Cotton Tissue Sampling

How to Sample

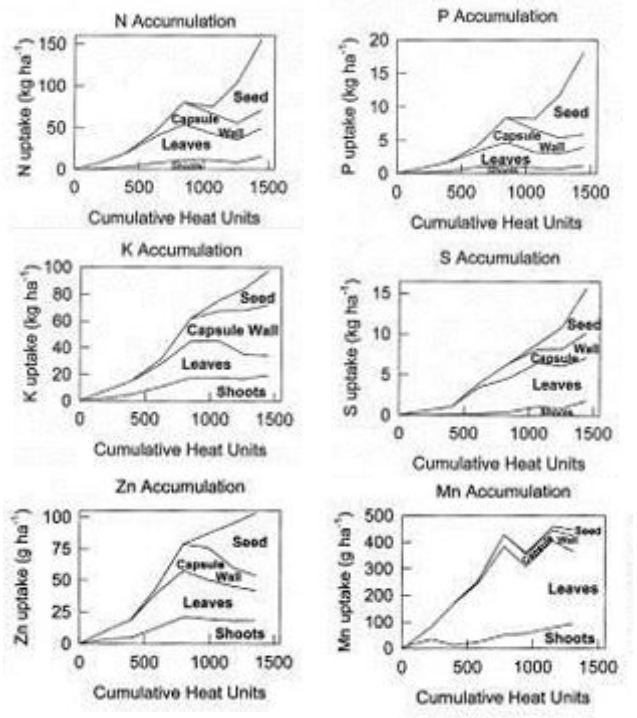
- Pull a representative sample. Do not sample end rows or next to gravel roads.
- Send leaf blade only for tissue analysis.
- Send at least a softball size amount of plant tissue for analysis.
- Ship as soon as possible in paper bags. NEVER use plastic bags.
- Ensure samples arrive within one shipping day. Never ship samples on a Friday.

When to Sample

A cotton tissue sampling program should correspond to important developmental growth stages or times of peak nutrient uptake.

Cotton Tissue Sampling Program:

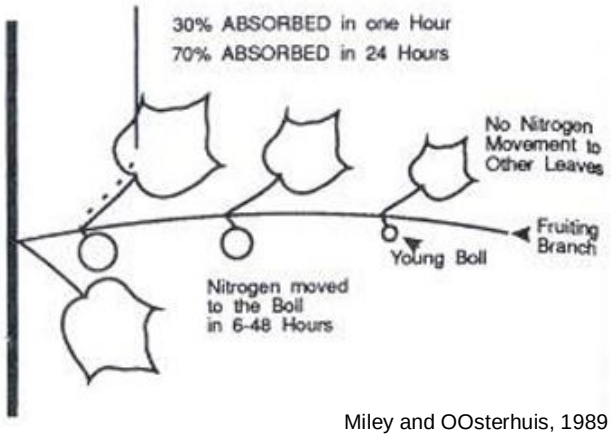
First Bloom: First mature leaf from 25 plants.
▪ Fourth node from the terminal.
Bloom+3 Weeks: First mature leaf from 25 plants.
▪ Fourth node from the terminal.
Between Bloom+3 Weeks and Cutout: First mature leaf from 25 plants.
▪ Fourth node from the terminal.



NCC, 1996

[1]Rochester, et al. Nutritional Requirements of Cotton During Flowering and Fruiting, *Flowering and Fruiting in Cotton, 2012*

- Cotton is very sensitive to deficiencies of N, K, S and B. These nutrients can be removed by leaching, especially in sandy soils.
- K tissue concentration is highly correlated with extractable soil K (Hsu 1976).
- Critical foliar K concentrations required for cotton productivity is 2.1%.[2]
- Cotton has high demand for N and K with daily accumulation rates of up to 3.6 lbs/day.[1]
- Redistribution of N accounts for 30-40% of boll development, particularly later in crop development. N for early bolls could be supplied by current N uptake from the soil; the N for later bolls is likely to be supplied from redistribution.[1]
- Movement of foliar N application:



Miley and OOsterhuis, 1989

- 55% of N, 75% of P and 60% of K and B is taken up during flowering.[1]
- Maximum uptake of N, P, K, B, Cu and Zn occurs within 19 days after bloom.[1]
- Boron deficiencies can sometimes be induced by a soil pH greater than 6.5 or a recent heavy lime application.
- Ca and Mg maximum uptake is between the first and fourth week of bloom.
- As soil pH increases from 4.0 to 7.0, the solubility of B, Zn, Fe, Mn and Cu decreases. Liming to a pH of 6.0 to 6.5 is generally recommended.

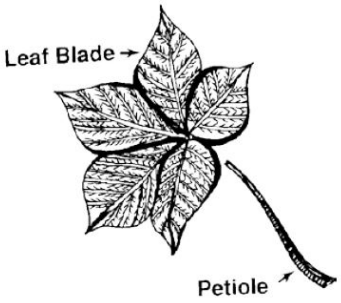
[2]Potassium Nutrition of Cotton, Mississippi State University

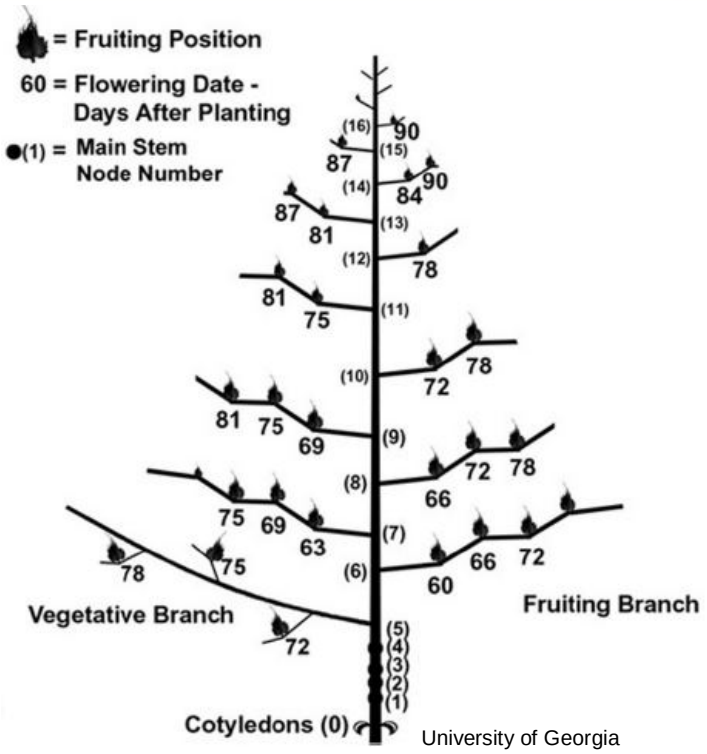
Cotton Growth Stages

$$DD_{60} = \frac{(^{\circ}F_{max} + ^{\circ}F_{min}) - 60}{2}$$

Growth Stages Indicated By Accumulation of DD60s and Days

Source: DeltaPine	Number of Days			
	AVERAGE	LOW	HIGH	DD60s
From planting to emergence	7	4	10	50-60
From emergence to first fruiting branch	24	21	27	300-340
From emergence to first square	32	27	38	425-475
From emergence to first white bloom	55	50	60	825-875
From emergence to peak bloom	90	85	95	1385-1435
From emergence to open boll	110	105	115	1700-1750
From emergence to 60% open bolls	140	135	145	2180-2230

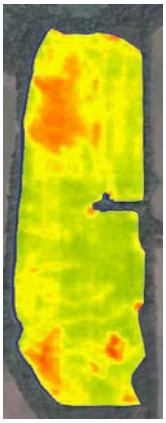




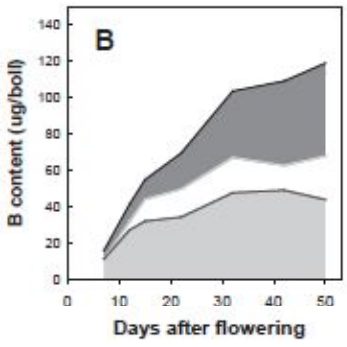
University of Georgia

Crop Notes

- Plant tissue nutrient levels should be maintained between the upper half of the sufficiency range for maximum yield. This helps prevent "hidden hunger" due to sampling and in-field variation.
- Note that crop stress can impact nutrient levels in the plant. For example, too much or too little soil moisture will impact the crop's uptake of soil nutrients. When leaves begin to wilt before noon, foliar nutrient applications become ineffective.
- Nematodes, pH and fertility problems can be identified with NDVI imagery. For a diagnostic sample, take a soil and plant tissue sample from a "good" area and a "bad" area. Indicate on the submittal form that the additional soil tests accompany the tissue. If a plant-mobile deficiency is suspected, sample the lower leaves in both samples.



- Cotton N:S ratio should be 25 or less.[3]
- Boron weight in the boll increases by a multiple of five the first 30 days after bloom.[1] Two applications of 0.25-0.5 lb/ac of B can be made with PGR applications.



[3]Sulfur Fertilization on Cotton for Sandy Loam and Silt Loam Soils, Stevens and Dunn