

**PEMETAAN BIOMASSA DAN SERAPAN KARBON GAMAL (*Gliricidia sepium* (Jacq.) Kunth. ex. Walp.) PADA AREAL PERSETUJUAN PERHUTANAN SOSIAL KTH RANU MAKMUR, PROBOLINGGO**

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**INTISARI**

PT Paiton Energy mengembangkan hutan energi di Indonesia melalui skema Hutan Kemasyarakatan (Hkm) untuk mendorong produksi biomassa berkelanjutan dan mengurangi emisi gas rumah kaca, dengan mengadopsi Gamal (*Gliricidia sepium* (Jacq.) Kunth. ex. Walp.) (*G. sepium*) sebagai tanaman bioenergi utama. Penelitian ini mengevaluasi biomassa, cadangan karbon, dan serapan CO<sub>2</sub>e dari penanaman *G. sepium* tahun 2024 di Hutan Kemasyarakatan Ranu Makmur, Probolinggo; menganalisis pertumbuhan bibit Wanagama dan stek Tiris; serta menilai perbedaan produktivitas antar lahan andil petani. Diameter batang seluruh pohon diukur. Biomassa dan cadangan karbon diestimasi menggunakan model alometrik spesifik jenis. Nilai CO<sub>2</sub>e dihitung dari cadangan karbon menggunakan rasio molekul 44:12. Uji statistik nonparametrik digunakan untuk menganalisis perbedaan kinerja pertumbuhan bibit asal Wanagama dan stek Tiris serta menentukan apakah perbedaan tersebut signifikan secara statistik. Pemetaan dilakukan untuk menghasilkan representasi biomassa dan sekuestrasi CO<sub>2</sub>e pada tingkat lahan andil, yang menyoroati variasi antar lahan andil petani. Hasil menunjukkan bahwa *G. sepium* yang ditanam pada tahun 2024 mengandung 8,23 Mg biomassa atas-permukaan (0,84 Mg ha<sup>-1</sup>) dan 2,29 Mg karbon (0,23 Mg C ha<sup>-1</sup>), setara dengan 8,41 ton CO<sub>2</sub>e (0,86 t CO<sub>2</sub>e ha<sup>-1</sup>) yang terserap. Sekitar 90% petani menanam *G. sepium* di sepanjang batas bidang lahan mereka. Pertumbuhan berbeda secara signifikan antar asal tanaman, dengan bibit Wanagama menghasilkan biomassa lebih tinggi dibandingkan stek Tiris ( $p < 0,05$ ). Pemetaan menunjukkan variasi biomassa dan serapan CO<sub>2</sub>e di antara lahan andil petani (0–3,07 Mg ha<sup>-1</sup>), mengindikasikan bahwa input penanaman yang seragam tidak menghasilkan produktivitas yang konsisten. Studi ini merekomendasikan agar penelitian selanjutnya melakukan analisis tanah untuk mengidentifikasi pengaruh karakteristik tanah terhadap produktivitas biomassa.

Kata Kunci: perubahan iklim, hutan bioenergi, agroforestri, hutan kemasyarakatan

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**MAPPING BIOMASS AND CARBON SEQUESTRATION OF *GLIRICIDIA*  
(*Gliricidia sepium* (Jacq.) Kunth. ex. Walp.) AT RANU MAKMUR SOCIAL  
FORESTRY, PROBOLINGGO**

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**ABSTRACT**

*PT Paiton Energy established energy forests in Indonesia under the Community Forest scheme to promote sustainable biomass production and reduce greenhouse gas emissions, adopting *Gliricidia* (*Gliricidia sepium* (Jacq.) Kunth. ex. Walp.) (*G. sepium*) as the primary bioenergy crop. This study evaluates the biomass, carbon stock, and CO<sub>2</sub>e sequestration of the 2024 *G. sepium* plantations in the Ranu Makmur Community Forest, Probolinggo; analyzes the growth performance of Wanagama seedlings and Tiris cuttings; and assesses productivity differences among farmers' land parcels. Stem diameters of all trees were measured. Biomass and carbon stock were estimated using species-specific allometric models. CO<sub>2</sub>e was derived from carbon stock using the 44:12 molecular ratio. A nonparametric statistical test was used to analyze the growth performance of Wanagama-derived seedlings and Tiris cuttings and determine whether their differences were statistically significant. Mapping generated land parcel-level representations of biomass and CO<sub>2</sub>e sequestration, highlighting variability across farmers' land parcels. The results showed that the *G. sepium*, planted in 2024, contained 8.23 Mg of aboveground biomass (0.84 Mg ha<sup>-1</sup>) and 2.29 Mg of carbon (0.23 Mg C ha<sup>-1</sup>), equivalent to 8.41 t CO<sub>2</sub>e (0.86 t CO<sub>2</sub>e ha<sup>-1</sup>) sequestered. Approximately 90% of farmers planted *G. sepium* along the borders of their land parcels. Growth performance differed significantly between planting materials, with Wanagama seedlings producing higher biomass than Tiris cuttings ( $p < 0.05$ ). The mapping showed variation in biomass and CO<sub>2</sub>e sequestration across farmers' land parcels (0–3.07 Mg ha<sup>-1</sup>), indicating that uniform planting inputs did not generate consistent productivity. Recommendation for future studies to conduct soil analyses to identify the impact of soil characteristics on biomass productivity.*

*Keywords: climate change, bioenergy forest, agroforestry, community forest*

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