Sidedressing nitrogen (N) in addition to pre-plant N application in corn has several advantages compared to pre-plant applications only. Some of the benefits include providing N closer to when it is needed by the crop and reducing potential N losses, and possibly fine-tuning N application rates for expected yield. A potential disadvantage of relying on a sidedress application include not being able to apply N in a timely fashion due to prolonged wet soil conditions. Also, some operations may require additional labor.

**Sidedress Application Timing**

Application can be done at any time after planting through tasseling. If no N was applied before or at planting, then sidedress applications should be made prior to the V5 (5 leaves) growth stage to meet the N requirements of developing seedlings. If supplementing previous pre-plant or starter N applications, sidedressing should be completed prior to the V8 growth stage. Adequate N from V5 through V8 growth stages is critical as the plant is determining the number of potential ears and ear girth at that time. Additionally, depending on weather conditions, N uptake is usually greatest from V8 growth stage through silking, (Figure 1).

**Nitrogen Fertilizer for Sidedressing**

To determine the best option for an in-season N application, consider the source of N to be used, crop growth stage, and the ability to minimize N loss. After considering these factors, injecting N fertilizer between rows is often the best option. With applications between rows, N is kept at a safe distance to avoid crop injury and is placed where the crop roots will be growing. Also injecting or incorporating N minimizes the potential for N loss.

Applying N in every other row can help increase the speed of application and research indicates that yield may not be negatively impacted because every row will have N applied on one side. Using this every other row system, injection points can be adjusted to avoid placing an injector in a wheel track, where higher N losses may occur.

**Anhydrous Ammonia.** Applications should be made under soil conditions that ensure proper sealing of the knife track. Ammonia vapor can escape with shallow injection or if improper sealing occurs, corn leaves can be damaged. If only a portion of the leaves are damaged, corn plants usually grow out of the leaf damage. Also, sidedressing should occur early to avoid root pruning or anhydrous ammonia “burn” damage to seedling roots (Figure 2).

**Urea-Ammonium Nitrate (UAN).** When using UAN solutions such as 28% or 32% N, injection between the rows is the preferred application method which minimizes volatilization N loss. The probability of N loss is higher if not incorporated appropriately. Half of the N content in UAN is urea. Up to 30% of the urea component could be lost due to volatilization if no rainfall is received within ten days and temperatures are warm.³

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**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.
Sidedressing Nitrogen in Corn

Broadcasting UAN solutions can be implemented; however, foliar leaf “burn” may occur resulting in leaf loss and reduced early growth. (Figure 3). Due to injury concerns, it is recommended not to exceed 90 lbs N/acre of broadcast UAN when corn plants are at the V3 to V4 growth stage and 60 lbs N/acre broadcast at the V7 growth stage. Also, if plants are larger than V7 growth stage, UAN solution should not be broadcast applied across the foliage. For applications after V7, use drop hoses for UAN “dribble” application directly to the soil surface between the rows.

**Urea.** Broadcasting urea may cause some leaf “speckling” or browning of the leaf edge when granules fall into the corn whorl. The potential for this to occur increases with higher application rates and taller plants. However, leaf burning is generally less with broadcast urea granules compared to broadcasting UAN solution, ammonium nitrate, or ammonium nitrate.3 To minimize adhesion of urea granules to the plant, apply when the foliage is dry. Using an urease inhibitor when sidedressing urea early in the season can minimize volatilization loss.

**Summary**

According to Iowa State University recommendations, the best options for sidedressing N in order from most preferable to least preferable are:

- Injected anhydrous ammonia, UAN, or urea.
- Broadcast dry ammonium nitrate, ammonium sulfate, or urease inhibitor treated urea.
- Surface dribbling UAN solution
- Broadcast UAN
- Broadcast urea

The potential for N loss after application and plant injury are factors that should be considered when ranking N source and application method.

**Sources:**

2 Sawyer, J.E. 2001 Nitrogen fertilizer management options. Integrated crop management. Iowa State University. [www.ipm.iastate.edu/icm](http://www.ipm.iastate.edu/icm)

Web sources verified 2/11/2015.

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