Publications

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Soil Nitrogen Mineralization Potential for Improved Fertilizer Recommendations and Decreased Nitrate Contamination of Groundwater

Frank Hons, Richard Haney, Alan Franzluebbers

- Full Text

In order to prevent overfertilization, which could lead to groundwater contamination, rapid and accurate soil testing procedures are needed to evaluate agricultural surface soils for their potential to mineralize C and N. Our objectives were to determine optimum conditions for estimating soil microbial biomass (SMB) from previously dried soils and to identify a quick, reliable biochemical predictor of soil N mineralization potential. Initial evaluations were conducted on a Weswood silty clay loam (fine, mixed, thermic Fluventic

Ustochrept) with five levels of soil organic C (SOC) using (i) fresh soil, and (ii) soil that was air-dried, rewetted, and pre-incubated for 0.2, 1, 3, 6, 10, and 15 d. Procedures to estimate C and N mineralization potentials included arginine ammonification (AA), substrate-induced respiration (SIR), cumulative C and net N mineralization, and soil microbial biomass carbon (SMBC) using the chloroform fumigation-incubation (CFI) method. Carbon mineralization was highly correlated to (i) SMBC using CFI determined on fresh and dried soil and (ii) net N mineralization during 21 d for the Weswood soil, as well as for seven additional soil types with 5 to 8 levels of SOC each. Measurement of CO_2-C evolved during the first day after rewetting of dried soil is recommended for rapid estimation of SMBC and potential N mineralization because of its simplicity and precision.

Texas Water Resources Institute

1500 Research Parkway A110
2260 TAMU
College Station, TX 77843-2260

Phone: 979.845.1851
Fax: 979.845.0662
Email: twri@tamu.edu