

Kinetics of Nonexchangeable Potassium Release in Surface and Subsurface Horizons of Predominant Soil Series in Kohgilouye-va-Boyerahmad Province

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Abstract

The aim of this study was to assess the kinetics of nonexchangeable potassium release in surface and subsurface soil horizons, using organic and inorganic extractions, in Kohgilouye-va-Boyerahmad Province. Kinetics of K⁺ release was studied by successive extractions of K from 64 selective surface and subsurface soil samples, using 0.01 M CaCl₂ and 0.01 M oxalic acid, for 1948 h, with two replicates. Nonexchangeable K⁺ release was fitted by Elovich, Pseudo-first order, Power function and Parabolic equations. Result showed that the average nonexchangeable K⁺ released (extracted by 1M HNO₃) was 356 mg/kg, while those extracted by CaCl₂ and oxalic acid after 1948 h were only 58% and 52% of the total amount of nonexchangeable K⁺ of the soils, respectively. In all soil samples, nonexchangeable K⁺ released by oxalic acid was less than that released by CaCl₂, due to the high buffering capacity resulting from high carbonates in the soils. Potassium release rate in Elovich and Parabolic equations were significantly correlated with non-exchangeable potassium and some physical and chemical characteristics. Based on high Coefficients of determination (r²) and low Standard errors (SE), Elovich, Power function, First order and Parabolic equations were selected as the best equations for prediction of K⁺ release from the soils.

Keywords: Kinetics of nonexchangeable Potassium, Kohgilouye-va-Boyerahmad, Oxalic acid, Calcium Chloride.

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