

## Potential N Mineralization – Laboratory Procedures

(Modified from LTER Standard Soil Methods Book)

This protocol assumes you have already determined Gravimetric Soil Moisture and Immediate Inorganic N for your soil.

### Materials

1. 3 125mL flasks per soil sample
2. Access to a 25°C incubator
3. Inorganic N extraction materials (See Suding Lab soil inorganic nitrogen extraction protocol)
4. Access to  $\text{NO}_3^-$  and  $\text{NH}_4^+$  analysis

### Procedure

1. Collect at least **30g** of soil from the field, sieve, and determine immediate inorganic N of **10g** of soil as per Suding Lab soil inorganic nitrogen extraction protocol.
2. Determine the moisture content of **10g** of soil for each sample as per Suding Lab gravimetric soil moisture protocol.
3. Adjust the moisture content of **10g** of soil for each sample to approximately 60% water filled pore space (WFP). Be certain the moisture-adjusted soil is well mixed.

$$\%WFP = [P_w \times (D_B / S_t)] \times 100$$

where

%WFP = percent water-filled pore space

$P_w$  = water content ([g water / g dry soil] x 100)

$D_B$  = bulk density ( $\text{g}/\text{cm}^3$ ) = Oven dried soil weight (g) / core volume ( $\text{cm}^3$ )

$S_t$  = total porosity (%) =  $[1 - (D_B / \text{Particle Density})] \times 100$

Particle Density can be assumed to be  $2.65 \text{ g}/\text{cm}^3$  for most non-volcanic soils (Blake and Hartge 1986)

(From LTER Soil Methods pg 75-77)

4. Weigh 10g of each soil composite into each flask.
5. Cap flasks loosely or cover with polyethylene film (permeable to  $\text{O}_2$  and  $\text{CO}_2$ , but not  $\text{H}_2\text{O}$ ) and place in a humidified darkened 25°C incubator.
6. Check for water loss periodically by weighing a subset of flasks at the outset and reweighing at intervals. Replace evaporated soil moisture as needed for each soil sample. After 28 days, extract soil as per Suding lab protocol for soil inorganic nitrogen extraction.

### Calculations

Convert nitrate and ammonium values to both an areal basis ( $\text{g N}/\text{m}^2$ ) and a gravimetric basis ( $\text{mg N}/\text{kg}$ ). Calculate net N mineralization

$$N_{\text{mineralized}} = [(Nitrate_f + Ammonium_f) - (Nitrate_i + Ammonium_i)] / T_{\text{days}}$$

where

$N_{\text{mineralized}}$  = net mineralization rate (mg N / kg / d)

$\text{Nitrate}_f$  = final nitrate concentration (mg  $\text{NO}_3^-$  / g soil)

$\text{Nitrate}_i$  = initial nitrate concentration (mg  $\text{NO}_3^-$  / g soil)

$\text{Ammonium}_f$  = final ammonium concentration (mg  $\text{NH}_4^+$  / g soil)

$\text{Ammonium}_i$  = initial ammonium concentration (mg  $\text{NH}_4^+$  / g soil)

$T_{\text{days}}$  = incubation time, in days

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