Anthracnose of Sorghum in Brazil

F. T. Fernandes and R. E. Schaffert*

In the early seventies, when sorghum began to expand in Brazil, it was noted that a relatively large number of diseases damaged the crop. In order to establish research priorities in the area of sorghum pathology, a disease survey was made of all Brazil, using a National Disease Nursery and other national trials. Foliar anthracnose was the principal sorghum disease, because of its frequency and intensity in most areas of the country. Anthracnose damage was most intense in Central Brazil, particularly in the area of Ribeirao Preto, São Paulo. As a result of the survey the plant-breeding program at the National Maize and Sorghum Research Center (CNPMS) was directed to obtain breeding lines resistant to anthracnose. Selections were made under field conditions in Ribeirao Preto and in Sete Lagoas, Minas Gerais.

Research at the University of Sao Paulo in Piracicaba aimed at selecting plants resistant to anthracnose in the greenhouse, is the topic of several thesis problems. As sorghum was a new crop in Brazil, it was necessary to import advanced breeding materials to begin the breeding program. Many breeding lines introduced from Texas A & M University in the USA were considered to be elite with good disease resistance, including resistance to the pathogen *Colletotrichum graminicola* (TX-2536, SC-170, SC-173, SC-110, SC-599-6-10, TAM-428, TAM-430). But many of these lines have not shown resistance to foliar anthracnose under our conditions. These lines were probably evaluated and selected for resistance to red rot (an important disease in the USA), and not to foliar anthracnose. Other breeding lines, such as TAM-2566, SC-175-14, P-721, TX-623 and TX-399, have been highly susceptible under our conditions.

Actually, the number of lines resistant to anthracnose in our breeding program is small; they include SC-326-6 and derivatives of SC-326-6, SC-234, SC-239-14, Brandes, and an early selection from a late-maturing forage variety known as Santa Elisa. In order to increase this limited genetic base, 400 breeding lines — including many sorghum conversion entries — were evaluated last year in Ribeirao Preto and Sete Lagoas. Some entries have shown excellent levels of resistance and are being evaluated again this year. Unfortunately, last year was dry in central and southern Brazil and the level of anthracnose development was below normal. Other material in our germplasm bank is in the process of being increased and will be evaluated for anthracnose in the near future.

The pathogen has been identified by its lesion type and its morphological characteristics (presence of setae, and shape of conidia) as *Colletotrichum graminicola*. However, elongated lesions have also been encountered, which could indicate the existence of other species of *Colletotrichum* such as *C. falcatum*.

Anthracnose lesions frequently occur on the peduncle and stalk, in the panicle, and on the grain. In the latter case *C. graminicola* may be contributing to reduced germination and seedling vigor. Tests with seed fungicides are being initiated this year.

The inheritance of anthracnose resistance is being studied. F_1s and F_2s of crosses between resistant lines such as SC-326-6, SC-283, and Brandes lines, with varying degrees of susceptibility such as Wheatland (TX-399), CK-60 (TX-3197), Redlan (TX-378), TX-623, and a male-sterile line BR-007 are being evaluated this year. Preliminary results of last year's work indicate that incomplete dominance is involved.

The National Maize and Sorghum Research Center has worked in cooperation with other institutions, principally with Texas A & M University in the USA, to study the problems of anthracnose more closely and would like to expand these activities.

Our sorghum-breeding program released several grain-sorghum hybrids, forage-

* Plant Pathologist, and Sorghum Breeder, Centro Nacional de Pesquisa de Milho y Sorgo, EMBRAPA, Sete Lagoas, Brazil.

sorghum hybrids, and sweet-sorghum varieties with good agronomic characteristics and excellent resistance to diseases during 1978.

Summary

A survey of sorghum diseases in Brazil has shown anthracnose to be the principal disease of this crop because of its frequency and intensity. The greatest damage from this disease has occurred in the region of Ribeirao Preto. Selection for resistance to this disease is being conducted by the National Maize and Sorghum Research Center, in Sete Lagoas and Ribeirao Preto. Greenhouse studies on resistance are being conducted by the University of Sao Paulo at Piracicaba. Breeding stocks imported from the USA as sources of anthracnose resistance have reacted as susceptible to foliar anthracnose in our conditions.

The number of resistant lines currently utilized in our breeding program is limited. New sources of resistance are being identified from our germplasm bank and from new introductions.

The pathogen has been identified as *Colletotrichum graminicola*, though it is possible that *C. falcatum* could also be involved. Lesions can be found on all plant parts, including the seed. Preliminary field observations have indicated that the inheritance of resistance to this pathogen is partially dominant.

Commercial grain and forage hybrids and sweet-sorghum varieties resistant to anthracnose were released for growing in farmers' fields in 1978.