INHERITANCE OF RYE CROSSABILITY IN WHEAT HYBRIDS

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The possibility of obtaining desirable economic varieties of plants from hybridizing distantly related species or genera continues to be of considerable interest. The results so far obtained have been discouraging, as incompatibility or sterility is found to exist at one or more of the vital phases necessary to begin or continue the work. This is especially true in hybridizing wheat and rye. Here, owing to the almost total sterility of the F₁ plants, very large F₁ generations are necessary. Unless wheats are used that will cross rather easily with rye, it is difficult to obtain a large F₁ generation. The problem may become still further complicated by the fact that the wheat varieties that cross readily with rye do not carry the desired agronomic characters. Any procedure that will further the success of transferring desirable rye characters, especially winterhardiness, to wheat is of considerable value.

REVIEW OF LITERATURE

Wheat varieties differ decidedly in their crossability with rye, as shown by Firbas (2) and Jesenko (3). Firbas obtained no conclusive results on the value of different environmental factors in crossing wheat with rye. No extensive testing of the common American wheats for rye crossability has been made, but so far as known no economic variety is outstanding for this character. Certain Chinese wheats, however, cross readily with rye as shown by Backhouse (1), Thompson (7), and Leighty and Sando (4). The almost total sterility of the F₁ wheat-rye hybrid has been shown by Jesenko (3) and Leighty and Taylor (5).

METHOD AND MATERIALS

The purpose of these experiments was to develop a method whereby large numbers of desired F₁ wheat-rye combinations could be obtained to facilitate breeding for more winterhardy wheats. This was attempted by two methods, as follows:

1. By crossing a variety (Purplestraw) of low crossability with rye (Abruzzes), backcrossing the resulting F₁ with Purplestraw, allowing this wheat-rye wheat type to self, and testing the resultant individuals for inherited crossability.

2. By crossing winterhardy varieties (Minhardi and Minhardi x Minturki, C. I. 8034) of low crossability with a rye crossable wheat (Chinese) (4), which, however, is not winterhardy, and obtaining crossable hardy types of wheat.

The experiments were conducted in the greenhouses and in the field at the Arlington Experiment Farm near Washington, D. C.