Agronomic Solutions II: Choosing the Right Fertilizer for Your Turf: Methods of Application

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Objectives

• Granular
  – Advantages and disadvantages
  – Size guide number
  – Uniformity index

• Foliar
  – Advantages and disadvantages
  – Application rates
  – Spray volumes
Granular Fertilizers

- **Advantages**
  - Fewer applications
  - Variety of slow-release sources
  - Use familiarity
  - Less expensive equip.

- **Disadvantages**
  - Loss of control
  - Labor intensive
  - More material handling
  - Uniformity of application
Physical Properties of Granular Turfgrass Fertilizers
Granular Fertilizer Terms

- **Blended Fertilizer** - a mixed fertilizer produced by mechanically mixing the solid materials

- **Homogenous Fertilizer** - a mixed fertilizer with all nutrients combined into each granule
Size Guide Number (SGN)

- (Def.) “average particle diameter” of the granules in mm multiplied by 100

**Greens**
- 80-100: SGN 80 (0.80 mm)
- 125-150: SGN 150 (1.50 mm)
- 210-240: SGN 215 (2.15 mm)

**Tees and Fairways**
- 125-150: SGN 150 (1.50 mm)
- 210-240: SGN 215 (2.15 mm)

**Rough**
- 210-240: SGN 215 (2.15 mm)
Impact of SGN on Spreadability and Fertilizer Response

- Particles per Square Inch (PPSI)
Uniformity Index (UI)

- Method of determining how consistent granule diameter is within a bag

- UI = $\frac{D_{10}}{D_{95}} \times 100$
  - $D_{10} =$ grain diameter (mm) corresponding to 10% passing
  - $D_{95} =$ grain diameter (mm) corresponding to 95% passing
Uniformity Index (UI)

**Example:** A product UI of 50 = average small particle is half the size of the average large particle.
UI Ranges for Blended Products

- **Excellent**
  - 50+

- **Good**
  - 40

- **Questionable**
  - 30
Questionable UI Values Can Produce Segregation

Acceptable

Unacceptable
UI Effects on Spreadability

Varying particle sizes and density can result in inconsistent distribution of product.
Summary

- Select proper SGN
- Use homogenous products
- Consistently high UI (blended product)
- Check distribution of spreader
- Use proper spacing between passes
Advantages of Foliar Applications

- Accuracy of application
- Ease of application
- Sprayer applying other products
- More consistent growth
- Delivery of nutrients when roots damaged
Nitrogen Response of Turf Quality in Shade Depends on Turf Species
(Verona, WI, 2001)

Steinke & Stier, 2003
Advantages of Foliar Applications

• Accuracy of application
• Ease of application
• Sprayer applying other products
• More consistent growth
• Delivery of nutrients when roots damaged
• Improved uptake efficiency
• Environmental safety
Disadvantages

• Frequent applications
• How fast does uptake occur?
• Season affect nutrient uptake?
• Application rate/burn potential?
• Is foliar N lost due to volatilization?
Foliar Nutrient Uptake by Cool-Season and Warm-Season Turfgrasses

University of Arkansas research lends insight into understanding turfgrass foliar feeding.

BY JAMES C. STIEGLER, MICHAEL D. RICHARDSON, DOUGLAS E. KARCHER, AND AARON J. PATTON

Foliar Nitrogen Uptake Following Urea Application to Putting Green Turfgrass Species

J. Chris Stiegler, Michael D. Richardson,* and Douglas E. Karcher

Field-Based Measurement of Ammonia Volatilization Following Foliar Applications of Urea to Putting Green Turf

University of Arkansas
Foliar Fertilization Research

- Two putting green research areas
  - ‘Penn A1’ Agrostis stolonifera
  - ‘Tifeagle’ Cynodon dactylon x C. transvaalensis

- Treatments applied May to September
  - Two N rates (0.1 and 0.25 lb. N 1000 ft\(^{-2}\))

- Measurements include:
  - Sampling of plant uptake (0, 1, 4, 8, and 24 h)
  - Tissue and rinsate 15N analysis
  - Volatilization over 24 h
How fast does N uptake occur?
Nitrogen absorption had generally peaked between 1 and 4 hours after application. (Stiegler et al. 2011)

- Nitrogen absorption had generally peaked between 1 and 4 hours after application.
Does season affect nutrient uptake?
Mean absorption by month:
May – 85%
June – 70%
July – 60%

Stiegler et al. 2011
Application rate affect uptake?
Higher rates (0.25 lb) of N are not absorbed as completely as low rates (0.10 lb)

Stiegler et al. 2011
Summary

• Use low application rates
• 60-80% foliar uptake
• % uptake not affect by season
• N uptake peaked between 1-4 hrs after application
• Use spray volumes <40 gal ac\(^{-1}\)

(Henning et al., 2013)
Thank You!

Jason Henderson
Nutrient Source
Foliar N Source Uptake Study

• Similar research methodology employed
  – $^{15}$N-labeled compounds
    • Urea
    • Ammonium sulfate
    • Potassium nitrate
    • Glycine
    • Glutamic acid
    • Proline
  – ‘Penn G2’ Agrostis stolonifera
  – Lower application rate (0.1 lb N 1000 ft$^{-2}$)
  – Sampled at 1 and 8 h after application
Ca(NO$_3$)$_3$ was also tested and had reduced uptake compared to other forms.
Spray Volume

Shelby Henning
Bruce Branham
Richard Mulvaney
University of Illinois-Urbana Champaign
Spray Volume Results

6 hr after application

Fertilizer Uptake Efficiency %

Spray volume (gal / acre)

- 20
- 40
- 60
- 80
- 100

A
AB
AB
B
B