

Effect of NaCl Induced Salt Stress on the Physiological Parameters, Growth Attributes and Yield of Groundnut (*Arachis hypogaea*) Cultivars during the Vegetative Stage

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Abstract

Salinity is one of the most deleterious environmental dilemmas that severely limit plant growth and productivity in the dry zone of Sri Lanka. Groundnut is cultivated in the Batticaloa district to a limited extent; the yield is highly susceptible to salt stress especially in the water scarce areas. Therefore, an experiment was conducted in the sandy regosols to evaluate salt stress responses of selected groundnut cultivars; 'Tissa', 'Indi' and 'Lanka Jumbo' on the Relative Water Content (RWC), Leaf Area Index (LAI), Chlorophyll content and yield to determine the most salt tolerant groundnut cultivar which can resist salinity and produce a substantial yield. The salt stress was imposed during the vegetative stage. The experiment was laid out in the Randomized Complete Block Design with six treatments and four replications. Polyethylene bags (45 cm diameter and 42 cm height) filled with top soil, red soil and compost (1:1:1) were used for this experiment. Salt stress was imposed for the groundnut cultivars from 32 days after sowing. A quantity of 500mL NaCl of 100 mM solution was applied at 2 days interval as the salt stress treatment and the control plants were watered at 2 days interval to Field Capacity. Salt stress significantly ($p < 0.05$) reduced the RWC and LAI of all the tested groundnut cultivars. The highest RWC (69.6%) and LAI (0.73) were observed in 'Indi' cultivar and the lowest values (RWC-55.2%, LAI-0.42) were found in 'Tissa'. Significant ($p < 0.05$) differences were observed in the Chlorophyll a, b and total Chlorophyll contents between cultivars under salt stress. The highest amounts of Chlorophyll a (1.82 mg/g), b (0.65 mg/g) and total Chlorophyll (2.47 mg/g) contents were observed in cultivar 'Indi' and the lowest Chlorophyll a (0.74 mg/g), b (0.28 mg/g) and total Chlorophyll (1.02 mg/g) were recorded in 'Tissa'. Similarly, the highest yield (1.4 t/ha) was obtained in 'Indi' groundnut cultivar under salt stress. This would have been due to its inherent characteristic feature. Based on the measured physiological and growth attributes, 'Indi' was identified as the most salt tolerant groundnut cultivar among the tested ones, which could be suggested for cultivation in the salt prone areas of the Batticaloa district.

Keywords: Chlorophyll content, Groundnut, Leaf Area Index, Salt stress, Yield

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