Sources of Resistance to Loose Smut, *Ustilago nuda*, in Winter Barleys

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The following is a preliminary report on varietal resistance in winter barleys to the floral-infecting loose smut, *Ustilago nuda* (Jens.) Rostr. This disease causes widespread damage in Missouri, and information on sources of resistance is needed to promote progress in breeding against it. The response of barley varieties reported herein was obtained with artificial inoculations.

**METHODS AND MATERIALS**

Two methods of artificial inoculation were employed. The partial vacuum technique as described by Moore (6) was used in the spring of 1942. Inoculated seed was planted in the fall of 1942 and results reported as infection obtained in 1943. Because of its difficult operation, this technique was later discarded in favor of a simpler method in which a spore suspension is injected into the individual florets with a hypodermic needle. The latter method used in 1943 and later years, results reported for 1944 through 1946, has been described by Poehlman (7), but its essential features are repeated here.

The equipment consists of a hypodermic needle (1 inch, 25 gauge) inserted into a rubber bulb of 10-cc capacity. The bulb is filled with a suspension of chlamydospores by suction through the needle, and inoculations are made by injecting a few drops of this suspension into each floret of the barley spike within 1 to 2 days following pollination. At that time immature florets at the base of the spike are removed by clipping. The spore suspension is prepared by straining spores from smutted heads through a cheesecloth into tap water and adding dextrose to make a 1% solution.

Smutted heads collected from Missouri Early Beardless, Reno, Kentucky 1, Purdue 21, Ward, and similar varieties growing in experimental plots at Columbia were mixed and used in preparing inoculum for these studies. Seed of the above varieties had been obtained originally from commercial sources in Missouri, Oklahoma, Indiana, or Ohio. The physiologic races that may have been contained in this composite inoculum are unknown.

Three heads from each variety were inoculated in the field each year. Seed from each inoculated head was planted in a 1-foot row the following season. This dense planting rate was used since winter injury from heaving is severe in thinly spaced plantings of barley here. The percentage of smut reported for a variety in any season is the average percentage of smutted heads in the three individual rows. The total number of heads per individual row on which this percentage is based varied, but for the 1946 season it ranged from 8 to 51 with an average of 28 heads for all of the rows in which smut was found.

The 65 varieties and selections reported here include most of the standard varieties and several experimental strains currently being grown or tested in the winter barley areas of the United States. Seed of a few of these varieties and strains was obtained by the Missouri Experiment Station through commercial sources, but most of them came from the Division of Cereal Crops and Diseases, U. S. Dept. of Agriculture. Also included are seven selections made at the Missouri Experiment Station from the variety Missouri Early Beardless. The winter barleys of foreign origin from the U. S. Dept. of Agriculture world collection are under test, but results are incomplete and will be reported later.