

ABSTRACT

Lithium (Li) is an emerging global scale pollutant that is contaminating soil and water bodies, which later pollute plants as well. Overall aim of the preset study was to determine impacts of Li on two tree species i.e., *Acacia modesta* and *Prosopis cineraria*; which are highly ecologically significant and indigenous species of Pakistan. The parameters on which the impacts of Li in both of these species were studied were height, growth rate, number of branches, chlorophyll content, rate of photosynthesis, rate of transpiration, stomatal conductance, root : shoot weights, radicle and plumule length of seeds, seed germination rate, and seed weight. Moreover, Li concentration in roots, stem, and leaves of both species was determined; along with translocation factor and bioaccumulation factor of Li. A pot experiment was set up in the wire house of Botanic Garden, GCU, Lahore where pots with 4 replicates of each treatment (T0 to T4) of each specie were arranged. The growth and physiological parameter measurements were taken in Botanic Garden with the interval of every two weeks until the period of 4 months. After harvest, Li concentration in roots, stem, and leaves of each species was determined using Automatic Flame Photometer. The plant growth rate in *Acacia modesta* at harvest ranged from -0.05 to 0.15 cm/day, and in *Prosopis cineraria* the range was -0.03 to 0.23 cm/day. Moreover, the rate of photosynthesis in *Acacia modesta* at harvest ranged from 1 to 7 $\mu\text{mol m}^{-2} \text{s}^{-1}$, and in *Prosopis cineraria* the range was 13 to 45 $\mu\text{mol m}^{-2} \text{s}^{-1}$. In addition, The bioaccumulation factor of Li in *Acacia modesta* at harvest ranged from 0 to 1.6, and in *Prosopis cineraria* the range was 0 to 1.2. Hence, the results showed that all the aforementioned growth and physiological parameters of both species decreased with increasing Li doses; however, *Acacia modesta* displayed a more significant decreasing trend while *Prosopis cineraria* showed resistance with decrease. Thus at the same concentrations for the same period of time, *Acacia modesta* is more sensitive to Li impacts and *Prosopis cineraria* is more resistant in comparison. Relationships between the given parameters were also determined using linear regression method, which support the results of this study. Thus this study recommends increasing Li doses in *Prosopis cineraria* to have observable, not negligible impacts. Moreover, morphological and anatomical changes in these two species could also be observed by future researchers. This study also encourages novel policy making to mitigate Li concentration to bring it to a safe level prior to its release into the environment, and is also useful for plantation decision makers who may need information on Li impacts in these two species before taking a step forward.