



# THE SCIENCE BEHIND FOLIAR ABSORPTION

1. Foliar absorption in turfgrass is well-documented. It occurs through channels in the cuticle.
  - a. Researchers have used isotopes to measure more accurately the rate of N absorption
  - b. All nutrients are capable of being foliar absorbed
  - c. Nitrogen is absorbed the most easily
  - d. Some chelates are inappropriate for foliar absorption; however, organic chelates (citrate, glucoheptanate) enhance foliar absorption of micronutrients
2. Urea is the most suitable source of N for foliar absorption, due to its neutral charge, its low salt index, and its high solubility; however, there is potential for volatilization. Ammonium sulfate is also absorbed well, but it has the potential for phytotoxicity. Potassium nitrate is not a good source for foliar absorption.
3. Studies report a range of 30-60% for foliar absorption of urea N; most peg it around 50-55% for both bentgrass and bermudagrass
  - a. 50% absorption occurs within the first hour
  - b. Absorption is enhanced in higher humidity
  - c. Absorption is enhanced by the use of a surfactant to help coat the leaf tissue
  - d. Absorption occurs best at temperatures ranging from 65-85 degrees
  - e. Absorption occurs best in the early morning or at night
  - f. Absorption of N continues up to 24 hours after application
  - g. Absorption of N declines a little in the summer for cool season turf
4. Water volume does affect foliar absorption. However, increasing the dilution rate from 20 gals/A to 80 gals/A results in only slightly less foliar absorption.
5. Liquid N that is not foliar-absorbed is still readily available to the plant through other entry points

## Therefore, Harrell's MAX products are ideal for foliar and liquid feeding.

1. All of the N products except for Nitrate Plus 6-0-0; Calcium 6-0-0, Potassium Plus Calcium 4-0-8; and Cal Plus 3-0-0 are urea based.
2. All of the urea N products are completely stabilized with UMAXX to prevent volatilization and to provide a more consistent feed over the application interval except for Soil Surge 17-0-0; Neutralizer 15-0-0; and Phosphorus Plus 3-30-3.
3. All of the micronutrients are chelated with organic chelates.

## To get the most out of your foliar program:

1. Use stabilized urea sources
2. Use products with organic chelates
3. Use an adjuvant like Harrell's Activator
4. Use flat fan nozzles to increase leaf surface coverage
5. Since foliar absorption doesn't decline that much with higher volumes of water, go ahead and use up to 2 gals/1,000 sf dilution to facilitate time-saving tank-mixes

### References:

- Branham, USGA Turfgrass Environmental Research Online, Vol. 9, #19, Oct 1, 2010
- Richardson et al., University of AR, Dept of Horticulture, Research Series 568, 2008