Lab Methodologies

Nitrate-Nitrogen and Sulfate-Sulfur
Approximately 15 grams of soil is weighed into a vessel and 30 milliliters (mL) 0.01 Molar (M) Calcium Chloride is added. The solution is agitated on a reciprocating shaker for 30 minutes and then filtered. Nitrate-Nitrogen is measured by automated colorimetry after reduction by hydrazine and complexing with n-(1-naphthyl) ethylenediamine dihydrochloride. Sulfate-Sulfur is measured by inductively coupled plasma optical emission spectroscopy (ICP-OES). NO3-N is reported as mg/kg, and SO4-S is reported as mg/kg (ppm).

Weak Bray & Olsen Phosphate-Phosphorus
For Bray, approximately 2.5 grams of soil is weighed into a vessel and 25 mL of 0.025 M Hydrochloric Acid in 0.03 M Ammonium Flouride extraction solution is added. The solution is agitated on a reciprocating shaker for 5 minutes and then filtered. For Olsen, approximately 2.5 grams of soil is weighed into a vessel and 50 mL of 0.5 M Sodium Bicarbonate extraction solution is added. The solution is agitated on a reciprocating shaker for 30 minutes and then filtered. Phosphate-Phosphorus is measured by automated colorimetry after reduction by ascorbic acid and complexing with ammonium molybdate. Phosphate-phosphorus is reported as mg/kg (ppm). Tests are highly sensitive to soil pH.

Exchangeable Cations (K, Ca, Mg, Na)
Approximately 5 grams of soil is weighed into a vessel and 50 mL 1.0 M Ammonium Acetate is added. The solution is agitated on a reciprocating shaker for 30 minutes and then filtered. All exchangeable cations are measured by ICP-OES and reported as mg/kg (ppm).

Organic Matter
Organic matter is determined by loss on ignition, a dry combustion method. Approximately 2.5 grams of sample is weighed into a porcelain crucible. The sample and crucible are dried at 104°C for 2 hours to drive off atmospheric moisture. The sample and crucible are weighed once more before ashing at 375°C for 2 hours. This process oxidizes organic carbon which is driven off as carbon dioxide. The final, ashed sample is weighed once more. This method employs an ashing temperature that allows for suitable oxidation of organic carbon and sufficiently low temperatures to prevent oxidation of inorganic carbon (carbonates). Organic matter is reported as a percentage.

pH, Sikora Buffer pH, and EC
To test pH and EC, 15 grams of the sample is weighed and extracted by 15 ml of deionized water. After 20 minutes of agitation, the solution is measured by electrochemistry methods. For soils with a pH of less than 6.6, 15 mL of Sikora buffer solution is added and agitated for 10 minutes before receiving another pH measurement. pH and buffer pH is reported as pH units. EC is reported as deciSiemens per meter (dS/m).

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DTPA-Sorbitol Extractable Micronutrients (B, Cu, Fe, Mn, Zn)
Approximately 15 grams of soil is weighed into a vessel and 30 mL of buffered DTPA-Sorbitol solution is added. The solution is agitated on a reciprocating shaker for 2 hours and then filtered. B, Cu, Fe, Mn and Zn are measured by ICP-OES and are reported as mg/kg (ppm).

Extractable Chloride
Approximately 2.5 grams of soil is weighed into a vessel and 25 ml of 0.01 M Calcium Nitrate is added. The solution is agitated on a reciprocating shaker for 30 minutes and then filtered. Extractable Chloride is analyzed by automated colorimetry by acidic thiocyanate method and is reported as mg/kg (ppm).

Mehlich 3 Multinutrient (B, Cu, Fe, Zn, P, Ca, Mg, Na, K, B, P, Al)
2.5 grams of soil is scooped into a vessle and 25ml of M3 extraction reagent is added. The solution is agitated for 5 minutes and filtered. Analysis is conducted by ICP-OES. Aluminum is reported optionally per test package.

Texture via NIR or Hydrometer
Hydrometer - 50g of soil scooped into a 1L cylinder with PSA solution and the specific gravity of the mixture is measured at 0 min, 40 seconds and 2 hours along with the temperature. Relative sand/silt/clay are reported as percentage. NIR - 35g of soil poured into NIR crucible and scanned via near-infrared spectroscopy. An estimate of sand/silt/clay is reported.