Reaction of *Oryza glaberrima* Accessions to Rice Yellow Mottle Virus

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ABSTRACT

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Thirteen potentially valuable sources of genes for resistance to rice yellow mottle virus were identified from 455 accessions of African rice.

Yellow mottle disease of rice caused by rice yellow mottle virus (RYMV) has been reported in some African countries (1,3,4). According to Bakker (1,2), this disease causes stunted growth, reduced tillering, malformation, partial emergence, and sterility of panicles. Plants less than 14 days old at the time of inoculation were killed by the virus (3). Yield losses caused by RYMV indicate it could be a potential threat to rice production, especially in Africa.

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RYMV was first reported in Kenya and Tanzania in East Africa by Bakker (1) and later in Nigeria, Ivory Coast, and Sierra Leone (all in West Africa) by Raymundo and Buddenhagen (4). In Sierra Leone and Liberia, the virus infected plants under dryland, hydromorphic, and swamp conditions. Disease incidence ranged from trace to nearly 100% in farmers' fields (4).

RYMV can be readily transmitted by mechanical inoculation (1). Some beetles, eg, *Sesselia pussila* Gerst and *Cheatocnema zea* Byrant, in the Chrysomellidae have been identified as vectors of the virus (2,4).

Most of the high-yielding recommended varieties of *Oryza sativa* L. and popularly grown land varieties of *O. glaberrima* Steud were susceptible to RYMV. This investigation was initiated to identify accessions of *O. glaberrima* that show resistance to RYMV.

MATERIALS AND METHODS

Field. Four hundred fifty-five African rice accessions from 12 African countries were planted in the field at the

International Institute of Tropical Agriculture (IITA) Ibadan, Nigeria, on 30 June 1980. Each accession was planted in two plots separated by a 75-cm path. In every plot, each accession was represented by five plants in single rows. Four or five seeds were sown and later thinned to one plant per hill after 3 wk. Plants were spaced 25 cm within the row and 50 cm between rows. After every 25 accessions (rows), two *O. sativa* varieties, IR 20 and OS 6 (susceptible and tolerant, respectively), were planted as checks. Complete fertilizer (NPK, 15-15-15) was applied at planting at the rate of 30-30-30 kg/ha.

Greenhouse. The 35 accessions that showed no symptoms in the field were later planted in the greenhouse. Each accession was sown in two pots with three plants per pot. Complete fertilizer was also applied to give 30-30-30 kg/ha. The two *O. sativa* indicator varieties used in the field were also planted.

Inoculation. Small pieces of young leaf blades collected from infected plants maintained at IITA were ground in an electric blender with 0.01 M phosphate at pH 7.0. Inoculum was collected by squeezing the mixture through muslin cloth and kept in a refrigerator at 5 C for 48 hr before use. Leaves of 9-wk-old plants were dusted evenly with 600-mesh Carborundum and inoculated by pulling them through fingers moistened with inoculum.

Observation and scoring. Records on symptom appearance began 2 wk after inoculation and continued to plant maturity. Disease ratings on a scale ranging from 0 (no symptoms) to 4 (severe symptoms) were made at 5 and 7 wk after inoculation. The score for each accession was the average of all plants of that accession.

RESULTS AND DISCUSSION

Inoculated plants generally were yellowed and several showed symptoms of rice leaf blast. Leaves formed after inoculation were narrow, twisted, and crinkled, particularly on severely infected plants. Panicle emergence was only partial in many plants, resulting in poor spikelet formation.

The distribution of accessions according to the disease scores indicated differences in reactions to RYMV. Thirty-five accessions developed no symptoms in the field screening. A few lines that showed symptoms initially but subsequently formed green and normal leaves were classified among 70 accessions with only traces of the disease. Sixty-four accessions representing 14% of the accessions assessed in this study showed severe symptoms and four of these had stunted growth.

Results obtained in the greenhouse indicated 13 of the 35 accessions reassessed were resistant because they showed no symptoms. These accessions by country of origin were Mali: 7235, 7238, and 7245; Nigeria: 5289, 5379, 5381, 5470, 5502, 5644, 5674, and 5681; and Upper Volta: 7291 and 7292. Generally, accessions from these countries showed a wider range of disease severities than those from other countries. Some accessions from these countries, except Upper Volta, also showed severe infection.

The high level of resistance demonstrated by some of these accessions should be useful to growers in places where this disease occurs and should also prove useful in future breeding programs involving African rice.

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