Sources of Resistance to Rough Leaf Spot Disease in Sweet Sorghum

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ABSTRACT

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Of the 403 exotic and 631 commercial, unreleased, and parental sweet sorghum lines field-tested for resistance to rough leaf spot disease at Meridian, MS, only two lines (MN 3344 and MN 4055) showed a high level of resistance in 1981 and 1982. MN 4055 remained completely free of the disease. MN 3344, which was introduced from India as PI 201754, showed only slight infection. No other lines showed good resistance to the disease. With a projected increase in grain sorghum production in Mississippi, the identification of sources of resistance to rough leaf spot disease in sweet sorghum will be of value to the grain sorghum industry.

Rough leaf spot disease, incited by the fungus *Ascochyta sorghina* Sacc., is found on sweet sorghum only in humid areas. The disease appears to be restricted to *Sorghum* spp. and has been found on grain sorghum, sweet sorghum, broomcorn, sudangrass, johnsongrass, and wild sorghums. It has been reported from most countries where sorghum is grown (1–3). The disease is spread mainly by airborne pycnidiospores during wet weather. The fungus is carried over from year to year on crop residues of grain sorghum, sweet sorghum, or johnsongrass, especially where sorghum is planted in the same field over a period of years. Damage by rough spot to sweet sorghum and other sorghums that give the tan or light color reaction to the disease may be overlooked, especially if pycnidia are not present.

Losses caused by rough leaf spot have generally been minor on grain sorghum in the United States because the crop has been grown mainly in the drier areas. However, with the increase in grain sorghum production in the more humid areas (it is estimated that 450,000 acres will be planted to grain sorghum in Mississippi in 1984), what was previously a "minor" disease could now cause economic losses, especially if sorghum is grown in the same field for several successive seasons. In the former sweet sorghum breeding program at Meridian, MS, where all sweet sorghum lines were evaluated for overall disease occurrence annually, rough leaf spot gradually increased in frequency and severity. In 1967, the disease occurred sporadically on sweet sorghum lines and seldom caused appreciable injury to infected plants. By 1980, rough leaf spot had become the most prevalent sorghum disease at Meridian, with almost all sweet sorghum lines infected and about 90% of them showing some injury from the disease.

This paper describes two sources of resistance to rough leaf spot that may be used in grain and forage sorghum breeding programs as well as in sweet sorghum production.

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MATERIALS AND METHODS

In April 1981, 403 introduced, 219 F_2, 191 F_3, 105 F_4, 35 F_5, 31 F_6, 13 unreleased, and 37 parental sweet sorghum lines were planted at Meridian. Single-row plots (replicated twice) of the introduced and F_2 lines were planted; all other lines were replicated four or more times. All plants were inoculated with rough leaf spot by placing about 0.5–1 g of dried, diseased leaf tissue containing pycnidia that had previously been shredded in the Wiley mill into the whorl of each plant. Disease ratings were made using the following scale: 0 = no infection; 1 = fewer than 50% of plants in each plot infected, with infected areas so small that they were difficult to recognize; 2 = more than 50% of plants in each plot infected but the percentage of diseased leaf area considered too small to affect yield or quality; 3 = all plants in each plot infected, with less than 25% of leaf area of each plant damaged but still considered severe enough to cause some reduction in yield or quality; and 4 = all plants in each plot infected, with more than 25% of leaf area of plant destroyed by the disease.

Sweet sorghum lines with a disease rating of 2 or less were replanted in single-row plots (replicated five times) in August 1981 and inoculated as described earlier. These lines were replanted (single-row plots replicated five times at each of two locations) and reinoculated in 1982.

RESULTS AND DISCUSSION

All sweet sorghum varieties except MN 3344 and MN 4055 became infected with rough leaf spot disease. Infection levels ranged from 3 to 4 on the disease scale. MN 4055 remained completely free of the disease. In August 1981, MN 3344 showed some infection, with a disease rating of 1, but remained free of the disease in 1982. MN 3344 was introduced as PI 201754 from India, where it was known as Red Janpur.

Some sweet sorghum varieties became infected with anthracnose as well as with rough leaf spot disease. It was not difficult to separate injury from these two diseases in these plantings because rough leaf spot disease symptoms appeared relatively early (while the sweet sorghum plants were still growing vegetatively), whereas anthracnose symptoms did not become apparent until the plants started to flower. The appearance of rough leaf spot disease pycnidia also aided in separating the diseases.

With the projected increase in grain sorghum production in Mississippi, the identification of sources of resistance to rough leaf spot disease in sweet sorghum should be of value to the grain sorghum industry.

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