ABSTRACT
A field study was conducted to assess the effect of neem seed cake (NSC) on the kinetics of net nitrogen mineralization and parameter estimates. The experiment consisted of sorghum plots to which milled NSC (with %N > 3) and urea (inorganic N source) were applied. Ammonium-nitrogen and nitrate-nitrogen were determined after 0, 2, 4, 6, 8, 12, 19 and 34 weeks from soils covered with PVC tubes inserted into the sixteen treatment combination plots. Inorganic N concentration in the amended plots and the control were analysed using five mathematical N mineralization models. \( N_0 \), \( N_e \), h and k were estimated from the fit of each mathematical model. The treatments were highly variable in their respective N mineralization characteristics, but the peaks for mineralized N content were observed at early incubation periods, i.e., 10 - 28 days. Potential respective mineralizable N \( (N_0) \) content of the first order rate, consecutive \( (h \neq k) \), consecutive \( (h = k) \), Gompertz and mixed order rate constant was \(-927E-22, 430.90, 1.9E-21, 568.40\) and \( 427.20 \) mg kg\(^{-1}\) soil and the respectively rate constant \( (k) \) was \(-5E+21, 0.2269, 2E+23, 0.0954\) and \( 0.8116 \). Net N mineralization was best described by a mixed order rate model \( (R^2 = 0.992) \) and residual mean square error (RMSE) was \( 28.41 \). A Gompertz function also fitted the data closely \( (R^2 = 0.999; \text{RMSE} = 52.47) \). The two models recognize that N mineralization is not just a function of substrate N concentration but also of the capacity of the microbial community to adjust to substrate quality and composition affecting their growth and activity.

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