Sources and Use of Scald Resistance in Barley

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BARLEY scald, *Rhynchosporium secalis* (Oud.), J. J. Davis, has been considered as “the most destructive disease to barley in California, especially in the northern half of the state.” Growers have derived some practical yield advantage from the long-recognized weak resistance in varieties like Vaughn, but information on sources of greater resistance has been wanting. This paper details the observed field responses of various resistant varieties tested during the period 1937-47. A companionate backcross breeding program to utilize such resistance also is discussed.

METHODS

Special early-sown nurseries planted close to infected stubble, and liberally extended with susceptible spreader rows, were used to determine the resistance of varieties and breeding stocks. Readings were first based on type of infection, i.e., 0, highly resistant; 1, resistant; 2-3, weakly resistant; and 4, susceptible. This was later expanded to include the percentage of the leaf area destroyed. High levels of infection were recorded on Atlas (susceptible) in all seasons. Readings generally were made shortly before heading.

RESULTS

The variously resistant varieties shown in Table I were discovered in the course of the diverse barley breeding programs conducted at the University Farm, Davis, Calif. In general, it seems that resistance is well distributed among world barleys. Thus, La Mesita, Trebi, Vaughn, and Winter Tennessee were screened from early routine testing work. A more impressive group of resistant varieties was obtained from the collections brought to America by Dr. J. G. Dickson in 1930, and by other plant explorers in other years. These were first grown at Davis for one or more years during the period 1933 to 1936. In 1938, the 28 parents used to make Composite Cross, C.I. 5461, and also 356 homozygous selections from this Composite Cross were grown. From this group the resistance of 3 of the 28 parents, namely, Trebi, Algerian, and Wisconsin Winter, was established. Seventeen resistant selections were recovered from this Composite Cross and their resistance subsequently confirmed but the response of only one of these, Modoc, is detailed here. In 1940 and 1941 a total of 196 F₂ families from randomly chosen barley introductions crossed on Atlas to determine “combining ability” were grown. The scald readings on these F₂ families pointed to four male parents, namely, Telli, Osiris, Sheba, and Abyssinian, as sources of resistance. Their resistance was subsequently confirmed.

1 Contribution from the Agronomy Division, University of California, Davis, Calif.; and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U.S. Dept. of Agriculture, cooperating. Received for publication April 20, 1948.

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