Improving Water Use Efficiency with Soil Incorporation of Organic Matter

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Issues & Concerns

Questions

- Is landscape water use an issue?
- Is the grass species, or cultivar, solely responsible for water use?
- Does site preparation play a role in water use?
- How can site preparation be improved to enhance turfgrass water use?
- Is proper site preparation routinely practiced by turfgrass installers?

Begins with the Soil

Cecil Series

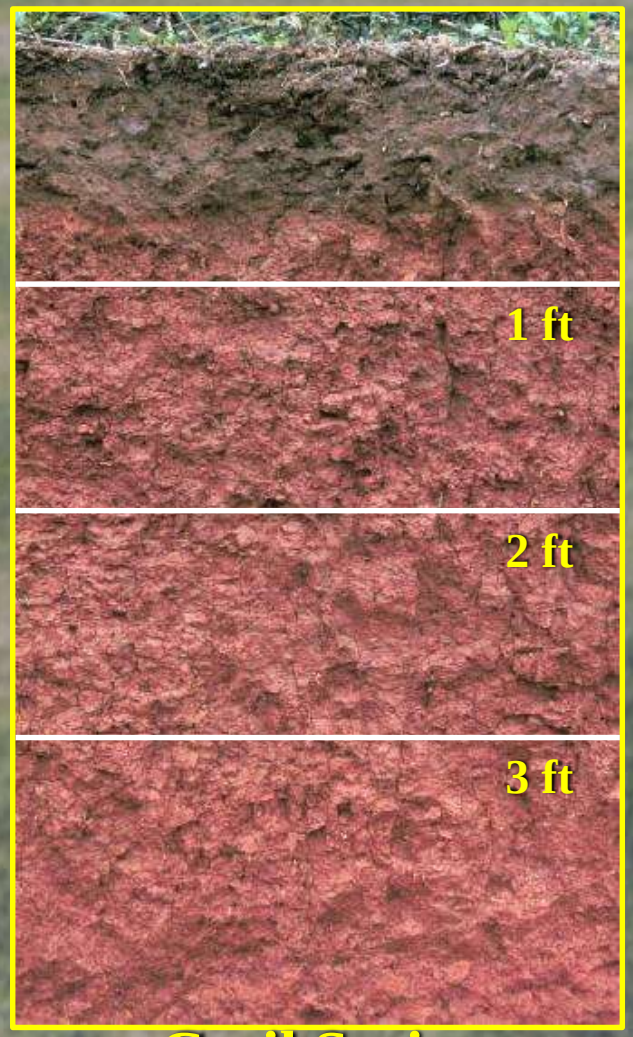
- ☆ Characteristics
  - ✓ Weathered felsic, igneous, & metamorphic rocks
  - ✓ Well drained
  - ✓ Low activity clay
  - ✓ A horizon – sandy loam
  - ✓ Range – > 9 million acres
  - ✓ Extensive though SE U.S.
  - ✓ If limed – highly productive

Cecil Series – State soil of NC

Begins with the Soil

Cecil Series

- ✯ Bt Horizon
  - ✓ New landscapes on Bt horizon
  - ✓ Extends to 1 to 2 feet
  - ✓ Silt – < 30%
  - ✓ Clay – 35% to 60 % in upper 20 in
    - ☹ Compactable
  - ✓ “Very strongly” acidic
  - ✓ Little to no organic matter



Cecil Series

Organic Matter

Benefits

- ☆ Chemical & Physical
  - ✓ Binds mineral particles
  - ✓ Soil porosity
    - ⚐ Improve water & air holding
  - ✓ Source of nutrients

Sources

- ✓ Organisms – indigenous
- ✓ Compost – added

Objective

Determine the impacts of proper site preparation, which include tilling and soil incorporation of organic matter (compost), on turfgrass water use efficiency.

Materials & Methods

Materials & Methods

Establishment

- June 2012
- Cecil sandy loam
- Tillage & Incorporation
  - ✓ Tilled
  - ✓ Compost applied to surface
  - ✓ Incorporated – upper 4 in
  - ✓ Control – tilled, no compost
  - ✓ Smoothed & rolled

Materials & Methods

Compost

- Sod
- Trimmings
- Rates – 500, 1000, & 2000 lbs / 1000 ft^2

Grass Species

- Bermudagrass - TifGrand
- Centipedegrass - TifBlair
- Zoysiagrass - JaMur

Materials & Methods

Plot Maintenance

- Mowed weekly – clipping returned
- Mowing height – 1.5 in
- Annual nitrogen rate – 2 lbs N / 1000 ft^2
- Pest Management – as needed
- Irrigation
  - ✓ Year 1 – as needed for establishment
  - ✓ Years 2 & 3 – 30% deficit

Materials & Methods

Experimental Design

- Compost source & rate as whole plots
- Grass species as split plot factors
- Replications – 4
- SAS JMP
  - Means separated by LSD (α=0.05)

Materials & Methods

Data

- ✯ Dry-down Cycles (DDC)
  - ✓ 2013 – 3
  - ✓ 2014 – 4
  - ✓ Range – 4 to 31 d following last ≥ 0.3 inch rain event
- ✯ Volumetric water content (VWC)
  - ✓ FieldScout TDR 300 – Spectrum Technologies
  - ✓ 3-inch tines
  - ✓ Daily during dry-down cycles (DDC)

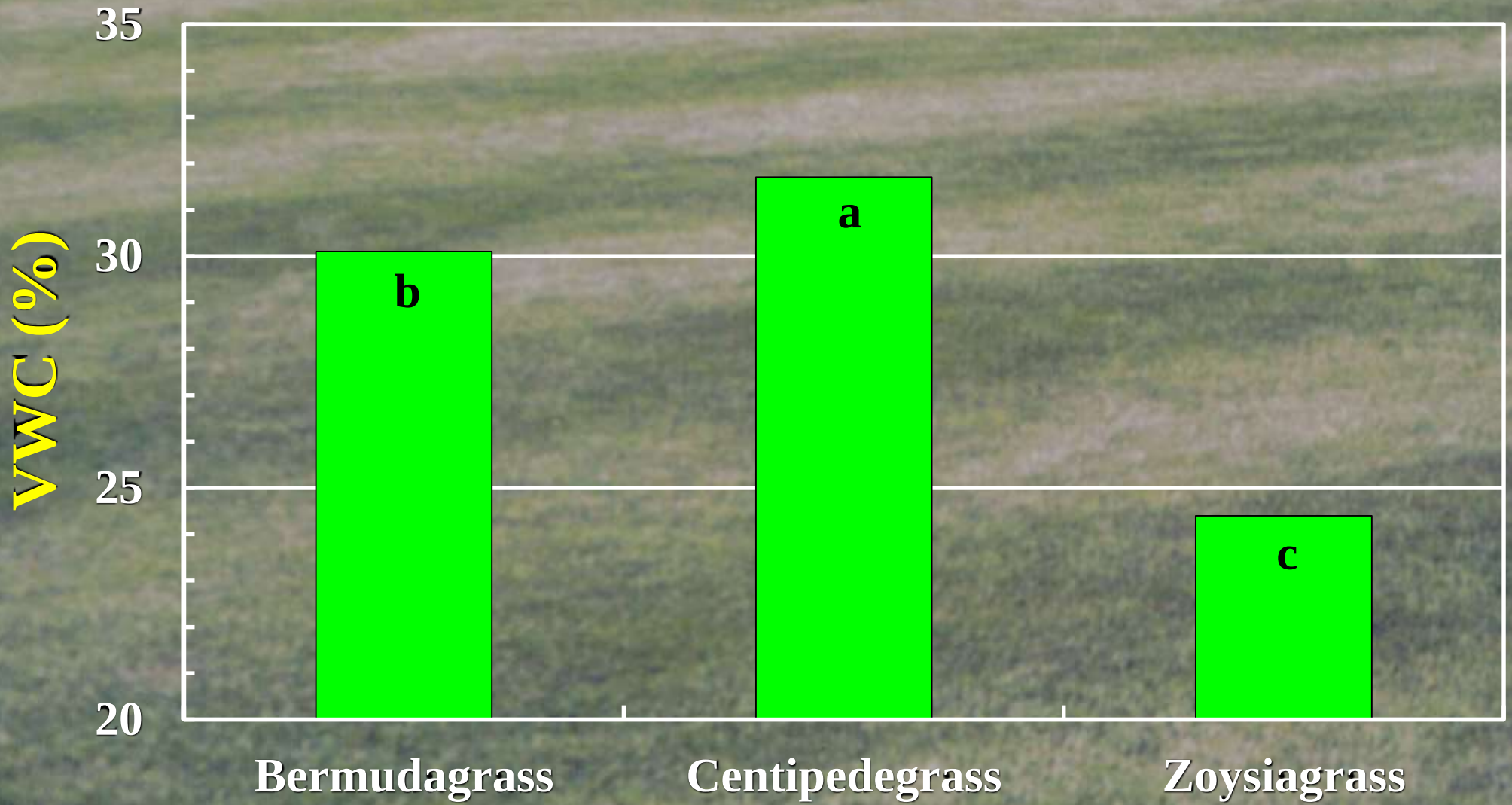
Materials & Methods

Data

- Turfgrass Quality
  - NTEP Scale – 1 to 9
    - 1 = brown, dead grass
    - 6 = minimally acceptable turf
    - 9 = healthy, green grass

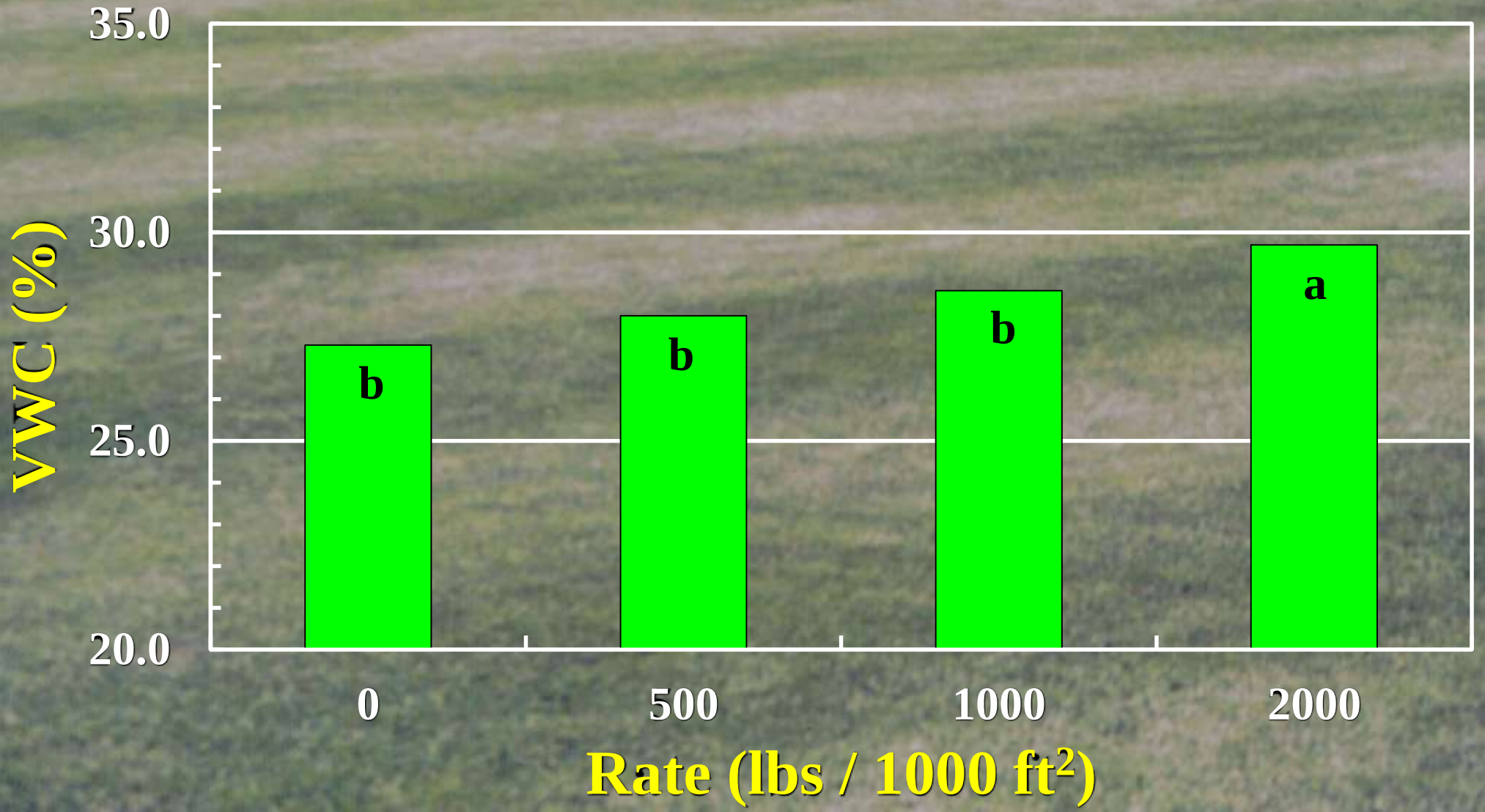
Results & Discussion

Species Water Use



VWC: Compost Sources

VWC: Compost Rates



Turfgrass Quality

	Turfgrass Quality (1-9)
Species	
Bermudagrass	6.5 a
Zoysiagrass	6.3 a
Centipedegrass	6.1 a
Compost Source	
Sod	6.3 a
Trimmings	6.3 a
Compost Rate	
0.0	6.3 a
2.5	6.3 a
5.0	6.3 a
10.0	6.3 a

Summary

- Zoysiagrass – lowest VWC
- Centipedegrass – highest VWC
- No difference in compost sources
- Compost at 2000 lbs / 1000 ft^2 – high VWC
  - ? Too wet
- No difference in TQ for species, compost source or rate

Acknowledgements

- UGA Center for Urban Ag.
- Georgia Dept. of Ag.
- U.S. EPA
- Georgia sod producers
  - ✓ NG Turf
  - ✓ Super Sod
- Foothills Compost

Thank You

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