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

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UCONN

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

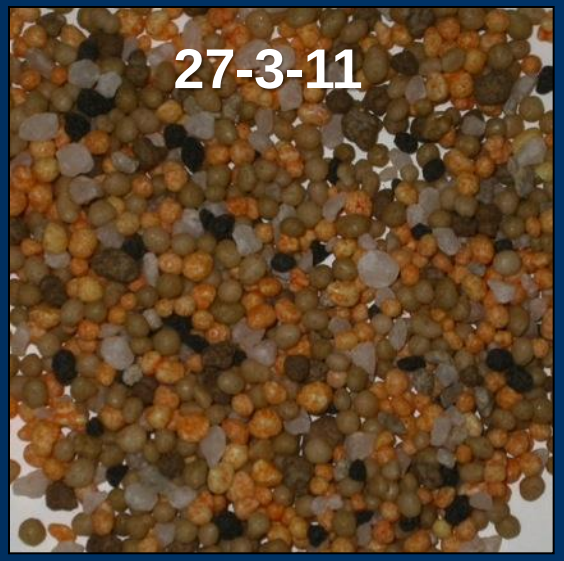
Granular Fertilizer Terms

- **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

Tees and Fairways

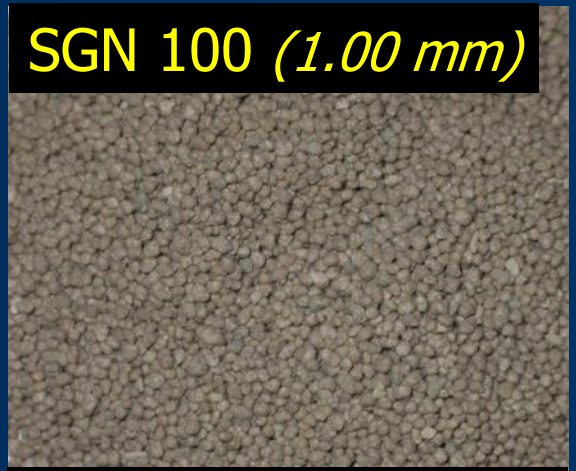
125-150

Rough

210-240

SGN 80 *(0.80 mm)*

SGN 100 *(1.00 mm)*

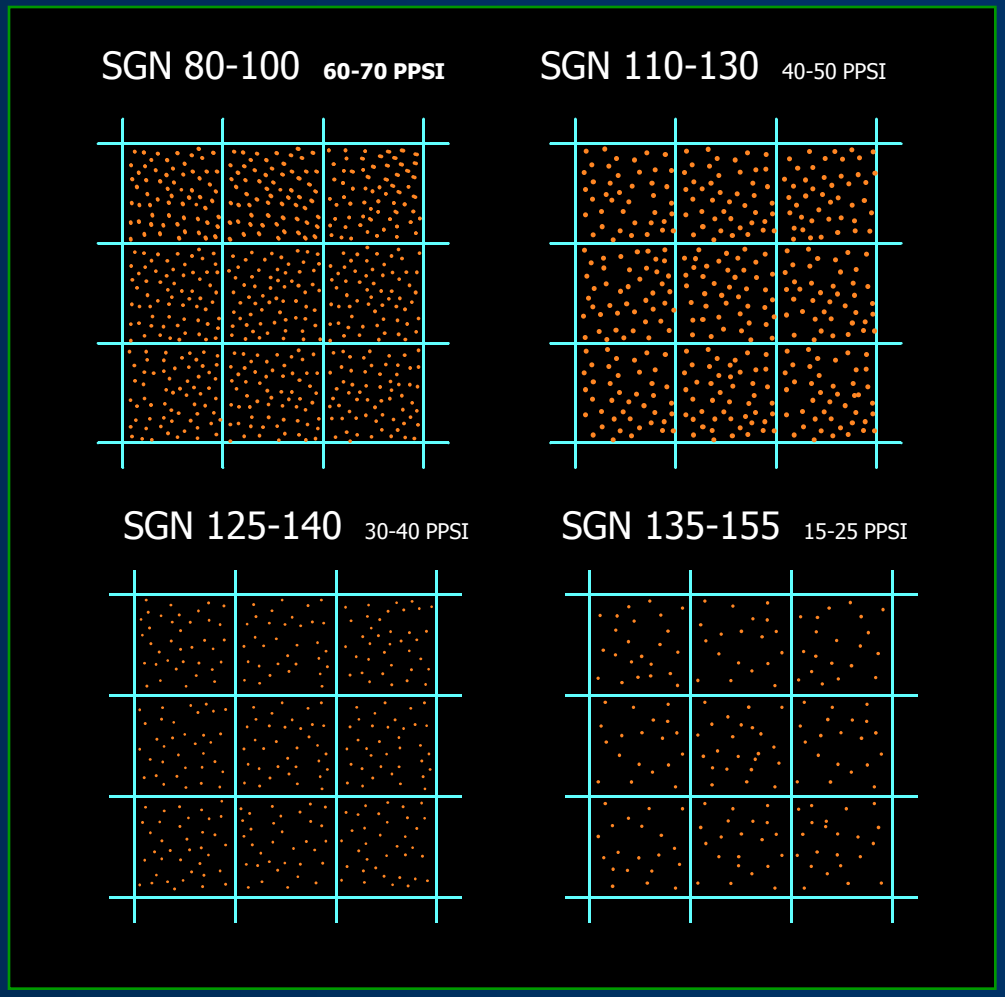


SGN 150 *(1.50 mm)*

SGN 215 *(2.15 mm)*

Impact of SGN on Spreadability and Fertilizer Response

- Particles per Square Inch (PPSI)



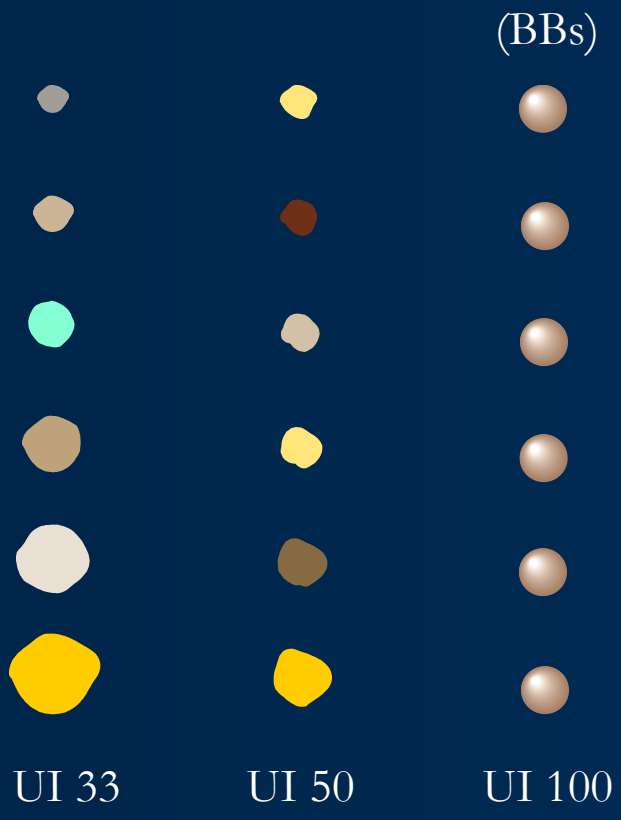
Uniformity Index (UI)

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

- UI= D_{10}/D_{95} X 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

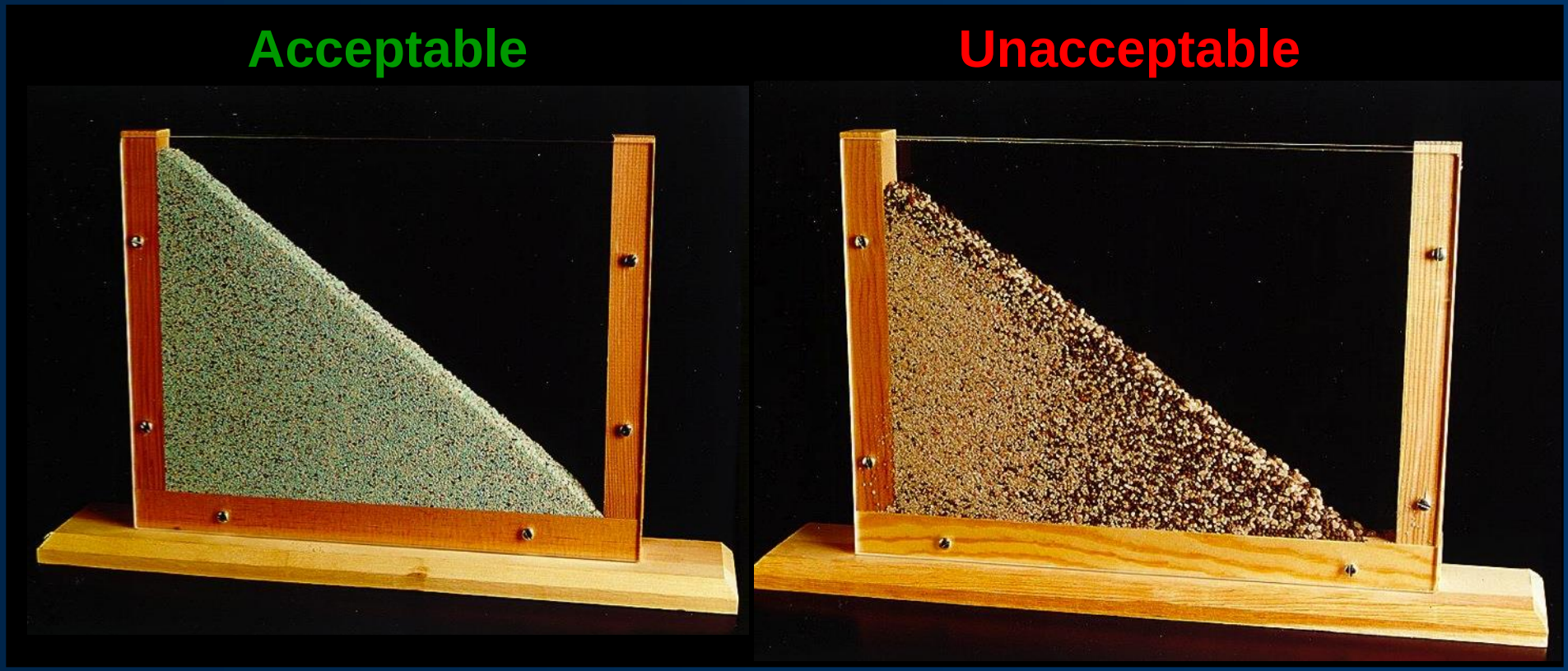


Average large size particle is 1.60mm

Average small size particle is half the size. .80mm

UI Ranges for Blended Products

Questionable UI Values Can Produce Segregation



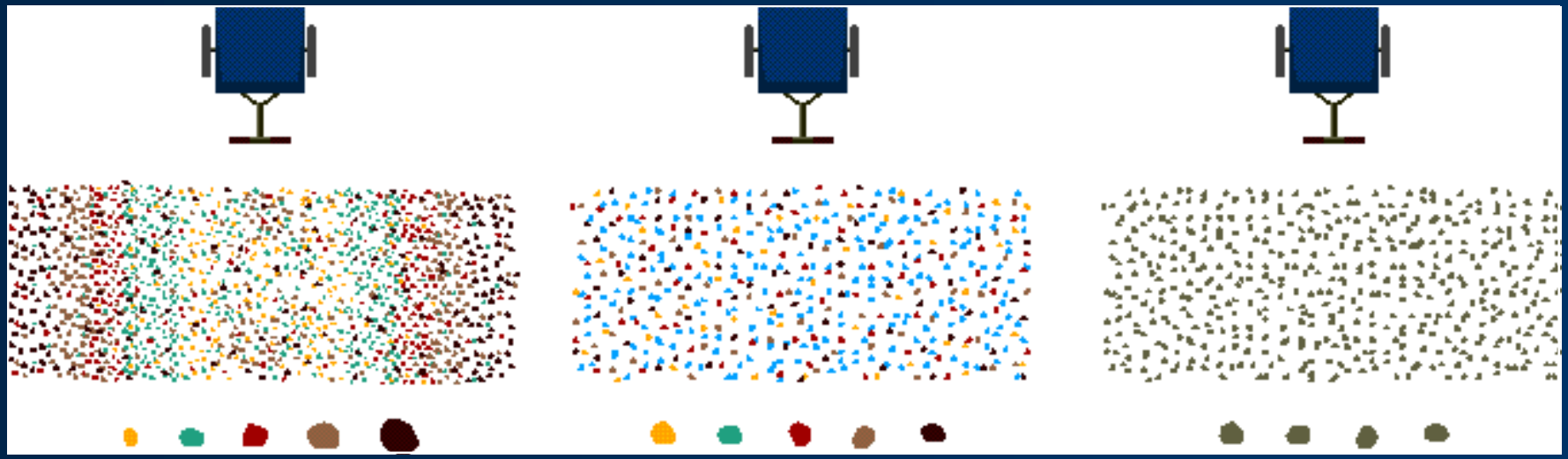
UI Effects on Spreadability

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

Non-Uniform

Uniform Blend

Uniform Homogenous



Summary

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

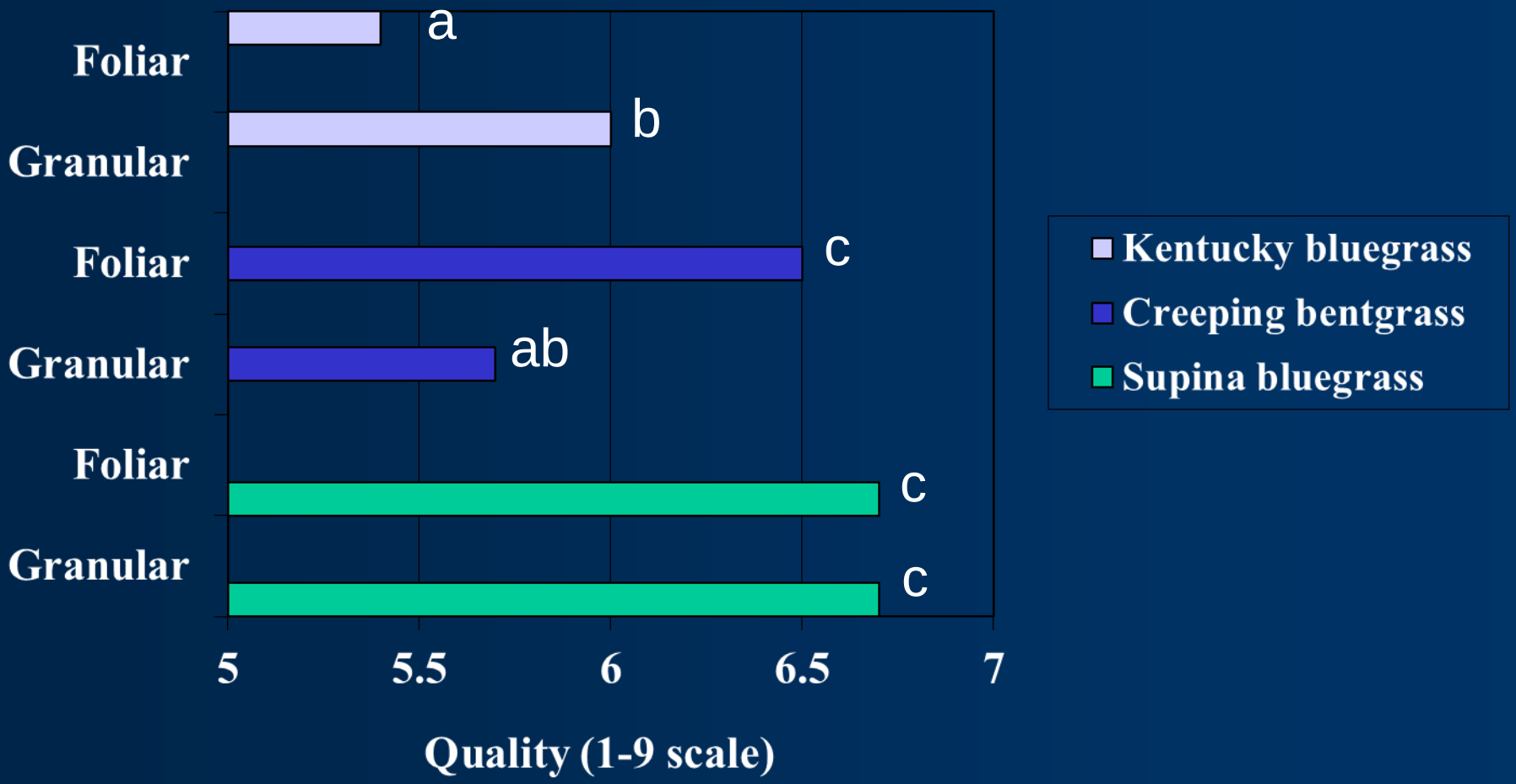
Photograph by Steve Rackliffe

Advantages of Foliar Applications

- Accuracy of application
- Ease of application
- Sprayer applying other products
- More consistent growth
- Delivery of nutrients when roots damaged

Photograph by John Inguagiato

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?

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Research *You Can Use*

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

RESEARCH

Foliar Nitrogen Uptake Following Urea Application to Putting Green Turfgrass Species

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

RESEARCH

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

J. Chris Stiegler, Michael D. Richardson,* Douglas E. Karcher, Trenton L. Roberts, and Richard J. Norman

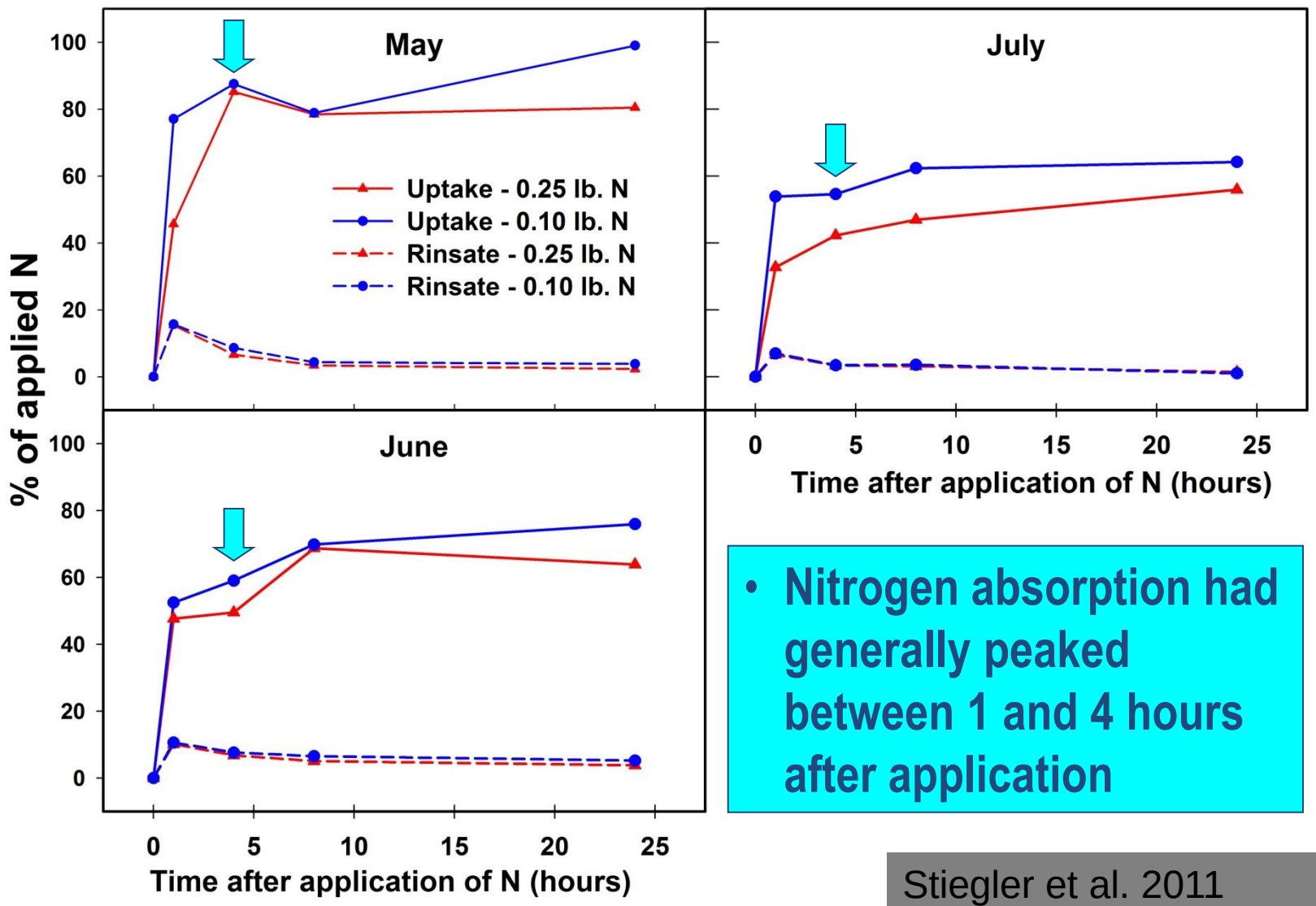
University of Arkansas *Foliar Fertilization Research*

- 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

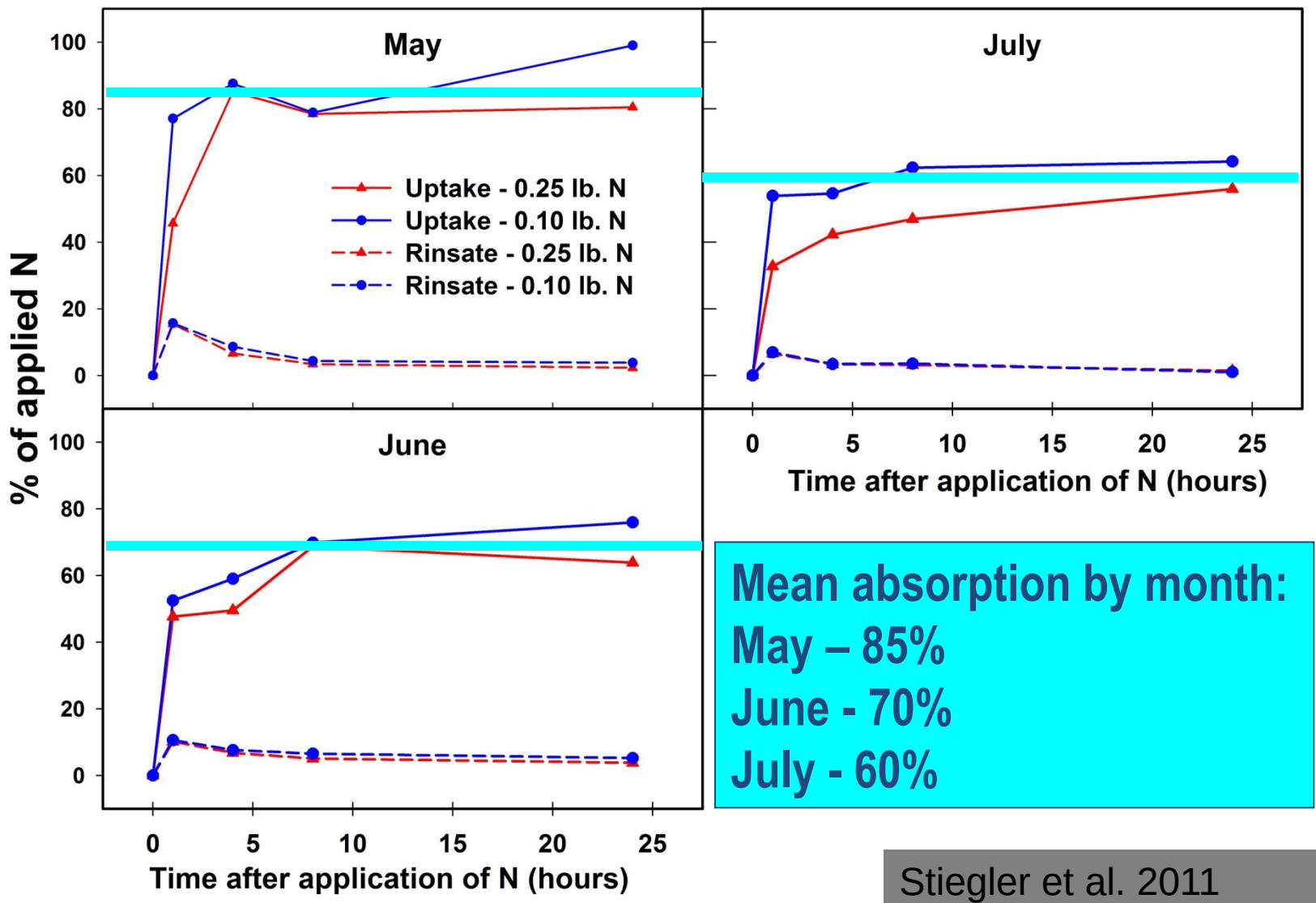
How fast does N uptake occur?



- Nitrogen absorption had generally peaked between 1 and 4 hours after application

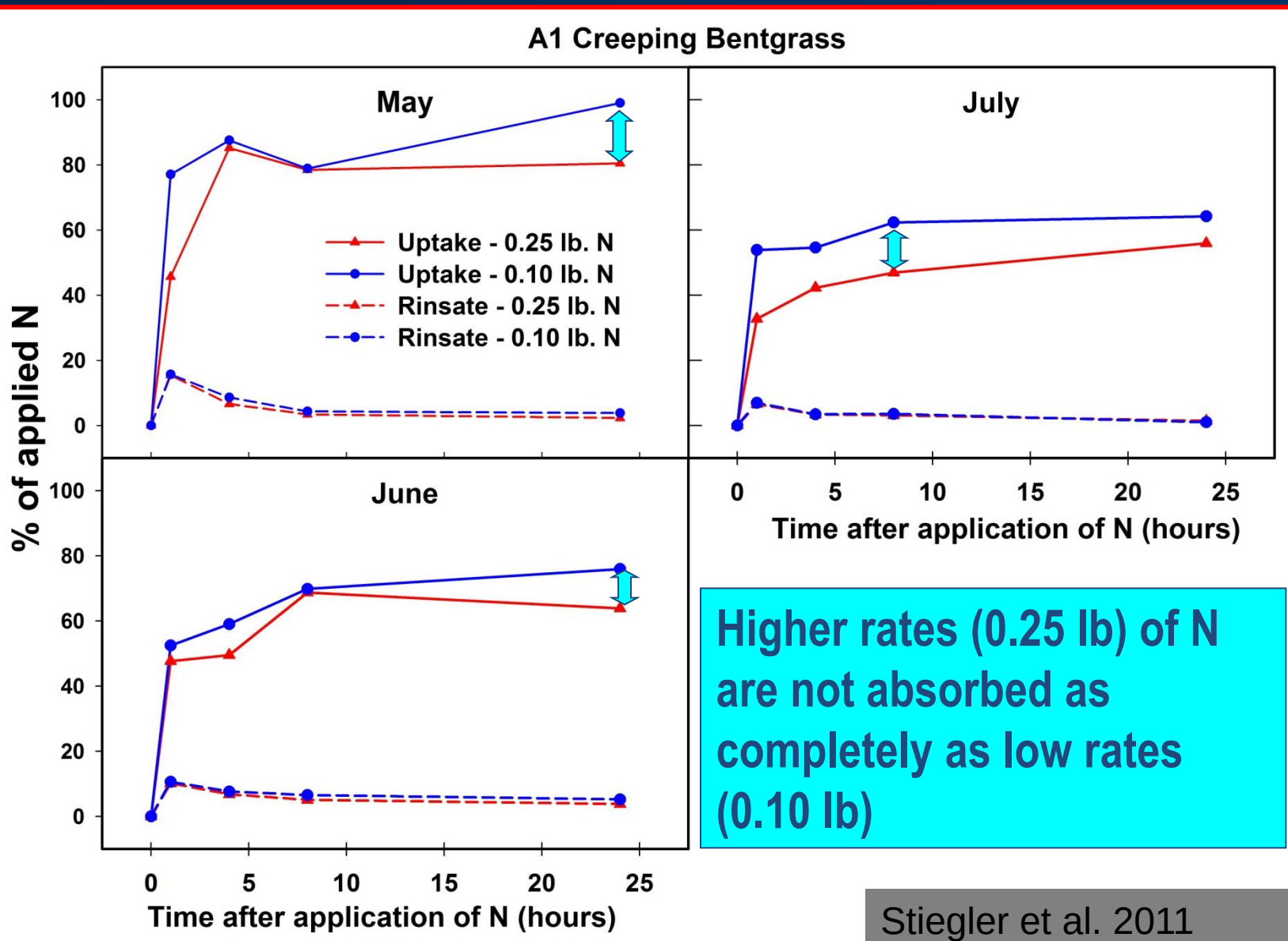
Stiegler et al. 2011

Does season affect nutrient uptake?



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

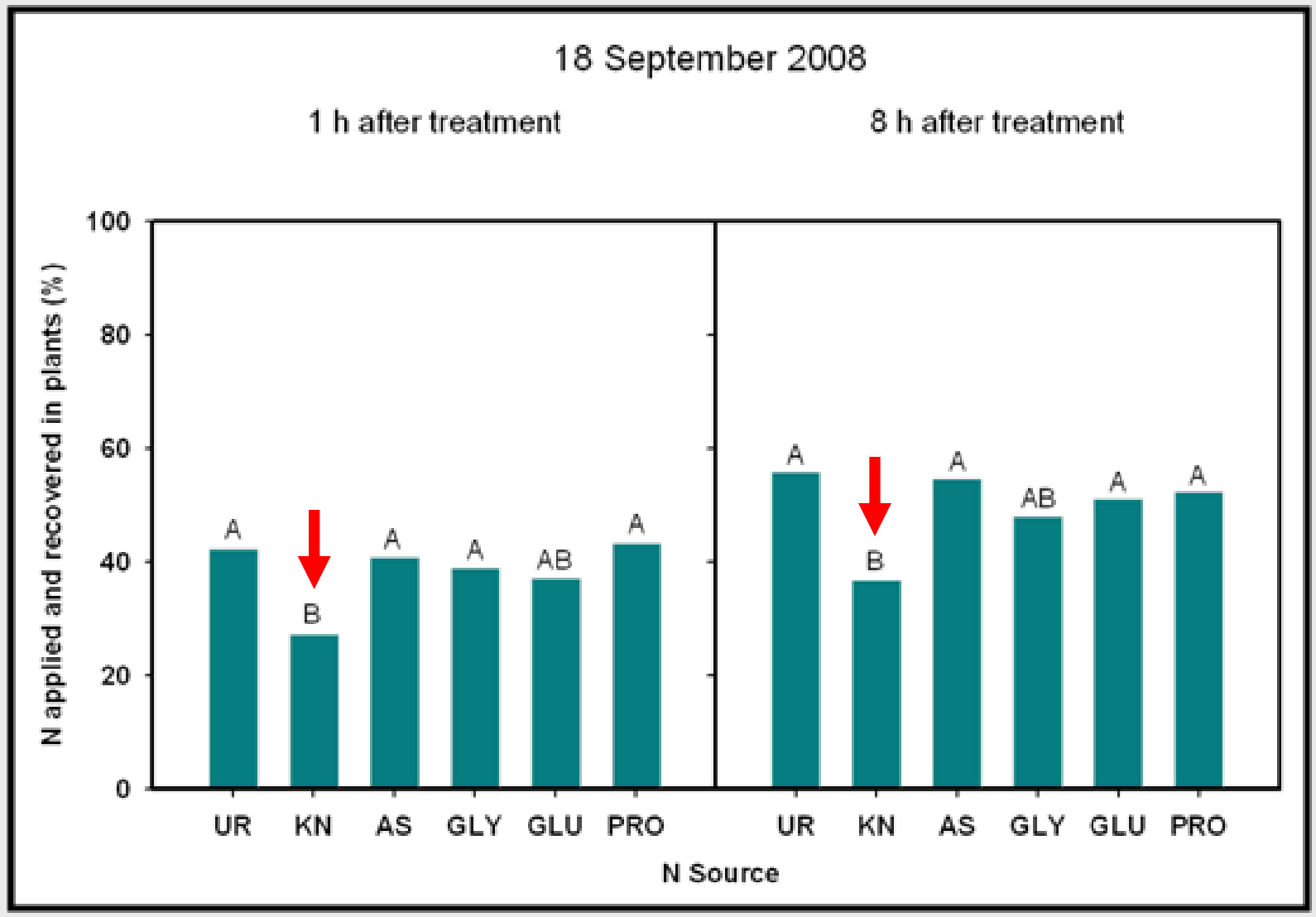
Nutrient Source

Foliar N Source Uptake Study

- Similar research methodology employed
  - ^{15}N-labeled compounds
    - Urea
    - Ammonium sulfate
    - Potassium nitrate
    - Glycine
    - Glutamic acid
    - Proline

    } Amino Acids
  - 'Penn G2' *Agrostis stolonifera*
  - Lower application rate (0.1 lb N 1000 ft^{-2})
  - Sampled at 1 and 8 h after application

Foliar N Source Uptake Study



$CaNO_3$ 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