

VARIASI RADIAL SIFAT FISIKA DAN MEKANIKA KAYU

KELAPA (*Cocos nucifera* L.) DI KABUPATEN BANTUL, YOGYAKARTA

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INTISARI

Kayu kelapa (*Cocos nucifera* L.) merupakan tanaman monokotil yang berpotensi sebagai bahan baku alternatif pengganti kayu dalam mendukung pemanfaatan sumber daya secara berkelanjutan. Namun, pemanfaatannya masih terbatas akibat kurangnya informasi mengenai variasi sifat fisika dan mekanika secara radial. Oleh karena itu, diperlukan penelitian terkait sifat kayu kelapa pada arah radialnya. Penelitian ini bertujuan untuk menganalisis variasi radial sifat fisika dan mekanika kayu kelapa yang tumbuh di Kabupaten Bantul, D.I. Yogyakarta, Indonesia berdasarkan pemodelan efek campuran. Hasil penelitian menunjukkan bahwa nilai rata-rata diameter batang dan tinggi total pohon kelapa masing-masing adalah 32,4 cm dan 13,2 m. Sementara itu, nilai rata-rata kerapatan dasar, kadar air segar, penyusutan radial, tangensial, dan longitudinal, MOE, MOR, dan kekuatan tekan sejajar serat berturut-turut adalah sebesar 0,56 g/cm³; 152,3%; 4,33%; 4,89%; 0,31%; 8,28 GPa; 69,2 MPa dan 38,3 MPa. Model pola variasi radial menunjukkan bahwa model efek campuran linier (Model I) terpilih untuk nilai kerapatan dasar, kadar air segar, dan MOR. Sementara itu, model efek campuran non-linier (Model II) terpilih untuk nilai penyusutan arah radial dan tangensial, MOE dan kekuatan tekan sejajar serat. Terdapat hubungan korelasi yang sangat signifikan antara nilai kerapatan dasar dengan kadar air segar atau sifat mekanika kayu kelapa. Hal ini menunjukkan bahwa kerapatan dasar dapat menjadi prediktor yang baik untuk mengetahui kadar air dan sifat mekanika kayu kelapa. Sementara itu, nilai MOR juga dapat diprediksi dari nilai MOE.

Keyword: Kayu kelapa, kerapatan dasar, modulus elastisitas, modulus patah, variasi radial.

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RADIAL VARIATION IN PHYSICAL AND MECHANICAL PROPERTIES OF COCONUT WOOD (*Cocos nucifera* L.) GROWN IN BANTUL REGENCY, YOGYAKARTA

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ABSTRACT

Coconut wood (*Cocos nucifera* L.) is a monocotyledonous plant that has potential as an alternative raw material to replace wood in supporting sustainable resource utilization. However, its utilization is still limited due to the lack of information regarding the radial variation of physical and mechanical properties. Therefore, research to evaluate the properties of coconut wood in the radial direction are needed. This study aimed to evaluate the radial variation of the physical and mechanical properties of coconut wood grown in Bantul Regency, D.I. Yogyakarta, Indonesia, based on mixed-effects modeling. The results showed that the mean values of diameter and tree height of coconut trees were 32.4 cm and 13.2 m, respectively. Meanwhile, the mean values of basic density, green moisture content, radial, tangential, and longitudinal shrinkage, MOE, MOR, and compressive strength parallel to the grain were 0.56 g/cm³, 152.3%, 4.33%, 4.89%, 0.31%, 8.28 GPa, 69.2 MPa, and 38.3 MPa, respectively. The radial variation pattern model showed that the linear mixed effect model (Model I) was selected for basic density, green moisture content, and MOR. Meanwhile, the non-linear mixed effects model (Model II) was suitable for the radial and tangential shrinkage, MOE, and compressive strength parallel to the grain. Significant correlations between basic density with green moisture content or mechanical properties were found in coconut wood. This indicates that basic density is considered a good predictor for determining the moisture content and mechanical properties of coconut wood. In addition, the MOR can also be predicted by the MOE.

Keyword: Coconut wood, basic density, modulus of elasticity, modulus of rupture, radial variation.

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