Reaction of Varieties and Strains of Winter Wheat
to Loose Smut

I. M. Atkins, E. D. Hansing, and Wayne M. Bever

LOOSE smut, *Ustilago tritici* (Pers.) Rostr., of wheat causes important economic losses in a number of wheat-growing areas of the United States. In the four leading hard red winter wheat states, Kansas, Oklahoma, Texas, and Nebraska, loose smut caused an average estimated annual loss of 2,577,000 bushels from 1935 to 1939 (4, 5, 13). During the same period, the corresponding average estimated annual loss in the four leading soft winter wheat states, Ohio, Missouri, Indiana, and Illinois, amounted to 1,399,000 bushels. Because of the difficulty of the modified hot water treatment for the control of loose smut, the most practicable method of control is growing resistant varieties. Until very recently, however, there were very few satisfactory resistant varieties available. Pawnee, recently distributed in Kansas, Nebraska, and Oklahoma, is the only hard red winter wheat variety commercially available that is resistant to loose smut. A large proportion of the soft winter wheat varieties grown commercially are very susceptible, although there are a few exceptions. The varieties Kawvale (semihard), Austin, Leap, Currell, Fairfield, Thorne, Trumbull, and Cornell 595 possess various degrees of resistance and have been distributed with such recommendations. A few are highly resistant under all conditions while others are resistant to certain races of loose smut as evidenced by their resistance in some growing areas and their susceptibility in others.

Since 1937, studies to determine varietal reaction to artificial inoculation with loose smut, as the first step in a breeding program to develop resistant varieties, has been under way at Texas Substation No. 6, Denton, Tex. Similar work was undertaken at the Kansas Agricultural Experiment Stations in 1940, and at the Illinois Agricultural Experiment Station in 1942. In order to assemble the results by varieties, the data obtained at the three stations are combined in this paper. A given variety or strain may have been tested at one to three stations from one to seven seasons.

MATERIAL AND METHODS

Three methods of inoculation were used in these tests. The partial vacuum spore-suspension method as modified and described by Moore (7) was used through-

---

1Contribution from the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration; and the Texas, Kansas, and Illinois Agricultural Experiment Stations. Contribution No. 480, serial No. 392, Department of Botany, Kansas Agricultural Experiment Station, Manhattan, Kans. Received for publication January 10, 1947.

2Agronomist, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering; Associate Pathologist, Department of Botany and Plant Pathology, Kansas Agricultural Experiment Station; and Pathologist, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, respectively.