ABSTRACT

The uptake of Na^+ and K^+ in several plant parts, including leaves, shoots, and roots in native *Acacia modesta* tree species, was examined in the current study. The main objective of this work was to examine growth features i.e. the number of leaves, the number of branches, plant height, the length of shoot and root, the fresh and dry weight of shoot and root (g); anatomical features such as the number of stomata in leaves and xylem vessels in the shoot; and physiological parameters such as the stomatal conductance (gs), photosynthetic rate (*A*), transpirational rate (*E*), chlorophyll content, relative water content (RWC%) and intrinsic water use efficiency in *Acacia modesta* exposed to different concentrations of NaCl. In this pot experiment, four different treatments of NaCl i.e. 2.28 dS m^{-1}, 4.58 dS m^{-1}, 6.86 dS m^{-1}, and 9.14 dS m^{-1} were applied and compared with the control, which did not include any addition of NaCl. The plant growth was monitored on bi-weekly basis and after twenty-four weeks, when the plants were harvested, an analysis of sodium and potassium uptake in various plant parts, such as the leaves, shoot, and root, was performed. Before harvest the physiological parameters were measured (*A* 25.28, 4.33; gs 1.07, 0.05; and *E* 0.72, 0.36 in control and T4 respectively). It was found that the growth, physiological, and anatomical features were significantly impacted by high concentrations of Na^+ (9.14 dS m^{-1}). Maximum Na^+ concentrations were found in the roots and minimum in the leaves of *Acacia modesta*. In this species, the largest K^+ concentration was found in the leaves and the lowest in the roots. With increasing concentrations of salt, the K^+:Na^+ ratio in *Acacia modesta* was significantly reduced. It is suggested that, despite having diverse natural distribution ranges, this species exhibits distinct strategy for Na^+ uptake in both of its shoot and root. This work would be beneficial in maintaining plantations of this species in a variety of habitats having varying degrees of salinity.