



# Collecting Plant Tissue Samples

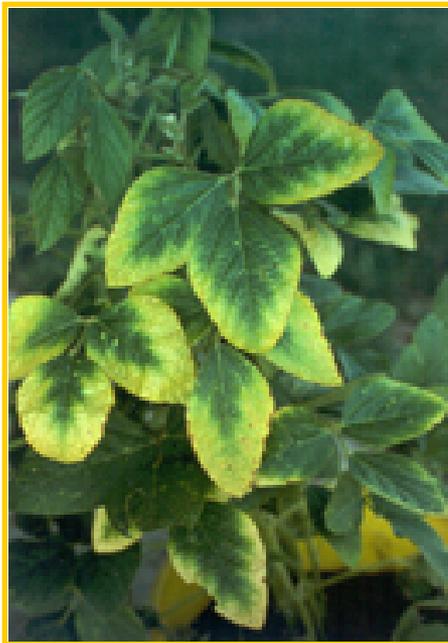


NCD&CS Agronomic Division  
Plant/Waste/Solution/Media  
Section

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# Plant Tissue Analysis — Why?



- To fine-tune fertilization by monitoring plant-nutrient uptake
- To detect nutritional problems (such as “hidden hunger”) prior to visual manifestation
- To diagnose suspected nutrient problems
- To optimize timing of harvest (tobacco)



# When to Sample (in general)

## Predictive (routine) samples

- Prior to or during early reproductive (bloom/flower) stage . . . for most crops



- Weekly or biweekly . . . for intensively managed crops (e.g., cotton, greenhouse & plasticulture crops, turfgrass)



# When to Sample (in general)

## Diagnostic (problem) samples

- Whenever you suspect that a plant growth problem (slow growth, poor color) is related to nutrition





# When to Sample (specifically)

- The correct time to sample varies by crop.
- Crop-specific sampling recommendations are available in Appendix A of the NCDA&CS Plant Tissue Analysis Guide, which is available online at

[www.ncagr.gov/agronomi/pdffiles/plantguide.pdf](http://www.ncagr.gov/agronomi/pdffiles/plantguide.pdf)



# Plant Part to Sample

- Depends on crop and stage of growth
- Is usually the Most Recent Mature Leaf (MRML)
  - **horticultural crops**, like blackberry, muscadine grape, pepper, sweetpotato, Irish potato, trellis and greenhouse tomato, cucumber & strawberry
  - **agronomic crops**, like soybean & peanut



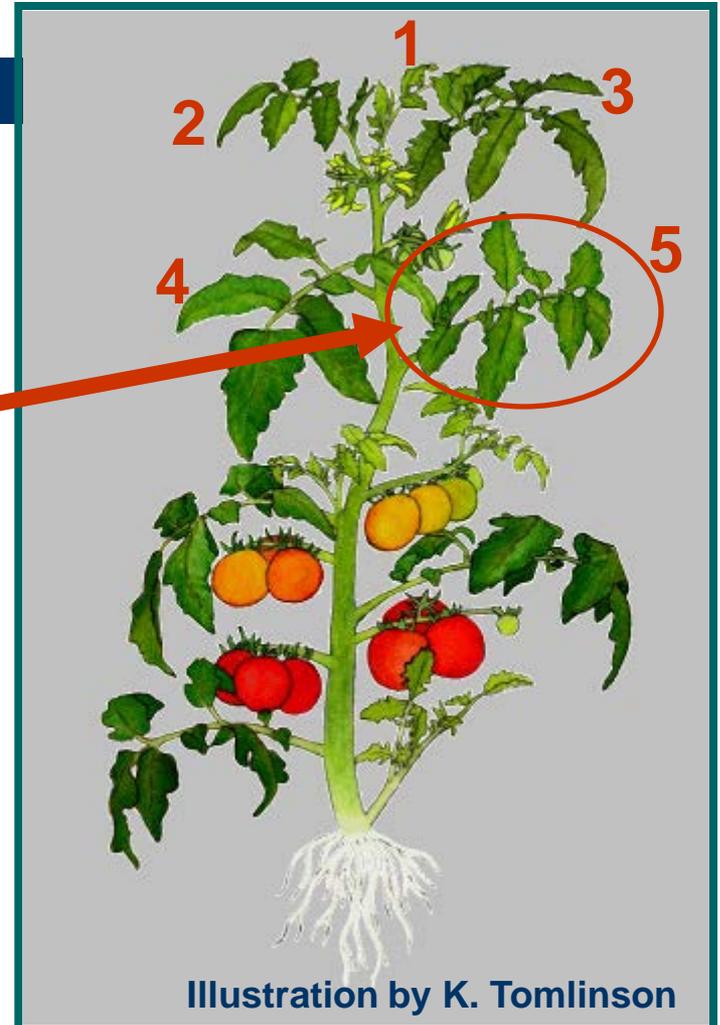
# What is the MRML?

- The first, full-sized and hardened-off leaf . . . not soft and succulent like a newly emerged leaf
- Usually the 3<sup>rd</sup> to 5<sup>th</sup> leaf back from the growing point
- **Note:** Some crops—like soybean, strawberry & tomato—have compound leaves with many leaflets. The MRML includes all the leaflets.



# Selecting the MRML

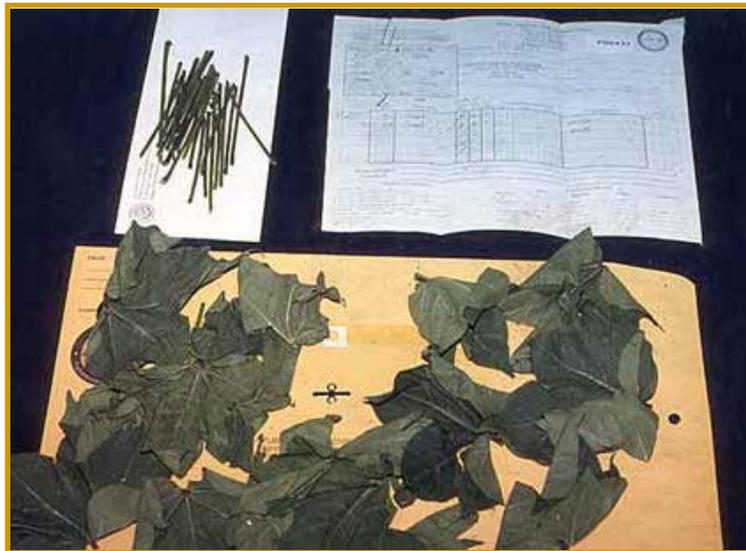
Tomato MRML  
5<sup>th</sup> entire leaf  
from the plant's  
growing point





# Other Tissue: MRML + Petiole

This is the required sample for cotton & strawberry.





## Other Tissue: Petioles Only

For wine grapes (*Vitis vinifera*), petioles of MRMLs opposite fruit clusters are the **recommended sample**. Sampled shoots should be well exposed (generally the 1st or 2nd fruit cluster from the base of the shoot).





# Other Tissue: Top of Plant

This is the appropriate sample for forage crops like bermuda or fescue.





# Other Tissue: Grass Clippings

Clippings (with all trash and weedy leaves removed) are the appropriate sample for freshly mowed grasses.





## Other Tissue: Corn

The appropriate sample may depend on growth stage.

- If plants are <12” tall, collect entire above-ground plant.
- If plants are >12” tall, collect 1<sup>st</sup> fully developed leaf below the whorl that has a sheath (collar).
- From tasseling to silking, collect the ear leaf (opposite and below the uppermost developing ear).
- For the end-of-season corn-stalk nitrogen test, collect the 8-inch section of stalk 6 to 14” above the soil line one to three weeks after black layer has formed.



# Other Tissue: Tobacco



- To monitor & adjust fertility, collect MRMLs.
- To test for ripeness (harvest readiness), collect samples by stalk position: lower, middle or upper.



# Online Help

[www.ncagr.gov/agronomi/pictorial.htm](http://www.ncagr.gov/agronomi/pictorial.htm)

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**Pictorial Guide to Plant Tissue Sampling**

<a href="#">Corn</a>	<a href="#">Soybean</a>
<a href="#">Cotton</a>	<a href="#">Strawberry</a>
<a href="#">Flue-cured Tobacco</a>	<a href="#">Tomato</a>
<a href="#">Fraser Fir</a>	<a href="#">Turf</a>
<a href="#">Wheat</a>	



# Best Practices for Predictive (routine) Samples

- Collect tissue randomly so the analysis will reflect the *average* nutritional status of an entire area.
- For each sample, collect tissue from 8–12 areas in a field (preferably 25–30 and up to 50 leaves).
- Collect all tissue for a given sample from a uniform area (same crop history, soil type, management practices, topography & visual appearance).
- Do not combine different cultivars or varieties.



# Best Practices for Diagnostic (problem) Samples

- Collect two separate tissue samples: one from an area of “good” plants and one from an area of “bad” plants.
- Collect two separate **soil** samples: one from an area of “good” plants and one from an area of “bad” plants.
- Comparison of results from “good” and “bad” areas helps to diagnose problems.



# Tissue Sample Quantity

- Enough to represent the sample area adequately
- 12 to 15 leaves for most crops (depends on size)
  - However, the sample also needs to provide the best representation of the field — so we recommend 25–30 leaves + petioles for cotton & strawberry and up to 50 petioles for vinifera grapes.
  - For small-leaved plants like azalea, collect 30 to 50.
  - For large-leaved crops like tobacco, collect about 6.
- ½ to 1 pint for grasses



# Tissue Sample Quality

- Rainfall tends to keep plant tissue surfaces free of dust & contaminants.
- If plants are dusty or have been recently sprayed, you should
  - brush or wipe leaves with a damp cloth or
  - rinse (only briefly!) to remove contaminants.



# Best Sample Handling

- Strive to get samples to the lab within 12 to 24 hrs, if possible.
- Refrigerate or air-dry samples if they cannot be delivered right away.
- Read & follow these guidelines  
[www.ncagr.gov/agronomi/pdf/tissuehandling.pdf](http://www.ncagr.gov/agronomi/pdf/tissuehandling.pdf).



# Plant Sample Information Form

- Find the most recent version of the form online [www.ncagr.gov/agronomi/pdffiles/isplant.pdf](http://www.ncagr.gov/agronomi/pdffiles/isplant.pdf).
- Print, fill out completely & submit along with samples and payment.
- Refer to [www.ncagr.gov/agronomi/2010plantform.ppt](http://www.ncagr.gov/agronomi/2010plantform.ppt) for detailed instructions.



## If you still have questions . . .

- Contact your NCDA&CS regional agronomist. Find county assignments and contact info at [www.ncagr.gov/agronomi/rahome.htm](http://www.ncagr.gov/agronomi/rahome.htm).
- Phone the NCDA&CS Agronomic Division at 919.733.2655, and ask for an agronomist in the Plant/Waste/Solution/Media Section.