MOLECULAR IDENTIFICATION AND PHYLOGENETIC ANALYSIS OF SRI LANKAN TRADITIONAL FOOD GRAIN SWAYANJATHA, USING THE MATK MOLECULAR MARKER

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Abstract

Swayanjatha is a traditional Sri Lankan cereal crop valued for its nutritional quality, bioactive potential, and adaptation to drought-prone environments, making it a promising climate-resilient food grain. Despite its agricultural significance, its taxonomic identity remains unresolved, particularly regarding its relationship with the genera *Oryza*, *Sorghum*, and *Zea*. Preliminary molecular characterization using a rice endosperm-specific prolamine gene marker failed to detect the target sequence, suggesting that Swayanjatha is unlikely to belong to *Oryza* and highlighting the need for further molecular evidence. Therefore, this study investigated its molecular identity using DNA barcoding based on the chloroplast-encoded *matK* gene. Genomic DNA extracted from Swayanjatha, rice (Bg 366), sorghum (ICSV 112), and maize (MMZ HY-05) were amplified by PCR and sequenced using Sanger sequencing. The obtained sequences were analyzed using BLASTn against the NCBI Nucleotide database, and phylogenetic relationships were inferred using reference sequences retrieved from GenBank. The Swayanjatha *matK* sequence showed 98.29% sequence identity and 100% query coverage with members of the genus *Sorghum*, including *S. arundinaceum*, *S. halepense*, *S. bicolor*, and *S. propinquum*. Maximum-likelihood phylogenetic analysis conducted using MEGA 12 with the Tamura–Nei model and 1,000 bootstrap replicates placed Swayanjatha within the *Sorghum* clade, with strong support for its association with the *Sorghum* reference group. The reference samples showed sequence identities of 97.08% with *Oryza sativa*, 98.81% with *Sorghum* spp., and 99.26% with *Zea mays*, supporting the molecular identification of the reference materials. Overall, the BLASTn and phylogenetic results provide molecular evidence that Swayanjatha is unlikely to belong to *Oryza* or *Zea* and is most closely associated with the genus *Sorghum*. However, the *matK* marker alone does not provide sufficient resolution for definitive species-level identification. Therefore, additional molecular markers and detailed morphological characterization are recommended to determine the precise taxonomic identity of Swayanjatha. These findings provide a molecular basis for further scientific characterization, conservation, and utilization of this traditional Sri Lankan climate-resilient food grain.

Keywords: Swayanjatha; matK; DNA barcoding; Phylogenetic analysis; Sorghum; Sri Lanka