REACTION OF VARIETIES AND HYBRIDS OF WHEAT TO PHYSIOLOGIC FORMS OF BUNT

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In a number of the wheat-growing areas of the world severe losses are sustained annually through the ravages of stinking smut, a disease caused by Tilletia levis Kühn and T. tritici (Bjerk.) Wint. Attempts have been made to devise ways of reducing these losses by the discovery of effective and economical methods of seed treatment, by various cultural practices, and by the breeding or selection of resistant varieties desirable in other agronomic characters. Some progress has been made. The copper carbonate treatment adequately reduces infection from seed-borne spores, but in areas in which the soil is contaminated with viable inoculum at seeding time its efficiency is much reduced. The breeding of varieties resistant to this disease seemed a few years ago to be relatively simple, but the presence of physiologic forms in the two species of Tilletia necessitates a more comprehensive breeding program. In the Pacific Northwest T. tritici was the only species of the organism known to be present up to 1918. In that year one collection of bunt was found that was caused by T. levis. Since then Gaines (3), Heald and Gaines (5), and Kienholz and Heald (6) have shown that physiologic forms of T. tritici and T. levis are now widespread in this area.

Before a breeding program to cope with this disease can be continued effectively, much data should be available on the number of physiologic forms present and on the reaction of different varieties of wheat to these forms. Studies of this nature were begun in 1927 at the Washington Agricultural Experiment Station and are being continued. Evidence gathered in 1927 on the presence of physiologic forms of bunt in the Pacific Northwest has already been described (3).

In the first part of this paper the earlier work on the differentiation of forms in the collections made in 1927 will be summarized; and the reaction of various varieties of wheat to these forms will also be described. It is desirable in a breeding program to have as much information as possible on the number of genetic factors concerned in the reaction of varieties of wheat to the prevalent physiologic forms. In the second part of the paper, the results of one of these genetic studies will be presented.

PHYSIOLOGIC FORMS AND VARIETAL REACTION

In a recent paper Aamodt (1) has given a comprehensive review of the literature on physiologic specialization in bunt and the reaction