

SOIL TESTING METHODS REFERENCE SHEET

SOIL ANALYSIS	METHOD	REFERENCE
Aluminum (Extractable)	Potassium Chloride Extraction / ICP-AES Analysis	WREP, Chapter 15.10 / EPA 6010B
Amino Sugar Nitrogen	Alkaline Digestion / Titration	Khan, S. A., Mulvaney, R. L., & Hoefft, R. G. 2001. A simple soil test for detecting sites that are non responsive to nitrogen fertilization. Soil Science Society of America Journal 65: 1751-1760
Ammonium Nitrogen	Potassium Chloride Extraction / Automated Phenate	WREP, Chapter 3.5 / SM 4500-NH ₃ G (mod)
Bar Moisture 1/3 bar & 15 bar	Pressure Chamber with Gravimetric Measurement for Field Capacity, Permanent Wilting Point, & Available Moisture	ASTM, D6836-16 (Method B)
Bulk Density Disturbed Undisturbed	Mass per unit Volume Determination Core Method	Gupta, P. K. 2000. Methods in Environmental Analysis: Water, Soil, and Air. Chapter 9: Soil Analysis Physical (mod)
Cations K, Mg, Ca, Na, S	Ammonium Acetate Extraction / ICP-AES Analysis	NCR, Chapter 7 (Cations) & SERA, Chapter 4.6 (Sulfur) / EPA 6010B
Chloride	Calcium Nitrate Extraction / Automated Ferricyanide	WREP, Chapter 12.10 / SM 4500-Cl- E
Excess Lime	Hydrochloric Acid Solution Spot Test	MWL SOP SO 051
Grain Size	Hydrometer Analysis / Particle Size Analysis	ASTM D7928-17 / ASTM D6913-17 (Method B)
Growth Media Saturated Paste pH EC Nitrate Nitrogen Minerals/Nutrients P, K, Ca, Mg, Na, S, Zn, Mn, Fe, Cu, B	Saturated Paste Extract Slurry pH Specific Conductance Automated Cadmium Reduction ICP-AES Analysis	NCR, Chapter 14 EPA 9045 D SM 2510 B EPA 353.2 EPA 6010B
Humic Matter	Photometric Determination	Mehlich, A. 1984. Photometric determination of humic matter in soils: a proposed method. Communications in Soil Science and Plant Analysis 15: 1417-1422
Mehlich 3 ICP P, K, Ca, Mg, Na, S, Zn, Mn, Fe, Cu, B	Mehlich 3 Extraction / ICP-AES Analysis	SERA, Chapter 4.3 / EPA 6010B
Molybdenum (Extractable)	Ammonium Oxalate Extraction / ICP-AES Analysis	Grigg, J. L. 1953. A Rapid Method for the Determination of Molybdenum in Soils. The Analyst 78: 470-473 / EPA 6010B
Nitrate Nitrogen	Potassium Chloride Extraction / Automated Cadmium Reduction	NCR, Chapter 5 / EPA 353.2
Organic Matter Loss on Ignition (LOI) Walkley-Black	Gravimetric Determination with High Temperature Oxidation Oxidation + Titration	NCR, Chapter 12

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pH pH Buffer Index	pH 1:1 (Soil:Water) pH 1:2 (Soil:Water) pH 1:1:1 (Soil:Water:Sikora Buffer)	NCR, Chapter 4
Phosphorus P1 P2 Olsen Bicarb Mehlich 3 Color	Weak Bray Extraction (1:7) / Colorimetric Strong Bray Extraction (1:7) / Colorimetric Sodium Bicarbonate Extraction / Colorimetric Mehlich 3 Extraction / Colorimetric	NCR, Chapter 6
PT2 Total Nitrogen (TN) Minerals/Nutrients P, K, Ca, Mg, Na, S, Al, Zn, Mn, Fe, Cu	LECO Combustion Acid Digest / ICP-AES Analysis	LECO Application Note: Determination of Carbon and Nitrogen in Soil AOAC 968.08 (mod) / AOAC 985.01 (mod)
Saturated Paste Saturated Paste pH EC Sulfate Chloride Bicarbonate	Saturated Paste Extract Slurry pH Specific Conductance Ion Chromatography Ion Chromatography Automated Titration	NCR, Chapter 14 EPA 9045 D SM 2510 B EPA 9056A EPA 9056A SM 2320 B
Silicon (Extractable)	Acetic Acid Extraction / ICP-AES Analysis	Snyder, G. H. 2001. Methods for silicon analysis in plants, soils, and fertilizer. In: Silicon in Agriculture. Datnoff, L. E., Snyder, G. H., & Korndörfer (Editors). Elsevier Science B.V., New York, pp. 185-207 / EPA 6010B
Sodium Adsorption Ratio (SAR) Saturated Paste Minerals/Nutrients Ca, Na, Mg	Saturated Paste Extract ICP-AES Analysis	NCR, Chapter 14 EPA 6010B
Soil Health Complete 1. Water Soluble Nitrate Nitrogen Ammonium Nitrogen Orthophosphate Total Carbon (TC) Total Nitrogen (TN) 2. H3A Orthophosphate Minerals/Nutrients P, K, Ca, Mg, Na, Fe, Al 3. CO2 Burst (BRAN)	DI Water Extraction Automated Cadmium Reduction Automated Phenate Automated Colorimetric Combustion Combustion H3A-3 Extraction Automated Colorimetric ICP-AES Analysis Determination of Biological Organism CO2 Emission	Haney, R. L., Haney, E. B., Smith, D.R., & White, M. J. 2017. Removal of Lithium Citrate from H3A for Determination of Plant Available P. Open Journal of Soil Science 7: 301-314 EPA 353.2 SM 4500-NH3 G (mod) SM 4500-P F LECO Application Note LECO Application Note SM 4500-P F EPA 6010B TMECC 05.08 Respirometry

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SOIL ANALYSIS	METHOD	REFERENCE
Soluble Salts	EC 1:1 (Soil:Water) EC 1:2 (Soil:Water)	NCR, Chapter 13
Texture % Clay, % Silt, % Sand	Hydrometer Analysis	Gee, G. W., Bauder, J. W. 1979. Particle size analysis by hydrometer: a simplified method for a routine textural analysis and a sensitivity test of measured parameters (Bouyoucos Method). Soil Sci Soc Am J 43: 1004-1007
Total Kjeldahl Nitrogen (TKN)	Acid Digest / Automated Distillation & Titration	AOAC 2001.11 (mod)
Total Nitrogen (TN) Total Carbon (TC) Total Organic Carbon (TOC) Free CaCO ₃ C:N Ratio	Combustion	LECO Application Note: Determination of Carbon and Nitrogen in Soil
Total Phosphorus	Acid Digest / ICP-AES Analysis	AOAC 968.08 (mod) / AOAC 985.01 (mod)
Trace Elements DTPA-Sorbitol Zn, Mn, Fe, Cu, B HCl Zn, Mn, Fe, Cu	DTPA-Sorbitol Extraction / ICP-AES Analysis HCl Extraction / ICP-AES Analysis	SERA, Chapter 4.5 / EPA 6010B NCR, Chapter 9 / EPA 6010B
Water Soluble P, K, Ca, Mg, Na, S	DI Water Extraction / ICP-AES Analysis	MWL SOP SO 025 / EPA 6010B
Wisconsin LOI Phosphorus Potassium	Gravimetric Determination with High Temperature Oxidation Weak Bray Extraction (1:10) / Automated Colorimetric Weak Bray Extraction (1:10) / ICP-AES Analysis	Peters, J. (Editor) 2013. Wisconsin Procedures for Soil Testing, Plant Analysis, and Feed & Forage Analysis. University of Wisconsin Soil Science Department

REFERENCES

AOAC - Association of Official Agricultural Chemists
 ASTM - American Society for Testing and Materials
 EPA - Environmental Protection Agency
 MWL - Midwest Laboratories
 NCR - Recommended Chemical Soil Test Procedures for the North Central Region
 SERA - Soil Test Methods from the Southeastern United States
 SM - Standard Methods
 TMECC - Test Methods for the Examination of Composting and Compost
 WREP - Soil, Plant and Water Reference Methods for the Western Region