

Intisari

Kecepatan pelepasan kalium (K) tidak dapat ditukarkan dari tanah dapat mempengaruhi secara signifikan terhadap kesuburan K tanah. Hanya ada sedikit penelitian tentang hubungan antara kinetika pelepasan K dan serapan K tanaman padi di Inceptisol Kalitirto, Sleman. Tujuan dari penelitian ini adalah (i) mengetahui pengaruh pupuk organik terhadap sifat kimia tanah, kadar NPK akar dan trubus, serapan NPK, pelepasan kalium dan pertumbuhan tanaman padi dan (ii) menentukan model kinetika terbaik yang menggambarkan pelepasan K dari tanah yang diperlakukan dengan pupuk organik. Perlakuan meliputi (i) kontrol, (ii) pupuk anorganik, (iii) 10 ton/ha pupuk kandang, (iv) 5 ton/ha pupuk hijau dan (v) 7,5 ton/ha pupuk kandang dan pupuk hijau (2:1). Percobaan dilakukan menggunakan rancangan kelompok acak lengkap (RAKL) dengan tiga ulangan. Kinetika pelepasan K tidak dapat ditukarkan diekstraksi dengan 0,01 M CaCl_2 selama periode antara 2 sampai 168 jam dan data pelepasan K dimasukkan ke dalam lima model matematika: zero-order reaction, first-order reaction, power function equation, parabolic diffusion dan *Elovich* equation. Hasil penelitian menunjukkan bahwa perlakuan pupuk organik berpengaruh menurunkan pH H_2O , pH KCl dan DHL, menaikkan KPK, P tersedia dan Mg tersedia, tidak berpengaruh secara nyata terhadap serapan trubus, serapan akar dan pelepasan K sehingga pupuk organik dapat digunakan untuk menggantikan penggunaan pupuk anorganik. Di antara lima persamaan, power function mendeskripsikan secara baik model pelepasan K dengan nilai R^2 sebesar 0,443. Konstanta b , indeks kecepatan pelepasan K, dari model power function berkisar dari 0,003-0,018 mg/kg/jam.

Kata kunci: kalium; kinetika; pelepasan; pupuk organik; serapan

Abstract

The rate of non-exchangeable potassium (K) release from soils can significantly influence K fertility of soils. There are few studies about the relationship between the kinetics of K release and rice-K uptake for Inceptisols in Kalitirto, Sleman. The objective of this study were (i) to determine the effect of organic fertilizer on soil chemical properties, content of NPK root and plant, NPK root and plant uptake, kinetics of potassium release and growing of rice and (ii) to find the best kinetic models to describe K release from soils. The treatments included (i) control, (ii) inorganic fertilizer, (iii) 10 ton/ha cow manure, (iv) 5 ton/ha green manure and (v) 7.5 ton/ha cow manure + green manure (2:1). The experiment was analyzed using randomized complete block design (RCBD) with three replications. The kinetics of non-exchangeable K release was extracted successfully with 0.01 M CaCl₂ for periods between 2 and 168 h and data of K release were fitted to five mathematical models: zero-order reaction, first-order reaction, power function equation, parabolic diffusion and Elovich equation. The results showed that organic treatments significantly decreased pH H₂O, pH KCl and EC, increased CEC, available P and Mg, but the treatments were not significant on plant uptake, root uptake and K release so organic fertilizer can be used to replace inorganic fertilizer application. Among the five equations, power function best described the K release pattern with R-square was 0.50. The constant *b*, an index of K release rate, ranged from 0.003 to 0.018 mg/kg/h in the power function model.

Keywords: Kinetics; Organic fertilizer; Potassium; Release; Uptake