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The Combination of Wood Density and Xylem Vessel Diameter to Detect the Timber Adulterations to Satinwood

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Abstract

Chloroxylon swietenia (Satinwood) is one of the major timber species in Sri Lanka and according to the timber corporation of Sri Lanka; it falls into the 'luxury class' of timber. There is a trend of blending satinwood with other low quality cheap timber species, *Michelia champaca* (Sapu), *Alstonia macrophylla* (Hawarinuga), *Hevea brasiliensis* (Rubber) and *Mangifera indica* (Mango) after spraying with dyes which provides a look of satinwood. The present study was conducted to examine the wood density and the cell size differences of the secondary xylem tissue among five different wood species which can be used to detect the timber adulteration to satinwood in Sri Lankan timber market.

Timber samples from five species were collected from reliable sources in Kegalle and Kandy districts avoiding any ambiguities. The density of the woods, satinwood, Rubber, Sapu, Hawarinuga, and Mango was calculated using the measured values of weight (kg), length (m), width (m) and height (m) of each wood piece. Thin (10 µm) cross sections were obtained from satinwood, Rubber, Sapu, Hawarinuga and Mango. They were stained with Safranin after immersing in an alcohol series (25%, 50% and 75%) and were observed under the microscope. Measurements for vessel and tracheid diameters were obtained by observing through the microscope using eye piece graticule .The data were analysed using ANOVA and mean separation procedure DUNNETT in software package SAS 9.1.

The wood density analysis showed that Satinwood (1,186.4 kgm^{-3}) was significantly heavier ($P<0.05$) than other timber types, Rubber (706.2 kgm^{-3}), Sapu (851.1 kgm^{-3}), Hawarinuga (765.3 kgm^{-3}) and Mango (774.9 kgm^{-3}). The wood xylem vessel diameter analysis showed that satinwood xylem vessel (0.072 mm) was significantly different ($P<0.05$) than the xylem vessel diameter of the other wood types, Rubber (0.222 mm), Sapu (0.141 mm), Hawarinuga (0.100 mm) and Mango (0.224 mm). However, the wood xylem tracheid diameter analysis showed that satinwood tracheids (0.027 mm) were significantly different ($P<0.05$) than the tracheid diameter of the wood types, Rubber (0.032 mm) and Hawarinuga (0.020 mm) but were not significantly different than Sapu (0.023 mm), and Mango (0.028 mm).

The wood density and the xylem vessel diameter data present here can be used as indicators to identify the timber adulteration to Satinwood. Also, it is necessary to develop a DNA fingerprinting scheme to further validate the timber adulteration in the molecular level which is currently undertaken by our research group.

Keywords: *Chloroxylon swietenia*, Timber adulteration, Satinwood