

MEETING YOUR CROP'S IN-SEASON NUTRIENT *needs*

Ward off yield-robbing nutrient deficiencies with tissue testing

It's advice oft-repeated by doctors and nutritionists: A well-balanced diet is key to good health. With it, our bodies run like well-oiled machines. Without it, they perform poorly and are more prone to disease and infection.

Crops aren't much different. Like us, they have certain minimum requirements for proper function and growth. Water, sunlight and nutrients — both macronutrients and micronutrients — are all components of a plant's well-balanced "diet." When crops receive everything they need, they flourish and produce greater yields. When something's missing, yields are reduced, and crops are more susceptible to stresses.

So, how can you ensure a crop has everything it needs? While a soil test is a great start in indicating what nutrients may be limited, tissue sampling can tell us if those nutrients are actually getting into the plant where they can increase yield. When good soil-monitoring practices are coupled with in-season tissue sampling, nutrient issues can be corrected even before symptoms show and yield potential is reduced.

Thinking beyond N, P & K: Micronutrients matter

Crops require 17 essential nutrients. While the macronutrients nitrogen, phosphorus and potassium top the list and get most of the attention when fertilizing, deficiencies in micronutrients can prevent a crop from reaching its maximum yield potential. In addition, even if nutrients are present, a number of environmental factors can impact their uptake by plants. These include:

- High relative humidity
- Soil compaction, waterlogged soils or puddling on the soil's surface
- Soil pH extremes
- Soil temperature and moisture
- Insects and disease

A tissue-testing program, developed in collaboration with your local Southern States Cooperative agronomist, provides an in-season snapshot of nutrient concentrations in plant leaves and can identify nutrient values that are insufficient for maximum crop growth and yield. This information can guide decisions about adding fertilizer or a foliar nutrient application.

Three years of tissue testing provide the proof

In-season tissue samples from corn and soybeans taken throughout the Southern States area from 2017-2019 showed deficiencies of key micronutrients that crops need for optimum health, growth and yield. While deficiencies varied by region, corn was most often deficient in zinc (Zn), boron (B) and manganese (Mn). Soybean tissue samples most often showed deficiencies of manganese (Mn) and copper (Cu) as well as the key macronutrients, phosphorus (P) and potassium (K).

Testing regime: Plan for a tissue trifecta

The more often tissue samples are collected and analyzed, the more accurate the assessment of a crop's in-season nutrient needs will be. Your Southern States agronomy expert will work with you to take at least three tissue samples throughout the growing season at times when it is still possible to apply fertilizer to the crop for a positive impact on yield.

Corn Sampling

For corn, sampling is recommended once during each of the following windows of corn growth:

- Fourth Leaf to Eighth Leaf (V4-V8)
- Ninth Leaf to Twelfth Leaf (V9-V12)
- Tasseling to Dent (VT-R5)

Soybean Sampling

For soybeans, samples should be taken:

- Once between Third Trifoliolate and Fifth Trifoliolate (V3-V5)
- Twice between Beginning Flowering and Full Pod (R1-R4)

Selecting samples: Only the best will do

In-season tissue analysis is only as good as the sample the lab receives, so it's crucial to start with the best plant material possible. Southern States experts recommend sampling early in the week so the tissue reaches the lab without delays that could degrade quality. Plant material should be placed in paper bags — not plastic — so it may continue to respire without concern about mold growth.

Sampling Do's and Don'ts

If you are collecting your own samples, follow this advice:

Do collect leaves randomly across the field.

Do sample tissue that is healthy and in optimum condition, which, generally speaking, consists of the most recently mature leaves.

Do collect enough tissue to ensure accurate analysis. As a rule, the material should be about the size of a softball when compressed in the hands.

Don't collect from areas of the field that have experienced long periods of plant stresses, such as drought or insect damage. Sample these areas separately so a comparison can be done to determine the problem.

Don't include border rows or dead plant material in your sample.

During corn vegetative stages, samples should consist of roughly 30-35 uppermost collared leaves; after tasseling, samples should consist of 30-35 ear leaves. For soybeans, samples should include 30-35 uppermost full open mature trifoliate leaves with petioles removed.

Nutrients in a nutshell: Tissue testing reveals strengths and weaknesses

Once samples have been sent to the lab, analysts will assess them for nutrient concentrations. The lab's tissue analysis report will contain results on both the percentage of macronutrients and the concentration of micronutrients within a given sample. Recommendations for each nutrient are visually presented along a three-range spectrum:

Adequate

Responsive (low)

Deficient

Adequate – These nutrients are present at a level that is sufficient for optimum growth and yield. The goal is to manage fertilizer applications so nutrients remain in the middle of this target zone.

Responsive (Low) – Nutrients deemed responsive fall in the lower part of the sufficiency zone, where yield reductions are expected but visual symptoms are not yet present. Correcting these nutrient levels will ensure plant growth isn't affected.

Deficient – When nutrients are lacking to this degree, visual deficiency symptoms can be expected. Depending on the growth stage, yield loss already may have occurred. Adding fertilizer now halts further reduction but probably won't recover yield already lost.

Regardless of a nutrient's status, the tissue analysis report will offer recommendations to help grow the highest-yielding crop. For nutrients at responsive or deficient levels, fertilizer applications will be suggested.

Review the results: Find the weakest link and correct it

Your Southern States agronomist can help you evaluate the tissue analysis and identify the weakest link – that is, the most limiting nutrient – and develop a fertilizer plan to increase your crop's yield potential, keeping the following in mind:

- No single nutrient does everything for a crop. Many are needed for a variety of physiological activities, such as photosynthesis and root development.
- Nutrients have an order of importance to plants. Nitrogen, phosphorus and potassium are always the most important, followed by other macronutrients, then by micronutrients.
- A macronutrient that falls in the responsive or deficient range requires attention before fertilizing for micronutrients.
- Many nutrients within a plant interact with others. As a result, a crop may need more than one nutrient to attain optimum yield.
- Because most macronutrients are required in larger quantities, soil application is most economical. Micronutrients, on the other hand, are required in smaller amounts by new young tissue, making foliar application during the growing season an efficient application strategy.

Contact us to get started

While soil testing can reveal what nutrients may be limiting, it can't measure actual availability of nutrients over time. Only in-season tissue analysis provides this valuable information. For help establishing a tissue-sampling program for your crops, contact your nearest Southern States agronomy team member at www.southernstates.com/agronomy/meet-our-team/.