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Optimizing Seed Germination and Establishment of *Sonneratia caseolaris* for Propagation and Reforestation

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Abstract

The mangrove apple (*Sonneratia caseolaris*), locally known as Kirala in Sri Lanka, is a salt-tolerant species with significant ecological and commercial importance. However, limited seedling availability hinders its propagation and reforestation. This study investigated seed viability, germination enhancement techniques, and optimal growth conditions to address these challenges. Viable seeds were treated to overcome the hard seed coat barrier, achieving a germination rate of 44% compared to 23% in untreated seeds. Soil media trials demonstrated the highest germination rate (38%) in sand/charcoal/coconut coir mix, outperforming sand (16%), compost (14%), and natural soil (20%). Field stability was assessed using quadrats in flood-prone and non-flooded areas. Seedlings in non-flooded quadrats exhibited higher survival rates (79% after one month), whereas those in flooded quadrats suffered significant mortality due to prolonged inundation. These results emphasize the efficacy of seed coat treatment and optimized soil media in enhancing germination, as well as the importance of site selection for successful reforestation. The study provides a foundation for advancing propagation techniques and sustainable population establishment of *S. caseolaris*.

Keywords: *Germination enhancement, Soil media, Flooding tolerance, Sonneratia caseolaris, Mangrove reforestation*