The Inheritance of Resistance to Stalk Red Rot in Sorghum

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S T A L K red rot, caused by Colletotrichum graminicolum (Ces.) G. W. Wils., is one of the most prevalent diseases of sorgo in southeastern United States. It is especially important in the production of sorgo sirup because the red discoloration is usually carried over into the sirup. Also, very susceptible varieties may lodge before harvest, thus increasing the cost of harvesting and processing. During the process of evaluating sorgo importations from all over the world at the U. S. Sugar Plant Field Station, Meridian, Miss., several sorgo varieties that appear to be resistant to this disease have been tested. This paper is a report on one cross involving a resistant importation from Africa and a susceptible domestic sorgo.

LITERATURE REVIEW

A comprehensive literature review on the occurrence of red rot in sorghum has been published by LeBeau et al. (4). They found that some varieties were highly resistant to this disease while others were very susceptible. Red rot is not only characterized by discolored stalks but in severe cases causes lodging and loss of sugars in the very susceptible varieties before they are ripe enough to harvest for sirup.

Another manifestation of infection by C. graminicolum in the sorghum plant is leaf anthracnose. LeBeau and Coleman (3) have shown that resistance to leaf anthracnose is inherited as a simple dominant (LL) to susceptibility (L). Reddish brown seed coat has been reported by Vinall and Cron (5) and others to be inherited as a simple dominant to white.

MATERIAL AND METHODS

The red rot susceptible parent Rex (Red X) has been grown on a limited acreage for sirup and silage in the United States for many years. On the other hand Sart, the resistant parent, was imported from Africa in 1945 and released as a sirup variety Collier. Several heavily infected leaves of this variety Collier. Several heavily infected leaves were washed in a moist chamber at room temperature about 4:00 p.m. the next morning these leaves were washed in a hypodermic needle. The concentration of spores was adjusted by dilution to not less than 30 per low power microscope.

The inoculation technic was the same for all tests. Spores of C. graminicolum were obtained from leaves of the variety Collier. Several heavily infected leaves were washed in a moist chamber at room temperature about 4:00 p.m. the next morning these leaves were washed in a hypodermic needle. The concentration of spores was adjusted by dilution to not less than 30 per low power microscope.

Leaf anthracnose ratings included only two classes, resistant and susceptible. Unfortunately, leaf anthracnose ratings for the Fa populations and parents were not reliable in 1950 because other diseases masked the anthracnose. Since the Fa population and parents were not reliable in 1950 because other diseases masked the anthracnose.

Each Fa and parental check plant with more than one stalk was given two red rot ratings. One of these stalks had been inoculated but the other had not. Uninoculated stalks did not give reliable red rot data in this cross; consequently, inoculated stalks were used. In the F2 test each individual a red rot rating on the basis of its inoculated stalk reaction as follows:

1. No discoloration beyond the point of inoculation.
2. Discoloration spreading from the point of inoculation confined to the same internode.
3. Discoloration extending beyond the inoculation area but limited to the adjacent internodes.
4. Discoloration extending beyond the inoculation area to adjacent internodes.

The resistant class included ratings 1 and 2 while the susceptible class had a rating of 4. Each F2 line and parental check was rated resistant, heterozygous or susceptible. The red discoloration of each parent was used as the criterion of resistance; consequently, resistant lines were easily differentiated. Distinguishing between the heterozygous resistant and the heterozygous lines became difficult in many cases. It was necessary, therefore, to group them together for genetic interpretation. There was an indication of linkage between the susceptible and heterozygous lines.

All of the seed color data from segregating populations in this paper are from F2 plants. Many of these lines failed to develop mature seed because of drought and very early freeze in the fall of 1951.

Standard methods were used in determining the probability values. Fisher's (1) maximum likelihood method was used in calculating linkage intensities.

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