Tropentag, September 9-11, 2020, virtual conference

"Food and nutrition security and its resilience to global crises"

Salinity Effects on the Activities of ROS Scavenging Enzymes in Leaves of two Sweet Potato Clones

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Abstract

In the Ganges-Brahmaputra delta of Bangladesh sweet potato significantly contributes to food security, but seasonal differences in river water levels combined with tidal effects, render the sweet potato production prone to salinity. Therefore, salt tolerant clones would be needed to maintain production, but to date little is known about salt tolerance traits in sweet potato. Salt (NaCl) stress in sweet potato may result in excessive uptake of sodium or chlorine into plant tissue leading to the formation of reactive oxygen species (ROS), which in turn may destroy chloroplasts' thylakoid membranes and reduce photosynthesis. Plant defensive mechanism include antioxidant enzymes such as glutathione reductase (GR), catalase (CAT), super oxide dismutase (SOD), ascorbate peroxidase (APX) and peroxidase (POX) whose levels may be increased in clones possessing a high tissue tolerance to NaCl. Cuttings of two contrasting cultivars of sweet potato, BARI SP 8 (tolerant) and BARI SP 4 (sensitive), were greenhouse-cultivated in nutrient solution for 21 days and then exposed to 100 mmol NaCl for 7 days. 3, 5, and 7 days after salt application the youngest leaves were sampled individually and enzyme activities, K and Na concentrations, chlorophyll content (SPAD), and dry mater (DM) determined. Leaf DM and leaf K/Na ratio in general, and GR activities in BARI SP 4 decreased for salt stressed plants whereas SPAD and CAT activities in general, and GR activities in BARI SP 8 increased. Varieties differed strongly in their responses with BARI SP 8 always showing more severe effects. Activity levels of SOD, APX and POX were not affected by salinity in neither variety. We conclude that salinity does not lead to increased levels of ROS in sweet potato under salt stress. Further studies are needed on the regulation of GR, sodium, chlorine, and potassium uptake as salt tolerance traits uptake in sweet potato.

Keywords: Antioxidant enzyme, dry matter, K/ Na ratio, salt tolerant

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