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Effects of Salinity on Tiller and Leaf Number, Leaf Appearance Rate, and Leaf Duration in Rice

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Abstract

Salinity effects on leaves observed in field trials, are generally reported by identifying the youngest fully developed leaf and relating to any other leaf starting from here. In Studies under controlled conditions leaf positions are identified and numbered by appearance. However, those studies generally concentrate on young seedlings without additional tillers. Hence, in field trials including sequential samplings of different leaf levels, the identification of the leaf position according to the developmental sequence is virtually impossible. The issue is further complicated when control plants are to be compared with stressed plants. The leaf appearance rate of rice plants subjected to salt stress is likely to differ from non stressed plants, as is the duration of physiological activity of individual leaf positions. We studied appearance rate and life cycle of individual tillers and leaves in two irrigated rice varieties differing in salinity resistance grown in hydroponic culture in a greenhouse. Treatments comprised two salinity (0 and 60 mmol NaCl) and in combination three potassium treatments (20, 40 and 80 ppm). Tiller number and leaf number was reduced in all salinity treatments for both varieties. Higher potassium concentration in the culture solution resulted in larger leaf area and higher tiller number in the control treatments as compared to lower potassium concentrations. Salinity increased senescence rate of individual leaves and shortened significantly the physiologically active period. We developed a rating system for leaf senescence to accurately describe the development stage of any individual leaf independent of the treatment. Results on the effects of salinity on leaf appearance rate and leaf duration will be discussed.

Keywords: Leaf development, leaf senescence, potassium nutrition, salt stress, tillering patterns