

**PENGARUH BEBERAPA AMELIORAN *BIOCHAR* TERHADAP  
NITRAT ( $\text{NO}_3^-$ ) DAN EMISI *NITROUS OXIDE* ( $\text{N}_2\text{O}$ ) PADA  
ULTISOL YANG DITANAMI KEDELAI**



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# PENGARUH BEBERAPA AMELIORAN *BIOCHAR* TERHADAP NITRAT ( $\text{NO}_3^-$ ) DAN EMISI *NITROUS OXIDE* ( $\text{N}_2\text{O}$ ) PADA ULTISOL YANG DITANAMI KEDELAI

## ABSTRAK

Penelitian tentang pengaruh beberapa amelioran *biochar* terhadap nitrat ( $\text{NO}_3^-$ ) dan emisi *nitrous oxide* ( $\text{N}_2\text{O}$ ) pada Ultisol yang ditanami kedelai, mulai Februari sampai Mei 2024. Penelitian ini bertujuan untuk mempelajari pengaruh pemberian beberapa amelioran *biochar* terhadap nitrat ( $\text{NO}_3^-$ ) dan emisi *nitrous oxide* ( $\text{N}_2\text{O}$ ) pada Ultisol yang ditanami kedelai dengan menggunakan Rancangan Acak Kelompok (RAK) 3 perlakuan dan 4 kelompok (ulangan) sehingga didapatkan 12 satuan percobaan. Penelitian ini dilakukan di Belimbing, Kecamatan Kuranji, Kota Padang, Laboratorium Tanah Universitas Andalas dan di Balai Penelitian Lingkungan Pertanian Jakenan Kabupaten Pati Jawa Tengah. Pengamatan lapangan meliputi pengamatan profil, suhu dan analisis di laboratorium yang terdiri dari pH  $\text{H}_2\text{O}$ , P-tersedia, Al-dd, N-total,  $\text{NO}_3^-$ ,  $\text{N}_2\text{O}$  dan Kadar Hara Nitrogen Tanaman. Hasil penelitian menunjukkan pemberian *biochar* limbah kelapa muda memberikan dampak paling baik dalam memperbaiki sifat kimia Ultisol dibandingkan dengan *biochar* sekam padi dan kontrol. Pada hasil analisis nitrat kandungan nitrat pada *biochar* sekam padi dengan kriteria paling tinggi dibandingkan dengan kandungan nitrat pada perlakuan *biochar* limbah kelapa muda dan kontrol dengan peningkatan 6,26 ppm. Nilai *biochar* limbah kelapa muda mampu menekan laju emisi sebesar  $-71,53 \mu\text{gNm}^{-2}$  pada dua hari setelah pemupukan dan *biochar* sekam padi mampu menekan laju emisi sebesar  $-41,94 \mu\text{gNm}^{-2}$  pada enam hari setelah pemupukan. Upaya memperbaiki sifat kimia Ultisol dan menurunkan emisi gas  $\text{N}_2\text{O}$  di Belimbing, Kecamatan Kuranji, Kota Padang disarankan dengan pemberian *biochar* limbah kelapa muda.

*Kata kunci* : *Biochar*, Nitrat ( $\text{NO}_3^-$ ), Nitrous oxide  $\text{N}_2\text{O}$ , Ultisol, Kedelai, Belimbing, Kecamatan Kuranji, Kota Padang

# THE EFFECT OF VARIOUS BIOCHAR AMENDMENTS ON NITRATE ( $\text{NO}_3^-$ ) AND NITROUS OXIDE ( $\text{N}_2\text{O}$ ) EMISSIONS IN ULTISOL PLANTED WITH SOYBEANS

## ABSTRACT

Research on the effect of various biochar amendments on nitrate ( $\text{NO}_3^-$ ) and nitrous oxide ( $\text{N}_2\text{O}$ ) emissions in Ultisol planted with soybeans was conducted from February to May 2024. The study aims to examine the impact of several biochar amendments on nitrate ( $\text{NO}_3^-$ ) and nitrous oxide ( $\text{N}_2\text{O}$ ) emissions in Ultisol planted with soybeans. This research utilized a Randomized Block Design (RBD) with 3 treatments and 4 groups (replications), resulting in 12 experimental units. The study was carried out in Belimbing, Kuranji District, Padang City, at the Soil Laboratory of Andalas University, and at the Agricultural Environmental Research Station in Jakenan, Pati Regency, Central Java. Field observations included profile observations, temperature, and laboratory analyses consisting of pH  $\text{H}_2\text{O}$ , P- available, Al-dd, N- total,  $\text{NO}_3^-$ ,  $\text{N}_2\text{O}$ , and Plant Nitrogen Nutrient Content. The results showed that the application of young coconut waste biochar had the best impact on improving the chemical properties of Ultisol compared to rice husk biochar and the control. The nitrate analysis results indicated that the nitrate content in rice husk biochar was the highest compared to the nitrate content in young coconut waste biochar and the control, with an increase of 6.26 ppm. The value of young coconut waste biochar could reduce the emission rate by -71.53  $\mu\text{gNm}^{-2}$  two days after fertilization, and rice husk biochar could reduce the emission rate is -41.94  $\mu\text{gNm}^{-2}$  six days after fertilization. Efforts to improve the chemical properties of Ultisol and reduce  $\text{N}_2\text{O}$  gas emissions in Belimbing, Kuranji District, Padang City, are recommended with the application of young coconut waste biochar.

*Keywords: Biochar, Nitrate ( $\text{NO}_3^-$ ), Nitrous oxide ( $\text{N}_2\text{O}$ ), Ultisol, Soybeans, Belimbing, Kuranji District, Padang City*