

Kelimpahan Bakteri Amonifikasi dan Kadar Amonium di Lahan Revegetasi pada Tanah Bekas Tambang Batu Bara di Provinsi Kalimantan Timur

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INTISARI

Pertambangan batu bara dengan sistem tambang terbuka dapat menyebabkan kerusakan tanah dan hilangnya vegetasi. Reklamasi melalui revegetasi diperlukan untuk memulihkan lahan, salah satunya dengan menanam jenis legum pioner yang mampu memfiksasi nitrogen dan memperbaiki kualitas tanah. Proses dekomposisi bahan organik dari tanaman tersebut menghasilkan amonium (NH_4^+) yang disebut proses amonifikasi oleh bakteri amonifikasi, yang berperan penting dalam penyediaan nitrogen bagi tanaman. Penelitian ini bertujuan untuk mengetahui kelimpahan bakteri amonifikasi dan kadar amonium pada tanah bekas tambang yang direvegetasi dengan tiga jenis tanaman berbeda, serta menentukan jenis tanaman legum terbaik dalam memicu pertumbuhan bakteri amonifikasi.

Penelitian dilaksanakan pada Desember 2024 hingga Mei 2025 dengan menggunakan rancangan *purposive sampling*. Sampel tanah diambil dari tiga jenis tegakan tanaman pionir pada dua kedalaman, yaitu 0–5 cm dan 5–10 cm, serta lahan tanpa revegetasi sebagai kontrol. Pengambilan sampel tanah dilakukan di lahan revegetasi PT Mahakam Sumber Jaya dan pengujian sampel tanah dilakukan di Laboratorium Fisiologi Pohon dan Tanah Hutan, Fakultas Kehutanan, Universitas Gadjah Mada.

Hasil penelitian menunjukkan bahwa populasi bakteri amonifikasi dan kadar amonium berturut-turut pada jenis sengon buto, johar, kayu putih, dan lahan tanpa vegetasi adalah 8,5 log sel/gram tanah; 59,8 mg/kg, 8,4 log sel/gram tanah; 50,7 mg/kg, 8,02 log sel/gram tanah; 44,1 mg/kg, dan 5,5 log sel/gram tanah; 30,5 mg/kg. Jenis sengon buto diketahui sebagai tanaman pionir yang paling efektif dalam memicu pertumbuhan bakteri amonifikasi.

Kata Kunci: Revegetasi, Bakteri amonifikasi, Amonium (NH_4^+), Tanaman pioner, Lahan bekas tambang

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Abundance of Ammonifying Bacteria and Ammonium Levels in Revegetated Land on Post-Coal Mining Soils in East Kalimantan Province

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ABSTRACT

Open-pit coal mining can cause severe soil degradation and the loss of vegetation. Land reclamation through revegetation is necessary to restore the ecosystem, one of which is by planting pioneer legume species that are capable of nitrogen fixation and improving soil quality. The decomposition process of organic matter from these plants produces ammonium (NH_4^+), known as ammonification, carried out by ammonifying bacteria, which play an important role in providing nitrogen for plants. This study aimed to determine the abundance of ammonifying bacteria and ammonium levels in post-mining soil revegetated with three different plant species, as well as to identify the most effective legume pioneer species in stimulating the growth of ammonifying bacteria.

This research was conducted from December 2024 to May 2025 using a purposive sampling design. Soil samples were collected from three types of pioneer vegetation stands at two soil depths (0–5 cm and 5–10 cm), with non-revegetated land serving as the control. Sampling was carried out in the revegetation area of PT Mahakam Sumber Jaya, and laboratory analyses were conducted at the Laboratory of Tree Physiology and Forest Soils, Faculty of Forestry, Universitas Gadjah Mada.

Results showed that the abundance of ammonifying bacteria and ammonium content for sengon buto, johar, kayu putih, and control plots were 8.5 log cells/g; 59.8 mg/kg, 8.4 log cells/g; 50.7 mg/kg, 8.02 log cells/g; 44.1 mg/kg, and 5.5 log cells/g; 30.5 mg/kg, respectively. Sengon buto was identified as the most effective species in promoting the growth of ammonifying bacteria.

Keywords: Revegetation, Ammonifying bacteria, Ammonium (NH_4^+), Pioneer vegetation, Post-mining land

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