

**PERMODELAN VARIASI LONGITUDINAL SIFAT FISIKA DAN
MEKANIKA BAMBU AMPEL (*Bambusa vulgaris*) DARI HUTAN
RAKYAT KULON PROGO, YOGYAKARTA**

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ABSTRAK

Bambu ampel (*Bambusa vulgaris*) merupakan salah satu jenis bambu yang banyak ditemukan di Indonesia dan memiliki potensi besar sebagai bahan baku pengganti kayu. Namun demikian, informasi mengenai variasi sifat fisika dan mekanika bambu ini sepanjang batangnya (arah longitudinal) masih terbatas. Penelitian ini bertujuan mengkaji sifat fisika dan mekanika bambu ampel (*Bambusa vulgaris*) dari hutan rakyat di Kabupaten Kulon Progo, Yogyakarta, berdasarkan variasi longitudinal sepanjang batang dengan pendekatan pemodelan efek campuran linier dan nonlinier. Hasil penelitian ini menunjukkan bahwa nilai rata-rata diameter, tinggi total, dan tebal batang bambu masing-masing adalah sebesar 9,1 cm; 18,3 m; dan 0,81 cm. Sementara itu, nilai rata-rata kerapatan dasar, kadar air segar, penyusutan radial dan tangensial pada setiap perubahan kadar air 1%, MOE dan MOR berturut-turut adalah sebesar 0,68 g/cm³; 77,4%; 0,29%; 0,24%; 9,83 GPa, dan 99,7 MPa. Model pola variasi longitudinal menunjukkan bahwa Model efek campuran linier (Model I) sesuai untuk nilai kerapatan dasar dan kadar air segar. Sementara itu, model efek campuran non-linier (Model II) lebih sesuai untuk nilai tebal bambu, penyusutan radial dan tangensial pada setiap perubahan kadar air 1%, serta MOE dan MOR. Terdapat korelasi yang sangat signifikan antara nilai kerapatan dasar dengan kadar air dan sifat mekanika (MOE dan MOR) bambu ampel. Hal ini berarti bahwa kerapatan dasar dapat menjadi prediktor yang baik untuk mengetahui nilai kadar air dan sifat mekanika (MOE dan MOR). Sementara itu, nilai MOE juga dapat diprediksi dari nilai MOR.

Kata kunci: bambu ampel, hutan rakyat, sifat fisika, sifat mekanika, variasi longitudinal.

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MODELING OF LONGITUDINAL VARIATION ON PHYSICAL AND MECHANICAL PROPERTIES OF *Bambusa vulgaris* FROM COMMUNITY FORESTS IN KULON PROGO, YOGYAKARTA

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ABSTRACT

Bambusa vulgaris is one of the bamboo species that is widely found in Indonesia and has great potential as a raw material to replace wood. However, information on the variation of the physical and mechanical properties of this bamboo along its stem (longitudinal direction) is still limited. This study aimed to examine the physical and mechanical properties of *Bambusa vulgaris* naturally grown in the community forests of Kulon Progo, Yogyakarta, Indonesia, based on longitudinal variations along the stem with a linear and nonlinear mixed-effect modeling approach. The results showed that the mean values of the diameter, total height, and thickness of the bamboo stem were 9.1 cm; 18.3 m; and 0.81 cm, respectively. Meanwhile, the mean values of basic density, green moisture content, shrinkage at 1% moisture content change in radial and tangential directions, MOE, and MOR were 0.68 g/cm³; 77.4%; 0.29%; 0.24%; 9.83 GPa, and 99.7 MPa, respectively. The longitudinal variation pattern model showed that the linear mixed effect model (Model I) was suitable for the basic density and green moisture content. Meanwhile, the non-linear mixed effect model (Model II) was suitable for the bamboo thickness, shrinkage at 1% moisture content change in radial and tangential directions, MOE, and MOR. The significant correlation between basic density with green moisture content and mechanical properties (MOE and MOR) was found in *Bambusa vulgaris*. This means that the basic density can be a good predictor for determining the moisture content and mechanical properties (MOE and MOR). In addition, the MOE can also be predicted by the MOR.

Keywords: *bambusa vulgaris*, community forest, physical properties, mechanical properties, longitudinal variation.

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