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RACES OF SORGHUMS RESISTANT TO SOOTY STRIPE DISEASE

Maurice C. Futrell and Orvin J. Webster[1]

Summary

At Samaru, Nigeria, we evaluated 2693 lines or varieties of sorghum for resistance to the sooty stripe disease in a natural epiphytotic. Only 5% of the entries in the test were resistant to the disease. Forty-seven percent of the lines collected in Volta, 10% of the lines collected in Nigeria and 6% of the lines collected in Mali were resistant. We found 17% of the resistant entries in the Conspicuum race and 10% in the Caffrorum race. Data show that West Africa is the geographic point of origin of sorghums resistant to the sooty stripe disease. Data also show that the greatest number of lines or varieties resistant to this disease were found in the Conspicuum race which is endemic to West Africa.

INTRODUCTION

The sooty stripe disease of sorghum caused by Ramulispora sorghi (Ellis & Everhart) Olive, Lefebvre & Sherwin has been observed in almost every area of the world where sorghum is grown under high rainfall and humidity.

Symptoms of the disease follow. Affected leaf areas become water-soaked; and elongated elliptical, gray-to-tan lesions with a regular outline develop. The lesions usually have red margins, but the color of the lesion and the margin varies, depending on the pigment present in the attacked sorghum variety. The elongated lesions become sooty-colored due to the profuse production by the fungus of black, loosely-attached sclerotia.

The economic loss has never been evaluated. In recent years, however, in crosses between certain lines of widely varying genetic material, the disease has been severe in experimental plots at Samaru. Much of the leaf and photosynthetic area was destroyed in infected plants. Olive, Lefebvre and Sherwin (3) showed that the disease invaded the xylem vessels and also caused leaf blights. The disease is widespread in commercial fields in Nigeria and in the humid areas of the United States. Further study is needed.

No systematic attempt has been made to select and develop adapted agronomic varieties resistant to sooty stripe. Tarr (4) pointed out that only species of sorghum appear to be attacked by this fungus. Bain (1) made the first attempt to evaluate sorghum varieties for their response to this disease in the southern USA in 1945. Olive, Lefebvre and Sherwin (3) made further varietal evaluations to this disease in Florida in 1946. In 1951 Leukel, Martin and Lefebvre (2) reported that no distinctly resistant varieties were known. No studies have since been reported. This paper is a report on a new source of resistance to this disease.

MATERIALS AND METHODS

Part of the world collection of sorghum was grown at Samaru, Nigeria during the rainy season of 1965. This collection had been assembled in India in recent years, under a PL 480 project entitled, "Cataloguing and Classifying Genetic Stocks of Sorghum." Dr. Kenneth O. Rachie, geneticist of the Rockefeller Foundation, and Dr. B. R. Murty, biometrical geneticist, the Indian Agricultural Research Institute, were the principal investigators. Part of this collection (2693 entries) was seeded at Samaru in June 1965. A natural epiphytotic of sooty stripe occurred in the nursery in July and August. By the first of September all of the leaf area of many of the lines and varieties had been destroyed by the disease. We noted the percentage of the leaf area thus destroyed. Lines and varieties having small restricted lesions and less than 5% of the leaf tissue destroyed by the disease were classified as resistant. All other entries were classified as susceptible.

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RESULTS

The resistant lines were arranged in groups according to country of origin (Table 1) and by race according to a classification established by Rachie and Marty (Table 2). Only 5% of the 2693 lines and varieties tested were classified as resistant to the disease. Forty-seven percent of the lines collected in Volta were resistant to this disease; 10% of the lines collected in Nigeria were resistant, and 6% of those collected in Mali were resistant. Seventeen percent of the resistant entries were found in the Conspicuum race, and 10% in the Caffrorum race. Data show that the geographic point of origin of sorghums resistant to the sooty stripe disease is West Africa, and that the greatest number of lines or varieties resistant to this disease were found in the Conspicuum race, which is endemic to West Africa.

Table 1. World Collection of Sorghums, grown at Samaru, Nigeria in 1965. Percentage of entries resistant to sooty stripe disease, arranged by countries of origin.

Country of Origin	No. of Entries Tested	% of Entries Resistant
India	855	1
USA	599	2
Nigeria	530	10
Sudan	194	1
Volta	75	47
Japan	60	2
Uganda	53	0
Mali	47	6
Ethiopia	46	2
South Africa	42	2
Rhodesia	26	4
Mexico	21	0
Other countries	145	2
Total	2693	5

Table 2. World Collection of Sorghums, grown at Samaru, Nigeria in 1965. Percentage of entries resistant to sooty stripe disease, arranged by races.

Race	No. of Entries Tested	% of Entries Resistant
Conspicuum	544	17
Durras	510	2
Caudatum	381	1
Roxburghii	169	1
Dochna	142	3
Caffrorum	97	10
Nigricans	69	4
Caffrorum-Birdproof	50	8
Nervosum-Kaoliang	35	3
Membranaceum	25	8
Caffrorum-Darso	22	5
All others[a]	649	0
Total	2693	5

[a]These include: Roxburghii-Shallu, Guineense, Margaritiferum, Nervosum-Broomcorn, Bicolor, Dochna-Leoti, Dochna-Amber, Dochna-Collier, Dochna-Roxburghii, Dochna-Kafir, Dochna-Nigricans, Dochna-Durra, Caffrorum-Roxburghii, Caffrorum-Feteritas, Caffrorum-Durra, Nigricans-Bicolor, Sumac, Nigricans-Guineense, Nigricans-Feteritas, Caudatum-Guineense, Caudatum-Bicolor, Caudatum-Dochna, Durra-Roxburghii, Durra-Membranaceum, Nandyal, Durra-Nigricans, Durra-Kaura, Cernuum, Subglabrescens, Subglabrescens-Milo, Sudanense.

DISCUSSION

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The development of di[illegible] [illegible] [illegible] period [illegible] [illegible] and its [illegible] [illegible] [illegible] of [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] of major [illegible].

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