

## KUANTITAS BAKTERI AMONIFIKASI SEBAGAI INDIKATOR PERBAIKAN KUALITAS TANAH BEKAS TAMBANG BATUBARA DI JAMBI PASCA REVEGETASI DENGAN TIGA JENIS TUMBUHAN PIONIR

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### INTISARI

Tiap jenis vegetasi, akan memberikan pengaruh yang berbeda terhadap percepatan perkembangan tanah. Proses perkembangan tanah juga dipengaruhi oleh proses dekomposisi yang melibatkan bakteri amonifikasi. Bakteri amonifikasi berperan dalam proses mineralisasi Norganik menjadi  $\text{NH}_4^+$ . Jumlah bakteri sering digunakan sebagai indikator awal perubahan sifat kimia dan fisika tanah, karena perubahan jumlah bakteri tanah dapat mempengaruhi fungsi ekosistem tanah. Penelitian ini bertujuan untuk mengetahui kondisi pertumbuhan 3 jenis tanaman revegetasi pada lahan bekas tambang, mengetahui kelimpahan bakteri amonifikasi pada tanah permukaan di 3 jenis tanaman revegetasi dan mengetahui hubungan kuantitas bakteri amonifikasi terhadap perubahan sifat fisika dan kimia tanah.

Penelitian dilaksanakan pada April – September 2022. Penelitian lapangan berupa pengamatan kondisi pertumbuhan tanaman, pengambilan sampel serasah dan sampel tanah dilaksanakan di PT Nan Riang. Pengujian sifat fisik dan kimia tanah dilakukan di Laboratorium Kesuburan Tanah Universitas Jambi, sedangkan pengujian mikrobiologi tanah dilakukan di Laboratorium Fisiologi Pohon dan Tanah Hutan, Fakultas Kehutanan Universitas Gadjah Mada. Data pengamatan dianalisis menggunakan ANOVA, sedangkan hubungan kuantitas bakteri amonifikasi dengan sifat fisika dan kimia tanah dianalisis menggunakan Uji Korelasi *Pearson* dan Analisis Regresi Linear.

Hasil penelitian menunjukkan bahwa tanaman sengon, mahoni dan jabon umur 5 tahun yang ditanam pada areal bekas tambang batubara di Jambi memiliki tinggi rata-rata (18;3,9;11,17m), diameter batang (15,6;4,3;9,8cm) serta diameter tajuk (2,2;0,47;1,2m). Populasi bakteri amonifikasi tertinggi terdapat pada tanaman jabon (8,1 Log sel/g tanah) diikuti sengon (7,8 Log sel/g tanah) dan mahoni (5,5 Log sel/g tanah). Populasi bakteri amonifikasi menurun seiring dengan semakin dalamnya lapisan tanah. Terdapat hubungan positif dengan derajat hubungan yang kuat antara kandungan C-organik, N-total dan pH tanah terhadap populasi bakteri amonifikasi. Sementara itu, terdapat hubungan yang negatif dengan derajat hubungan yang sedang antara *bulk density* dan kerapatan partikel tanah terhadap populasi bakteri amonifikasi.

**Kata kunci:** Tanaman Pionir, Bakteri amonifikasi, Rehabilitasi Lahan, Tambang Batubara.

## QUANTITY OF AMMONIFICATION BACTERIA AS AN INDICATOR OF SOIL QUALITY IMPROVEMENT AT POST COAL MINING AREA IN JAMBI AFTER REVEGETATION WITH THREE TYPES OF PIONEER PLANTS

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### ABSTRACT

Vegetation types will give different influences on the acceleration of soil development. The process of soil development is also influenced by the process of decomposition involving ammonification bacteria. Ammonification bacteria play an important role in the process of mineralizing N-organic into  $\text{NH}_4^+$ . Population of bacteria are often used as an early indicator of changes in soil chemical and physical properties, because changes in soil bacteria population can affect the function of soil ecosystems. The objectives of this research were to determine the growing condition of 3 pioneer species planted on post coal mining land, the abundance of ammonification bacteria on surface soils in the 3 different plantations and the relationship of the ammonification bacteria quantity and changes in soil physical and chemical properties.

The research was conducted in April – September 2022. Field research in the form of observing plant growth conditions and collecting litter and soil samples were done at PT Nan Riang, Soil physical and chemical characteristics were tested in the Soil Fertility Laboratory of Universitas Jambi, while soil microbiology test were conducted in the Laboratory of Tree Physiology and Forest Soil, Faculty of Forestry, Universitas Gadjah Mada. Observational data were analyzed using ANOVA, while the relationship of ammonification bacteria quantity to soil physical and chemical properties was analyzed using the *Pearson* Correlation Test and Linear Regression Analysis.

Based on results it is showed that the 5-year-old sengon, mahogany and jabon plantations on post coal mining area in Jambi respectively had averages height of 18;3,9;11.17m, tree trunk diameter of 15.6;4,3;9.8cm and canopy diameter of 2.2;0.47;1.2m. The highest populations of ammonification bacteria was found in jabon (8.1 Log cells/g soil) followed by sengon (7.8 Log cells/g soil) and mahogany (5.5 Log cells/g soil). The population of ammonification bacteria decreased with the deeper soil layer. There is a positive relationship with a strong association degree between C-organic, N-total and soil pH content to the population of bacteria. Meanwhile, there is a negative relationship with a moderate degree between bulk density and soil particle density to the population of ammonification bacteria.

**Keywords:** Pioneer vegetation, Ammonification Bacteria, Land Rehabilitation, Coal Mines