

PEMODELAN SEBARAN DIAMETER TEGAKAN HUTAN RAKYAT DI CABANG DINAS KEHUTANAN SUMENEP, JAWA TIMUR

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INTISARI

Hutan rakyat merupakan salah satu sumberdaya penting dalam penyediaan kayu, penunjang ekonomi rumah tangga pedesaan, serta menjaga fungsi ekologis. Namun, pengelolaan hutan rakyat di wilayah Cabang Dinas Kehutanan (CDK) Sumenep, Jawa Timur, masih bersifat tradisional dan belum berbasis data teknis, khususnya terkait struktur tegakan horizontal. Sebaran diameter pohon sebagai indikator struktur tegakan berperan penting dalam menilai dinamika pertumbuhan, produktivitas, dan keberlanjutan pengelolaan. Oleh karena itu, penelitian ini bertujuan memodelkan sebaran diameter tegakan hutan rakyat di CDK Sumenep menggunakan distribusi Weibull 3-parameter.

Penelitian dilaksanakan pada November 2024–Juli 2025 dengan menggunakan data sekunder hasil inventarisasi hutan rakyat tahun 2024 di 56 petak ukur yang tersebar di empat kabupaten di Pulau Madura. Analisis dilakukan di Laboratorium Biometrika Hutan Fakultas Kehutanan UGM. Data diameter setinggi dada (DBH) dianalisis dengan metode distribution fitting menggunakan distribusi Weibull 3-parameter. Estimasi parameter dilakukan dengan metode *moments*, sedangkan uji kesesuaian distribusi menggunakan uji *Kolmogorov–Smirnov*. Hasil analisis kemudian divisualisasikan dalam bentuk grafik sebaran diameter dan dikelompokkan secara manual berdasarkan kerapatan dan kelas diameter.

Hasil penelitian menunjukkan sebanyak 2.318 pohon dari 15 jenis tercatat dengan kisaran diameter 1,27–57,30 cm. Struktur tegakan cenderung didominasi pohon berdiameter kecil hingga sedang dengan pola miring ke kanan, meskipun terdapat variasi antar petak ukur. Distribusi Weibull 3-parameter terbukti sesuai mewakili data ($p\text{-value} > 0,05$) sehingga dapat digunakan untuk menggambarkan struktur diameter hutan rakyat. Terdapat tujuh pola sebaran diameter yang mencerminkan variasi regenerasi dan kondisi pertumbuhan. Temuan ini memberikan dasar ilmiah untuk strategi silvikultur adaptif dan perencanaan pengelolaan hutan rakyat yang produktif serta berkelanjutan.

Kata Kunci: Hutan rakyat, Sebaran Diameter, Weibull 3-Parameter, Metode Moments, Kolmogorov–Smirnov

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MODELING THE DIAMETER DISTRIBUTION OF PRIVATELY OWNED FOREST STANDS IN THE SUMENEP FORESTRY BRANCH OFFICE, EAST JAVA

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ABSTRACT

Privately owned forests play an important role in providing timber resources, supporting rural household economies, and maintaining ecological functions. However, forest management in the Sumenep Forestry Branch Office, East Java, is still mostly traditional and lacks adequate technical data, particularly on stand horizontal structure. Diameter distribution, as an indicator of stand structure, is essential for evaluating growth dynamics, productivity, and sustainable management. Therefore, this study aims to model the diameter distribution of community forest stands in Sumenep using the three-parameter Weibull distribution.

The research was conducted from November 2024 to July 2025 using secondary data from the 2024 community forest inventory in 56 sample plots distributed across four districts in Madura Island. Data analysis was carried out at the Forest Biometric Laboratory, Faculty of Forestry, Universitas Gadjah Mada. Diameter at breast height (DBH) data were analyzed using distribution fitting with the three-parameter Weibull distribution. Parameters were estimated by the *method of moments*, and the goodness of fit was tested with the *Kolmogorov–Smirnov* test. The results were then visualized in diameter distribution graphs and manually grouped based on stand density and diameter classes.

The study recorded 2.318 trees representing 15 species with diameters ranging from 1,27 to 57,30 cm. The stands were generally dominated by small to medium-sized trees with right-skewed distributions, although variations were found across sample plots. The three-parameter Weibull distribution was proven to adequately represent the data ($p\text{-value} > 0,05$), thus suitable for describing diameter structure in privately owned forests. Seven distribution patterns were identified, reflecting differences in regeneration and growth conditions. These findings provide a scientific basis for adaptive silvicultural strategies and sustainable management planning of community forests.

Keywords: *Privately Owned Forests, Diameter Distribution, 3-Parameter Weibull, Method of Moments, Kolmogorov–Smirnov*

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