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Effect of Salinity on the Morphological and Physiological Parameters of Quinoa (*Chenopodium quinoa* Wild.), Amarillo Marangani Variety

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Abstract

Quinoa (Chenopodium quinoa Willd.) is a genetically diversified Andean crop, which has drawn attention from all over the world for its nutritional and health benefits as well as its adaptability to a variety of conditions, including marginal agroecosystems that are stressed by drought and nutrient-poor, salinized soils. Salinity is the main factor that inhibits crop growth at both the cellular and whole plant levels. Where high salinity groundwater is utilized for irrigation, soil salinity poses a significant concern in growth and development of plants. The aim of the present study was to investigate the effects of salinity on morphological and physiological parameters of quinoa variety Amarillo Marangani. Salt stress was imposed by application of 0 mM NaCl, 200 mM NaCl and 300 mM NaCl to the plants grown in pots (12 cm×12 cm). (Five plants per treatment) with 95% of field capacity of water. Tree height and stem diameter as morphological parameters and relative water content (RWC %) and stomatal density as physiological parameters were measured through 34 weeks of treatment period and analysed statistically using Minitab 17. Based on the morphological findings, plants grown under 300 mM NaCl showed the least growth in average height of 56.16±1.42 cm compared with the average heights of plants grown under 200 mM NaCl (62.33±2.85 cm) and 0 mM NaCl (66.50±2.59 cm). The stem dimeter under 300 mM NaCl showed a mean value of 3.40±0.11 mm compared with 200 mM NaCl (3.93±0.07) mm and 0 mM NaCl (4.2±0.07) mm respectively. Plants grown under 300 mM NaCl showed a significantly lower average RWC% value of 71.16±0.42 compared with the mean RWC % of 77.39±0.63 and 87.02±1.03 at 200 mM NaCl and 0 mM NaCl respectively. Comparing the values of stomatal density in different salinity conditions, plants grown under 300 mM NaCl has the lowest average stomatal density 54.64±1.36 than the plants under 200 mM NaCl 62.33±1.13 and 0 mM NaCl 74.20±1.59. The results emphasized that high salt concentrations in soil affected the plant growth morphologically and physiologically but considerable growth at salt concentration of 200 mM in the Amarillo Marangani variety.

Key words: Quinoa, Amarillo Marangani, Salinity, Growth parameters