BREEDING FOR DISEASE RESISTANCE IN OATS

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The two smuts and two rusts affecting oats, namely, loose smut (Ustilago avenae (Pers.) Jens.), covered smut (U. levis (Kell. and Sw.) Magn.), crown rust (Puccinia coronata avenae Eriks.), and stem rust (P. graminis avenae Eriks. and Henn.), apparently have caused more damage to the oat crop in the United States than all other oat diseases combined. Among the minor oat diseases that frequently have caused considerable damage are oat blast (non-parasitic), Fusarium blight or foot rot (Fusarium culmorum (W.G.Sm.) Sacc., and other species), halo blight (Bacterium coronafaciens Ell.), stripe blight (B. striafaciens Ell.), Helminthosporium leaf blotch (Helminthosporium avenae Eidam), Pythium root necrosis (principally Pythium debaryanum Hesse), and others.

Epiphytotics of the two smuts vary considerably in severity from year to year and from region to region, but on the whole tend to be much more uniform in this respect than either crown or stem rust. Except for the smuts, it is difficult to obtain an accurate estimate of the damage caused by oat diseases. Estimates of losses caused by the rusts and minor diseases of oats as reported by the Plant Disease Reporter are inadequate because of the evident lack of sufficient and consistent observations and the absence of any reliable basis for determining the actual losses caused by these diseases. Some idea of their relative importance in recent years is indicated, however, by the estimated reduction in Iowa oat yields for the years 1935 to 1939 (Table 1) and for Iowa, Minnesota, Illinois, and Wisconsin in the 5-year period 1935 to 1939 (Table 2).

In these leading oat-producing states, crown rust, smut, blast, foot rot, and stem rust, in the order named, apparently have been most important in recent years. Similar estimates during the 20-year period 1919 to 1938 would indicate, however, that smut, crown rust, and stem rust, in the order named, were most important for the same states and for the United States as a whole. The apparent decreasing relative importance of oat stem rust doubtless is due, in part, to the increasing acreage of stem-rust-resistant varieties, particularly in the Corn Belt. Probably the losses caused by some of the so-called minor diseases, such as oat blast, foot rot, Pythium root necrosis, etc., were

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