and 24 from open-pollinated plants.

These selected clones were grown in 1943 in randomized blocks with three replications, each plot consisting of a single clonally reproduced plant. Each of the three species was planted in a separate section of the field at University Farm, St. Paul, Minn. Studies of seed setting, under conditions of open pollination and under parchment bags, were made on the plants grown in the triplicate blocks in 1943 and 1944, except that seed setting in meadow foxtail was studied only in 1944. Some of these clones were planted also in space isolation, and in isolation in pairs, for comparisons of seed setting under such conditions with that under open pollination and under bags. In the case of space isolation, individual plants of these three species were planted in isolated plots in small grain nurseries, each plant of the same species being separated about 100 feet apart. Isolation in pairs was made by planting two clones of the same species in an isolated plot and these plots were distributed at a considerable distance apart in the small grain nurseries. These isolation plots were partially protected also by open-top cheesecloth cages considerably higher than the plants.

Methods and material used for bagging at St. Paul have been described by Hayes and Schmid (2).\(^3\) In determining the seed set, five representative heads or