Mid Season Nitrogen Fertility Management in Wheat and Barley

Steve Wright, Alan Fulton, Doug Munier, Jerry Schmierer, Kent Brittan & Lee Jackson

The total nitrogen recovered by a wheat crop in season can range from 60 to 250 lbs N/A depending on the final grain yield. A high yielding and high protein wheat crop (3-3.5 tons/A above 13 % protein) will require about 150 to 225 lbs/A of applied nitrogen in a season. Residual nitrogen in the soil from previous crops will provide the difference between the nitrogen provided with fertilizers and the nitrogen which is recovered by the crop. Barley will require less applied nitrogen than wheat (about 125 lbs N/A) in a season because it is lower yielding and grain protein is not a concern.

A good guideline is to have at least one-half, but no more than two-thirds, of the seasonal nitrogen fertilizer requirement applied preplant to establish a vigorous crop with maximum yield potential. The remainder of the nitrogen fertilizer requirement should be supplied with one or two supplemental nitrogen applications during the crop season. The timing of the first post plant N applications should occur during tillering before the wheat starts elongating. The second postplant N application for increasing wheat quality should occur between boot and flowering. Barley or oats do not require an N fertilizer application after the boot stage.

Nitrogen fertilizers for increased yield are most effective during tillering, but are also effective in the jointing stage. Nitrogen applied after boot stage will have a minimal effect on grain yield (at most a 200 to 300 lbs/A yield increase due to plumper kernels and higher bushel weight), but will increase grain protein. Rates of 30 to 50 1bs N/A topdressed, followed by significant rainfall (0.5 inches) or irrigation should be sufficient. Water run applications should be limited to 25 to 30 lbs N/A to minimize volatilization of the fertilizer.

The use of stem nitrate-nitrogen tissue tests is an effective way to monitor the nitrogen status of a wheat or barley crop. Table 2 provides critical stem NO_3-N levels for wheat and barley as the crop develops from the third and fourth leaf stages up to the early boot stage (late March to early April). This test is not effective for managing late season N fertility in wheat after heading when the goal is to produce high grain protein.

Proper tissue sampling procedures are necessary to attain a valid and informative analysis. Collect 20 to 40 stems at random from the field in question. Cut off the roots and plant tops and send the bottom 1 to 2 inches of each stem to an agricultural laboratory for analysis. Be certain the stem tissue sample is not contaminated with soil or old leaves. Submit the tissue sample the same day that it has been collected.

Table 2: Wheat and barley stem NO_3-N analysis critical levels during vegetative growth.

Growth Stage	Approx. Date	Deficient Level	Desired Range	Excessive Zone
3-4 leaf	Jan. 25	<7,000	7,000-12,000	>12,000
Tillering	Feb. 1 - March 5	<6,000	6,000-11,000	>11,000
Jointing	March 5 - March 25	<5,000	5,000-10,000	>10,000
Boot	March 25 - April 1	<4,000	4,000-9,000	>9,000

Choice of fertilizer material used to manage a crop will depend on the current weather conditions, weather forecasts, and costs. Urea (46-0-0) is the highest analysis and usually the cheapest form of dry fertilizer. It is particularly effective when broadcast and followed by at least 0.5 inches of rain within 5 days after application. Urea must be converted to nitrate nitrogen by soil microorganisms, so it is released over a longer period of time and thus, less prone to leaching from the root zone. However, the urea form of nitrogen is relatively unstable once it has been broadcast; volatilization can occur.

Water run applications of nitrogen can be useful for nitrogen fertility. Anhydrous ammonia (82-0-0), UAN-32 (32-0-0), and aqua ammonia (20-0-0) are the primary fertilizers used for this purpose. Anhydrous ammonia is most economical because of its higher analysis. However, UAN-32 is more easily handled and the nitrate component in UAN-32 is readily available to the crop.

A final alternative to supply N to the crop is aerial applications of UAN-32 or foliar urea. Tank mixes of UAN-32 with MCPA and other herbicides are effective means of applying both herbicides and nitrogen. Nitrogen rates should be limited to less than 25 lbs N/A. If aerial applications of UAN-32 are applied when air temperatures exceed 80 ° F, considerable leaf burn and some yield loss is likely.

(Nitrogen applications for increasing grain protein will be discussed next week.)