Soybean Tissue Sampling

How to Sample

- Pull a representative sample. Do not sample end rows or next to gravel roads.
- 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

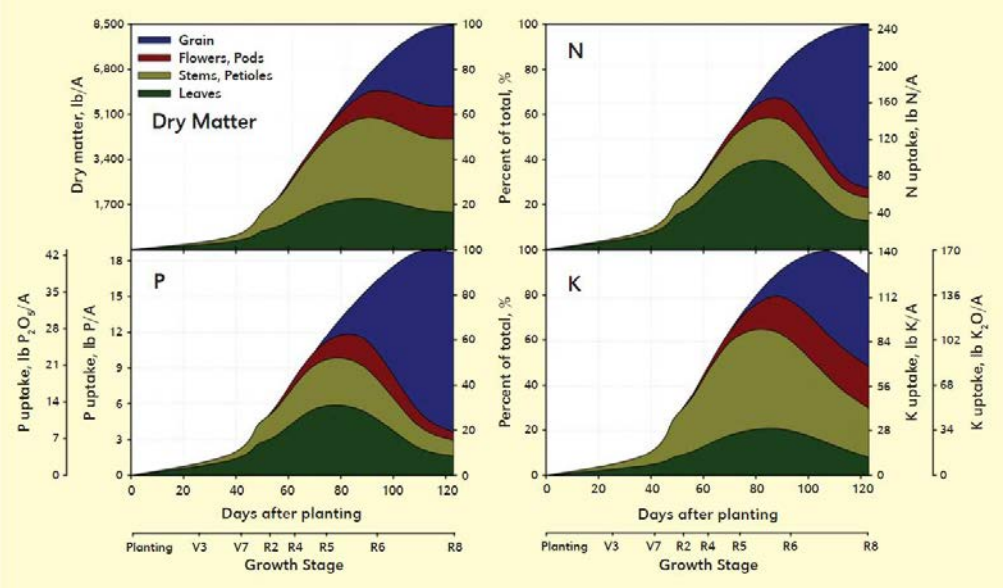
A soybean tissue sampling program should correspond to important developmental growth stages or times of peak nutrient uptake.

Soybean Tissue Sampling Program:
V3-V5: First mature trifoliate from 25 plants.
R1-R3: First mature trifoliate from 25 plants.
R4-R5: First mature trifoliate from 25 plants.

Growth stage	Days in period	Dry matter	N	P_2O_5	K_2O
			----- % -----		
Emergence to full bloom	60-70	30	30	30	33
Full bloom through early pod development	12-15	25	25	25	34
Pod filling to maturity	35-45	45	45	45	33

[2]News & Views, PPI, June 1998

- Early season tissue analysis is needed because nutrients are remobilized from leaf and stem tissue to the seed.[1]
- Peak absorption of K takes place the 12-15 days from flowering to early pod development and can range from 5 to 8 pounds per acre per day.[2]
- Demand for N and P is greatest between pod filling to maturity with 45% of their uptake occurring during these growth stages.[2]
- Like that of all macro and secondary nutrients, soybean demand Zn, B, Mn, Cu and Fe is greatest near R3, while early season demand is extremely low.[3]
- After R5.5, vegetative Zn and Cu remobilization is greatest, while Mn and B remobilization to the seed is minimal and Fe has no mobility to the developing seed.[3]
- Uptake after R5 of Mn and Fe is 83 and 100%, respectively, of the seeds' demand for these nutrients. Zn, Cu, and B still met the majority (>50%) of seed nutrient demand through uptake past R5, signifying the importance of season long micronutrient availability, although in small amounts.[3]
- Other soil fertility publications can be found at www.waypointanalytical.com/Publication



Soybeans
Collect recently mature trifoliate leaves from the top of 20 to 30 plants prior to or during flowering. (In the seedling stage, collect all of the above-ground portion).

[1]Modern Soybean Varieties' Nutrient Uptake Patterns, Better Crops, 2015

Soybean Tissue Sampling

Soybean Growth Stages

Vegetative Stages

Stage	Description
VE	Emergence - Cotyledons above the soil surface
VC	Cotyledon - Unifoliolate leaves unrolled sufficiently so that the leaf edges are not touching
V1	First-node - Fully developed leaves at unifoliolate node
V(n)	nth-node - Here, the "n" represents the number of nodes on the main stem with fully developed leaves beginning with the unifoliolate leaves.

Reproductive Stages

Stage	Description
R1	Beginning bloom - One open flower at any node on the main stem
R2	Full bloom - Open flower at one of the two uppermost nodes on the main stem with a fully developed flower
R3	Beginning pod - Pod 3/16" long at one of the four uppermost nodes on the main stem with a fully developed leaf
R4	Full pod - Pod 3/4" long at one of the four uppermost nodes on the main stem with a fully developed leaf
R5	Beginning seed - Seed 1/8" long in a pod at one of the four uppermost nodes on the main stem with a fully developed leaf
R6	Full seed - Pod containing a green seed that fills the pod cavity at one of the four uppermost nodes on the main stem with a fully developed leaf
R7	Beginning maturity - One normal pod on the main stem that has reached its mature pod color
R8	Full maturity - Ninety-five percent of the pods have reached their mature pod color. Five to ten days of drying weather are required after R8 for the soybean moisture levels to be reduced to less than 15 percent

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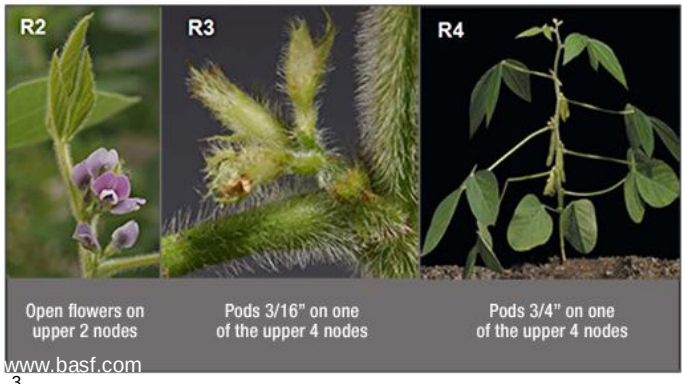
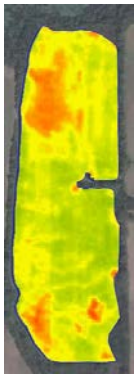
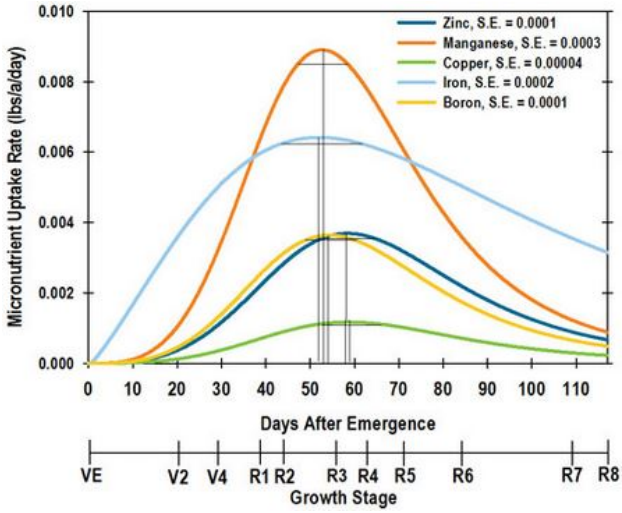


Crop Notes

- 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.
- 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.



- Research has shown that N:S ratio wider than 16.0 in soybean leaves of 50-day-old plants was considered to indicate S starvation. Leaf N:S ratio of 10.83 produced maximum soybean grain yield.[4]
- Micronutrient uptake rates peak between R2-R4, suggesting that if in-season foliar applications are planned they should be made by R3 to match peak uptake periods to potentially increase the probability of a positive yield response.[3]



[3] Soybean Micronutrient (Zn, Mn, Cu, Fe, B) Uptake, Partioning, and Removal. www.pioneer.com

[4] Sulfur Nutrition of Soybean, Agrawal & Mishra, 2008