

Spring Nitrogen Management of Hard Red Winter Wheat

Nitrogen management is one of the most important practices that influences the final yield of wheat. This Field Facts discusses factors to consider in determining the amount of nitrogen (N) to apply and when to apply it.

Determine the stand

It is important to determine the plant and tiller populations for proper amounts and timing of N. Stands can be taken using a “hoop” that encompasses a known area (Figure 1). Refer to Tables 1 and 2 to calculate the stand and its associated yield potential.



Figure 1. Taking stand counts in wheat.

Table 1. Inches of row equal to one square foot at various row spacings.

Row Spacing	Length of Row Equal to 1 ft ²
6"	24"
7"	20.5"
7.5"	19"
8"	18"

Table 2. Wheat yield potential based on plants per square foot or square yard.¹

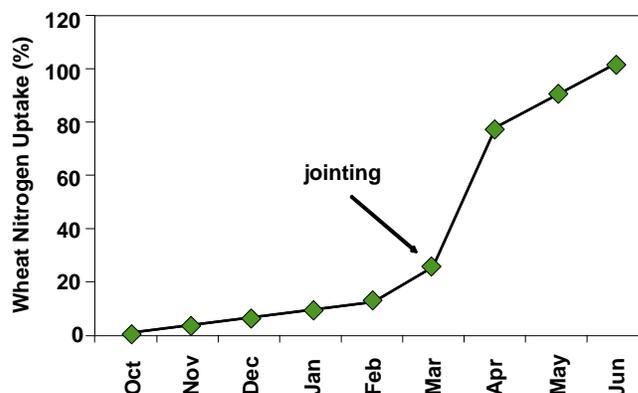
Final Stand (%)	Plants per:		Potential Yield ^a (%)
	sq ft	sq yd	
100	30-35	270-315	100
80	24-28	216-252	100
60	18-21	162-189	90-95
50	15-18	135-162	75-80
40	12-14	108-126	60-70
20	6-7	54-63	40-50

^aThis provides an estimate of the relationship of wheat stand to yield potential and is only a guide. Plant vigor, weather, disease, fertility management, planting date, variety and other factors influence how a wheat stand ultimately responds to achieve its final yield.

Source: University of Kentucky¹.

The approximate timing of nitrogen uptake by month for southern Illinois is shown in Figure 2.

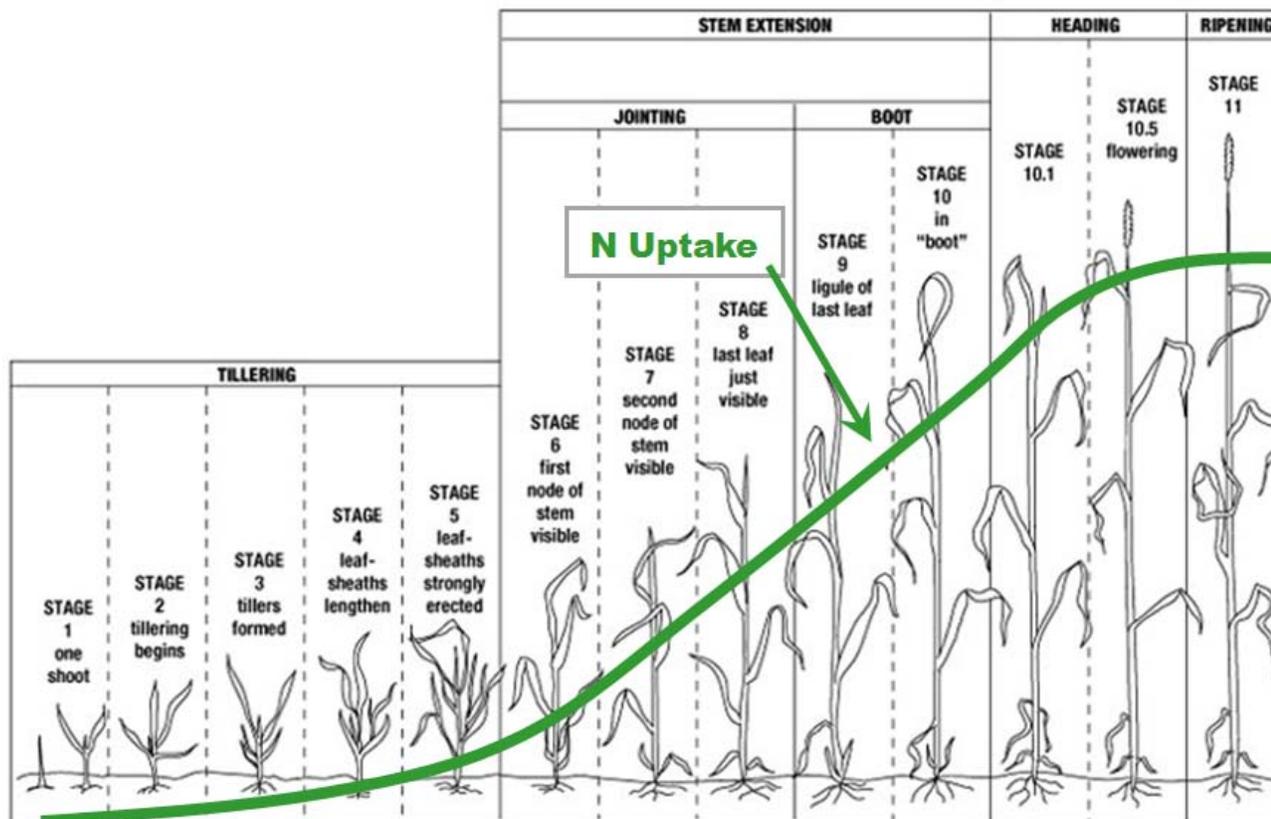
Figure 2. Nitrogen uptake by wheat.



Timing of nitrogen application

The bottom line—*apply the nitrogen as close as possible to the time in which the plant will take it up.* Figure 3 shows this timing. Notice the highest uptake begins around jointing and ends at head emergence.

Figure 3. Wheat growth staging and nitrogen use.



Source: S.A. Ebelhar, University of Illinois.

Single application or split-shot?

There are two primary reasons to apply the nitrogen in a split-shot application.

- 1) If the tiller and plant counts gathered are in the lower portion of Table 3, an early application prior to final tiller development may increase the actual number of tillers/plant, thus increasing the relative yield potential.
- 2) The most N that should be applied at any one time should not exceed 120 lb. Even varieties with good tolerance to high N can lodge if given too much N at one time. If applying rates above 120 lb, make an early application just prior to "greenup", with the majority of the N being applied at or just prior to jointing.

Finding the fine line between maximum yield potential and lodging takes experience and an in-depth knowledge of the growing crop and its environment.

Watch the weather and the wheat, which can help you determine how much nitrogen to apply and when to apply it.

Should UAN be used as carrier in an application of Harmony® herbicide?

There are two reasons this is not a good idea.

- 1) The UAN will cause the herbicide to be less effective than with water, especially on hard-to-control species like wild garlic.
- 2) Applying UAN with flat fan nozzles will cause significant leaf burn to the wheat. Research has shown that most times there is not a statistically significant yield penalty for this burn. However, dead tissue does

not come back to life and therefore the plant must “recover” from this burn. Any plant energy spent on “recovery” is energy not being spent on making yield. If there is no other option to get N on the wheat, then cut the spray solution with at least 50% water to reduce the burn.

What form of nitrogen is best?

Most of the common forms of N will provide excellent results. The form of N is not nearly as important as the manner in which it is applied and how evenly the rate gets to the ground. Urea is a good product if it is being spread with an air machine or properly calibrated “spinner” bed. Also, pay special attention to the wind, as urea is a low density product, meaning the spread pattern can be easily influenced by a strong wind.

UAN from “stream bars” is probably the most accurate way to apply N to a wheat field. The stream will cause little if any burn to the leaf surface and it is completely even across the width of the boom. Coupled with satellite steering and boom shutoffs, this significantly reduces the overlaps that typically get “double rates” and consequently lodge. UAN is also very predictable in its availability to the plant compared to other forms of N. Ammonium nitrate is also very predictable.

Figure 4. UAN solution being applied with stream bars.



Source: Needham Ag Technologies, LLC.²

References

¹*A Comprehensive Guide to Wheat Management in Kentucky*, Section 3. Cultural Practices. Online: <http://www.uky.edu/Ag/GrainCrops/ID125Section3.html>

²*Stream Bars For Uniform Liquid Fertilizer Application*, Needham Ag Technologies, LLC. Online: http://www.needhamag.com/innovative_product_sales/stream_bars_for_uniform_liquid_fertilizer_application.php

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