

**ANALYSES OF GENETIC DIVERSITY AND DRUPE SIZE QTLs IN
PHYLLANTHUS EMBLICA L. USING DNA MARKERS**

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Phyllanthus emblica L. (V. Nelli) is a medicinally and commercially important fresh fruit species. Yet it remains as an underutilized fruit crop to date. There is a significant diversity in this germplasm in relation to drupe traits which can be exploited to breed superior cultivars. However, the genomic diversity of *P. emblica* germplasm in Sri Lanka has not been studied in detail. Therefore, the present study was conducted to molecularly characterize the *P. emblica* germplasm in Sri Lanka.

Young tender leaves were collected from 66 trees of *P. emblica* from various parts of Kandy, Kurunegala and Anuradhapura districts of Sri Lanka. Genomic DNA was extracted using QiaGen DNeasy Plant mini kit. Six microsatellite markers and one SACR marker developed for *P. emblica* were used for PCR amplification of the sampled *P. emblica* germplasm. The PCR products of the DNA samples of 66 *P. emblica* trees were then size separated by using 6 % denaturing polyacrylamide gel electrophoresis. Different alleles for each marker were visually identified in base pairs and a binary scoring matrix was built for all the markers. For each allele, allele frequency, heterozygosity and polymorphic information content were calculated. Cluster analysis was conducted based on marker data and association analysis was done to detect putative QTLs associated with drupe traits.

The dendrogram based on seven DNA marker alleles, showed three major clusters at 46.39 % genetic similarity coefficient without showing any biasness based on sampling location. A total of 51 alleles were detected for the sampled *P. emblica* germplasm for the six microsatellite markers and SCAR marker tested. Out of the six microsatellite markers, four were polymorphic and one was monomorphic. Heterozygosity of the tested markers ranged from 0.89 to 0.44. Out of those markers highest significant association ($P < 0.001$ and $P < 0.0001$) with commercially important traits drupe height, width, weight and mesocarp thickness was shown by the marker *Phyll* 112, alleles 175 bp, 176 bp and 178 bp. The *P. emblica* germplasm has a higher variation in Sri Lanka and this diversity can be used to develop genetically superior varieties in the future. The putative QTLs can be used for marker assisted selection in breeding and for molecular screening of seedlings for drupe traits of commercial importance.

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