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Reserve Mobilisation, Dry Matter Partitioning, and K/Na Ratio of Rice (*Oryza sativa*) Seedlings in Response to Varying Levels of Salt Stress

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Abstract

Across South and Southeast Asia millions of hectares of arable land are left uncultivated or only support low yields due to salinity. This will likely worsen through a combination of changes in land use and climate, such as urbanisation, intensification of agriculture, unpredictable wet seasons, irregular rainfall, and rising sea levels. Greater insight into the underlying physiological mechanisms of varietal tolerance in rice (*Oryza sativa*) to salt stress across development stages, in particular germination and early seedling stages, will improve management practices and varietal screening, ultimately leading to more targeted breeding.

This study investigates morphophysiological characteristics related to rice seed-ling vigour and salt stress tolerance, such as the kinetics of reserve mobilisation, dry matter partitioning among organs, the K/Na ratio, and early seedling growth in seedlings subjected to salt stress . Five rice cultivars ranging in their sensitivity to salt stress (I Kong Pao, IR4630–22-2–5-1–3, OM5451, IR31785–58-2–3-3, and IR64) were germinated in sand and subjected to three levels of salinity (0, 50, 100 mM) over the course of 17 days in a greenhouse. Dry matter fractions were measured from samples taken every other day. Sodium and potassium concentrations within the seedling biomass were determined on a whole seedling basis for each sampling period, except for the final sampling date, during which above and below-ground biomass were analysed separately. Varietal differences in early growth vigour across salt stress treatments will be discussed in relation to genotypic partitioning strategies among organs, growth respiration, transition to autotrophy, and the sodium and potassium concentrations within the seedling biomass.

Keywords: K/Na ratio, rice (*Oryza sativa)*, salinity, salt stress, seedling vigour

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