

## Nitrogen Sidedressing in Corn

- Sidedressing is used to provide corn with nitrogen (N) closer to when it is needed by the plant.
- Sidedress management options vary and growers should be aware of potential injury concerns as they sidedress N during the spring.
- Strategic timing of N sidedress applications should be used to improve N availability to corn during peak growth stages.

### Sidedress Application Timing

If nitrogen was not applied at or before planting, sidedress N applications should be made early (by V3 growth stage) to meet the needs of developing seedlings. At the V3 growth stage, seedlings have used up nutrients stored in the seed and become dependent on soil-supplied nutrients. The nodal root system is developing at this stage and will soon surpass the seminal roots as the primary root system. When supplementing previous N applications, sidedressing can be done through V8. Adequate N from V5 through V8 is critical due to the number of potential ears and ear girth being determined. Additionally, nitrogen uptake is greatest from V8 through silking, depending on weather conditions (Figure 1).<sup>1</sup>

Split applications of sidedressed N may be used to help extend N availability to corn, especially in warm, wet climates. A split application method can reduce the likelihood of substantial N loss before crop uptake.<sup>2</sup> A small portion of N can be applied after the corn plant emerges, reducing the potential for N loss early in the season.

The majority of N should be applied just before the rapid vegetative growth stage begins. For split sidedressing applications of N, Mississippi State University recommends applying no more than 1/3 of the total N at crop emergence followed by the remaining amount of N applied 30 days later when corn is at or beyond the V6 growth stage.<sup>2</sup>

### Nitrogen Sources

Urea-ammonium nitrate (UAN) and anhydrous ammonia are good nitrogen fertilizers to use when sidedressing corn.

**Urea-Ammonium Nitrate.** UAN liquid solutions, such as 28% or 32% N, can be applied by soil injection or as a band on the surface with drops, even on fairly large corn. When applying N, especially as UAN or other sources

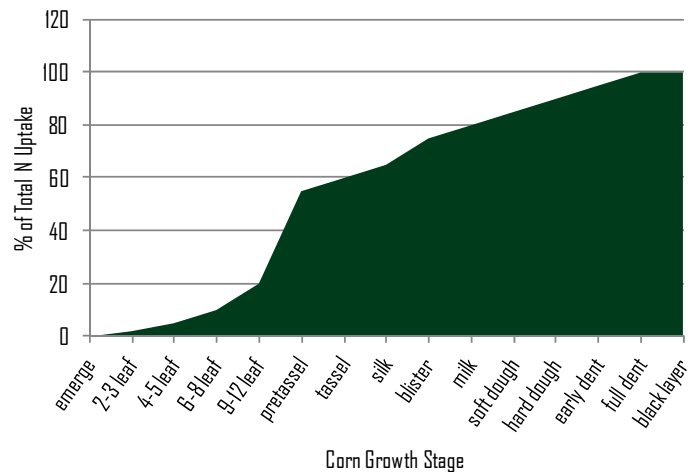


Figure 1. Percent of total nitrogen uptake for corn by growth stage. Nitrogen data adapted from "How a corn plant develops," Special Report 48, Iowa State University.

containing urea, remember that rainfall or light tillage is necessary to avoid volatilization, and move the N into the soil profile. Up to 30% of the urea could be lost due to volatilization if no rainfall occurs within two weeks and temperatures are warm. The most effective way to apply UAN to the soil is by injection.

**Anhydrous Ammonia.** Anhydrous ammonia applications should be made in moist soil and only if excess root pruning will not occur. Sidedressing ammonia can begin immediately after planting. Injection can either be done between every row or every other row.

### Weighing Benefits vs. Risks

Sidedressing is agronomically more efficient and can help reduce input costs. If over 50% of the N applied is through sidedressing, rates can be 10% less than pre-plant rates.<sup>3</sup>

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Based on early indications of yield potential, N rates can be adjusted with sidedress applications. If the stand is good, and biotech traits and fungicides are being used to protect yield potential, N rates can be increased. Conversely, with poor stands, N rates can be reduced.

Some of the risks associated with sidedressing are that a shortage of labor or adverse weather conditions can delay the application. When sidedress applications are delayed and corn is deficient of N for an extended period of time, yield potential can be dramatically reduced.



Figure 2. Corn leaf damage from broadcast UAN at 100 lb N/acre. Photo courtesy of John E. Sawyer, Agronomy Extension, Iowa State University.



Figure 3. Corn roots damaged (right) from anhydrous ammonia. Photo courtesy of John E. Sawyer, Agronomy Extension, Iowa State University.

Crop injury is also a potential concern with sidedress applications. Solution UAN that is applied broadcast has the potential to cause foliar plant burning, leaf loss, and reduced early growth (Figure 2). Because of leaf burning, it is recommended to not exceed 90 pounds of N/acre when corn is at V3 to V4 stage, 60 pounds N/acre at the V7 stage, and to not apply UAN to foliage if plants are larger than V7 stage.<sup>4</sup> Hot, dry weather can increase leaf burn and reduce plant growth.

Care must also be taken to avoid injury from sidedressing with anhydrous ammonia. Vapor damage to the corn leaves can occur if ammonia escapes from applicator knives that are close to or above the soil surface. Additionally, wet soil conditions or improper equipment may cause improper sealing of the knife track, which can cause ammonia to escape. When soil is drier, it is easier to seal the knife slot and ammonia is less likely to escape. If only a portion of the corn leaves are damaged, corn plants will usually grow out of the damage. It is recommended to sidedress early with anhydrous ammonia to avoid root pruning by the applicator knives (Figure 3). Corn roots may reach the row middle at an early growth stage.

## Summary

Use of sidedress applications of N can be helpful in instances where N was not able to be applied prior to planting or as an additional N application after planting. Anhydrous ammonia and UAN are the sources of N best suited for sidedress application. Before sidedressing N, it is important to be aware of the potential risks and ensure that crop injury does not occur.

### Sources:

<sup>1</sup> Russelle, M.P., Hauck, R.D., and Olson, R.A. 1983. Nitrogen accumulation rates of irrigated maize. *Agronomy Journal*. 75:593-598.

<sup>2</sup> Larson, E., Oldham, L., and Golden, B. 2014. Tips to improve nitrogen response for Mid-south corn. Mississippi State University Extension, [www.mississippi-crops.com](http://www.mississippi-crops.com)

<sup>3</sup> Brouder, S., Joern, B., Vyn, T., and Nielsen, B. 2003. Nitrogen fertilizer management in good economic times and bad. [www.agry.purdue.edu](http://www.agry.purdue.edu)

<sup>4</sup> Sawyer, J. 2001. Nitrogen fertilizer management options. Integrated Crop Management, IC-486 (2). Iowa State University. [www.ipm.iastate.edu](http://www.ipm.iastate.edu)  
Web resources verified 2/16/15.

For additional agronomic information, please contact your local seed representative.

Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible. **ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.** Leaf Design® is a registered trademark of Monsanto Company. All other trademarks are the property of their respective owners. ©2015 Monsanto Company. 140315070131 030115JMG