PROGRESS WITH TRITICUM × AGROPYRON CROSSES IN CALIFORNIA

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HIS report of progress is prompted by persistent popular announcements of impending commercial utilization of perennial wheat in Soviet Russia (1) and a very general interest in Triticum-Agropyron crosses in the United States (6). It is concerned with two groups of hybrids received in the F₀ and later generations from W. J. Sando of the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Dept. of Agriculture. These consisted of wheat crossed with Agropyron elongatum (Host) Beauv., and A. trichophorum (Link) Richt. The results with backcrosses, sib crosses, and natural crosses derived from the above crosses are reported. The experiments at Davis, Calif., began in 1938. Both annual and perennial derivatives with wheat-like characters and perennial plants with potential forage use are being sought. The annual types have not been retained for study until recently.

REVIEW OF LITERATURE

Russian seed stocks of wheat-Agropyron crosses have not been available for observation in America. Armstrong (3) has given a very good summary of the Russian work in a report on Triticum-Agropyron experiments in Canada. Armstrong and associates (2, 3) have worked extensively in this field, especially with material in which Agropyron intermedium (Host) Beauv. (A. glaucum Desf.) was the grass parent. On the whole, their work has not yet achieved its prime objectives of greater winterhardiness and drought resistance, although certain forage types with large seeds have been obtained. Colchicine-induced amphidiploids are apparently being studied most extensively now.

Sando (8), whose experiments with intergeneric hybrids are long-standing, has never published any detailed results with Agropyron crosses, although Smith (9) mentions some of his material. A preliminary report on agronomic and cytological results with some of our material has been published (5), and three other papers (4, 6, 7) mention the California work.

EXPERIMENTAL BACKGROUND

The experiments to date have been chiefly an attempt to evaluate the agronomic possibilities of Agropyron-wheat crosses. The primary stocks from which our stocks have been developed were 23 F₀, BCF₁, or BCF₂ lines in which Agropyron elongatum or A. trichophorum had been used as the grass parent and various Triticum species as the other parent. These were seeded for observation at Davis, Calif., in the fall of 1938. Their probable adaptation soon became apparent.

A few viable seeds were obtained in 1939 and 1940 on some of the F₁ plants from Agropyron trichophorum wheat crosses. From these, rather fertile derivatives were obtained in the F₂ generation (5), presumably resulting from the union of partially reduced gametes, with natural outcrossing to various lines. Most of the F₁ plants from A. trichophorum wheat crosses are still alive and have been vegetatively divided into many units. These, however, are not discussed here.

Conventional breeding methods such as pedigree selection, bulk populations,