

Morphological changes in an inbred line of pearl millet selected for downy mildew resistance

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ABSTRACT

Downy mildew [*Sclerospora graminicola* (Sacc.) Schroet.] resistant pearl millet [*Pennisetum glaucum* (L.) R. Br.] line 81B has reportedly been developed as a result of induced mutation in highly susceptible line Tift 23d₂B. A comparative study of these Two B-lines and their A-line counterparts at Tifton, GA, U.S.A. and the ICRISAT Center, Patancheru, India showed that for ten of the 14 common morphological characters evaluated at both locations, there were significant differences between inbreds '81' and Tift 23d₂. For two characters (time to 50% flowering and inflorescence length) differences between the two inbreds were in similar direction at both locations; for two characters (plant height and seed set) differences at the two locations were inverse; and for six characters (number of internodes, leafsheath length, peduncle length, number of effective tillers per plant, inflorescence diameter and seed mass) differences between the two inbreds were significant either only at Tifton or only at the ICRISAT Center. There was also significant difference between the two inbreds for internode length pattern. The results indicate substantial morphological changes besides downy mildew resistance in '81' which could be due either to pleiotropic effects of downy mildew resistance genes or to genetic changes at loci other than those responsible for the downy mildew resistance. Introgression from resistant breeding materials leading to concomitant changes in downy mildew resistance and other morphological characteristics, however, cannot be ruled out as a likely possibility.

Key words: *Pennisetum glaucum*, disease resistance, mutation, introgression.

INTRODUCTION

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] cytoplasmic-nuclear male-sterile (cms) line Tift 23A₁, developed at the Coastal Plain Experiment Station, Tifton, GA, was successfully used in India for the production of commercial grain hybrids (BURTON and POWELL, 1968). Backcross transfer of the d₂ dwarfing gene into Tift 23B led to the development of Tift 23d₂B used to maintain cms of Tift 23d₂A₁ (BURTON, 1969) which is an equally good inbred line. Although Tift 23A₁ and Tift 23d₂A₁ have good general combining ability, both are highly susceptible to downy mildew [*Sclerospora graminicola* (Sacc.) Schroet.] in India. Gamma ray irradiation of dry seeds of Tift 23d₂B led to the isolation in the M₂ generation of some plants which were resistant to downy mildew in the disease nursery at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India. Further inbreeding and selection of resistant

plants followed by backcrossing to Tift 23d₂A resulted in the development of cms 81A and its maintainer line 81B (KUMAR *et al.*, 1984). Although no experiments have yet been conducted to evaluate the relative combining ability of lines 81A and Tift 23d₂A, studies have shown line 81A as a better general combiner for grain yield than some of the best cms lines of commercial hybrids developed in India (NAGARAJAN *et al.*, 1983; RAI *et al.*, 1986). The objective of this research was to determine if there were changes in morphological characters of pearl millet inbred '81' besides downy mildew resistance.

MATERIALS AND METHODS

The cms (A) and male fertile maintainer (B) lines of inbreds '81' and Tift 23d₂ were planted in a randomized complete block design with six replications at Tifton, GA, USA and at the ICRISAT Center, Patancheru, India. Seeds of Tift 23d₂A and Tift 23d₂B were treated with

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