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Sifat Fisika dan Mekanika pada Arah Aksial dan Radial Kayu Jati (Tectona grandis L.f) Biotrop Umur 16 Tahun yang Ditanam di Gunungkidul Yogyakarta
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SIFAT FISIKA DAN MEKANIKA PADA ARAH AKSIAL DAN RADIAL KAYU JATI (*Tectona grandis* L.f) BIOTROP UMUR 16 TAHUN YANG DITANAM DI GUNUNGKIDUL YOGYAKARTA

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INTISARI

Kelangkaan pasokan kayu jati di Indonesia disebabkan oleh pemintaan pasar terhadap kayu jati yang semakin meningkat hingga 13-17% per tahun. Namun, daur tebang tanaman jati konvensional menurut sifat dan kondisi perusahaan hutan adalah 40-60 tahun (Marsoem *et al.,* 2000). Solusi pengembangan kayu jati cepat tumbuh, yaitu jati biotrop telah dikembangkan oleh SEAMEO BIOTROP dan PT PPA Agricola di Bogor. Jati biotrop berasal dari klon jati unggul dengan pertumbuhan yang cepat, volume kayu yang tinggi, dan umur tebang yang lebih singkat, yaitu 15-20 tahun. Meskipun demikian, informasi terkait sifat fisika dan mekanika kayu jati biotrop umur 16 tahun sampai saat ini masih terbatas.

Penelitian ini bertujuan untuk menganalisis sifat fisika dan mekanika kayu jati biotrop umur 16 tahun asal Gunungkidul, Yogyakarta yang ditinjau berdasarkan arah aksial (pangkal, tengah, dan ujung) dan arah radial (dekat hati, tengah, dan dekat kulit) kayu mengacu pada metode *British Standard* Nomor 373 Tahun 1957 dengan rancangan acak lengkap (RAL) menggunakan analisis keragaman anova dua arah yang dilanjut dengan uji lanjut *honestly significant difference* (HSD).

Hasil penelitian menunjukkan retata nilai kadar air segar, kadar air kering udara, berat jenis kondisi segar, berat jenis kondisi kering udara, dan berat jenis kondisi kering tanur secara urut sebesar 103,30%,14,60%, 0,50, 0,51, dan 0,52. Penyusutan arah longitudinal, radial, dan tangensial pada kondisi segar ke kering udara sebesar 0,13%, 1,17% dan 3,06%. Penyusutan arah longitudinal, radial, dan tangensial kondisi segar ke kering tanur sebesar 0,38%, 2,63% 5,86%, Rasio T/R pada kondisi segar ke kering udara dan kondisi segar ke kering tanur secara urut sebesar 2,71 dan 2,25. Rerata keteguhan lengkung statis pada batas proporsi, *modulus of rupture* (MoR), *modulus of elasticity* (MoE), keteguhan tekan sejajar serat, keteguhan tekan tegak lurus serat, dan kekerasan kayu didapatkan secara urut sebesar 401,93 kg/cm², 781,55 kg/cm², dan 90.384 kg/cm², 455,14 kg/cm², 135,16 kg/cm², dan 325,73 kg/cm². Arah aksial berpengaruh nyata terhadap kadar air segar, berat jenis kondisi segar, berat jenis kondisi kering udara, berat jenis kondisi kering tanur, keteguhan tekan tegak lurus serat, dan kekerasan kayu. Sementara itu, arah radial berpengaruh nyata terhadap kadar air segar, kadar air kering udara, dan penyusutan arah tangensial pada kondisi segar ke kering tanur. Tidak didapatkan interaksi antara kedua faktor terhadap sifat fisika dan mekanika kayu jati biotrop yang diamati.

Kata kunci : jati biotrop, sifat fisika, sifat mekanika, aksial, radial

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PHYSICAL AND MECHANICAL PROPERTIES IN AXIAL AND RADIAL DIRECTIONS OF 16-YEAR-OLD BIOTROP TEAK TREES (*Tectona grandis* L.f) PLANTED IN GUNUNGKIDUL YOGYAKARTA

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ABSTRACT

The shortage of teak supply in Indonesia is due to market demand for teak, which is increasing by 13-17% per year. However, the conventional harvesting cycle for teak plantations, depending on characteristic and conditions of forestry company is 40-60 years (Marsoem *et al*., 2000). A solution involving the development of fast growing teak, specifically the biotrop teak has been developed by SEAMEO BIOTROP and PT PPA Agricola in Bogor. Biotrop teak originating from superior teak clones characterized by rapid growth, high timber volume, and shorter harvesting age of 15-20 years. However, information of physical and mechanical properties of 16-year-old biotrop teak remains limited to date.

This study aims to analyze the physical and mechanical properties of 16-year-old biotrop teak from Gunungkidul, Yogyakarta, examined along the axial direction (bottom, middle, and top) and radial directions (pith, midle, and bark), in accordance with British Standard (373) 1957, using a completely randomized design (CRD) with analysis of varians, two-way ANOVA and honestly significant difference (HSD) post hoc test.

The results showed that the average green moisture content, air-dry moisture content, specific gravity in green, air-dry, and oven-dry conditions of biotrop teak wood were 103.30%, 14.60%, 0.50, 0.51, and 0.52, respectively. The shrinkage in longitudinal, radial, and tangential directions from green to air-dry condition were 0.13%, 1.17%, and 3.06%. The shrinkage in longitudinal, radial, and tangential directions from green to oven-dry conditions were 0.38%, 2.63%, and 5.86%. The T/R ratio from green to air-dry condition and from green to oven-dry condition were 2.71 and 2.25. The average static bending strength at proportional limit, modulus of rupture (MoR), and modulus of elasticity (MoE), compressive strength parallel to grain, compressive strength perpendicular to grain, and wood hardness were 401.93 kg/cm², 781.55 kg/cm², 90,384 kg/cm², 455.14 kg/cm², 135.16 kg/cm², and 325.73 kg/cm², respectively. The axial direction had significant effect on green moisture content, specific gravity in green, air-dry, and oven-dry conditions, compressive strength perpendicular to grain, and wood hardness. Meanwhile, the radial direction had significant effect on green moisture content, air-dry moisture content, and tangential shrinkage under green to oven-dry conditions. There is no interaction was found between two factors regarding the observed of physical and mechanical properties.

Keywords : biotrop teak, physical properties, mechanical properties, axial, radial