

# Soil Sampling

Fact Sheet No. 0.500

Crop Series | Soil



by J.R. Self and P.N. Soltanpour\*

Careful soil sampling is essential for an accurate fertilizer recommendation. A sample must reflect the overall or average fertility of a field so analyses, interpretations and recommendations accurately represent the nutrient or mineral status of the soil. An accurate evaluation of soil nutrient levels will result in more efficient fertilizer use, which can increase yields, reduce costs and potentially reduce environmental pollution.

Consider each of the following before obtaining a soil sample:

1. field area (acreage) per sample,
2. sampling procedure,
3. sampling depth,
4. when to sample,
5. sampling tools,
6. sample handling,
7. information form, and
8. handling and mailing.

## Field Area

A composite soil sample should represent a uniform field area that has a similar crop and fertilizer history for at least the last two years. Soil characteristics (color, slope, texture, drainage and degree of erosion) should appear similar. Exclude small areas within a field that are obviously different. These can be sampled separately if they are large enough to warrant special treatment. The field area represented by a single composite sample should be no more than 40 irrigated acres or 100 dryland acres. Fewer acres is better. For gardens or landscaping, the areas can be defined by turf verses gardens, for example.

## Sampling Procedure

Use a systematic sampling scheme. Grid the area in your mind's eye (it is not necessary to measure it) and sample once within each

grid. Take 15 to 20 surface subsamples per 40 acres and six to eight subsurface cores. Mix these subsamples thoroughly and save 1 pint for analysis as the composite soil sample. In some cases, the number of subsamples may be limited by time constraints or availability of labor. Keep in mind, however, that fewer subsamples result in less accuracy in evaluating the nutrient or mineral status of the soil. For gardens and landscaping, take five to 10 subsamples from the site to be evaluated.

## Sampling Depth

Take the surface sample to tillage depth. For perennial pastures or hay crops (cases where the soil is not annually mixed), sample to 4 inches deep. Be sure to separate and discard surface litter. Take deeper samples (subsoil) for nitrate-nitrogen ( $\text{NO}_3\text{-N}$ ) analysis where the nitrogen (N) fertilizer recommendation is of special importance. Sugarbeets are an excellent example: There is a delicate balance between yield response (too little N) and quality reduction (too much N).

Deep soil sampling greatly improves nitrogen recommendations for irrigated crops. Take deep samples to 2 feet, preferably to 4 feet. There is little point in going deeper unless an unusual situation requires special attention. Sample as follows: surface to tillage depth, tillage depth to 2 feet, and 2 feet to 4 feet. Keep each depth separate. Request a routine test for the surface composite sample and  $\text{NO}_3\text{-N}$  only for the subsoil samples. Gardens and landscapes can be sampled to a depth of 6 to 8 inches.

## When to Sample

Sample fields before each growing season. Fertility trends over a period of years provide important information, indicating the adequacy of a fertilizer program (too much, too little or the correct amount).

## Quick Facts

- A quality fertilizer recommendation depends on a quality soil sample.
- A composite soil sample should represent a uniform field area.
- Use a systematic sampling scheme and a minimum of 15 subsamples throughout the field, regardless of acreage.
- Sampling depth depends on the crop and the tillage depth.
- Sample most fields every year for nitrate analyses.
- Thoroughly air dry all soil samples within 12 hours after sampling.

\*J.R. Self, manager, Colorado State University Soil, Water and Plant Testing Laboratory; and P.N. Soltanpour, professor, soil and crop sciences. 3/2010



## Information Form

Fill out the information form completely. Interpretations depend on a series of field and crop factors. Such items as past crop, manuring, crop to be grown and its yield goal, and irrigation, all enter into the final fertilizer recommendation. Without this information, a fertilizer recommendation cannot be tailored to the specific situation.

## Handling and Mailing

Soil sample jars and information forms are available at Colorado State University Extension county offices, fertilizer and agrichemical dealers, garden centers, nurseries, commercial soil testing laboratories, or from the Colorado State University Soil, Water and Plant Testing Laboratory, Room A319, Natural and Environmental Sciences Building, Colorado State University, Fort Collins, Colorado 80523-1120; (970) 491-5061. Samples can be mailed directly to the laboratory for analysis.

The closer the samples are taken to planting time, the less chance there is for changes to occur. This usually is a problem only with N. However, soil samples may be taken either in the fall or spring. Fall sampling ensures the test results are ready in plenty of time for spring or for fall fertilization when weather usually is good and time not so critical.

Beware of situations that may cause soil values to change between sampling and planting. For example, heavy rainfall or pre-irrigation on sandy soils could leach  $\text{NO}_3\text{-N}$  below the root zone of shallow-rooted crops.

## Tools

A stainless steel soil-sampling probe (moisture probe) is recommended for obtaining a soil sample. A shovel also is satisfactory for sampling, but it takes more time. Tools must be clean and free of rust. Collect the subsamples in a plastic or stainless steel container. **DO NOT USE** galvanized or brass equipment of any kind. It will contaminate the samples with important micronutrients.

## Handling

Air-dry soil samples within 12 hours. Air drying samples prevents microbes from mineralizing soil organic matter that can cause less accurate N fertilizer recommendations. Samples to be analyzed for ammonium -N should not be dried, and should be kept cold by shipping in a cooler.

## Environmental Soil Sampling

Sampling for environmentally-related purposes may require special tools and different sampling procedures. Larger diameter probes may be needed for rocky or sandy soils. Use plastic sleeves that line sample probes to prevent sample contamination or to keep cores intact for later analysis. Deeper subsoil sampling may be necessary to evaluate potential sources of minerals at reclamation sites. Wide-mouth 1-liter plastic containers with screw caps can prevent moisture loss (if soil moisture needs to be evaluated) and provide enough soil for the tests required. Whether sampling for environmental or agricultural purposes, it is important to obtain a sufficient number of subsamples to adequately evaluate a site.