Worapong Athihirunwong 2011: Assessment of Wood Density, Syringyl/Guaiacyl Ratio of Lignin and Fiber Characteristics from Eucalyptus Hybrids Using Near Infrared Spectroscopy. Master of Science (Forestry), Major Field: Forest Products, Department of Forest Products. Thesis Advisor: Assistant Professor Pratuang Puthson, Dr.rer.nat. 118 pages.

Wood density, syringyl/guaiacyl (S/G) ratio of lignin and fiber characteristics belong to the indicators of wood quality that are much related to pulping and papermaking properties. The feasibility of near infrared (NIR) spectroscopy for the non-destructive evaluation of these properties from five eucalyptus hybrids planted in Thailand was investigated. Acquisition of NIR spectra (1000-2500 nm) was obtained from 40-60 mesh wood powder using a standard closed-cup for measuring. The best NIR models of wood basic density, S/G ratio and fiber length were obtained from partial least squares (PLS) regression analysis, whereas that of fiber coarseness obtained from principal component regression (PCR) analysis. The ratio of performance to deviation (RPD) of wood basic density (RPD = 3.13) and S/G ratio of lignin (RPD = 2.67) were fulfill the requirements of AACC Method 39-00 for screening in tree breeding programs (RPD ≥ 2.5). The RPDs of NIR models for fiber length and fiber coarseness (RPD = 1.83 and 1.97 respectively) were not good enough to use for screening in tree breeding programs. Further investigation in the relationships of these fiber characteristic properties and NIR spectra is required.

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