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Molecular Practices in Plant Phylogenetic Studies

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It has been demonstrated that comparative analyses of DNA molecules have a powerful potential for plant systematic studies. Various techniques have been developed to address phylogenetic questions at different taxonomic levels. The determination of nucleotide sequences is the primary molecular marker used for phylogenetic inference at higher taxonomic levels. For systematic studies at lower taxonomic levels, RAPD analyses can be adopted because they produce molecular data sets comparatively fast and easily. It has been reported that chloroplast DNA is generally inherited by maternal inheritance and that nuclear DNA is inherited by biparental inheritance. Considering the different modes of inheritance of plant genomes, origins of hybrids can be determined and their parental species can be clearly identified by analyzing both chloroplast and nuclear DNA. PCR-mediated RFLP analysis is a convenient taxonomic tool to be utilized for examining the origin of hybrids. In this study, three examples on plant phylogenetic studies will be discussed to demonstrate phylogenetic utilities of DNA molecules: 1) Molecular phylogeny of the family Magnoliaceae inferred from *ndhF* sequences, 2) RAPD analyses of Korean *Adonis* (Ranunculaceae), and 3) Molecular evidence for the hybrid origin of a *Viola* species (Violaceae) from Ullung Island.