IN VITRO RAPID MASS MULTIPLICATION AND MOLECULAR VALIDATION OF *RHEUM EMODI*

ABSTRACT

India, known for its mega diversity, hosts rich flora with high endemism, particularly in the Northern Himalayas. Among the diverse medicinal plants, Rheum emodi, a highly recognized herb with potent therapeutic properties, faces endangerment due to overexploitation. This study aims to establish a clonal propagation protocol for *Rheum emodi* using in vitro techniques and assess the genetic fidelity of the regenerated plants through molecular markers.

The conventional propagation of *Rheum emodi* is slow and hindered by environmental conditions and low seed viability. The present study introduces a novel approach involving callus induction from leaf explants, followed by *in vitro* shoot multiplication and rooting. The optimized protocol demonstrated high efficiency in terms of shoot multiplication and root formation, providing a reliable method for mass propagation.

Synthetic seed technology was explored as an alternative for conservation and mass propagation. The study assessed the survival and germination rates of encapsulated embryos stored at different durations, providing insights into the potential of synthetic seeds for long-term storage and transportation.

To ensure the genetic integrity of the micropropagated plants, molecular markers (RAPD and ISSR) were employed. The analysis revealed no polymorphism among the regenerated plantlets and the mother plant, confirming the genetic homogeneity of the in vitro raised plantlets. This molecular approach serves as a valuable tool for quality control before commercialization.

Keywords: *Rheum emodi*, medicinal plant, molecular markers, genetic fidelity, *in vitro* regeneration