VARIETAL RESPONSES OF RICE TO SOIL SALINITY AND DIFFERENT SALINITY CAUSING IONS

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Salinity is becoming a major threat to rice farming in Sri Lanka, especially in areas where irrigation water is used. Therefore, detailed investigations on varietal responses to different salinity levels and identification of traits associated with salinity tolerance in rice are of immense importance for development of salinity management measures. This study was initiated to investigate morphological, physiological and biochemical traits of rice varieties that influence their ability to tolerate sub-soil salinity and higher concentrations of major salinity causing ions of Na^+ and Cl^-.

The experiment was conducted with four different soil salinity levels [i.e. (1) Bathalagoda soil as the control; (2) Polonnaruwa soil having high contents of Mg^{+2} and Ca^{+2}; (3) Bathalagoda soil treated with NaCl to raise ECe upto about 4 dS/m and (4) Bathalagoda soils with a similar concentration of Na^+ as in treatment 3, but treated with $NaHCO_3$], and two rice varieties (At 354 saline tolerant and Bg 352- saline sensitive) arranged in a two factor factorial in a completely randomized design as a pot experiment at the Rice Research and Development Institute (RRDI), Bathalagoda.

Morphological traits such as plant height and leaf area (LA), green leaf number (GLN), and tiller number (TN) per plant decreased when the salinity stress increased. Bg 352, showed a significant reduction in growth under the stresses of Na^+ and Cl^-. Significant reductions in plant height (20%), root length (50%), GLN, leaf area and total dry weight were observed in NaCl treated plants when compared to $NaHCO_3$ treated plants. There was a greater accumulation of Cl^- in cells of root, sheath and leaves in the NaCl treated soils. Though there was a reduction in plant growth in At 354, it was much lower than that of Bg 352 under both Na^+ and Cl^- treated soils. It was evident that salt sensitive Bg 352 can tolerate Na^+ stress better than the stress of Cl^-.

Overall results revealed that At 354 could tolerate sub-soil salinity and salinity causing ions of Na^+ and Cl^- better than Bg 352. Occurrence of salinity stress due to NaCl accumulation causes a greater impact on growth and production of rice varieties and out of the two ions, Cl^- is the main ion that causes toxicities.