Nitrogen Applications During the Growing Season

Nitrogen (N) applications to corn plants during the growing season can place N closer to when plant need and utilization is peaking. Peak utilization occurs near the reproductive growth stages. Methods for applying during the growing season include injection of anhydrous ammonia, broadcasting urea, and injecting or banding UAN solutions. Growing season applications can help reduce the potential for leaching and denitrification.

What to Watch For

Nitrogen is an essential nutrient for corn growth and maximization of yield potential. Plants that are short on N can be easily identified by characteristic yellowing when plants are small and an inverted “V” yellowish discoloration from the tip of the leaf up the midrib in more mature plants.

Nitrogen shortages can appear quickly in seedling corn if N was not applied prior to planting or environmental conditions such as cold and wet or extremely dry prevent N uptake. Corn plants require an adequate amount of N starting at the V5 (5 collared leaves) through V8 growth stage because the number of potential ears and ear girth is determined during this growth period. The quickest N uptake occurs from about the V8 growth stage through silking providing environmental conditions are favorable for plant growth (Figure 1).¹

Impact on Your Crop

The yield potential for corn plants not fertilized with N can be greatly reduced as plant-available N in the soil becomes depleted. Research conducted in Iowa demonstrated an average yield of 60 bu/acre for continuous corn and 115 bu/acre for corn following soybean when additional N is not applied.²

Within the plant, N is critical for photosynthesis and production of amino acids, proteins, and chlorophyll. Without chlorophyll, which gives the plants their green color, photosynthetic processes and potential yield are compromised and reduced respectively. Applying all N preplant has the risk of being lost to the environment through leaching or denitrification. Lost N is not only unavailable for crop growth but becomes an environmental concern when it enters waterways and the air. Sidedress and pre-tassel N applications can help reduce environmental concerns associated with N loss, supply N closer to maximum crop uptake, and allow for adjusting N rates depending on current growth, plant population, and environmental forecasts.

Nitrogen Sources and Growing Season Application Methods

Early-season sidedressing can be accomplished with an applicator that injects N (Figure 2) or can be surfaced applied in the form of urea or 28% or 32% urea-ammonium nitrate (UAN) liquid solutions. Surface applied N should receive rainfall or an irrigation, or be tilled in soon after application to avoid volatilization which can be up to 30% within two weeks if temperatures are warm. Urea granules can burn the leaves when they fall into the plant whorls or when UAN liquids are applied to the leaves (Figure 3).

Figure 1. Percent of total nitrogen uptake for corn by growth stage. Nitrogen data adapted from “How a corn plant develops,” Special Report 48, Iowa State University.

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To help reduce the risk of burning leaves, recommendations include:

- Applying less than 90 lbs UAN/acre when corn is at growth stages V3 or V4.
- Applying less than 60 lbs UAN/acre at V7 growth stage.
- Drops should be used after V7 through PTN to apply a concentrated UAN band application at an N rate that supports current yield potential.

In general, injection of anhydrous ammonia is potentially the best sidedressing choice. Best management practices for applying anhydrous ammonia as a sidedress include:

- Applications should be to moist, not wet, soil.
- Applications should occur prior to root expansion into the row middles to avoid root damage.
- Applications can begin immediately after planting.
- Injection can be between every row or every other row.
- To avoid snapping off plants, applications should occur before plants are too tall for the tool bar.
- Applicator safety precautions should be followed to avoid injury to eyes and limbs.

**Pre-tassel N application**

Another time period for a growing season N application is when the plants enter the V10 growth stage and just prior to tasseling (VT). An application during this period is referred to as pre-tassel N (PTN). Recommended PTN application rates range from 15 to 25% of the total N to be applied. The other 85 to 75% of total applied N should have already been split between a preplant injection or a sidedress operation. Equipment such as a 360 Y-Drop® applicator should be considered for a PTN application to place N near the plant base and to reduce the potential for plant breakage (Figure 4).

Should weather conditions prevent a sidedress application, a PTN application can help supply needed N. University trials have demonstrated that a late PTN application can improve yield potential.3

**Sources:**


Web resources verified 4/25/18. 140315070131