Properly timed nitrogen applications are essential to the growth and development of wheat. The best way to optimize yield is to apply the correct nitrogen rate in the spring. To determine this rate, collect wheat tissue and biomass samples at Zadoks growth stage 30 (GS-30) and submit them to the NCDA&CS Agronomic Division Plant/Waste/Solution/Media Section for testing.

Wheat growth and development varies with conditions such as planting date and weather. Therefore, the timing of tissue sampling to determine nitrogen need is not based on a specific calendar date but should coincide with wheat reaching Zadoks growth stage 30 (GS-30). To make this determination, note when wheat begins to stand up tall and straight, and then pull several plants. Carefully split the stems from the top to the base and look for the growing point. Before GS-30, it will be just above the roots; at GS-30, it will have moved about one-half inch up the stem (Figure 1).

As spring nears and the temperatures rise, wheat growth is rapid. This is the period when nitrogen uptake and need is greatest. It is not advisable to apply nitrogen before wheat reaches GS-30 because nitrogen stimulates new growth, which is susceptible to cold injury. On the other hand, application of nitrogen after jointing increases the potential for damage by application equipment.

As soon as wheat reaches GS-30, collect tissue samples and matching above-ground biomass samples.

- The tissue sample includes whole wheat plants cut about one-half inch above the ground from 20 to 30 representative areas throughout a field. Remove dead leaves and weeds. Two large fistfuls of leaves will make a good size sample.
- The biomass sample contains all the above-ground wheat-plant tissue from one representative, 36-inch section of row. In fields where seeds were broadcast, collect all the plants from one square yard. The biomass sample should be placed in a separate paper
bag from the tissue sample, with the identical sample ID from the corresponding tissue sample and the word “biomass” written on the bag (Figure 2).

Figure 2. Correct labeling of wheat tissue with corresponding biomass sample.

Collecting biomass samples along with wheat tissue samples is fairly new concept. The idea was first broadly implemented in 2010 based on research by Dr. Randy Weisz of N.C. State University. He developed a method of using biomass weight along with tissue test results to calculate site-specific nitrogen recommendations. His approach takes into account crop-growth differences due to planting date, row spacing and moisture levels. For wheat grown on large acreages of poorly drained soils, however, growers should consult with an agricultural adviser about whether this method is likely to be useful.

Upon receiving the NCDA&CS plant tissue report, look first for biomass, which is listed as DW (dry weight), and the N(%) value (Figure 3). To determine the appropriate nitrogen rate, insert these values and certain crop planting details into the interactive tool developed by Weisz. See www.smallgrains.ncsu.edu/_Pubs/PG/Nitrogen.pdf for details.

North Carolina growers wanting more information about this method should contact their NCDA&CS regional agronomist, county Cooperative Extension agent or other agricultural adviser. Regional agronomists, in particular, can offer advice on how to collect and submit tissue and biomass samples, and how to interpret and use plant analysis report data. Contact information is available online at www.ncagr.gov/agronomi/rahome.htm.