



# Soil Sampling and Analysis

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**S**oil analysis can provide important information about physical conditions, fertility (nutrient) status, and chemical properties that affect a soil's suitability for growing plants. Four steps associated with soil testing include: 1) soil sample collection, 2) laboratory analysis, 3) interpretation of results, and 4) fertilizer or other management recommendations. We'll look at soil sample collection and analysis.

## SOIL SAMPLE COLLECTION

The first step in soil analysis is soil sample collection. It's important to realize that only a tiny portion of a field is actually analyzed in the laboratory. Thus, collecting a representative soil sample is critical for accurate results.

The most common method is composite sampling. Sub-samples are collected from randomly selected locations in the field. The sub-samples are thoroughly mixed to obtain a representative sample and analysis of this sample gives average values for the entire area. Although the actual number of sub-samples depends on field size and uniformity, no less than 5 sub-samples should be taken, and 15 to 25 are preferred. Usually samples are collected to a depth of about 6 to 8 inches or to the effective rooting depth.

Soil samples should be immediately air-dried at room temperature for two to three days and should not be heated or dried in an oven. If samples cannot be dried immediately, they can be refrigerated for several days and taken to a laboratory as soon as possible.

The primary consideration for timing of soil sample collection is convenience. Collect samples early enough to allow for interpretation and soil management adjustments. Status of some soil nutrients can change quickly, whereas others do not. For example, phosphorus levels in soil are unlikely to change rapidly and frequent testing is unnecessary. Nitrogen levels, on the other hand, change very quickly and only very recent tests will reflect current plant-available levels. When making substantial changes to soil fertility levels, it is a good idea to make the change over a period of two to three years, retesting the soil annually.

Otherwise, occasional testing (once every few years) is adequate in the absence of any noticeable nutritional deficiencies.

## SAMPLE ANALYSIS

A soil test determines the soil's nutrient supplying capacity by mixing soil during the analysis with a very strong extracting solution (often an acid or a combination of acids). The soil reacts with the extracting solution, releasing some of the nutrients. As soil supplies most of the mineral nutrition for higher plants through the plant's root system, the extracted nutrient concentration is evaluated based on research that relates plant utilization to soil nutrient concentrations. This works well for some nutrients, but is less accurate for others. Nutrients supplied from soil organic matter (OM) decomposition (such as nitrogen and sulfur) depend more on the rate of OM decomposition than on extractable levels of these nutrients.

Standard or routine soil tests vary from laboratory to laboratory, but generally include soil texture; electrical conductivity (EC, a measure of soil salinity); soil pH; available phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg); sodium (Na); cation exchange capacity (CEC); and often an analysis of OM content. Most laboratories offer nitrogen (N), sulfur (S), and micronutrient analyses for additional cost.

The methods used to test soils vary depending on soil chemical properties which are affected by geographic region. A listing of local soil test laboratories that use methods suitable for local soils can be found in the University of Arizona publication, "Laboratories Conducting Soil, Plant, Feed or Water Testing" (AZ1111) <http://cats.arizona.edu/pubs/garden/az1111.pdf>.

## STANDARD SOIL TESTS

### Soil Texture

Soil texture reflects the amounts of various sized particles (sand, silt, and clay) in the soil. Relative amounts of these particles are used to categorize soil into textural classes. Listed generally from most clayey to most sandy these are clay, silty clay, sandy clay, silty clay loam, clay

# Soil Sampling And Methods Of Analysis

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**Soil Sampling And Methods Of Analysis** Susanta Kumar Pal,2021-02-10 Soil Science is an important and basic science in agriculture which deals with different domains of soil research namely soil formation genesis and classification soil physics soil chemistry soil fertility and plant nutrition soil biology etc Characterization as well as our understanding of soils requires that they are precisely analysed and described While the physical properties of soils determine their adaptability to cultivation chemical properties tells about their chemical environment and nutrient status to the crop production the most important use of soils on this densely populated planet Determination of different soil physical and chemical properties in the field or in the laboratory following suitable analytical methods is first step towards appropriate soil managements and scientific recommendations for increasing crop production

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I.C. Gupta, N.P.S. Yaduvanshi, S.K. Gupta, 2012-06-01 Land water and plants are of crucial importance to the mankind While per capita availability of land and water is decreasing due to burgeoning population degradation is resulting in declining productivity per unit of these resources This degradation is impacting the environment and the quality of the field crops consumed by the humans and the animals raising serious concerns on the health of the consumers A concerted effort is being made to keep track of the health of these resources by Central Water Commission Central Pollution Control Board and many state government agencies through limited monitoring networks Soil water health cards are being distributed to the farming community to keep track of the health of these resources Many of these agencies feel handicapped not only in soil water and plants analysis but also in interpreting the analytical results for practical use It is especially true for the salt affected soils and waters which require special attention and management to achieve potential productivity The current book compiles and puts together the most important aspects of the existing knowledge on sampling procedures and physical chemical and biological determinations needed to monitor the soil health and water quality Besides procedures of general interest in agriculture all analysis procedures needed for the reclamation and management of salt affected soils and or poor quality waters have been included Unlike other books of this nature the current book includes sections where exhaustive interpretations of the analytical results and or their applications have been given in many cases with relevant examples The readers therefore would be able to understand and proceed from the most preliminary step of taking soil water samples to most advanced analytical techniques to diagnose the problems and to take appropriate measures to reverse the degradation processes We believe that this book is an improvement over the existing books and is a useful addition to the literature on this subject The information contained in this book would facilitate the access to and implementation of the knowledge by the scientists engaged in research in the basic streams and agricultural sciences It would also prove to be a useful reference book to professional students and personals engaged in the NGOs and the state laboratories associated with soil water and plant analysis work **Manual on Soil Sampling and Methods of Analysis**, 1978 *Methods of Soil Analysis, Part 4*  
Jacob H. Dane, Clarke G. Topp, 2020-05-27 The best single reference for both the theory and practice of soil physical measurements Methods Part 4 adopts a more hierarchical approach to allow readers to easily find their specific topic or measurement of interest As such it is divided into eight main chapters on soil sampling and statistics the solid solution and gas phases soil heat solute transport multi fluid flow and erosion More than 100 world experts contribute detailed sections Soil Analysis Handbook of Reference Methods J. Benton Jones, Jr., 1999-12-20 For more than 30 years soil testing has

been widely used as a basis for determining lime and fertilizer needs Today a number of procedures are used for determining everything from soil pH and lime requirement to the level of extractable nutrient elements And as the number of cropped fields being tested increases more and more farmers and growers will come to rely on soil test results But if soil testing is to be an effective means of evaluating the fertility status of soils standardization of methodology is essential No single test is appropriate for all soils Soil Analysis Handbook of Reference Methods is a standard laboratory technique manual for the most commonly used soil analysis procedures First published in 1974 this Handbook has changed over the years to reflect evolving needs New test methods and modifications have been added as well as new sections on nitrate heavy metals and quality assurance plans for agricultural testing laboratories Compiled by the Soil and Plant Analysis Council this latest edition of Soil Analysis Handbook of Reference Methods also addresses the major methods for managing plant nutrition currently in use in the United States and other parts of the world For soil scientists farmers growers or anyone with an interest in the environment this reference will prove an invaluable guide to standard methods for soil testing well into the future Features

**Procedures for Collecting Soil Samples and Methods of Analysis for Soil Survey** ,1984 **Proceedings of the American Society of Agronomy** American Society of Agronomy,1915 *Bulletin - United States. Bureau of Soils* ,1898 Publication British South Africa Company,1930 **Bulletin - United States. Bureau of Soils** United States. Bureau of Soils,1902 **Journal of the Chemical Society** ,1901 *Proceedings of the International Society of Soil Science* International Society of Soil Science,1930 **Fiscal Year 1999 EPA R&D Budget Authorization** United States. Congress. House. Committee on Science. Subcommittee on Energy and Environment,1998 *"Code of Massachusetts regulations, 2004"* ,2004 Archival snapshot of entire looseleaf Code of Massachusetts Regulations held by the Social Law Library of Massachusetts as of January 2020 Journal of the American Society of Agronomy American Society of Agronomy,1915 An international journal of agriculture and natural resource sciences

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