



# 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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