Soil, Plant and Pest Center

Soil Sampling Basics for Nutrient Management Plans in Tennessee

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The Natural Resources Conservation Service (NRCS) uses guidance from local land-grant universities for 590 nutrient management plans. This publication is to help define basic soil sampling strategies for nutrient management plans in Tennessee. For site specific strategies, please refer to UT Extension publication W1191 Site-Specific Soil Sampling (Duncan *et. al.* 2023).

Sample Tools

Probe

A soil probe can be used to easily collect soil samples. Be sure to use the proper head on the probe based on your soil conditions to prevent compressing the soil when sampling. A light spray of silicone-based lubricant may be used to help get sticky soil out of the probe.

Some UT-TSU Extension County offices have soil sampling probes that one can check out. Please reach out and see if they are available in your county.

Shovel

A shovel can be used to sample soil as well. When using a shovel, be sure to collect an even amount of soil throughout the 0- to-6-inch depth to ensure there is no depth of soil within the sample that is more represented than the other.

Power Auger

Power augers can be used either on handheld drills or attached to vehicles. Oklahoma State published an Extension publication in 2003 on how to make "A Sweatless Soil Sampler" (Kress *et. al.* 2003). Commercial varieties are also now sold.

Sampling

Sample depth

Sample depth is important because soil test interpretations for immobile nutrients are based on the 0- through 6-inch depth. In tilled soils, the 0- through 6-inch depth is mixed, and sample depth has more forgiveness. In no-till soils, immobile soil nutrients such as phosphorus (P) and potassium (K) may stratify in the surface. A shallow sample may give a false high result and a false low fertilizer recommendation. Too deep of a sample may dilute the nutrients and give a false high fertilizer recommendation back from the lab.

Long-term no-till fields may have stratification of soil acidity at the surface. Acidifying fertilizers such as urea or ammonium-based N and P fertilizers will slowly acidify the top 2 inches of soil. Surface-applied lime will mostly react with the surface soil as well. In this system, one may choose to sample the 0- to 2-inch depth for pH only, separate from the 0- to 6-inch depth for P and K.

Number of Cores

It is important that the individual cores, while randomly taken, are also representative of the area. When taking cores across an area, take at least ten cores per area, with an equal number of cores per acre. More cores are always better and will allow the soil test result to be closer to the true average of the sampling area. In a 5-acre sampling area, this would mean that at least two cores are pulled from each acre in the 5 acres being tested. In a 10-acre sampling area, this would mean that at least one would be pulled from each acre in the 10 acres being tested. In a 20-acre field, at least 20 cores would be taken, one from each acre.

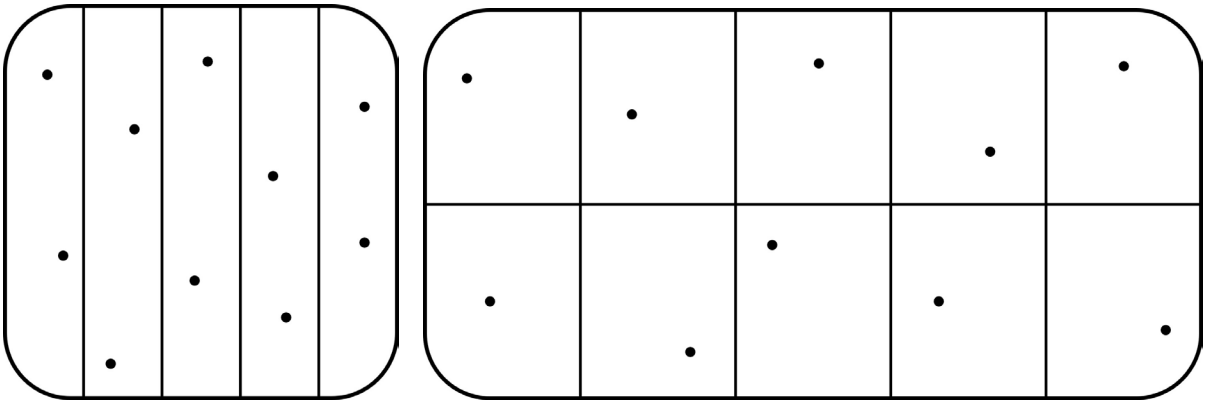

Figure 1: Examples of cores taken from 5- and 10-acre fields, with at least 10 cores being pulled in total, and each acre equally represented in the composite sample. At left, a 5-acre field divided into equal parts to evenly pull cores across field. At right, a 10-acre field divided into equal parts to evenly pull cores across the field.

More soil should be sampled than would fill a soil sample box or bag. As cores are pulled, place them into a clean plastic bucket. Once done sampling an area, mix the soil well by hand or with a tool and then fill the sample box or bag with the composite soil which will become your composite soil sample. If one cannot fill a sample soil sample box or sturdy quart bag (almost two cups) then enough sample was not taken to properly represent the area.

Soil boxes can be picked up at many local UT-TSU Extension county offices. See the resource section at end for a listing of county office websites.

Banded Fertilizer in the Past

Be aware that banded fertilizer, or manure, in the recent past will increase the variability of the soil test results. In these cases, it is better to take at least 20 cores per area.

Representative Area

Soil cores that will be collected for a composite sample should be taken from similar soils, with similar lime and fertilizer regimes, and crop removal.

Historically, and for simplicity, the suggestion was to have one composite sample not represent more than 10 acres. With the understanding that some soils may be similar and cropping management may be consistent over a larger geographical area, a new suggestion has been proposed.

One composite soil sample may represent up to 20 acres if:

The soil map unit is continuous; AND

The past three years of similar cropping history across the 20 acres; AND

The past three years of fertilizer/manure/lime treatments were applied similarly, and evenly throughout the area.

If the previous conditions are not met, one composite soil sample may only represent up to 10 acres, but one composite sample per 5 acres is suggested

To look up soil map units in your field, see resource section at end for a link to the NRCS's Web Soil Survey interactive page. A video on how to use Web Soil Survey is also in the resource section.

Frequency

Soil samples should be collected at least once every three years.

Shipping

Packaging

Pack samples in a sturdy shipping box and add padding to ensure they will not rattle in the shipping box. Samples shipped in an envelope or mailing bag will be crushed open.

Paperwork and payment

In the shipping box, include your submission sheet and method of payment. Samples without a submission sheet will cause samples to be delayed. Submission sheets can be found on the Soil, Plant, and Pest Center's website. A link is in the resources section at the end.

Shipping options

Many UT-TSU County Extension Offices ship samples for a small fee. Check with your local county Extension office, if they ship samples, and how much it costs.

Otherwise, one may use any shipping service of their choice or drop off samples at the lab itself.

The physical and mailing address is:

UT Soil, Plant, and Pest Center

5201 Marchant Dr

Nashville, TN 37211

Resources

Duncan, L., N. Adotey., and R. Florence. 2023. Site-Specific Soil Sampling. UT Extension Publication W 1191.

Adotey, N., H. B. Savoy, F. Walker, and R. Florence. 2023. Soil Testing for commercial Farmers. UT Extension Publication W 1194.

Kress, M., B. Arnall, and H. Zhang. 2003. A Sweatless Soil Sampler. Production Technology Oklahoma State University PT 2003-6. Vol 15(6).

UT-TSU County Extension Offices: utextension.tennessee.edu/office-locations-departments-centers/

UT Soil, Plant, and Pest Center, including submission sheets: soillab.tennessee.edu/

Soil map units from NRCS's Web Soil Survey: websoilsurvey.nrcs.usda.gov/app/

A helpful TSU Extension video on how to use Web Soil Survey: youtube.com/watch?v=TN4mP2mQn0w

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