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Genotypic morphological traits affecting ion partitioning and tuber formation in salt stressed sweet potato

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Abstract

Sweet potato (*Ipomoea batatas* L.) is one of the major foods, feed and vegetable crops globally with a total global production of 93.52 million tons per annum over an estimated land area of 7.57 million hectares. However, increased soil salinity driven by climate change is significantly constraining its productivity worldwide. This study aimed to evaluate the differential responses of sweet potato genotypes under varying salinity levels, and if genotypic variation in source-sink regulation determines salinity tolerance and yield stability.

A greenhouse experiment was conducted at University of Hohenheim using six genotypes viz., BARI SP 8, CIP 194281.2, CIP 188002.1, Bita, BARI SP 12 and Bie exposed to 0, 40, and 80 mM NaCl for a period of 100 days grown in soil-compost substrate. Morphological traits including vine, leaf, petiole length and biomass, leaf area, biomass portioning and tuber yield were measured to assess physiological responses to salt stress.

The results show that CIP 188002.1 had the strongest vegetative performance under both non-saline and saline conditions. At 40 mM NaCl, it produced the highest dry weight (42.07 g plant^{-1}), vine biomass (21.28 g plant^{-1}), side-branch biomass (14.07 g plant^{-1}) and petiole length (10.12 m plant^{-1}). A similar trend was observed at the highest salinity of 80 mM NaCl. Interestingly, CIP 188002.1 did not produce any tuber at any salinity level, including 0 mM, suggesting that its tuberisation failure was not caused by salinity alone. In contrast, BARI SP 12 produced the highest tuber dry weight (9.78 g plant^{-1} at 80 mM NaCl) among the tested genotypes regardless of the salinity levels. This indicates that differences among genotypes in tuber yield formation under salt-stress conditions are likely due to variation in Na and K uptake, as well as ion partitioning mechanisms across different organs, where Na may be preferentially accumulated in older leaves, while K might be retained in leaf blades or petioles to sustain metabolic activity. However, the analysis of Na and K concentrations in different organs are ongoing. Therefore, the results will be discussed on the poster in view of ion partitioning, biomass allocation and tuber yield formation among the genotypes.

Keywords: Salt stress, source-sink, sweetpotato, tuber formation

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