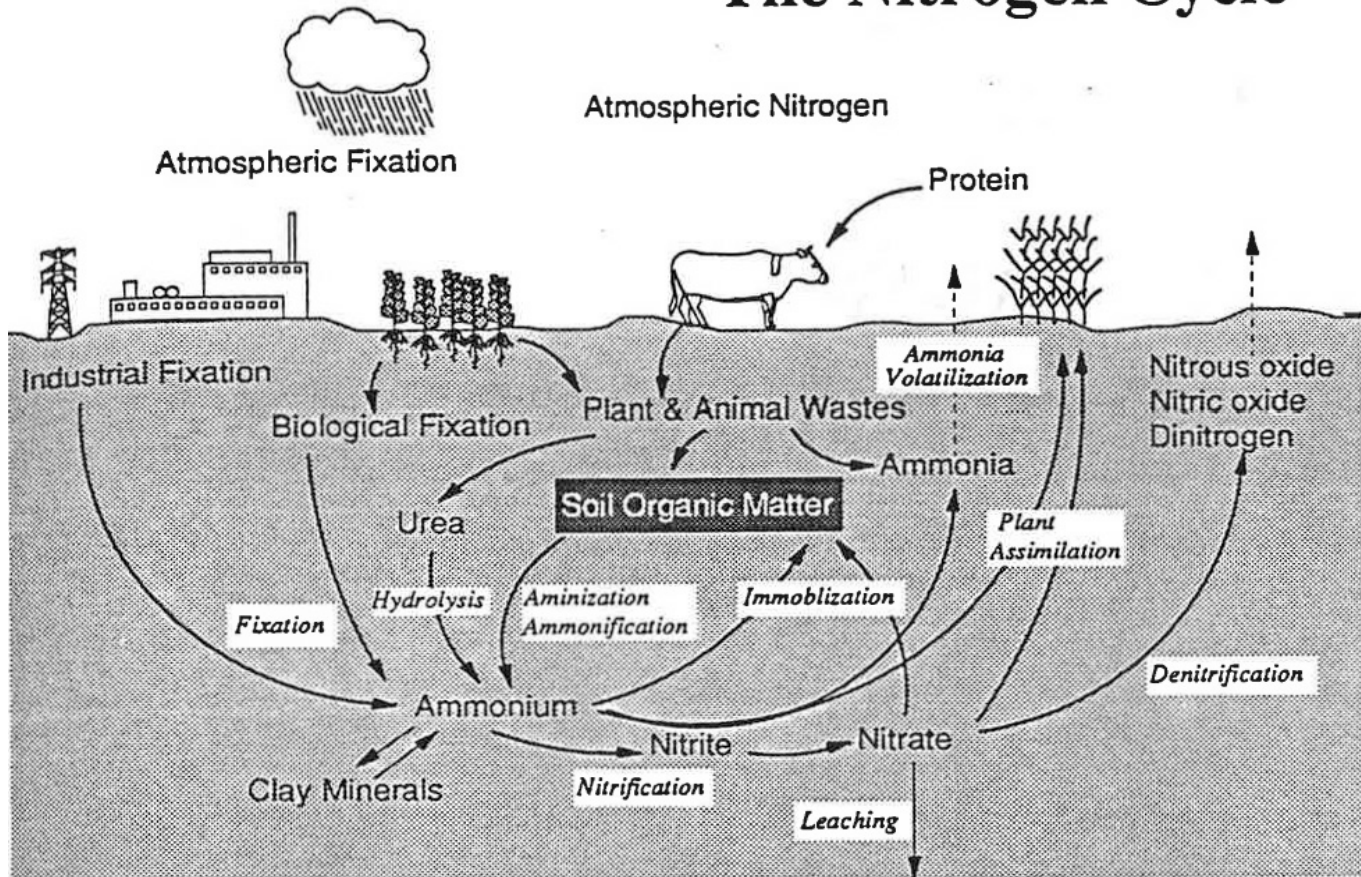


Soil Health - Nitrogen

Nitrogen (N) is the most abundant element in the atmosphere, and it generally is the most limiting nutrient for crops. Nitrogen cycles in soil through various processes and in various forms. Some of the processes convert N into forms that can be used by plants, and some of the processes, such as leaching and volatilization, can lead to N losses. Nitrogen is added to soil naturally through N fixation by soil bacteria and legumes and through rainfall.

The Nitrogen Cycle



Nitrogen cycle ("Soil as a Plant Sees It", University of Nebraska, 1991)

Soil Nitrate-N Calculations (for procedures on other side):

Sampling Depth Conversion: Depth (cm) = Depth (in) x 2.54

Subsample Soil Water Content (g/g): $SWC_{sub} = \frac{\text{weight of moist soil} - \text{weight of oven-dry soil}}{\text{weight of oven-dry soil}}$

Dry Weight of Soil: $w_{dry} = \frac{\text{weight of moist soil in scoop}}{1 + \text{soil water content}}$

Volume (weight) of Water (g/g): Water added to soil (g) + (dry weight of soil x soil water content)

Adjusted ppm Soil Nitrate N: $\frac{\text{ppm NO}_3 \text{ N in 1:1 mix} \times \text{volume of water in extract and soil}}{\text{dry weight of extracted soil}}$

Estimated Bulk Density (D_b): $\frac{100}{(\% \text{ o.m.}) \div (\text{o.m. } D_b) + (100 - \% \text{ o.m.}) \div (\text{ave. soil } D_b)}$

Pounds Nitrate N/Acre-Depth: (adj. ppm $\text{NO}_3 \text{ N}$) x (sample depth \div 10) x est. soil D_b x 0.89

Soil Health - Nitrogen

Measuring Soil Nitrate/Nitrite Levels

Materials needed:

Soil Probe and plastic container
Nitrate/Nitrite Test Strips
1/8 cup (29.5 mL) measuring scoop
Calibrated 120mL vial with lid

Squirt bottle
Distilled water or rainwater
Pen, notebook, permanent marker
Resealable plastic bags

Procedure: Quick In-Field Hand Test

1. Using a soil probe, gather at least 10 small samples randomly from an area that represents a particular soil type and management history. The probe should extend to a depth of 8 inches or less for a surface layer sample and to a depth of as much as 3 feet for a subsurface layer sample. Place samples in a plastic container and mix. Surface layer and subsurface layer samples should be placed in separate containers. Do not include large stones and plant residue. Repeat step 1 for each sampling area.
2. Neutralize hands by rubbing moist soil across palms. Discard soil. Place a scoop of mixed soil in palm of hand and saturate with "clean" water (distilled water or rainwater).
3. Squeeze hand gently until a soil and water slurry forms.
4. Touch tip of nitrate test strip to soil and water slurry. Leave until the slurry is drawn up at least 1/8 to 3/16 inch on strip.
5. After 1 to 2 minutes, measure nitrate by comparing the color of the wet test strip to the color chart on the test strip container (fig. 4). The color that most closely matches the test strip indicates the amount of nitrate in the saturated soil.
6. Bend or cut off end of strip to expose the tip for the nitrite test. Repeat steps 2 through 5 to determine the amount of nitrite in the saturated soil.

Procedure: 1:1 Soil to Water Nitrate/Nitrite Test

1. Gather samples as instructed in step 1 under "Quick in-field hand test."
2. Fill scoop (29.5 ml) with mixed soil, tamping down during filling by carefully striking scoop on a hard, level surface. Put soil in vial. Add one scoopful (29.5 ml) of water to the vial, resulting in a 1:1 ratio of soil to water, on a volume basis.
3. Tightly cap the vial and shake 25 times. Let settle for 1 minute. Remove cap, and carefully decant 1/16 inch of the soil and water slurry into the cap.
4. Allow to settle for 2 to 3 minutes. Touch end of nitrate test strip to soil and water slurry. Leave until liquid is drawn up to least 1/8 to 3/16 inch beyond the area covered by the soil.
5. After 1 to 2 minutes, compare color of wet test strip to color chart on the test strip container. The color on the chart that most closely matches the color on the test strip indicates the amount of nitrate in the saturated soil.
6. Bend or cut off end of strip to expose the tip for the nitrite test. Repeat steps 2 through 5 to determine the amount of nitrite in the saturated soil.