THE EFFECT OF SOME ENVIRONMENTAL INFLUENCES IN BULK HYBRIDIZATION OF GRASS

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The smallness of the floral parts of some grasses makes the work of controlled hybridization tedious and slow. A simple, inexpensive, and accurate method for bulk hybridization would be useful and would speed up the work. The investigation herein reported was designed to study further the possibility of bulk hybridization. The technic involves immersion of inflorescences in water heated to specific temperatures to effect inactivation of pollen. As a necessary corollary, the desired pollen is then applied by any of several methods.

It is now well known that controlled heat treatments applied to inflorescences near the time of anthesis are effective in seriously reducing the viability of pollen without having a similar effect on the female gametophyte. However, good female fertility has not been found following complete male sterilization. It has become apparent that influences of the plants’ environment other than the heat of the emasculation treatment must be taken into consideration.

The present study was conducted on three important forage grasses, namely, smooth bromegrass, *Bromus inermis* Leyss., crested wheatgrass, *Agropyron cristatum* (L.) Goertn., and western wheatgrass, *Agropyron smithii* Rydb. The general findings of earlier investigators are substantiated, and, in addition, evidence is presented to show the existence of a daily cycle in the efficiency of emasculation of treatments at critical temperatures.

REVIEW OF LITERATURE

The literature on bulk emasculation and bulk pollination has been adequately reviewed by Domingo (2) and will be mentioned only briefly here. Stephens and Quinby (4) reported the effectiveness of hot water in the emasculation of sorghum. Jodon (3) reported that both hot and cold water were effective in the emasculation of rice. Suneson (5) demonstrated that wheat was partially emasculated by prolonged low air temperatures. Bulk pollen transfer has long been useful in corn breeding, as indicated by Webber (6), in 1900, and Coulter (1), in 1919. It has also been effective in obtaining hybrids among other cereals, as reported by several investigators.

Perhaps the most critical and extensive study reported in the literature covering both bulk emasculation and pollination is that of Domingo (2). He attempted...