

THIS ARTICLE IS ABOUT...

RIGHT
SOURCE

RIGHT
RATE

RIGHT
TIME

RIGHT
PLACE

Soil Sampling Gets at the Core of Nutrient Needs

- A precise soil analysis can result in more efficient fertilizer use
- Most experts recommend annual testing
- Attention to detail helps to ensure a successful soil sampling program
- Trends are key to analyses and planning

Soil Sampling Enhances Crop, Maximizes Fertilizer Use

Plan and Keep Track with Soil Sampling

The primary purpose of soil sampling is to get an idea of what the nutrient level of your soil is. Plus, proven methods of soil sampling are essential to develop an accurate fertilizer recommendation. Soil samples provide a representation of the ability of the soil to supply nutrients to meet crop needs throughout the growing season, as well as support your desired yield. In other words, if you don't know what nutrients are available and in what amounts, your fertilizer application will be off. A precise soil analysis can result in more efficient fertilizer use, increased yields, lower costs and reduced environmental exposure.

Collected samples must reflect the field's fertility so that the analyses also reflect the field's fertility. Soil fertility professionals generally recommend a composite sample of no fewer than 15 to 20 soil cores that represent no more than 20 acres.

In many ways, soil sampling is like pulling the dipstick on your engine to check the oil level. You wouldn't add oil without performing this simple step. The same should be true for a sound fertilization program. You must know existing nutrient levels before adding inputs to obtain optimum benefits.

Collection of a soil sample to get the best fertilizer recommendation and in order to apply the *right source* at the *right rate* and *right place* in your field, accurate soil sampling and analysis is critical. Samples should reflect the overall fertility of a field, or fields. Analyses can then help determine the representative nutrient and mineral content of the soil.



While there are some variations in recommendations of soil sampling regularity, most experts recommend annual testing. Composite soil samples should represent uniform field areas that have had similar crops and fertilizer for at least two previous years. In addition, soil characteristics (texture, color, drainage etc.) should be relatively the same. Smaller areas that are obviously different from the rest of the field should be tested separately.

Grid sampling is fairly common and grids are based on 2.5 acres, in general. It's important to come back each year and especially check the lower portions of the field. If you're following the grid and trying to build up nutrients, you need to keep testing to make sure you're accomplishing that. Spots in some fields may build up faster than others and you don't want to over-apply in those areas.

Keep in mind there are inherent variations in grid sampling, even if you use the same lab each time. That's another reason it's important to test regularly. Sample analyses are merely snapshots in time of the nutrient levels in your field. By testing consistently, you'll begin to get an overview of trends and can better predict what fertilizer adjustments you may need to make. Trends are key to strong analyses and planning.

Follow the Basics

Whether you're gathering soil samples on your own, with your local coop or with a consultant, keep the basics in mind and create a soil sampling plan. Basics to consider include:

- **Field area**, or acreage per sample
- **Sampling procedure**
- **Sampling depth** — inconsistent or incorrect sampling depth is often

cited as the major source of soil sampling error

- **Time of sample** — try to sample at the same period, time after time; it adds to the consistency of trend information
- **Tools** — hollow soil sampling probes or augers may be used; probes are often preferred because intact cores can be obtained from accurate depths; use plastic buckets, not metal, galvanized or rubber material.
- **Handling** — handle samples carefully when transferring to shipping bags or boxes; try not to let them touch anything and keep foreign matter out; be especially careful not to let it touch any fertilizer that may be in your pickup, ATV or trailer
- **Forms, handling, shipping** — fully complete all forms and follow the shipping and handling methods recommended by your lab
- **Quality control** — there is no substitute — **whoever collects samples is directly responsible for the integrity of them**; attention to detail can help ensure a successful soil sampling program.

Use All Tools Available

Discussing a Soil Map Depending on what other information is available, it may be useful to create **nutrient management zones** instead of a grid. Zoned sample plans may utilize detailed yield monitor maps, remote sensing imagery, digital soil surveys or topographic maps.

Zones are typically defined in areas of five or fewer acres. However, it's important to note that while smaller zones provide more accurate results, testing costs increase. At the same time, more than one sample per zone better defines variability within the zone. All sample points should

be referenced with GPS technology so that it correlates as accurately as possible with other GIS data.

Use Practicality

Arlen Koepp of Boyd, Minn., takes a practical approach to sampling the soil on his 1,700 acres he and his son farm. The ground is evenly split with 850 acres of corn and soybeans.

"From the beginning, we've always pulled samples of some kind," Koepp says. "About 10 years ago, we started zones, typically using an 80-acre plot and made it into five zones."

Koepp adds they used a Veris soil-sensing machine, which measures the ability of soil to conduct electricity across two colters.

"The last two years, we've started using 2.5 acre grids. The samples are all geo-referenced and 10 to 12 cores are used to make one composite sample from each grid," he says. "It then creates a map layer for each of the samples: phosphorous, potash or pH. The program we use has mathematical formulas that correlate to what the university recommends. We put the soil test map in first, then add a yield map that is representative of what the field has yielded in the past. It then tells us what we need for each area and gives us a map."

"We're now applying just the amount of fertilizer that's needed in the right areas," Koepp says. "It's more efficient and we get more bang for the buck. Plus, when the market moves to where margins are tighter, we'll be able to make our fertilizer dollars go farther."

Return on Investment is Key

Koepp uses the same lab each year, a practice recommended by experts and consultants industry wide. In his case, it happens to be the local fertilizer coop. He's also doing more of his own sampling.

"When our son came back, it helped us with our labor situation," Koepp says. "Doing the grids is time-consuming if you do it right."

The investment is paying off for the Koepp family, though. Along with soil sampling, they've incorporated management changes that help the soybeans grow better on parts of their ground that has high pH levels. This includes building a planter that switches varieties on the go allowing them to plan "offensive" or "defensive" beans using the maps they've developed.

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One of Many Tools

Consultants, Extension and university personnel are quick to point out that **soil sampling is a tool**. It's not a panacea for all problems, nor will one sample result in the highest yields. It's more important to set your yield and crop goals, get the results and then work over time to achieve them using proper soil sampling practices, sound land management and general nutrient stewardship principles.

If you aren't performing regular soil samples, now is the time to start. Check with your local coop, crop consultant or county Extension agent about how to get started.



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The information presented here is mostly general and conceptual. For more specific information regarding safe rates of in-furrow fertilization for specific crops and conditions, one should refer to university extension resources, and/or consult a knowledgeable and experienced crop advisor or industry professional. Also, an Excel decision support tool is available online. Visit the IPNI website www.ipni.net/toolbox.

