



EXPOSE. CORRECT. VALIDATE.

The Agronomy 365 program brings an integrated approach to discover yield limiting factors on your farm and reallocate the dollars that no longer meet profit or yield goals.

We turn full-picture soil and tissue data into actionable agronomy.

Soil and plant tissue samples pulled from multiple areas throughout each field help tie yield data together with nutrient analysis allowing for fine-tuning of long-term nutrient management strategies. The 365 program is a great way to show what the gas tank (soil) can supply, and if the nutrition investment has paid off by getting into the plant's tissue. It is also useful for product research: find out if a product can help release nutrients from the soil and get them into the plant and/or if a product is qualified to get into the plant through the leaf itself.

Take your nutrition program to the next level with a comprehensive in-season soil and tissue sampling program.

Agronomy 365 currently uses Next Level Ag Labs to analyze all soil and tissue samples. Sampling protocol recommendations from this lab should be followed to receive best results. Locations of sample sites can be determined in one of two ways; fields can be split up by management zones, or Next Level Ag can utilize in-season satellite imagery to define the sample sites. All samples are pulled in a site-specific manner to allow for yield by nutrient analysis.

WHY SOIL SAMPLE?

A soil test is a process where nutrients are chemically removed from the soil and measured for their plant available content. A soil test also measures pH and the amount of acidity within the soil to determine if lime is needed and how much should be applied. Careful soil sampling and sample handling is essential for accurate fertility recommendations. Samples must reflect the fertility of the soil so that analysis, interpretations, and recommendations correctly represent the nutrient status of the entire field. Accurate evaluation can result in more efficient fertilizer use, reduced costs, and reduced environmental degradation.

Soil samples can be taken any time throughout the year for planting. Early spring is a good time to take soil samples for summer crops, and summer is a good time to sample for fall and winter crops. This allows time for any lime recommended to react with the soil and change the pH before the crop is planted. To assess soil available nitrogen, sample as close to planting as possible.

Tools and Supplies Needed to Take a Soil Sample

A clean plastic bucket and a stainless-steel soil sampling probe are the most used tools for collecting soil samples under normal conditions. The soil probe provides a continuous soil core with minimal disturbance to the soil that can be readily divided into various sampling depths. Vehicle-mounted hydraulic probes are available and are a better choice under adverse soil sampling conditions. Other tools include one or two plastic sample buckets, shovel or spade, sample bags, and markers for identifying samples on sample bags. Tools should be clean, free of rust, and stored away from fertilizer materials. **DO NOT USE** galvanized or brass equipment of any kind as it will contaminate the samples with micronutrients.

HOW TO SAMPLE SOIL

Prepare for Collection: Sample soil cores collected for each sampling depth must be thoroughly mixed. Individual cores pulled for 365 must be taken from one inside the furrow and three taken from outside the furrow for a total of 12 cores per bag per location and mixed thoroughly in a clean plastic container. For those that band nearly all of their nitrogen or fertility needs, instead of our traditional method of soil sampling one in the furrow and three outside the furrow, pull three in the furrow and one outside the furrow. Approximately a pint (two cups) of the soil mixture (called the composite sample) should be placed in a soil sample bag which is often lined with plastic.

Choose Testing Locations: Fields with significant landscape or other differences should be divided into separate sample locations. Differences may include soil types, slope, degree of erosion, drainage, crop and/or manure history, or other factors that may influence soil nutrient levels. More intensive sampling should be used where detailed information about within field nutrient variability is needed. Options for 365 include yield level (optimal for flatter landscapes) and soil type (optimal for hilly landscapes).

Determine Sampling Depth: Laboratory tests are calibrated to specific depths. It is vital to collect samples from appropriate depths because a core taken deeper or shallower will generate inaccurate results. Sampling depth for most soils is typically in six-inch intervals. The top six inches of soil has the most root activity and fertilizer applications are generally restricted to this depth. These surface soil samples (zero to six inches) are typically used for conventional tests of organic matter, phosphorus, potassium, pH, and salt levels. Deep-rooted crops such as wheat and barley need deeper samples if nitrogen fertilizer recommendations are desired. Be sure to separate and discard surface litter. Subsoil samples from the six- to 24-inch depth are needed to estimate available nitrogen and in some cases sulfur. Nitrate-nitrogen and sulfate/sulfur are mobile in the soil and will move below the six-inch tillage layer. If leaching has not moved these nutrients below the rooting depth, they will be available for plant uptake. Both surface and subsurface soil samples are needed to test for available nutrients in the root zone.

Dry Samples Before Submission: Moist soil samples must be air dried as soon as possible before being bagged and sent to a soil testing lab. Drying is the best accomplished by spreading each sample on paper to air dry at room temperature. Do not oven dry the samples. Samples may also be bagged and frozen for shipping.

Sample Identification: Along with each soil sample, sampling information sheets should be filled out that describe the location, past cropping and management history, and proposed crops along with a list of tests required.

KEEP IN MIND

Roughly one pint of soil is needed for testing analysis at the lab. For soil immobile nutrients, such as Phosphorus and Potassium, analyses of a soil sample at 0-6" depth is recommended. When monitoring soil mobile nutrients such as Nitrogen and Sulfur, a 0-12" soil sample is recommended. If taking a 0-6" sample, a 6-12" sample can be submitted in place of the 0-12" sample. Next Level Ag recommends the following soil tests: Indicator Complete 0-6" at two locations and Plant Available 6-12" at two locations during growth stages V3-V5, V7-V8, and VT for corn and V3-V5, R1, and R3 for soybeans.

WHY TISSUE TEST

Tissue testing allows for the detection of suspected or hidden deficiencies and toxicities while also accurately determining nutrient availability. Yield potential can be prepared for when fertilizer uptake is tracked and analyzed, and optimal application methods and times are evaluated. Frequent tissue sampling, like NLA's suggests, creates better accuracy. Soil pH, fertilizer rates, soil compaction, microbial activity, and many other factors can influence use and uptake; therefore, changing tissue concentrations throughout the growing season. In order to track these changes, it is best to analyze at least three tissue samples throughout the season to make assessments precisely and accurately for your plant's nutrient needs.

HOW TO SAMPLE TISSUE

Be Crop Specific: Different crops require different sampling time for accurate and precise results. Please use NLA's sampling chart for optimal sampling times.

Walk Past End Rows: To ensure you get the most representative samples of your crops, walk into your field past the end rows for your sampling.

Choose Optimal Leaves: The uppermost, recently mature leaves from your crop provide the most ideal plant sample. Juvenile or older mature leaves may not accurately reflect the nutrient status of the whole plant.

Use Healthy Tissue: Tissue samples from areas under high amounts of stress should not be used. This includes areas exposed to standing water or damage from insects or disease.

Collect Sufficient Amount of Plant Material: In order for our lab to analyze tissue accurately/precisely, sufficient amounts of plant tissue are needed. Before analysis is performed, the tissue is dried and ground, which greatly decreases its weight and mass. For reference, the sample should be about the same size as a softball when balled up.

Randomize the Plant Selection Process: In order for your sample to represent an entire area, randomly select plants. This is especially important for when the field being sampled from is under stress.

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Avoid Contamination: Ensure hands are clean of residue and sweat while collecting samples. Rinsing the plant tissue and sending it directly to the lab upon sampling is critical when avoiding contamination. If you suspect contamination is present, rinse the sample with bottled or deionized water. Do not rinse tissues with tap water due to ion concentrations that may affect analysis results. Also, do not let the samples sit in water.

Safe Storage: Do not seal the plant tissue bag until packaged in the shipping container to facilitate air flow to help drying time. Store samples in a dust free, cool environment to reduce contamination.

TIPS FOR WORKING WITH NEXT LEVEL AG LABS

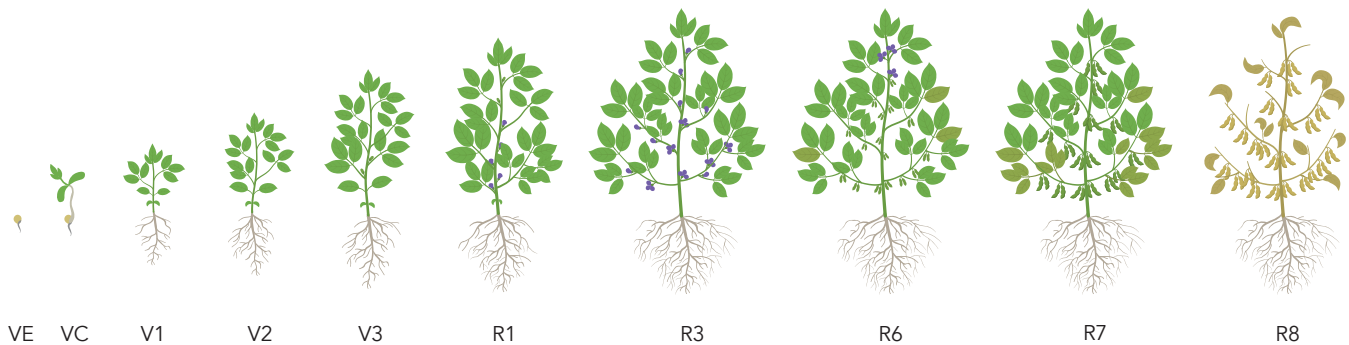
Sample at Optimal Times & Avoid Extreme Temperatures: Collect tissue samples during the first part of the week so they reach the lab and are analyzed in a timely fashion for quick results. If samples can't be collected earlier on in the week, store the tissue in a refrigerator until able to ship on Monday. Sending samples and tissue on a Friday could mean sitting in a warehouse until Monday; leading to possible formation of mold and deterioration. This can compromise accuracy/precision of the data as well as loss of time and money. Ensure samples are kept somewhere cool where they are not susceptible to freezing or extreme heat. Collect soil samples from fields used for crop production after harvest and before planting the subsequent crop. To obtain the most accurate estimates of nitrogen availability, take samples as close to planting time as possible. Sampling fields near the same time each year is recommended for more consistent results. Nitrate-nitrogen concentrations should be determined annually for non-legume crops. Phosphorus and potassium determinations should be made every three to four years. Sampling and testing for both phosphorus and nitrate-nitrogen is required prior to manure application. Beware of situations that may cause soil values to change between sampling and planting, e.g. heavy rainfall or pre-irrigation on sandy soils could leach nitrate-nitrogen from the root zone.

Choose The Correct Sampling Locations: For sampling locations that are primarily flat, it is best to sample according to yield levels. For locations that have a hilly landscape, sampling according to soil type is optimal.

Use Next Level Ag Sample Bags: Samples should always be placed in NLA's soil/tissue bags. Please do not use plastic bags as they can contribute to mold formation. If the lab's bags are unavailable to you, clean paper bags are preferred. Make sure to properly label all samples and weigh the samples before sending to the lab.

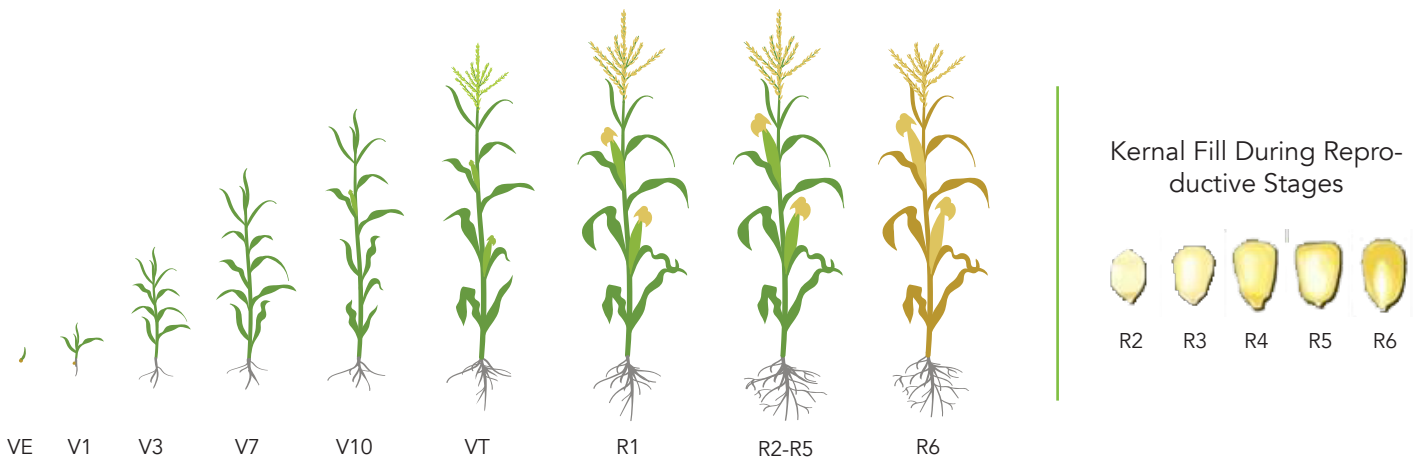
Tissue Samples with Soil Analysis: In congruence with tissue testing, soil analysis (at recommended stage) from the same area is very beneficial for determining nutrient availability and/or potential nutrient tie-ups. For 365, collect for Tissue Test Complete during growth stages V3-V5, V7-V8, V12-13, VT, R2 and R4 for corn. For Soybeans, V3-V5, R1, R2, R3, R4 and R5. Next Level Ag recommends a soil mobile nutrient analysis with all Tissue Plant Complete Analysis samples. Pairing soil and tissue analyses is the best way to identify strengths and/or weaknesses of the grower's program.





IDENTIFYING SOYBEAN CROP STAGE

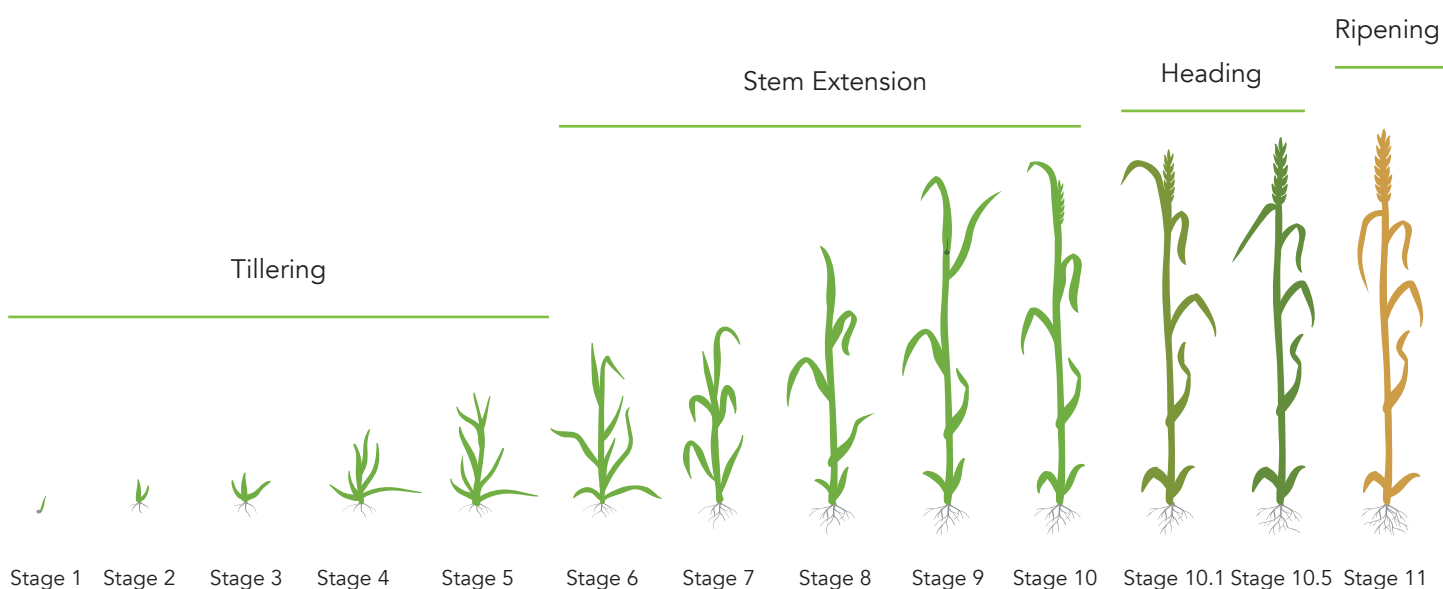
- VE Emergence – Cotyledons appear above the soil surface and provide nutrients for 7 to 10 days.
- VC - Unrolled unifoliate leaves. Cotyledons have fully expanded and unifoliate leaves have unfolded. Four dormant growing points are present at the base of the petiole (axil) of unifoliate leaves and cotyledons.
- V1 - First trifoliate. Second true node, but first node at which a trifoliate leaf is produced. Nodules visible. New V stages develop every 5 days with normal temperatures.
- V2 - Two fully developed trifoliates unfold. The plant is roughly 8 inches tall. Nodules are actively fixing nitrogen. Cotyledons have fallen off plant. Lateral roots proliferating rapidly in the top 6 inches of soil.
- V3-V4 – A dramatic increase in the number of nodules visible on roots take place by these stages. This is typically the time that iron chlorosis deficiency syndrome is highly visible in impacted fields.
- V5-Vn - Lateral roots extend 15 inches away from the main stem and grow to the centre of 30 inch row. Branches begin developing on the lowest nodes. The total number of nodes that the plant may produce is set at V5.
- R1 - Beginning bloom. Plants have at least one flower on any node on the main stem.
- R2 - Full bloom. An open flower at one of the two uppermost nodes of the main stem with a fully developed leaf.
- R3 - Beginning pod development. Pods are 3/16" at one of the four uppermost nodes on the main stem.
- R4 - Full pod. Pods are 3/4" at one of the four uppermost nodes of the main stem. This is the most critical period for seed yield. Any stress from R4-R6 can cause more yield reduction than at any other time in plant development.
- R5 - Beginning Seed. Seed is 1/8" long in the pod at one of the four uppermost nodes.
- R6 - Full seed. Pod containing a green seed filling the pod cavity is present at one of the top four nodes.
- R7 - Beginning maturity: One normal pod on the main stem has reached its mature pod color. At this stage, the crop is safe from a killing frost.
- R8 - Full maturity: Ninety-five percent of the pods on the plant have reached their mature color. Approximately 5 to 10 days of good drying weather is needed to bring crop to less than 15 percent moisture.



IDENTIFYING CORN CROP STAGE

- V3 – 4 to 5 days after planting under ideal conditions, but up to 2 weeks longer under cool, dry conditions.
- V1-V5 - At V1, round-tipped leaf on first collar appears, nodal roots elongate. By V2, plant is 2 to 4 inches tall and relies on energy in seed. V3 begins 2 to 4 weeks after VE, and plant switches from kernel reserves to photosynthesis and nodal roots begin to take over. Around V4, broadleaf weeds should be controlled to avoid loss. By V5, number of potential leaf and ear shoots are determined. Plant is 8-12 inches tall and growing point remains below the soil surface.
- V6-V8 - Beginning 4 to 6 weeks after VE, growing point grows about soil surface making plant more susceptible to hail, frost, or wind damage. The nodal root system is dominant. At V7, rapid growth phase and stem elongation begin. The number of kernel rows are determined and potential kernels per row begins and continues through V15- 16. By V8, plant reaches 24 inches tall.
- V9-V11 - Around 6 to 8 weeks after VE, corn begins steady and rapid period of growth and dry matter accumulation. At V9, tassel is developing rapidly, but not yet visible. New leaves appear every 2 to 3 days and ear shoots are developing. By V12 plant is about 4 feet tall or more. Nutrients and water are in high demand to meet the growth needs.
- V12-Vnth - All leaves are full size and roughly half are exposed to sunlight. Brace roots are developing and potential number of kernels per ear and size of the ear are still being determined. Insect and hail injury can reduce the number of kernels that develop. The plant is about 2 weeks away from silking at V15. The tassel is near fill size, but not visible. Moisture and nutrient deficiencies at this time can reduce the number of potential kernels per row resulting in shorter ears and lower yield potential.
- VT - Beginning around 9 to 10 weeks after emergence, corn enters a critical period where successful pollination is required to convert potential kernels into viable, developing kernels. The plant has reached full size. Tassels are fully visible, and silks will emerge in 2 to 3 days. Pollen shed begins and continues for 1 to 2 weeks. Hail can be very damaging at this stage.
- R1 (Silking) - One of the most critical stages in determining yield potential: silks are visible, and pollination begins at the base and proceeds toward the tip. K uptake is complete, N and P uptake occurring rapidly. The average silking date is the first indicator of crop progress. Physiological maturity can be estimated by adding 60 (+5) days to the silking date).
- R2 (Blister) - About 12 days after silking, silks darken and dry out. Kernels are white and form a small blister containing clear fluid. Each kernel develops an embryo. Kernels contain 85% moisture. Stress (especially drought) at this stage can reduce yield potential by causing kernel abortion.

- R3 (Milk) - About 20 days after silking, kernels are yellow and clear fluid turns milky white as starch accumulates. Kernels contain 80% moisture. The effects of stress are not as severe after this stage, but can result in shallow kernels, stalk cannibalization, or lodging.
- R4 (Dough) - About 26 days after silking, the starchy liquid inside the kernels has a dough-like consistency. Kernels contain about 70% moisture, begin to dent at the top, and have accumulated close to 50% of their maximum dry weight. Stress can produce unfilled or shallow kernels and chaffy ears.
- R5 (Dent) – About 38 days after silking, nearly all kernels are dented and contain about 55% moisture. Cob has distinct color – white, pink or red. Silage harvest begins sometime during this stage, depending on desired whole plant moisture.
- R6 (Black) - About 60 days after silking, physiological maturity is reached, and kernels have attained maximum dry weight at 30 to 35% moisture. Total yield is determined, frost has no impact on yield.



IDENTIFYING WHEAT CROP STAGE

Wheat growth can be broadly divided into several different stages: germination/emergence, tillering, stem elongation, boot, heading/flowering, and grain-fill/ripening. Several different systems have been developed to identify wheat growth stages, the two most popular are called the Feeke's scale and the Zadok's scale. Being able to know and recognize your wheat crop stage is vital to producing a good crop of wheat. Wheat responds best to certain inputs at certain stages of development.

STAGING A CORN SEEDLING

Each leaf stage is defined according to the uppermost leaf whose leaf collar is visible. The first part of the collar that is visible is the back, which appears as a discolored line between the leaf blade and leaf sheath. The characteristically oval-shaped first leaf is a reference point for counting upward to the top visible leaf as demonstrated below in Figure 1.

STAGING LARGER PLANTS

Beginning at about V6 increasing stalk and nodal root growth combine to tear the small lowest leaves from the plant. Degeneration and eventual loss of the lowest leaves results. To determine the leaf stage after lower leaf loss, split the lower stalk lengthwise (Figure 2) and inspect for the internode elongation. The first node above the first elongated stalk internode generally is the fifth leaf node. This internode is usually a little less than 1/2 inch in length. This fifth leaf node may be used as replacement reference point for counting to the top leaf collar.

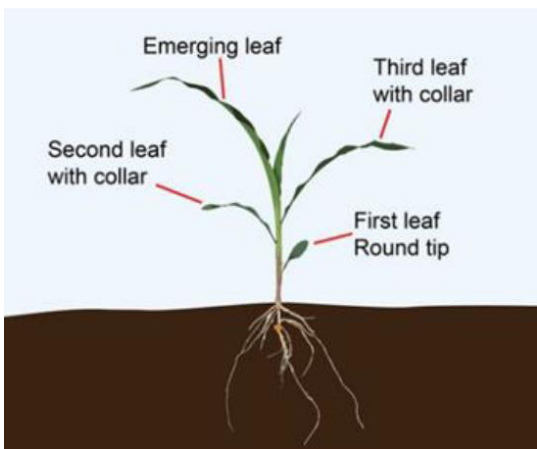


Figure 1

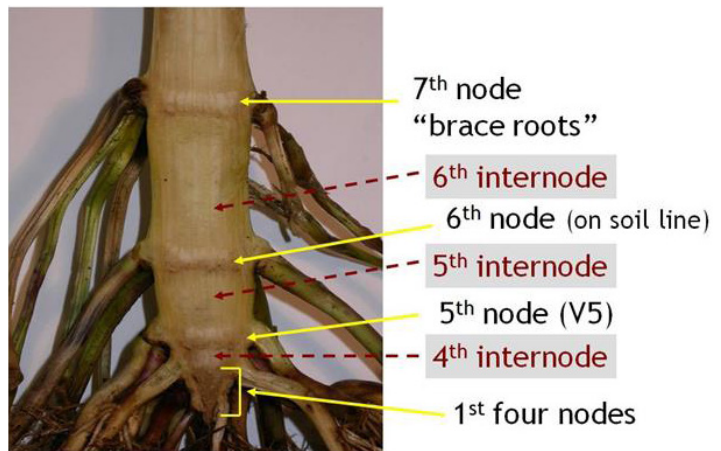


Figure 2



TISSUE/SOIL SAMPLING GUIDE

CROP	WHEN TO SAMPLE	PART OF PLANT TO SAMPLE	HOW MANY PLANTS TO SAMPLE
Alfalfa	Before cutting	Top 4-5 inches of growth	20-25
	Regrowth after cutting	Top 4-5 inches of new growth	
Canola	Once during vegetative growth	Whole top	20-25
	Once during flowering stage	First fully mature leaf down from the terminal (4th or 5th leaf down)	
Corn	V3-V5	Whole plant	20
	V7-V8	Uppermost collared leaf	15
	V12-V13	Uppermost collared leaf	15
	VT	The ear leaf	15
	R2	The ear leaf	15
	R4	The ear leaf	15
Cotton	Pinhead square	First fully developed leaf from the terminal	20-25
	First bloom	This is usually the 4th or 5th leaf down	

Guide continued on next page

CROP	WHEN TO SAMPLE	PART OF PLANT TO SAMPLE	HOW MANY PLANTS TO SAMPLE
Cotton	Full bloom		
	Boll fill		
Flax	Seedling Stage	Aboveground portion or youngest mature leaves	20-25
	Prior to heading		
Grain Sorghum	Seedling <30 cm, 23-29 days	Above-ground portion	20-25
	37-56 days after planting	Most recently fully developed leaves	
	Bloom stage-head visible	Third leaf below head	
	Grain in dough condition	Third leaf below head	
	4-5 weeks between clippings	Whole top	
Soybean	V3 to V5	Whole plant	20-25
	R1	Fully developed leaves at the top of the plant	
	R2	Fully developed leaves at the top of the plant	
	R3	Fully developed leaves at the top of the plant	
	R4	Fully developed leaves at the top of the plant	
	R5	Fully developed leaves at the top of the plant	

Guide continued on next page

CROP	WHEN TO SAMPLE	PART OF PLANT TO SAMPLE	HOW MANY PLANTS TO SAMPLE
Sugar Beet	Twice between the 2nd & 10th leaf stages	First fully mature leaf, collected at the growing point	20-25
	Once in early June and once in early August		
	V6		
	V12 to V14		
Winter/Spring Wheat	Feekes 3 to 4	Whole plant from 1/2 in. above soil surface	20-25
	Feekes 5	Whole plant from 1/2 in. above soil surface	
	Feekes 6 to 9	Most recently fully developed collar	
	Feekes 10	Flag leaf	

365 CROP STAGE FERTILITY PROGRAM CHART

CORN GROWTH STAGE	TASK	SOYBEAN GROWTH STAGE
V3 to V5	Indicator Complete 0-6" Tissue Test Complete	V3 to V5
V7 to V8	Plant Available 0-12" Tissue Test Complete	R1
V12 to V13	Tissue Test Complete	R2
VT	Plant Available 0-12" Tissue Test Complete	R3
R2	Tissue Test Complete	R4
R4	Tissue Test Complete	R5

Guide continued on next page

SUGAR BEETS

SOIL SAMPLE TIMING	TASK
Spring	Indicator Complete 0-6"
	Indicator Complete 6-18"
	Nitrate + Ammonium + Sufficiency Level of Available Nutrient 18-24"
	Nitrate + Ammonium 24-36"
Mid-July	Indicator Complete 0-12"
	Indicator Complete 12-24"

Tissue: Optimal to begin with a weekly petiole and tissue analysis. Sample the youngest fully expanded petiole/leaf. Following the trend is more important than the point in time of analysis once you get into the weekly sampling.

For Alternative Sampling: 2 to 4 True Leaves, 8 True Leaves, 10 to 12 True Leaves

SPRING & WINTER WHEAT

SOIL SAMPLE TIMING	TASK
Before Planting	Indicator Complete 0-6"
	Subsurface 6-12"
Spring	Indicator Complete 0-6"
	Subsurface 6-12"
Fall	Indicator Complete 0-6"
	Subsurface 6-12"

TISSUE SAMPLE TIMING	TASK
Feekes 3 to 4	Tissue Test Complete
Feekes 5	Tissue Test Complete
Feekes 6 to 9	Tissue Test Complete
Feekes 10	Tissue Test Complete

Guide continued on next page

POTATO

SOIL SAMPLE TIMING	TASK
Fall Before Potato Crop	Indicator Complete 0-12"
Spring	Indicator Complete 0-12" Pull samples from center of potato row

***General dates for tissue sampling on this aggressive scale:

TISSUE SAMPLE TIMING	TASK
June 15	Leaf Petiole
June 22	Leaf Petiole
June 29	Leaf Petiole
July 6	Indicator Complete Soil Sample Center of Hill Run + Leaf Petiole
July 13	Leaf Petiole
July 20	Leaf Petiole
July 27	Leaf Petiole
August 3	Indicator Complete Soil Sample Center of Hill Run + Leaf Petiole
August 10	Leaf Petiole
August 17	Leaf Petiole

Tissue: Begin tissue sampling when the plant reaches 6" in height. Remove the oldest fully-expanded petiole. This is a much earlier protocol than what most producers follow, but is important to get the plant nutritional trend established early. After this first sample at 6" continue petiole sampling every week until harvest.

Sampling both the petiole and leaf is a great solution for growers who are looking to enhance in-season crop management. By conducting samples this way, growers will be able to see which nutrients accumulate in the leaf vs. petiole.

ENROLL IN AGRONOMY 365



BECOME EMPOWERED TO ANALYZE, UNDERSTAND, AND MAKE NUTRITION ADJUSTMENTS WITH AGRONOMY 365.

What We Offer

Whether you are a grower, agronomist or work in production agriculture and have been seeking a validated tool to unlock your field's full nutrient and fertility potential – Agronomy 365 is for YOU. We offer a variety of subscriptions that are sure to meet your needs.

Agronomist Membership

\$10,000 ANNUALLY

- You will receive 10 coupon codes for 10 of your growers to access the Agronomy 365 Dashboard for one year at no cost
- Unlimited enrollment of fields for each of your growers in Agronomy 365 (*all fields must be operated by said grower*)
- As the Agronomist, you will be able to access and view all of your growers' Dashboards under your Agronomist Dashboard account
- Access for yourself and all 10 of your growers to BOTH the 2021 and 2022 Video Series for FREE

Dashboard Program Membership

\$2,500 ANNUALLY

- One-Year Access to the Agronomy 365 Dashboard
- Unlimited enrollment of fields in Agronomy 365 (*all fields must be operated by said user*)
- Access to BOTH 2021 and 2022 Video Series for FREE (*over \$1,000 in value*)

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\$100 PER HOUR

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- Analyzing Soil and Tissue Results
- Nutrient Recommendations
- Fertility Recommendations

Video Series Membership

\$500 ANNUALLY

- One-of-a-kind annual Video Series covering in-depth agronomic topics such as individual nutrients, genetics, zones, seeding rates, panels of High Yield Growers, and MUCH more
- Includes bonus access to 2021's Video Series (*over 10 hours of expert agronomic content*)

Next Level Ag Lab Registration

\$488/FIELD + 10% OFF = \$439.20

- 2 Sample Locations per field

Agronomy 365 App

Connect with others across the country, and dive deep into agronomic conversations. Some have even called this the new "Ag Twitter"!

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