

Germination sensitivity and seedling quality of mahogany (*Swietenia macrophylla*) in response to saline irrigation

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Salinity is a major abiotic constraint to seed germination and early seedling establishment in forest tree species, especially in arid and semi-arid regions where freshwater scarcity necessitates the use of saline irrigation. The present study assessed the effect of varying salinity (4.0–8.0 dS m⁻¹) on seed germination and seedling quality of *Swietenia macrophylla* (mahogany) under nursery conditions at the Indian Council of Agricultural Research–Central Soil Salinity Research Institute, Karnal. Germination parameters, final germination percentage (FGP), germination index (GI), coefficient of velocity of germination (CVG), and seedling quality indices declined significantly with increasing salinity. The FGP decreased from 28% in the control to 7% at 8.0 dS m⁻¹. Higher salinity prolonged the mean germination time and significantly reduced growth and Dickson quality index values. The present study highlights the salinity sensitivity of mahogany during germination and underscores the need to screen and select tolerant genotypes for sustainable afforestation in saline-prone areas.

Keywords: Biomass allocation, Dickson quality index, germination, mahogany, salinity, *Swietenia macrophylla*

but also in large-scale plantations. However, the effect of subtle environmental variation on germination requirements is common within species^{8,9}, and indicates that genetic and environmental factors interact¹⁰. Drought or water stress^{4,7,11,12}, salinity^{6,7,13–15}, and temperature^{1,3,16–18} are all abiotic stresses that control seed germination. In addition, provenance effects are typically pronounced, whereby seeds collected from different localities show substantial disparities in optimal germination responses^{3,8,9}.

One of the most economically and ecologically valuable multipurpose tree species is *Swietenia macrophylla* King (big leaf mahogany) of the family *Meliaceae*, which has been known to possess fine grain, durability and resistance to decay. Introduced outside Central and South America, the species is now naturalised in several sub-tropical countries, including India, where it was first introduced in 1865. Its timber is highly sought after for furniture, shipbuilding, and decorative veneers, being among the most important timber species in the world^{11,19,20}. In addition to timber value, species have diverse uses in the production of bioenergy, hydrocarbons, and phytochemicals¹⁹. Illegal logging and trade have put mahogany under extreme pressure, leading to its inclusion in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)²¹, requiring a new approach for sustainable propagation and plantation strategies.