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A LOW COST PCR DIAGNOSTIC ASSAY FOR DETERMINING THE SEXES OF PAPAYA (*Carica papaya* L.) SEEDLINGS

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Papaya is an important fruit crop. In Sri Lanka, nearly 8,000 hectares of land is under papaya cultivation and the annual fruit production is 32,000 metric tons and the annual export value of papaya is Rs. 83 million highlighting, its economic significance.

The breeding system of papaya is triocious (papaya is a polygamous plant with three sex types) because individual plants can exist as male, female or hermaphrodite. The presence of unproductive trees in orchards greatly reduces the productivity as growers have to maintain all the plants until the reproductive stage to identify the sexes. Therefore, the detection of sexes at the early seedling stage is considered the best to avoid this problem. Molecular analysis of sex determination genes, and subsequent development of DNA markers to detect the sex genotype provide a valuable tool to detect the sexes at an early stage of development. DNA markers to discriminate sexes in papaya have been reported previously. These DNA markers can detect female plants separately from the hermaphrodite or male plants. However, these markers have to be validated to the Sri Lankan papaya populations before using them in routine screening for sexes. Moreover, genotyping with sex specific DNA markers for papaya has to be cheap and quick so that growers can use the technology without significantly increasing the cost of production and select preferred sexes at a very early stage and cull all the unwanted plants. The present study was conducted to validate a sex specific DNA marker for Sri Lankan papaya populations and to develop a rapid reliable and low cost sex genotyping facility for Sri Lankan papaya growers.

DNA marker SCAR W11 was used for the molecular identification of sexes in papaya varieties grown in Sri Lanka. A total of 36 plants, in which, six plants from each of the commercially available varieties of papaya, *Sinta, Red Lady* and *Rathna* and three local Sri Lankan papaya types based on the fruit shape, Pyriform, Elongated and Round were grown in the Green House at the Department of Molecular Biology and Biotechnology, University of Peradeniya. Leaf samples were collected from seedlings for DNA extraction by using CTAB method and PCR was carried out for the DNA marker SCAR W11. The sexes of plants were determined by observing the flowers. The cost required to conduct genotyping was calculated based on the market prices in June, 2012. The minimum time period required to run the complete analysis was also tabulated.

The DNA marker SCAR W11 generated a PCR band for male and hermaphrodite plants and no band for female plants whose sexes were confirmed by observing floral structures at the reproductive stage. The genotypes of 12 papaya seedlings can be predicted within six hours after receiving leaf samples from the growers. The approximate cost is Rs. 500/- per seedling, and the growers can know the sex of their future plants and adjust the female to pollenizer plant ratio without unnecessarily wasting resources on unproductive plants.