

Abstract

Sorghum (*Sorghum bicolor* L. Moench) crop has been considered relatively more salt tolerant than other cereals and has the potential as a grain and fodder crop in saline soils. However, only a few of the cultivars can thrive under relatively high levels of salinity. Genetic improvement of *Sorghum bicolor* for salt tolerance is of importance due to limited arable land and increasing salinity coupled with population pressure. The objective of this study was to evaluate the salinity tolerance of four selected Kenyan sorghum cultivars (Mtama1, El-gadam, Seredo and Serena) obtained from KARI-Katumani. Seeds of the named cultivars were pregerminated in petri dishes lined with moistened 12.5 mm diameter Whatman filter paper in a germination chamber at 27°C for 3 days prior to transfer into the hydroponics system using the Shive and Robbin's nutrient solution {constituted of Macronutrients contained in the following salts namely: KH_2PO_4 , $\text{Ca}(\text{NO}_3)_2$, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, NH_4SO_4 and micronutrients in the following salts: FeSO_4 , $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$, H_3BO_3 , $(\text{NH}_4)_6\text{MgO}_7 \cdot 24\text{H}_2\text{O}$, $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ } for testing of seedling salinity tolerance. The hydroponics was placed at controlled environmental conditions with supplemental lighting of 4750 lux for twelve hours of day and twelve hours of darkness in the biotron. Four salinity levels were established using different NaCl concentrations corresponding to a nutrient solution electrical conductivity (EC) of 5, 10 and 15 dS/m and a control of Shive and Robbin's nutrient solution (0.22 dS/m). Shoot length, root length, fresh and dry weights of the seedlings were recorded in order to quantify seedling growth under salinity pressure. The factorial experiment was set up in a CRD. There were significant intercultivar differences in shoot growth ($p < 0.01$), where Serena had the highest growth at high NaCl concentrations (10 and 15 dS/m) while Mtama1 had the least shoot growth among the four cultivars. Even though increment of salinity level, continued to contribute to growth inhibition at an electrical conductivity above 5 dS/m Seredo and Serena showed adaptation to the high levels of salinity as compared to Mtama 1 and El-gadam. Results further indicated that root development (presence of root hairs and root length) was significantly inhibited at 10 and 15 dS/m for both Mtama 1 and El-gadam while Seredo and Serena were less affected. The sensitivity and tolerance levels in the cultivars suggest that there were two classes of tolerance levels: those that were tolerant and not inhibited in shoot and root growth and those that were sensitive. Based on this study it was concluded that *Sorghum bicolor* L. Moench cultivars differ in their ability to grow under different levels of salinity during the early seedling growth stages. This

is an important characteristic to be taken into account when selecting cultivars that can survive in saline soils.