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Differential activities of antioxidant enzymes and physio-chemical changes in *Dalbergia sissoo* genotypes under waterlogged stress

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Abstract
Dalbergia sissoo is an important agroforestry tree species used for timber, fodder and medicinal value. Waterlogging stress affects in the early stages of tree growth and development leads to poor stand establishment. The effect of waterlogging stress in ten *D. sissoo* genotypes was studied at morphological, physiological and biochemical levels. Waterlogging stress was imposed for seven days on three-month-old seedlings. A significant influence of waterlogging stress was observed on most of the studied traits. The genotype PT-8 exhibited tolerance by minimum percentage reduction for traits *viz*., plant height (6.90%), total chlorophyll content (10.97%), root length (1.30%) and total biomass (18.05%) compared to other genotypes. Also this genotype had superior mean performance under stress condition for total carotenoid (538.80 µg g^{-1} FW), catalase (0.53 µmol H_2O_2 g^{-1} FW), peroxidase (0.21 µmol g^{-1} FW), total free amino acid (300.13 µg g^{-1} FW) and proline accumulation (0.32 µg g^{-1} FW). Further, the principal component analysis (PCA) revealed under stress condition a total of 75.17% of total variability accounted by two components. In conclusion, this study provides an improved understanding of short-term waterlogging effect on morpho-physiological and biochemical traits. Additionally, our results revealed that PT-8 was identified as early tolerant genotype for short-term water logging conditions that can be used in breeding programmes.

Keywords: Abiotic stress, Antioxidants, *Dalbergia sissoo*, Genotypes, Water logging