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Nutritious food from salty ground: the development of an early-detection-screening-tool for salinity tolerant sweet potato varieties

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Abstract

In 30 years, about half of all arable land will be affected by salinity. High-input agricultural production systems are contributing to soil salinisation through excessive fertiliser use and poor irrigation management. A typical symptom of the crop production paradigm of maximising yields while degrading the environment. An adaptive approach to food production in degraded landscapes is growing salinity tolerant varieties that yield nutritious food under challenging conditions. Field-based screening tools are a promising instrument for the detection of salinity tolerant varieties at early growth stages, especially the combination of yield-based tolerance evaluation with non-destructive growth indices. Sweet potato is considered a resilient and nutritious crop. It is a reliable staple food in many tropical countries and has high potential for the productive use of saline land due to its ability to adapt to various agro-ecological conditions. Salt stress is known to reduce yield and suppress health-promoting compounds of some varieties, while others are considered salinity tolerant. Little is known about traits suitable for effective screening of salinity tolerance across the vast number of available sweet potato varieties and to date no field-based screening tool has been developed. We suggest that such a tool is needed to explore salinity tolerant and productive candidates among diverse sweetpotato clones and detect global tolerance indices. Ultimately, it may lead to timely dissemination of invaluable information for adapted crop production. The advantage of developing a screening tool for salinity tolerance under field conditions is that yield and yield components can be determined during the trial as the agronomically relevant tolerance indicators while the resulting screening tool can recognise a large number of salinity tolerant varieties under dynamic salinity at earlier growth stages. This is possible when simultaneously to the yield components, phenology and source-sink structures are recorded. Our study tested the performance of 30 sweet potato varieties under saline drip irrigation at the CIP research station in Maputo, Mozambique. The field trial was run from transplanting to tuberous root development, laid out in a randomised block design with three replicates.

Keywords: Salinity, screening tool, sweetpotato