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Effects of zeolite and vermicompost applications on potassium release from calcareous soils

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Zeolite and vermicompost applications to soil may improve K fertility of soils. For this purpose, these materials were added to five representative calcareous soils collected from southern Iran. The treatments included (1) control, (2) 20 g/kg zeolite, (3) 20 g/kg vermicompost, and (4) 20 g/kg vermicompost + zeolite (1:1). The samples were incubated for 90 days, and the concentrations of soluble, exchangeable, and non-exchangeable K and K release rate to 0.01M CaCl₂ during 240 min (16 successive 15 min extractions of soil samples with CaCl₂ solution) were determined. Results indicated that zeolite application increased significantly the concentration of soluble and exchangeable K. Vermicompost application had a positive effect on all forms of K. Cumulative K release was also affected by vermicompost application. Comparison of experimental data to different kinetic models indicated that Elovich, power function, and parabolic diffusion models described well kinetics of K release from all soil samples to 0.01M CaCl₂. The b values of Elovich equation had significant relationships with NH₄OAc- and HNO₃-extractable K. It is recommended that for K fertility management of calcareous soils, organic and inorganic amendments application to soils should be taken into consideration.

Keywords:

available K; Iran; K fertility; kinetic models; non-exchangeable K

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