BREEDING FOR RESISTANCE TO CROWN RUST, STEM RUST, SMUT, AND DESIRABLE AGRONOMIC CHARACTERS IN CROSSES BETWEEN BOND, AVENA BYZANTINA, AND CULTIVATED VARIETIES OF AVENA SATIVA

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The introduction in 1929 of Bond from Australia and Victoria from South America, as described by Stanton and Murphy, was a direct result of a search by plant explorers throughout the world for oats highly resistant to crown rust, Puccinia coronata. Stanton and others have described selections from crosses of Victoria with Richardland that appear desirable agronomically and that are resistant to stem rust, crown rust, and the smuts.

The present paper summarizes results obtained in Minnesota from crosses of Bond with cultivated varieties of Avena sativa. Particular attention is given to the performance of Bond crosses in advanced generations, in individually spaced plots, and in rod-row trials, in relation to important agronomic characters.

MATERIAL AND METHODS

Cooperative studies of crown rust resistance made at Minnesota indicated that Bond had a much higher degree of resistance than Victoria and, as the early reports showed that Bond was more desirable in agronomic characters than Victoria, Bond has been used extensively in the Minnesota breeding program.

Bond resulted from a cross of Avena sterilis with Golden Rain and belongs to the cultivated species, Avena byzantina, characterized by the separation of the lower floret from the axis of the spikelet by abscission with a well-defined basal cavity on the lower grain, floret disjunction by basifracture, and conspicuous bristles on the base of the lower floret. Important differential characters of Bond and Anthony, one of the varieties crossed with Bond, are given in Table 1.

Bond was crossed also with Iogold, an early-maturing variety bred at Ames, Iowa, that has been grown extensively in southern Minnesota, Rainbow, a selection from Green Russian made in North Dakota, and two selections known as Double Crosses A and B, selected from (White Russian × Minota) × Black Mesdag. The two double cross selections have the Black Mesdag type of resistance to smut and the White Russian type of resistance to physiologic races 1, 2, and 5 of stem rust, while Iogold and Rainbow are resistant to races 1, 2, 3, 5, and 7 of stem rust. All sativa varieties used in crosses with Bond were susceptible to crown rust, although Rainbow has moderate resistance in some seasons. With the ex-

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