

Soil Sample Preparation

1. Application

Soil samples are dried, ground and sieved prior to analysis. The grinding and sieving operations should ensure a homogeneous mixture for analysis.

2. Summary of Methods

Soil samples are dried at 50 °C in cardboard boxes. The dried soil is ground in a mechanical mortar and pestle and passed through a 12-mesh (approximately 2 mm) screen. Routine testing for pH, lime requirement, phosphorous, potassium and organic matter is designed to handle the analyses in series of groups of ten. The soil samples, at the time they are received, are recorded and placed in trays holding five rows of ten boxes each (boxes are 2.5" x 3" x 3" deep), making a total of 50 samples. Each tray is lettered or numbered and sample identification follows each set of numbered racks through the entire analysis. Boxes in sample trays, shaker flasks, funnel-top filter tubes, colorimeter tubes and racks for pH and pipette batteries are all spaced at 2.5" center-to-center. Soil for analysis is measured by volume rather than by weight.

3. Safety

A dust collection system should be connected to the soil grinder. Dust masks and ear protection plugs should be used. Basic precautions regarding mechanical equipment and electric motors, and involving common sense, must be followed.

4. Interferences

Drying about 50 °C can result in release of nonexchangeable K from illitic minerals and entrapment (fixation) of K by vermiculite. If micronutrient analyses are to be performed, all surfaces contacting the material should be made of stainless steel, plastic or wood. Rubber, paint and galvanized metal must be avoided if Zn is to be analyzed. Air or oven-drying samples can lead to significant changes in the ammonium or nitrate contents of soils. However, the changes in ammonium content of soils have been more pronounced than the changes in nitrate content. Drying and storage of soil samples after drying leads to a marked increase in their content of exchangeable ammonium.

5. Sample Preparation and Handling

Soil samples usually are received in a moist, aggregated state, unsuitable for analysis. The volume of the soil sample containers are 22 cubic inches (about 375 cc). Many samples are larger than this as received. Such samples must be subsampled to ensure as representative a sample as possible of appropriate volume.

Dried and ground soil is measured using a calibrated scoop. The scoop volume is based on the weight of a light-colored silt loam soil such that an acre of the soil to a depth of 7 inches weighs 2 million pounds. A heaping scoop of the required volume of soil is removed from the soil box, the scoop is tapped three times lightly on the handle with the spatula and the soil is leveled off with the spatula. The soil is then transferred to the appropriate container using a stainless steel or polypropylene funnel.

6. Apparatus and Materials

- 6.1 Soil sample trays accommodating five rows of ten sample boxes
- 6.2 Soil sample boxes, cardboard, 2.5" x 3" x 3"
- 6.3 Mechanical soil grinder with a 10- or 12-mesh stainless steel screen
- 6.4 Dust collection system (attached to soil grinder)
- 6.5 Forced air drying cabinet, thermostatically controlled at 50°C

7. Reagents

Not applicable.

8. Methods

- 8.1 Place soil samples in cardboard boxes, with location of sample in tray recorded on a lab data sheet.
- 8.2 Place tray of samples in drying cabinet.
- 8.3 Dry 24 to 48 hours at 50°C. (Wet clays might require a longer drying period.)
- 8.4 Grind entire sample to pass a 10-mesh screen.

9. Calculations

Not applicable.

10. Quality Control

- 10.1 The first sample in each tray should be a standard soil of known analyses. This sample is used to check each procedure. If the analysis is outside the known range, corrective action must be taken.

11. Reporting

Not applicable.

12. References

- 12.1 Evans, D.D., J.L. White, *et. al.* 1965. Methods of Soil Analysis, Part 2 (Chemical and Microbiological Properties), p1182.

- 12.2 Gelderman, R.H., and A.P. Mollarino. 1998. Soil sample preparation. In J.R. Brown (ed.), Recommended Chemical Soil Test Procedures for the North Central Region (Revised). Missouri Agr. Exp. Sta. SB1001. Columbia, MO.
- 12.3 Corey, R.B., and C.B. Tanner. 1961. Soil Sci. Soc. Am. Proc. 25:326-327.