Winter Wheat 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.

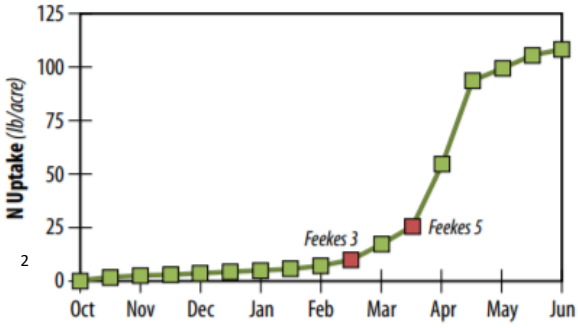
When to Sample

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

Winter Wheat Tissue Sampling Program: Tillering (Feekes 3) to Joint (Feekes 6): Above ground portion from 50 plants. Flag Leaf (Feekes 8) to Flowering (Feekes 10.5): Flag leaf from 60-70 plants.

Nitrogen Management

- Proper Nitrogen rate and timing are important for high tiller numbers and yield.
- N will affect the number of grains that are set on individual ears/spikes. A high yielding crop will have approximately 45-50 grains/ear.
- 82% of N uptake occurs by flowering.



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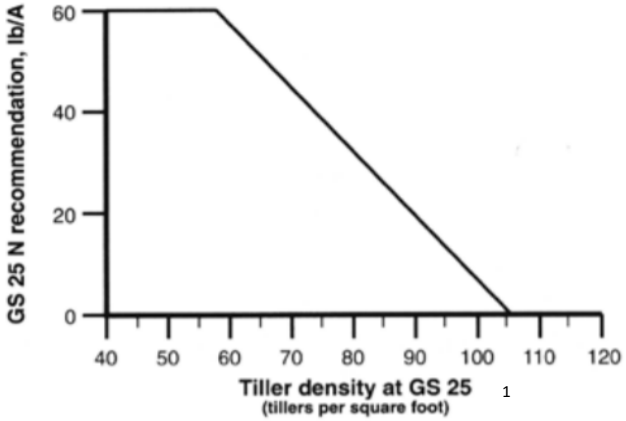
- Splitting N applications in the spring offers more management flexibility.
- The first split application should be based on tiller counts at Feekes 3 (Zadoks 25).



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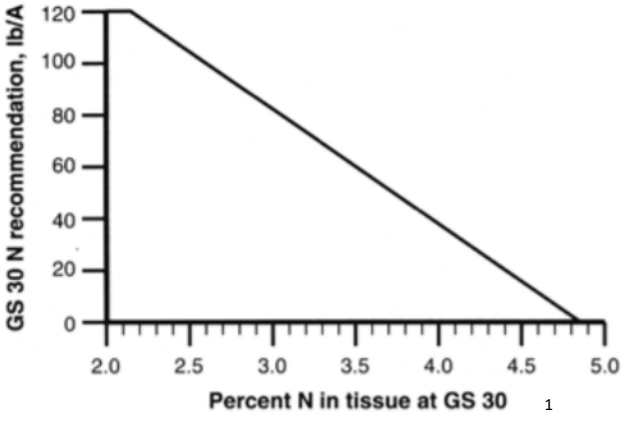
- The second split application can be based on plant tissue N% at Feekes 6 (Zadoks 30).



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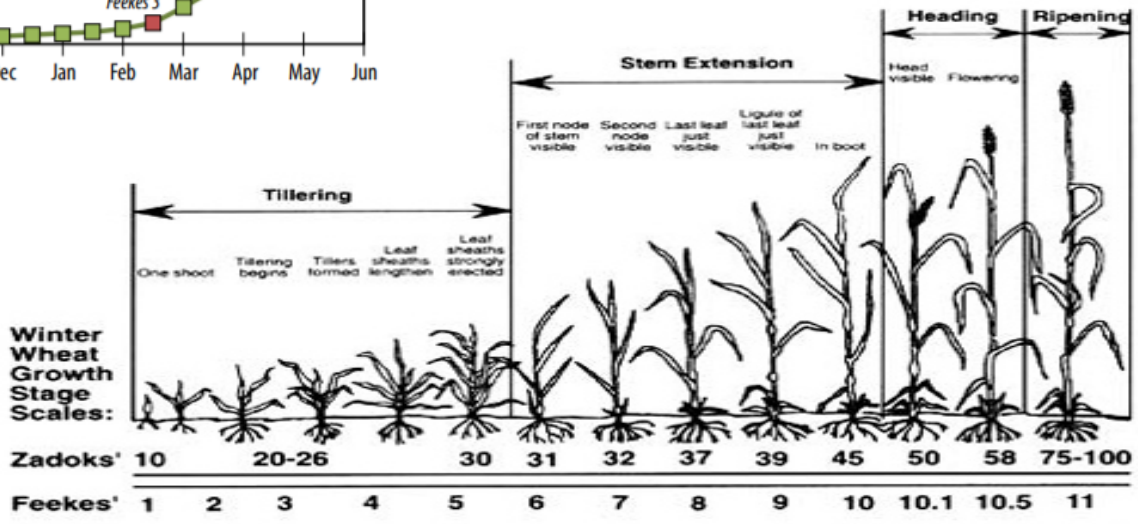

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Sulfur Management

- S is an important component of all proteins and is always required together with N for protein synthesis.
- Sufficient levels of S results in maximum N response.
- S deficiency symptoms are visible in the younger leaves unlike N which shows up in the older, lower leaves.
- S deficiencies are best determined by plant tissue analysis at Feekes 5 (Zadoks 30). If the N:S ratio is greater than 15:1, a water-soluble sulfate-S (-SO_4) form of S should be applied at a rate of 20-40lb of S/acre.[2]

Phosphorus Management

- P is critical for plant growth especially at early jointing (Feekes 6 or Zadoks 31) and for enhancing grain yield and yield components.
- Plant tissue P levels should be in the optimum level at Feekes 5 (Zadoks 30) to account for the 70% of uptake that occurs between March to May.

Potassium Management

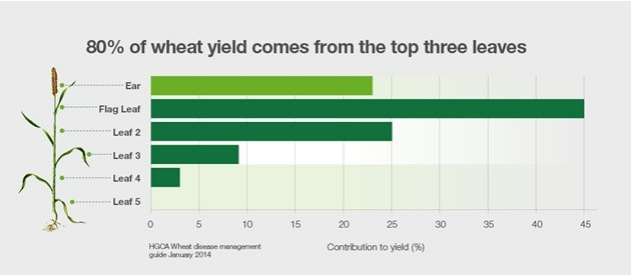
- K maintains cell turgidity and strength as well as nutrient mobility through the plant.
- Optimizing plant tissue K levels improves stem strength and helps alleviate the effects of lodging with higher N applications.
- The highest daily K uptake is between the beginning of tillering and the end of tillering (Feekes 3 or Zadoks 20-26).

Micronutrients

- Zn, Mn, Fe and B are all immobile in the plant and cannot be remobilized from older plant tissue if deficient during grain fill.[3]
- Zn, Mn, Fe and B have been shown to increase grains per ear/spike and yield when applied as a foliar application to deficient wheat.[3]
- Attention should be paid to Cu if soil test levels are under 1 ppm.
- Cu is essential for pollination, pollen tube formation and disease resistance, so a flag leaf application may be beneficial if deficient.

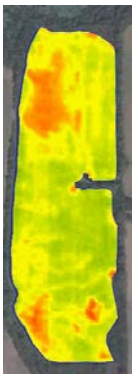
Estimated Yield (bushels per acre)

(No. of heads per sq. ft. x 43560 x [No. of seed per head / No. of seeds per lb.]) / 60



Crop Notes

- The flag leaf accounts for 46% and the top three leaves contribute 80% of yield, so protecting the upper leaves from disease, insects and nutrient deficiencies is essential for high yields.
- Plant tissue nutrient levels should be maintained in 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.



[1] Virginia Cooperative Extension Pub 424-026

[2] University of Kentucky Extension Pub ID-125

[3] M.S. Zeidan et al, World J. Agric.Sci., 6 (6): 696-699, 2010