

ABSTRACT

Khaled Adly Mohamed Khaled. Marker-Assisted Selection for Salt Stress and Quality traits in Sweet Sorghum [*Sorghum bicolor* (L.) Moench], Department of Genetics, Faculty of Agriculture, Ain Shams University, 2005.

Eleven sorghum cultivars were screened to assess their salt tolerance based on some yield-related traits. Two sorghum cultivars were selected in which one of them was the most salt-sensitive (Atlas) and the other was the most salt-tolerant (Rex) according to their performance. Cross pollination was conducted between the two contrasting cultivars, Rex and Atlas to produce F_1 seeds. In order to study the nature of salt tolerance inheritance and segregation in F_2 , self pollination was performed for F_1 plants to produce F_2 seeds. The F_2 seedlings were exposed to salinity stress (6000 ppm NaCl). The two extreme groups of F_2 individuals (salt tolerant and salt sensitive) were selected. The results showed that the effects of salt stress varied across the yield related traits in all cultivars, also yield related traits (total root length, root dry weight, shoot fresh weight, shoot dry weight, shoot/root ratio, total chlorophylls and plant height) were decreased by salt stress. Bulked segregant analysis was used to analyze DNA extracts with 20 random primers using RAPD-PCR and 15 pairs of SSR primers for the two contrasting parents, their F_1 and the two extreme F_2 groups (bulks of plants from each of tolerant and sensitive groups). SSR results were confirmed using the same primers with a limited subset of individual F_2 plants. Out of the 20 random primers, four primers gave polymorphism and developed molecular markers for salinity tolerance. These bands exhibited five positive molecular markers and three negative molecular markers. Three pairs of primers out of the fifteen SSR pairs produced scorable markers. Two positive molecular markers and two negative markers were detected.

The results indicated that RAPD and the SSR markers could be considered as reliable markers for the molecular detection of salinity tolerance in sweet sorghum [*Sorghum bicolor* (L.) Moench].

Key words:

Sorghum bicolor, salt stress, molecular markers, RAPD-PCR., SSR-PCR, marker-assisted selection

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