EVALUATION OF INTERNAL DEFECT IN *Aquilaria malaccensis* TREE USING ULTRASONIC PULSE VELOCITY (UPV) METHOD

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ABSTRACT

EVALUATION OF INTERNAL DEFECT IN *Aquilaria malaccensis* TREE USING ULTRASONIC PULSE VELOCITY (UPV) METHOD

A study was done to investigate the relationship between the density of material and the ultrasonic pulse velocity (UPV) in the tree. *Aquilaria malaccensis* tree or gaharu in Malaysia was selected as the sample. Three samples from 3 years-old gaharu tree with circumference about 54 cm each was derived from Ladang Gaharu at Malaysian Nuclear Agency (NM). They were then cut into 23 cm long cylindrical cross-sections. Each sample was drilled at the center and was filled with three materials with different densities namely aluminum, concrete and perspex respectively that served as indicators for the internal defect. Using the transmission of wave method, the travelling time for an ultrasonic wave from the transmitter to the receiver probes was recorded. The ultrasonic pulse velocities (UPV) of each sample were determined using a portable ultrasonic instrument or TICO at the frequency of 50 kHz in wet and dry conditions. The UPV measurements were then reconstructed into tomographic images using Sonicmain program. The results showed that the UPV measurement in samples differed according to the filler densities. The reconstructed tomographic images showed a clear color contrast for the sample with relatively high density. The tomographic image for wet condition was visibly higher in contrast compared to that in dry condition. Hence, the UPV method can be alternatively used to evaluate the internal defects in *Aquilaria malaccensis* tree.