Evaluating 0.01M $CaCl_2$ as an Extractant for Estimating Available N from Soils Amended with Animal Manures.

Jennifer Forkes* and Michael J. Goss
Dept. of Land Resource Science
University of Guelph, Guelph
Ontario N1G 2W1
jforkes@lrs.uoguelph.ca

Abstract The current Ontario soil test for N measures the nitrate (NO_3^-) present in the soil at planting and side-dressing. The N that comes from the breakdown of organic matter present in the soil is inferred from the average of many nitrogen response trials. Farmer experience suggests that the test commonly fails to include the N released through the microbial breakdown of organic sources (mineralizable nitrogen) including animal manures and forages. The failure to account for the mineralizable organic N fraction of manure has been shown to result in the over application of nitrogen, which is both costly to the farmer and the environment. The modified 0.01M $CaCl_2$ procedure undergoing detailed investigation involves extracting a soil or manure sample with 0.01 M $CaCl_2$ solution at 20°C, 80°C and then digesting an aliquot of the 20°C fraction in H_2SO_4. The 20°C extract yields the current mineral N fraction, the 80°C extract yields the loosely bound organic N fraction and the digested extract supplies the soluble organic N plus fraction plus the ammonium (NH_4^+) - N. Two of the difficulties in estimating available N for soils that have been amended with animal manures are the early immobilization of mineral N in the soil by the microbial mass flourishing under the new organic inputs and the fixation of NH_4^+ within the clay lattice structure. The robustness 0.01M $CaCl_2$ extraction procedure is evaluated in this study using both a field scale experiment and an aerobic incubation in a controlled environment chamber. The field experiment examines the ability of the 0.01M $CaCl_2$ procedure to estimate N availability from different manure types applied to one soil type at increasing rates and relates it to N uptake by a corn crop. The incubation experiment examines the ability of the 0.01M $CaCl_2$ procedure to estimate the mineralization of N from soils from a range of clay contents that have been amended at increasing rates with various manure types. This study demonstrates the capabilities of the 0.01M $CaCl_2$ extraction procedure for use for soil, soils that have been amended with manure and manure alone, in an effort improve to efficient use of manure nitrogen.