

Performance of New Bermudagrass Varieties in the Southeast

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Who had winter damage this
past year?

What did you see?



91%





83%





58%





25%



What is acceptable damage

- Below 10%
- 10 - 30%
- 30-40%
- Above 40%

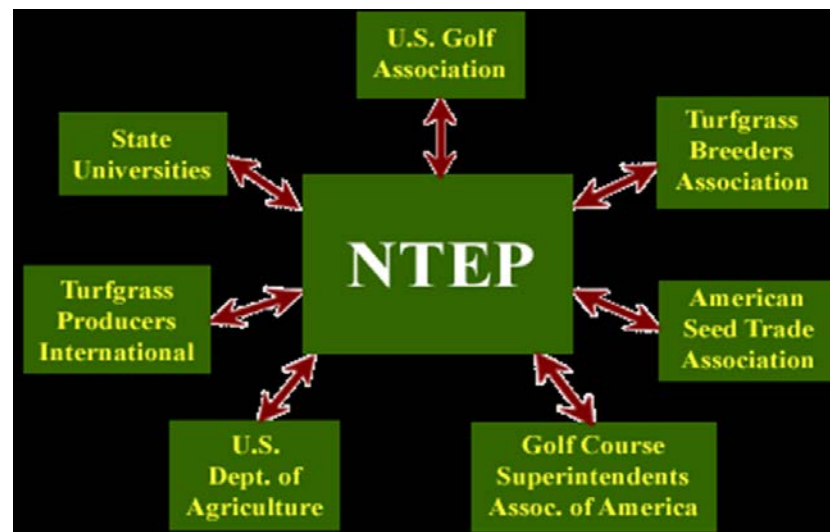


Bermudagrass NTEP



What is the NTEP?

- National Turfgrass Evaluation Program
 - “Providing Results of National Testing of all Major Turfgrass Species”
- 17 Different Turfgrass Species
- 40 States and 6 Provinces in Canada





NTEPs at UT

- Bermudagrass
 - Trafficked
 - Non-Trafficked
- Kentucky Bluegrass
 - Trafficked
 - Non-Trafficked
- Tall Fescue
 - Trafficked
 - Non-Trafficked
- Zoysiagrass





Experimental Design

- 35 Different entries
 - 18 seeded
 - 17 vegetative
 - 3 replications of each variety
- 2 separate trails
 - Non traffic
 - Trafficked
- Tests side by side

Experimental Design

- Maintained at 7/8in mowing height
- Data collected
 - Percent green turfgrass cover
 - Surface hardness
 - Soil moisture
 - Visual percent green turfgrass cover
- Fertilized at 1 lb Nitrogen per month



Varieties

■ Standard varieties (10)

- Tifway
- Latitude 36
- Patriot
- Celebration
- NuMex-Sahara
- Princess 77
- Riviera
- Yukon
- North Shore SLT
- Astro

■ Experimental varieties (25)

- | | |
|-----------------|-------------|
| • MBG 002 | • 11-T-251 |
| • OKS 2009-3 | • 11-T-510 |
| • OKS 2011-1 | • DT-1 |
| • OKS 2011-4 | • FAES 1325 |
| • JSC 2-21-1-v | • FAES 1326 |
| • JSC 2-21-18-v | • FAES 1327 |
| • JSC 2007-8-s | • PST-R6P0 |
| • JSC 2007-13-s | • PST-R6T9S |
| • JSC 2009-2-s | • PST-R6CT |
| • JSC 2009-6-s | • BAR C291 |
| • 12-TSB-1 | • OKC 1131 |
| • MSB 281 | • OKC 1163 |
| | • OKC 1302 |



Results

- Highest amount of winterkill 2014

1. NuMex-Sahara
2. BAR C291
3. North Shore SLT
4. Princess 77
5. Yukon

All seeded varieties

April 28, 2014



Top Performers 2014 Spring Green-Up

DT-1



OKC 1131



Astro



Latitude 36



Tifway



Slower Spring Green-Up

BAR C291



Yukon



North Shore SLT



NuMex-Sahara

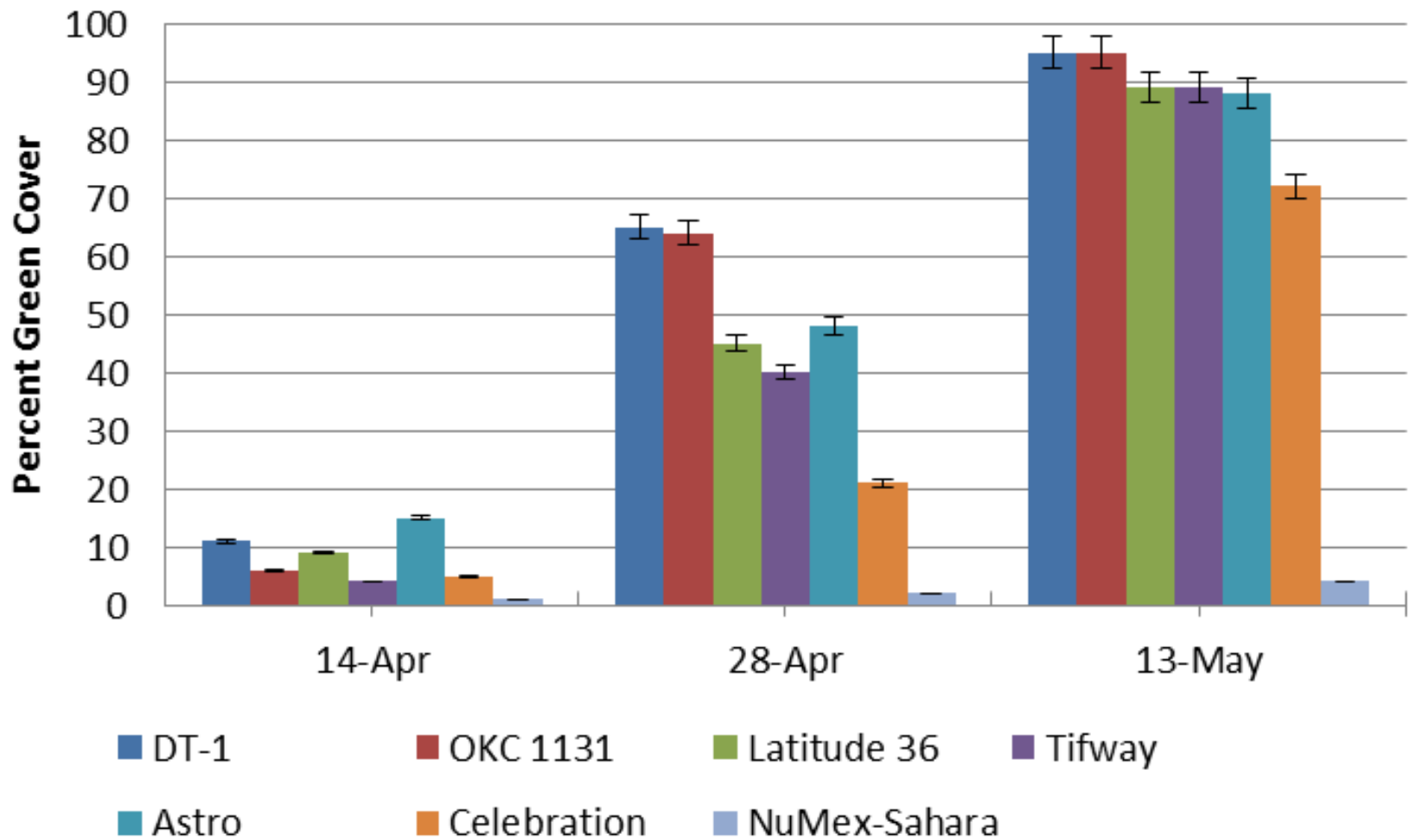




Princess 77



Spring green-up 2014



Results

- Fastest spring green-up 2014

1. DT-1

1. OKC 1131

2. Astro

2. Latitude 36

2. Tifway

All vegetatively established

Results

- Slowest spring green up in 2014

1. BAR C291

2. Yukon

2. North Shore SLT

3. NuMex-Sahara

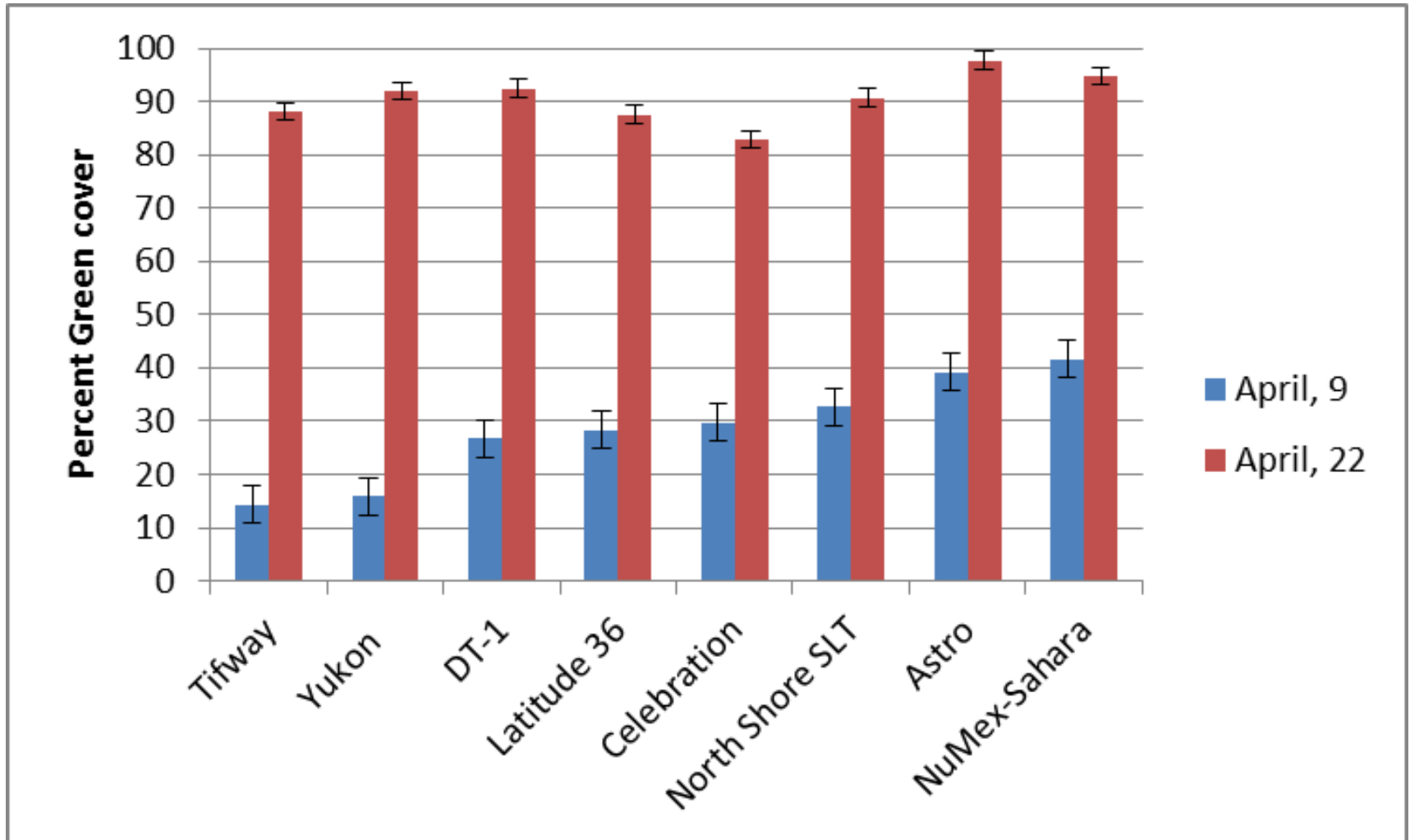
4. Princess 77

All seeded varieties

Summary of winter damage year 1

- DT-1 had the fastest spring green-up
- NuMex-Sahara had the highest percentage of winterkill
- Seeded varieties had higher rates of winterkill
- Seeded varieties took longer to green-up in the spring
- Vegetative varieties were more cold hardy

Spring Green-up 2015



Results

- Slowest Green-up
 - Tifway
 - Yukon
- Fastest Green-up
 - NuMex-Sahara
 - Astro
 - DT-1
 - Latitude 36

Summary of winter damage year 2

- Equal winterkill between seeded and vegetative varieties
- NuMex-Sahara greened up the fastest
- DT-1 and Latitude 36 are consistently among the fastest spring green-up

Overall Spring green up for first 2 years

- DT-1 and Latitude 36 most consistent spring green-up
- First year difference among winterkill in seeded vs. vegetative varieties

How to Test for Winterkill

Department of Plant Sciences

TESTING TURF FOR WINTERKILL

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Warm-season turfgrasses maintained throughout much of Tennessee can be damaged during severe winter weather. This low temperature damage (often termed “winterkill”) can be caused by exposure to sustained low temperatures or abrupt temperature decreases.

Causes of Winterkill

In Tennessee, winterkill often occurs when warm-season turfgrasses such as bermudagrass (*Cynodon dactylon*) are exposed to sub-freezing temperatures during the dormant winter season. Moisture present in turfgrass tissue can cause the formation of intracellular ice crystals in plant crowns that can cause cells to rupture. Additionally, exposure to temperatures less than 23 F can also be lethal. Affected plants will have a water soaked appearance that becomes necrotic over time.

Soil can insulate underground portions of the plants, allowing turfs to withstand sudden temperature decreases for short periods of time. However, several days of exposure to lethal temperatures can be fatal to warm-season turfgrasses.

Bermudagrass dormancy is a critical process that allows plants to acclimate for winter conditions each fall. Weather conditions that interrupt winter dormancy (i.e., abnormally warm temperatures) can make

<https://extension.tennessee.edu/publications/Documents/D4.pdf>

How to determine winter damage



Things to do to mitigate damage going into winter

- Turf covers
- Straw covers
- Combination of covers and straw
- Raise mowing height going into winter
- Reduce traffic
- Improve drainage



Summer plot set up for traffic

- Trafficked trial only received traffic
- Traffic applied at three games per week
- Traffic from August 11 – September 21





Materials and Methods

30 Simulated Traffic Events

Cady Traffic Simulator
(Henderson et al., 2005)



15 Games of Traffic



DT-1



Celebration



Astro



Latitude 36

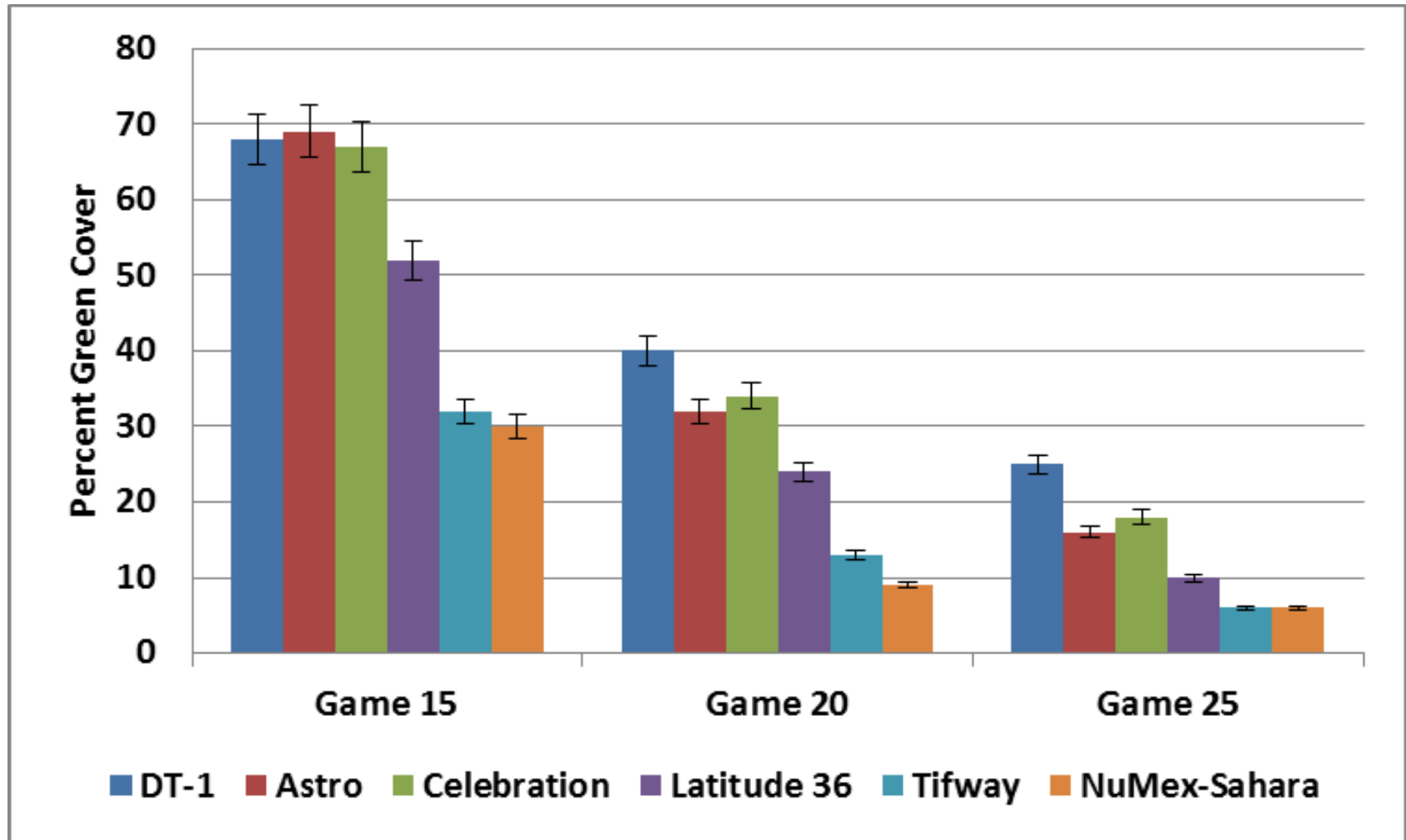


Tifway



NuMex-Sahara

Percent Green Cover Lost 2014



Results

- Highest traffic tolerance 2014
 1. DT-1
 2. Astro
 3. Celebration
 4. FAES 1325
 5. Latitude 36

Results

- Lowest traffic tolerance 2014
 1. NuMex – Sahara
 2. OKS 2009-3
 3. Tifway
 4. Patriot
 5. North Shore SLT

Summary of traffic data

- Currently available varieties with good traffic tolerance
 1. Astro
 2. Latitude 36
 2. Celebration
 3. Riviera
- NuMex – Sahara had the lowest traffic tolerance of all varieties

Overall

- DT-1 had the lowest amount of winterkill and the highest traffic tolerance
- NuMex – Sahara performed poorly in traffic tolerance and had high amounts of winterkill
- First year establishment showed that vegetative varieties had the least amount of winterkill

Species Selection



Materials and Methods

- 2 Mowing Heights
 - ½" & 7/8"
- 6 Varieties (4 vegetative and 2 seeded)
 - Vegetative
 - Tifway (NuLife sod), Latitude 36, Patriot, NorthBridge (Oakwood Sod Farm)
 - Seeded
 - Hollywood and Riveria
- 2 Overseeding Treatments (40% SR4600, 40% Zoom, 20% SR4420)
 - With and without overseeding at 10 lbs./1000 ft²

Plot Testing

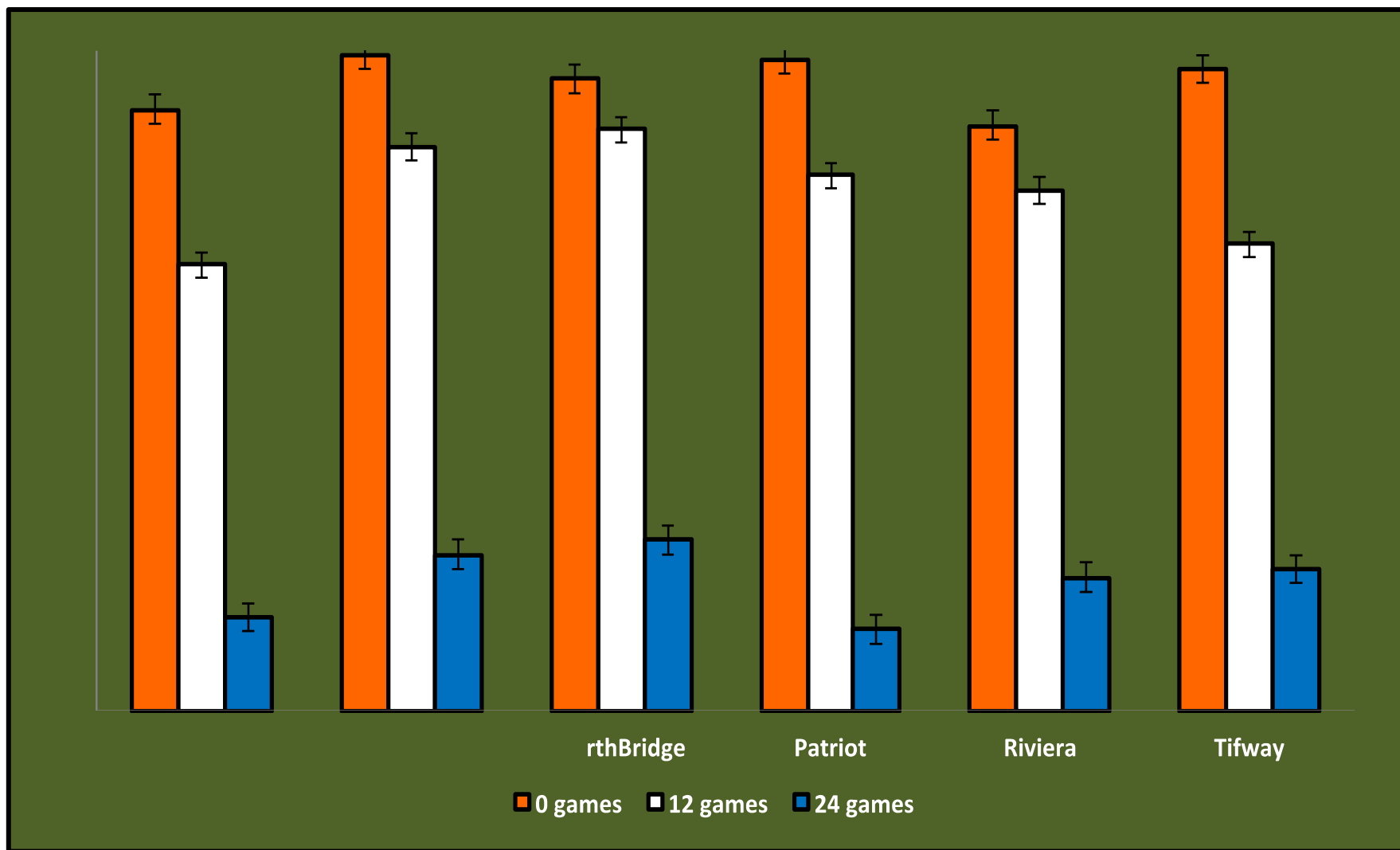
- Mechanical testing after 0, 12, and 24 games:
 - Surface hardness
 - Soil moisture
 - Rotational Resistance
 - Overseeding will be 1 week old for 12 games testing
- DIA
 - Digital Image Analysis
 - Percent Green Cover
 - Visual Ratings
 - Quality every two weeks

Clegg

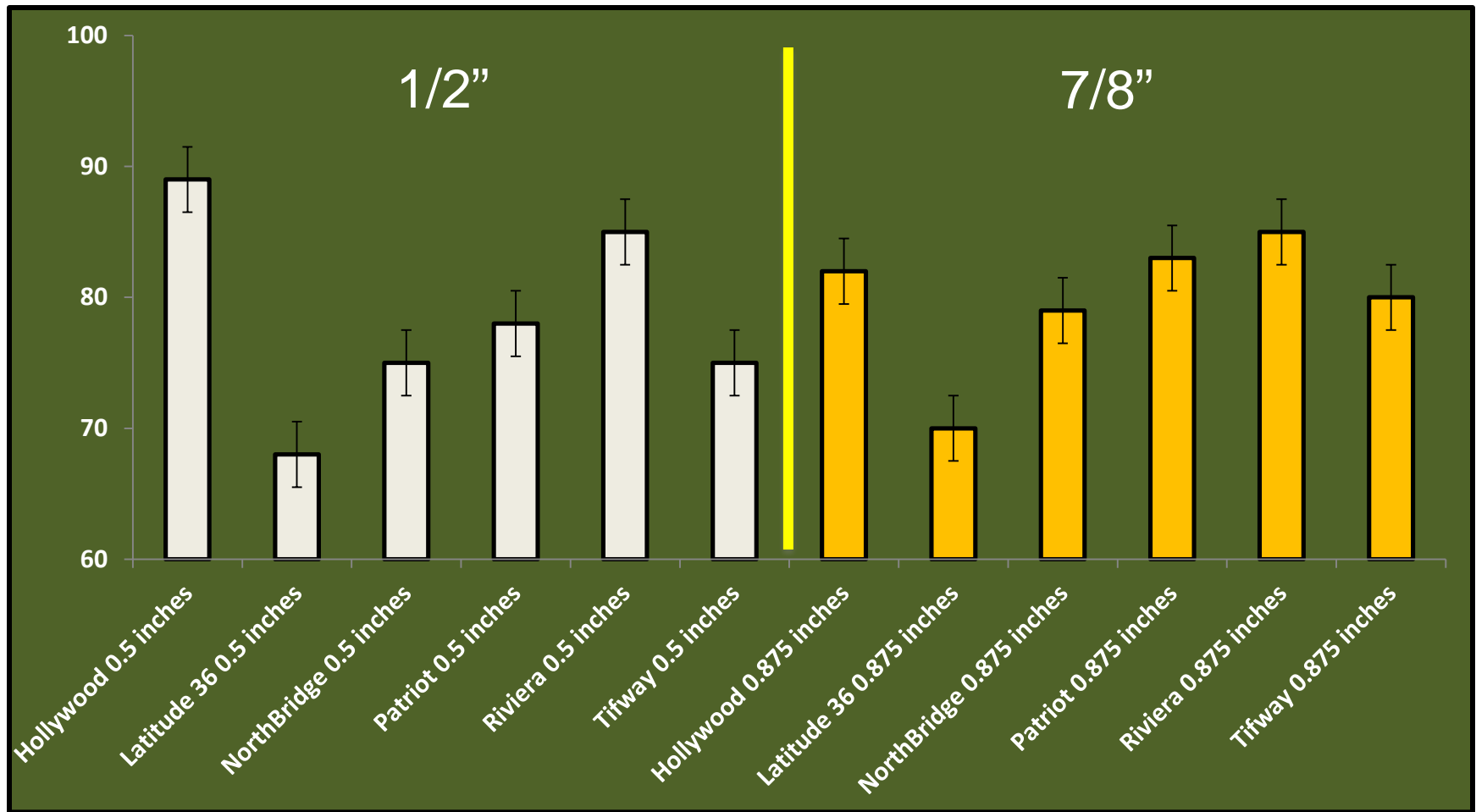
- Clegg Impact Surface Hammer
 - 2.25 kg missile
 - Originally designed for testing on roads
 - NFL uses it to determine surface hardness of fields



Digital Image Analysis for Percent Green Cover for Bermudagrass Varieties



Mowing height by variety Clegg values (Gmax) after 24 games



Summary

- Latitude 36 and Northbridge are comparable to Tifway (419) in:
 - Traffic tolerance
 - Recovery
- Seeded vs. vegetatively established made a difference
 - Vegetatively established varieties preformed better

Bermudagrass Athletic Field Management Calendar



Turfgrass Management

The Basics

- Proper implementation of the primary cultural practices
 - Mowing
 - Cultivation
 - Fertilization
 - Irrigation
 - Pest management



Additional Tools in Management

- Air injection
- Crumb rubber
- Turf Covers



Introduction

- Air injection aerators systems are a new tool that can be used to alleviate compaction and surface hardness

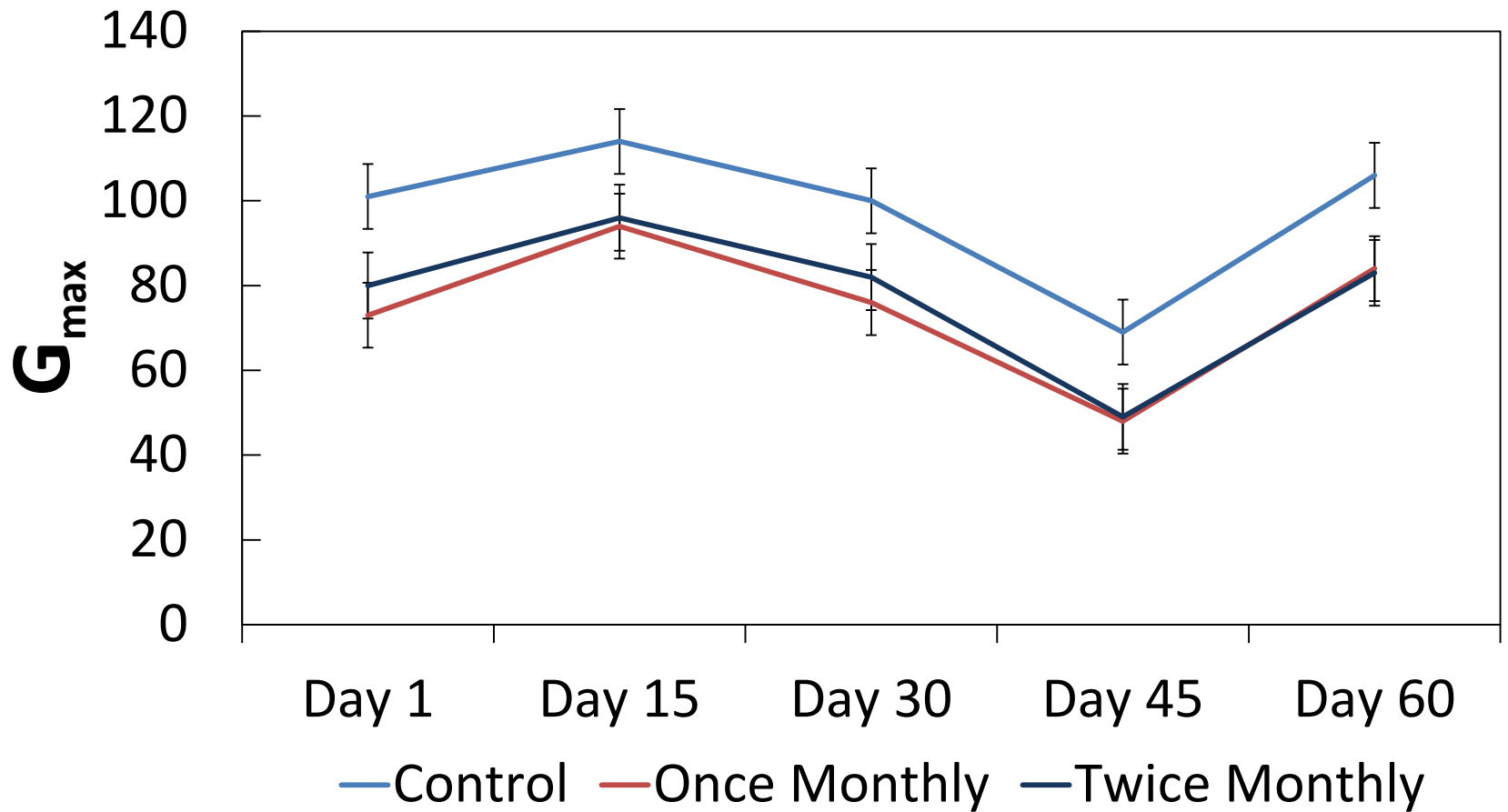




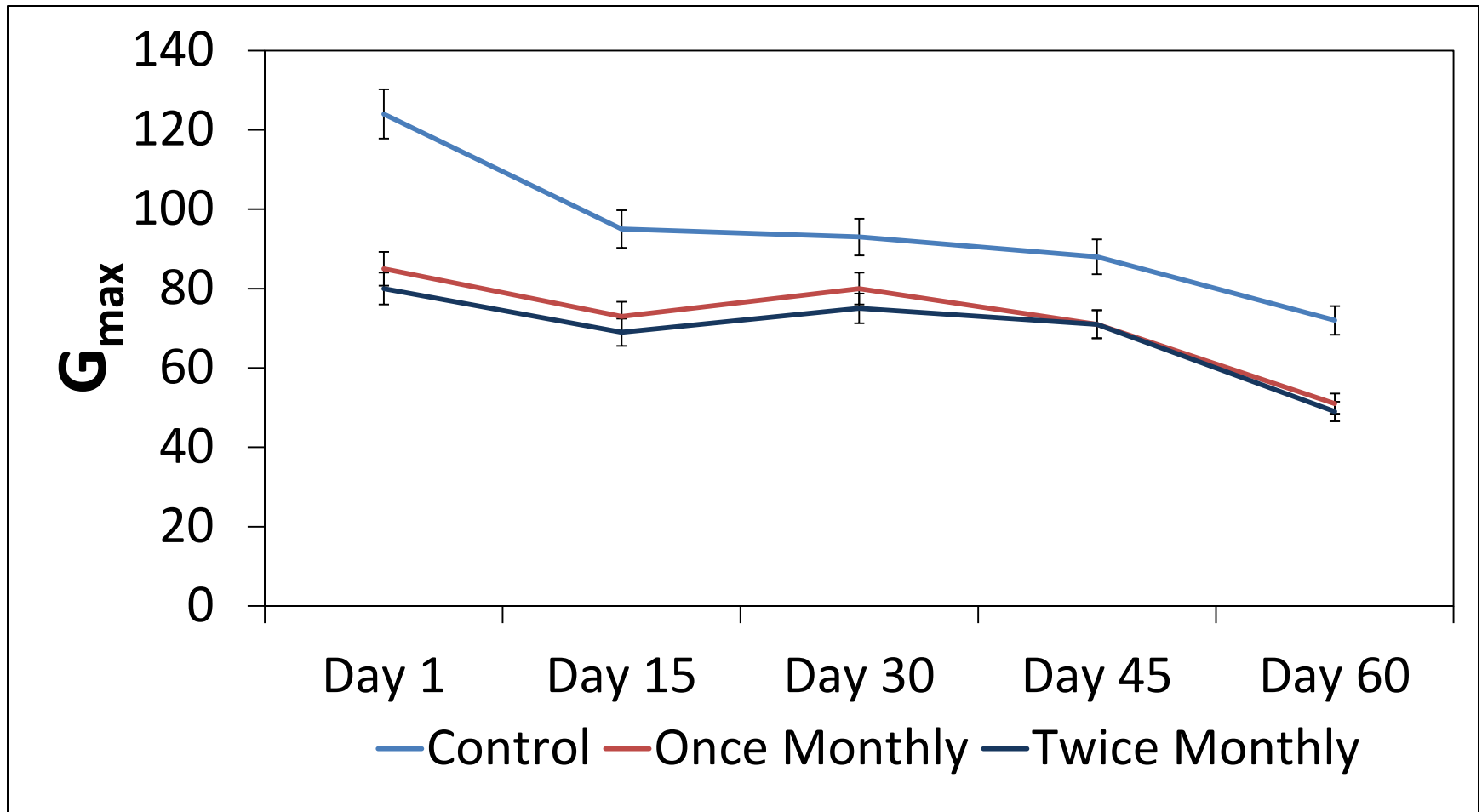
Materials and Methods

- Completed on a Tifway 419 athletic field
- Tine pressures of 100 psi and inject pressure of 150 psi were used for each air injection treatment.

Location One Surface Hardness



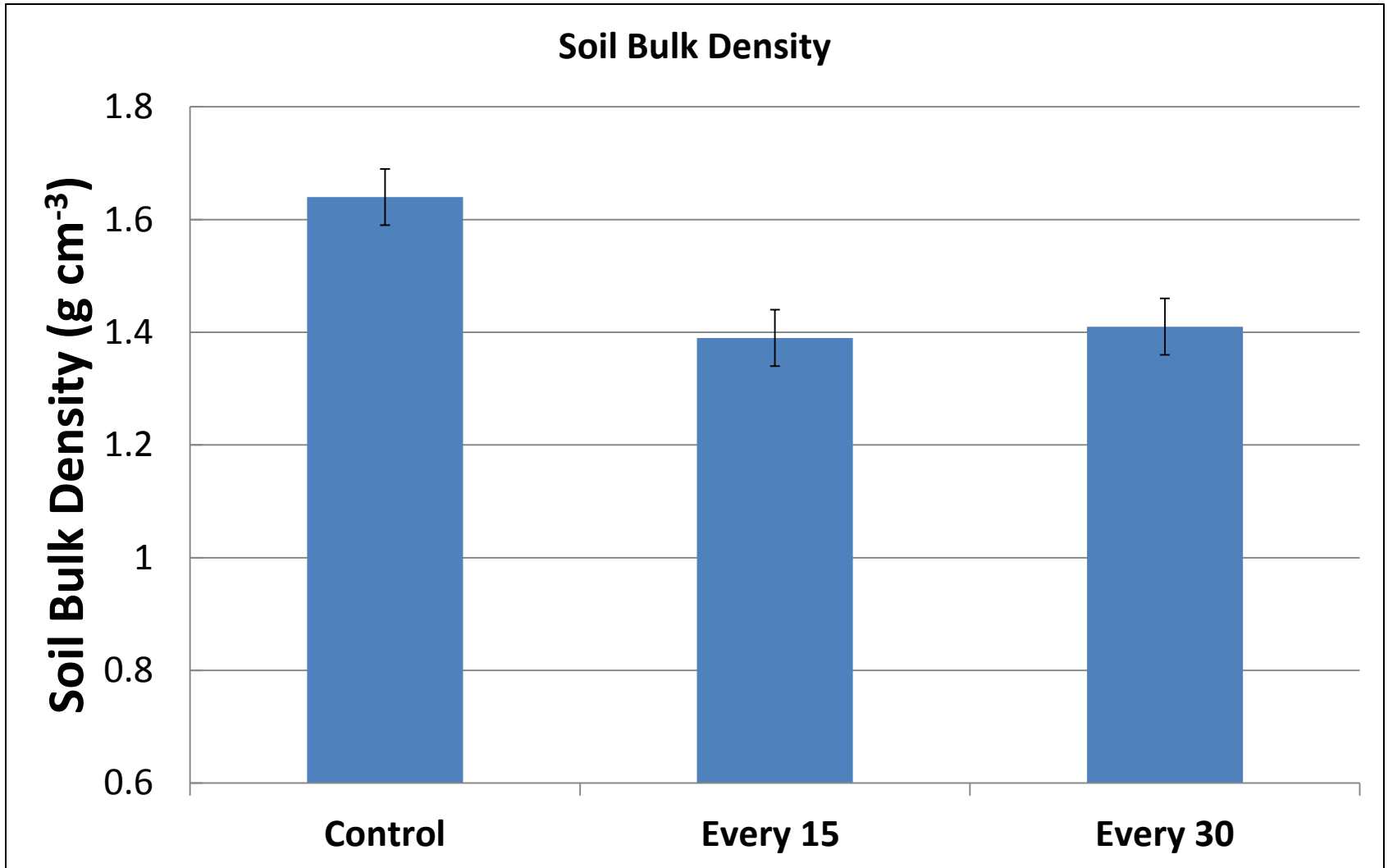
Location Two Surface hardness



Results

- Surface hardness was reduced in both AI immediately after application at both locations
- Location two at every date had 20% higher soil moisture content the location one
 - The higher the soil moisture content had a greater surface hardness reduction

Results



Results

- Bulk Densities were reduced on average from 1.64 to 1.4 g/cm³. The untreated control saw no reductions in bulk density
- Bulk Densities were reduced in both air injection application timing by an average of 15% in the top five cm of soil

Summary

- Airinjection systems:
 - Decrease surface hardness for one week
 - Decrease soil bulk density
 - Increase infiltration

Crumb Rubber

- Design
 - 5 crumb rubber (CR) particle sizes
 - 4 CR depths (in): 0, 1/4, 1/2, and 3/4



(1.0-2.0 mm)



(0.05-0.5 mm)

Costs

- Costs \$0.30 cents a pound
 - For a football field it would cost \$10,000 for a ½” depth applied to the whole field
- More of an affordable option for high use areas
 - Center of a football field
 - Goal box: soccer, lacross
 - Sidelines
 - High use areas

A Comparison of a control plots

Start



End



A Comparison of 1/4in Rubber Plots

Start



End

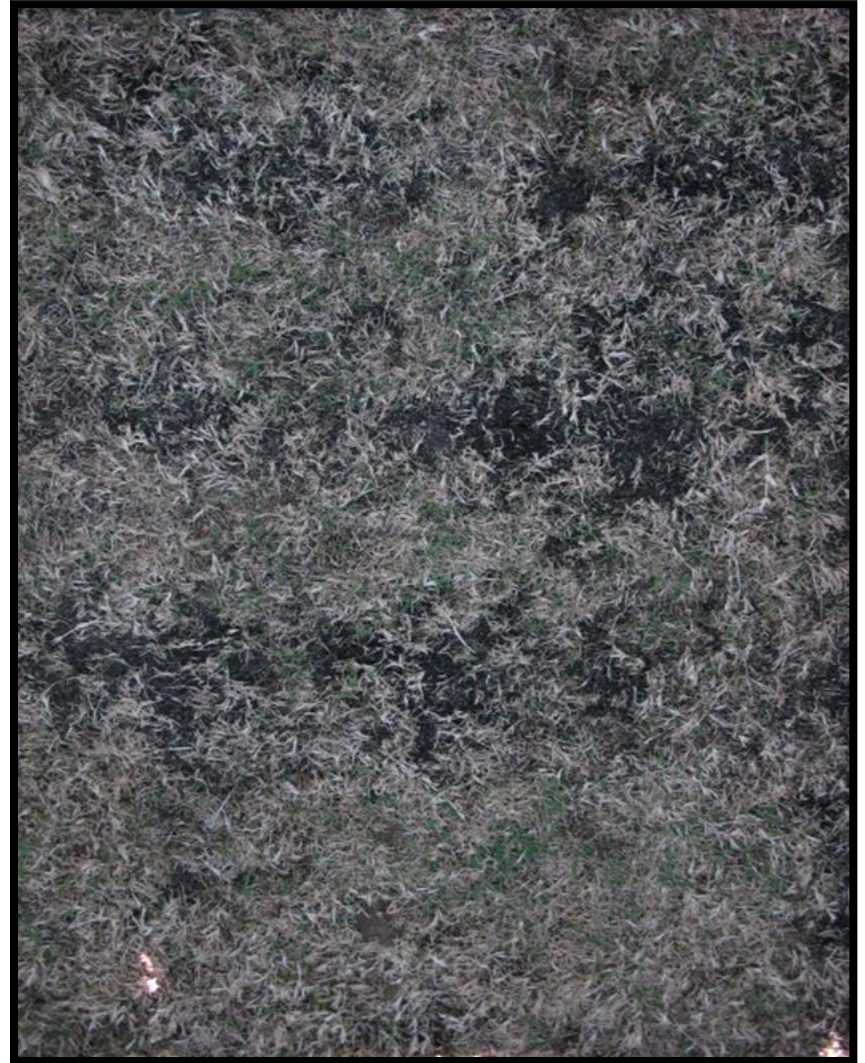


A Comparison of 1/2in Rubber Plots

Start



End



A Comparison of 3/4in Rubber Plots

Start

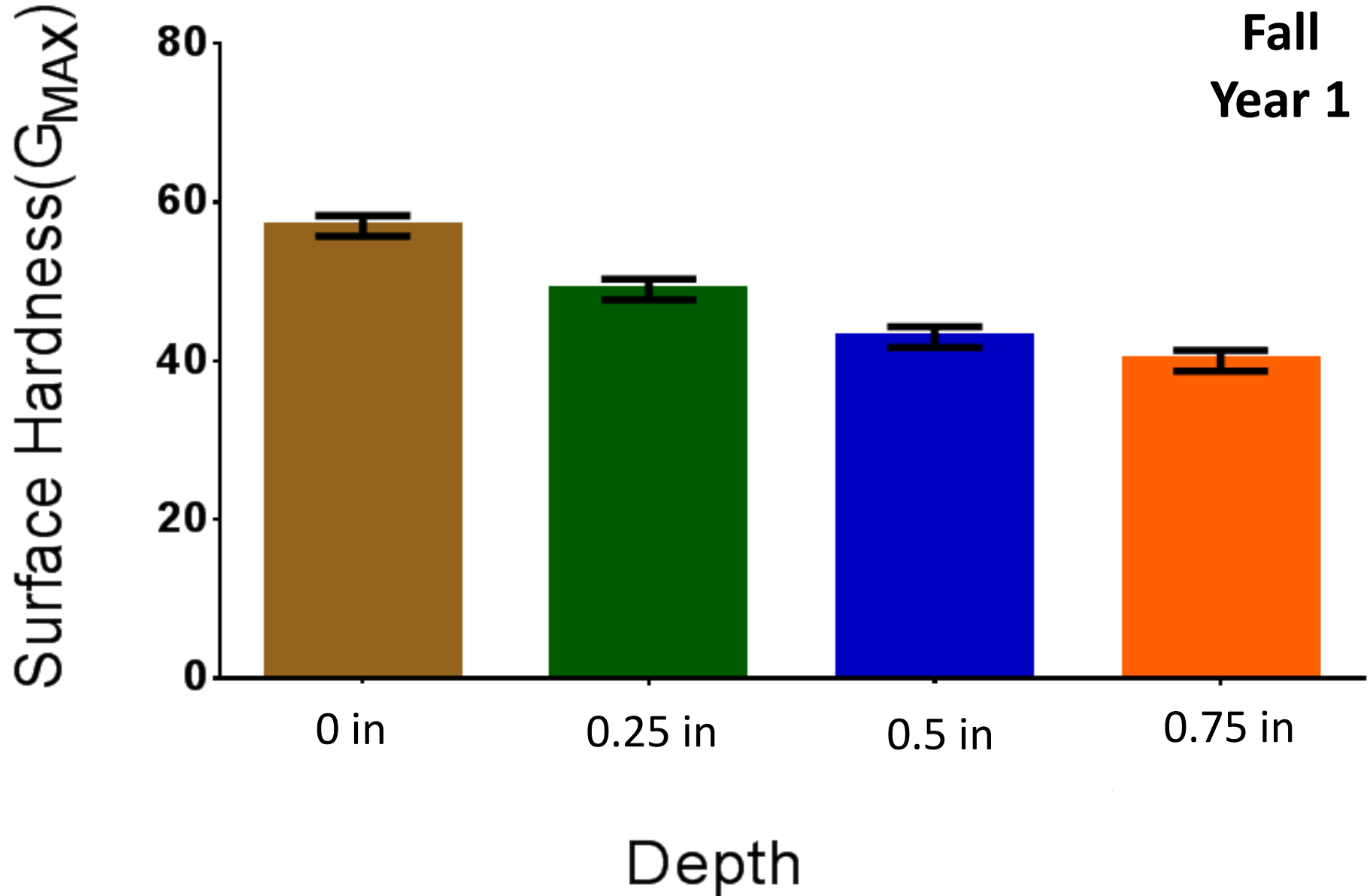


End



25 Simulated Traffic Events

Fall
Year 1



Study Conclusions

- Crumb rubber topdressing depth has a greater effect on increasing bermudagrass traffic tolerance, regardless of particle size
- The greater the crumb rubber topdressing depth on bermudagrass, the lower the surface hardness

Update on crumb rubber

CR overseeding

- Crumb rubber topdressing
 - 1/2in depth crumb rubber
 - Perennial rye overseeding at 20,000 lbs per 1,000 ft²
 - Hybrid bermudagrass (C. dactylon (L.) Pers. x C. transvaalensis Burtt-Davy, 'Tifway') athletic field
 - 24 simulated traffic events

CR overseeding picture



Summary of that study

- Perennial ryegrass had trouble germinating in 1/2 crumb rubber topdressing
- Crumb rubber plots had more dormant bermudagrass coverage
- Crumb rubber plots had less perennial ryegrass remaining after 24 games of simulated traffic

Overall Take home

- Newer varieties are becoming just as good if not better than Tifway
- Seeded vs. vegetatively established will perform differently
- There are new tools available to help improve turfgrass quality

Questions?

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