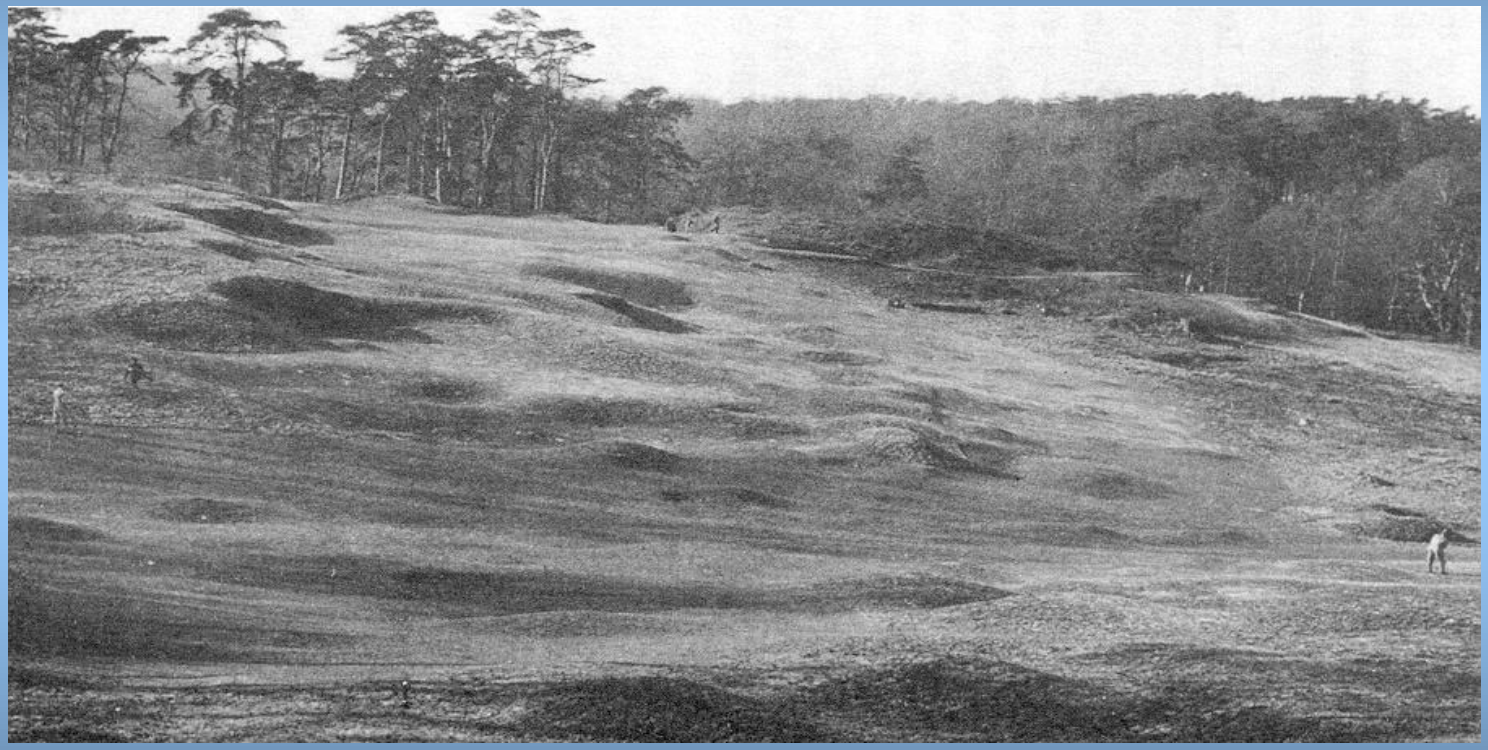
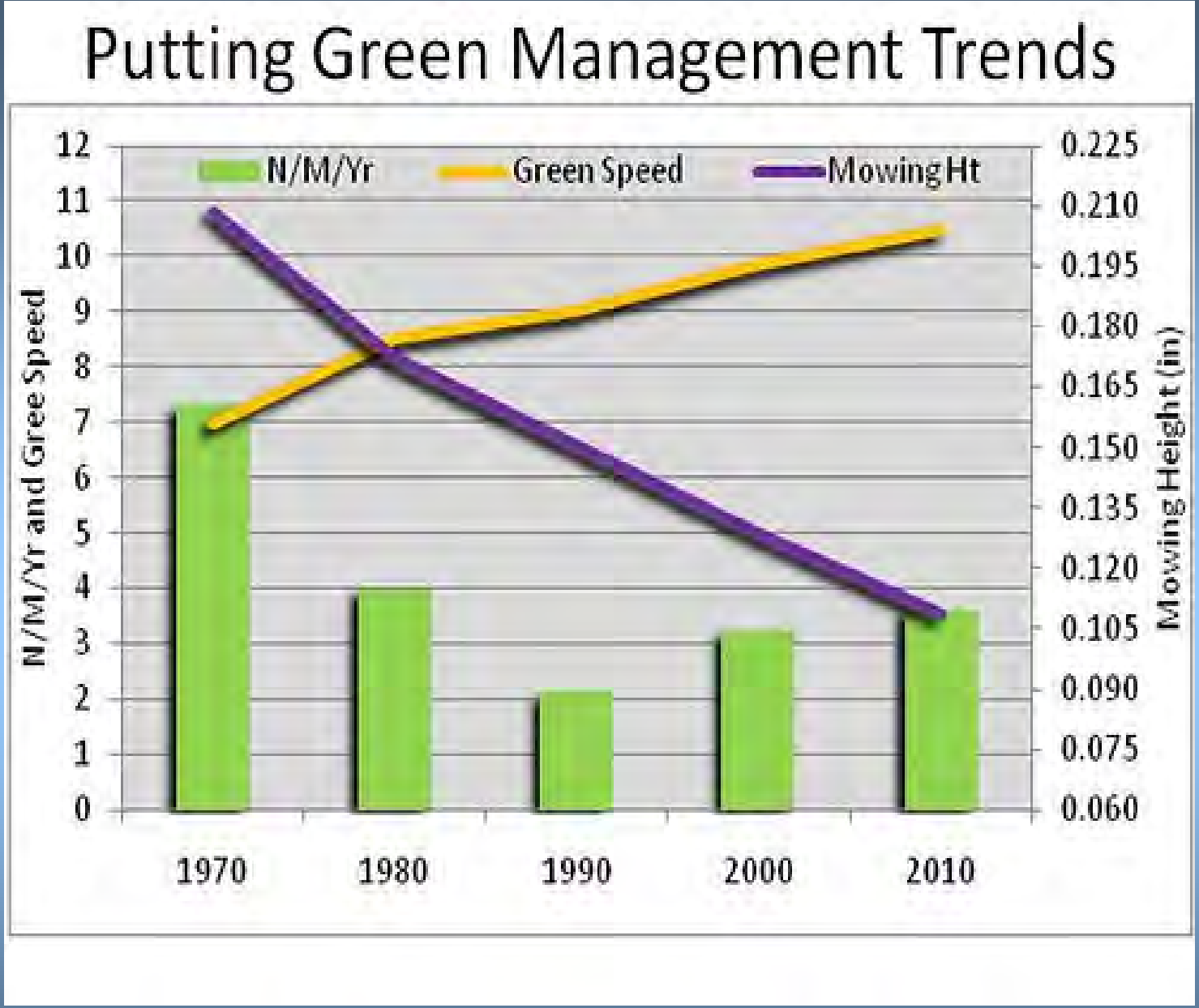
Greens Rolling

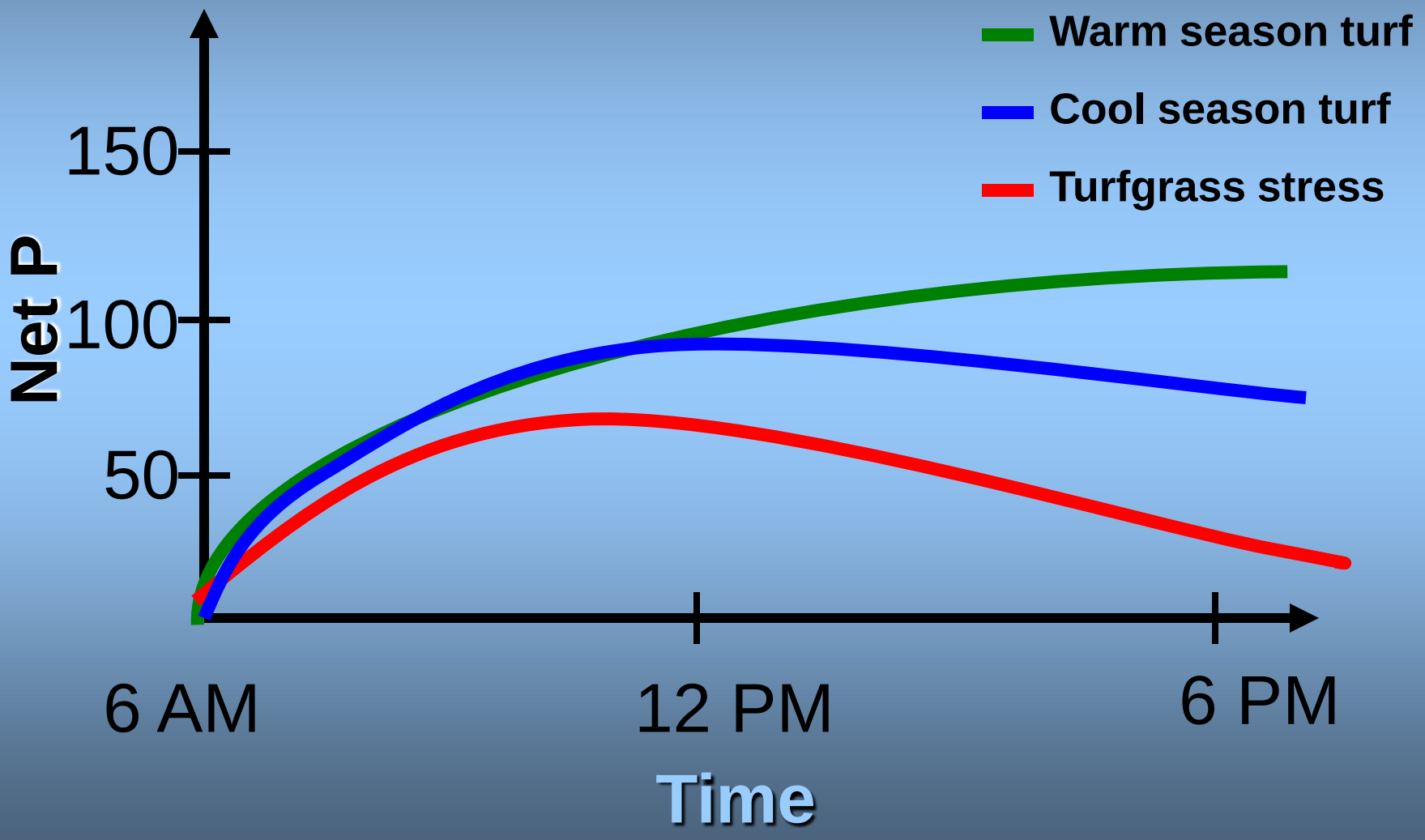


John C. Sorochan, Ph.D.
University of Tennessee



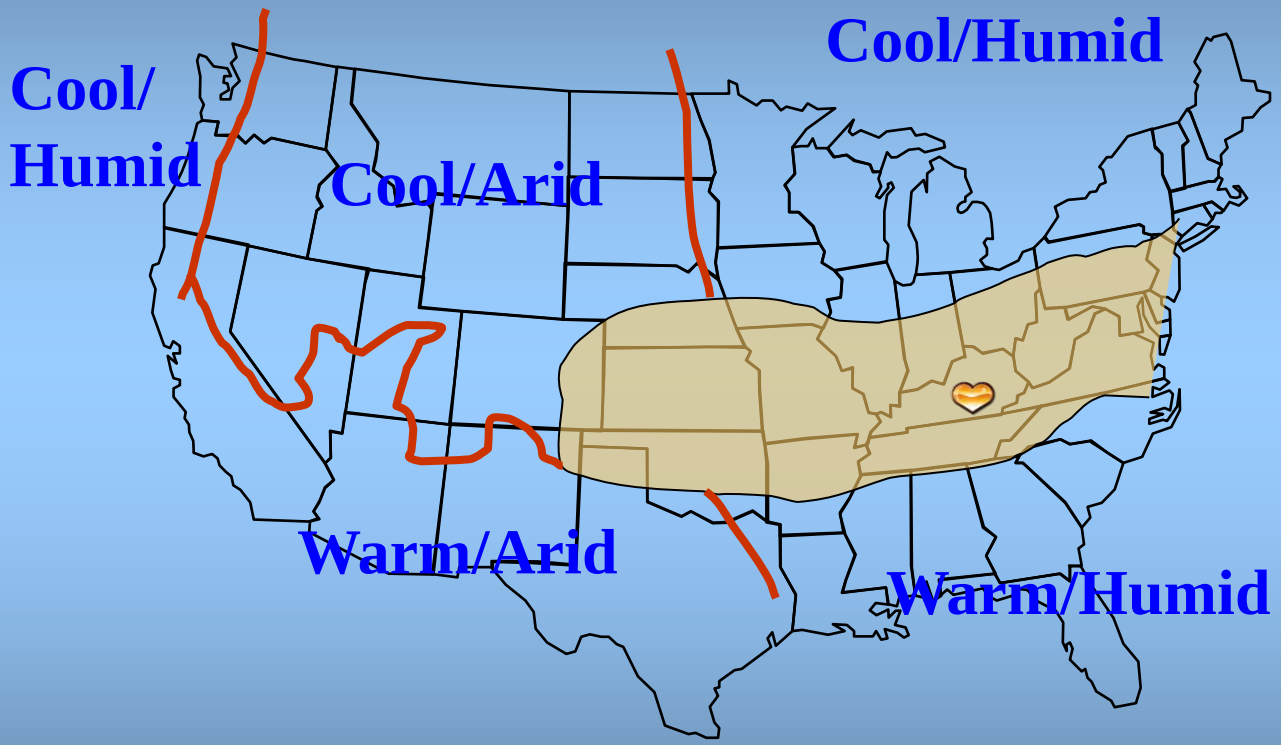
This figure was put together from USGA data representing responses in management practices at "high level clubs" in the Northeastern and Mid-Atlantic regions of the USGA green section. Data shows varying nitrogen fertility practices and a trend for lower mowing heights. Despite fluctuations in annual nitrogen rates, green speeds have continued to increase since 1970.

Turfgrass Photosynthetic Efficiency



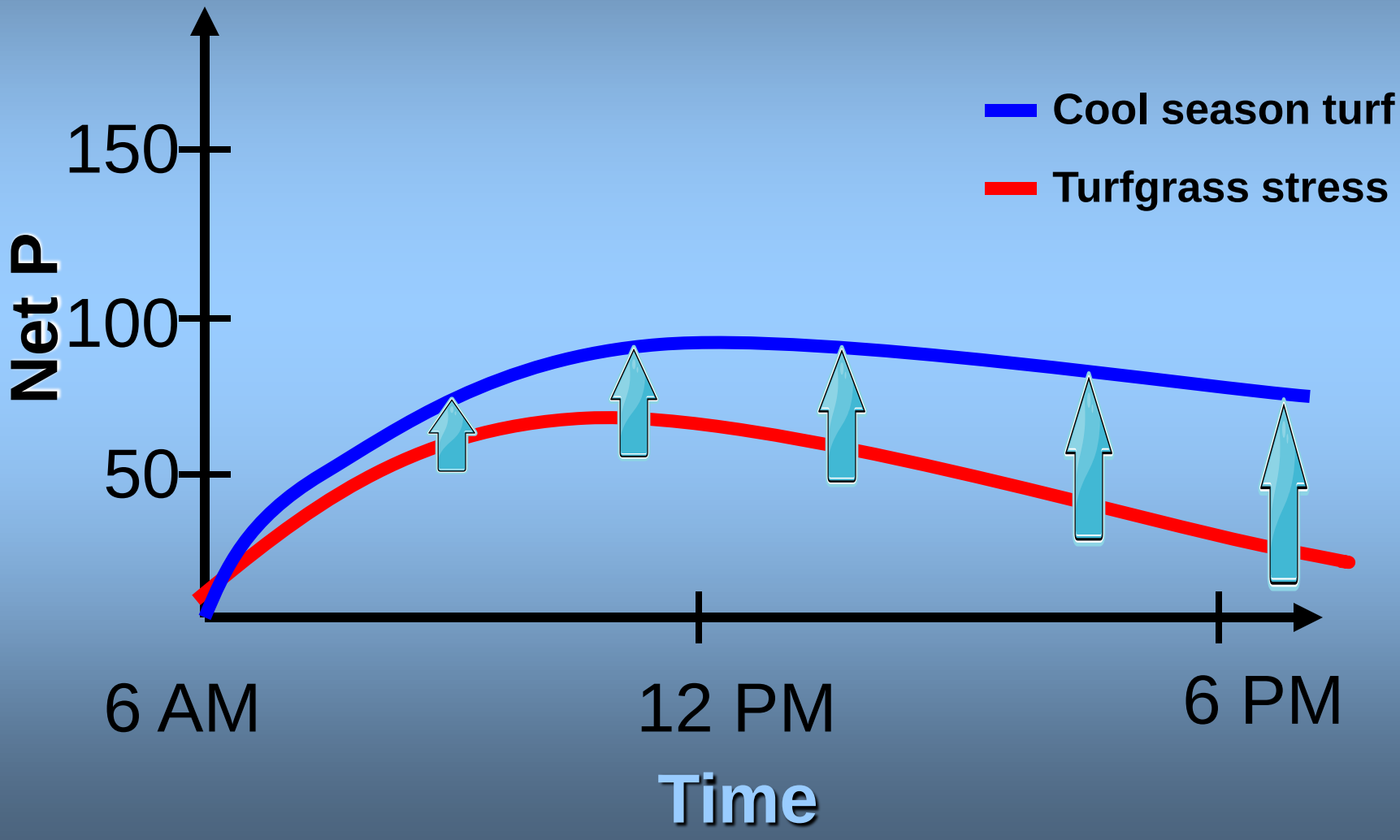
Turf Climates in U.S.

- **Adaptation: Cool vs. Warm Season**



- **Transition Zone Challenge**

Turfgrass Photosynthetic Efficiency



Light-weight Rolling

Mowing and Light-weight Green Rolling on Creeping Bentgrass Putting Greens During Heat Stress Conditions in the Transition Zone

Sorochan et al., 2006. University of Tennessee

Introduction

- **Preventing Turf Decline from Indirect Heat Stress**
  - **Reduce mowing frequency**
    - **Mow maximum of five days week^{-1} (McCarty, 2001)**
    - **Mow six days week^{-1} (Beard, 2002)**

Introduction

- **Raise mowing height**
  - **Lower mowing heights increases the susceptibility to heat stress and injury (Fry & Huang, 2004)**
- **Greenside fans**
- **Syringing**

Introduction

- **How do we manage a stressed turf without sacrificing:**
  - **Putting Speed**
  - **Playability**
  - **Aesthetics**

Rolling and Mowing During Heat Stress

- **Objective:**
  - **Determine how alternating mowing with light weight greens rolling affects putting green quality, disease incidence, root length, and speed**

Materials and Methods

- **Experimental Design**
  - **Randomized Complete Block Design with three replications**
  - **Plots are 4 x 16 feet**
- **Treatments**
  1. **Mowing 6 days week^{-1} (Mow Only)**
  2. **Mowing 6 days and rolled 3 days week^{-1} (Mow with Roll)**
  3. **Alternating mowing 3 days week^{-1} with rolling (Alternate Mow w/ Roll)**

Materials and Methods

- **Locations**
  - **University of Tennessee Golf Facility, Lakeshore Park**
    - **‘Penncross’ Creeping Bentgrass**
      - **Location A: 2004**
      - **Location B: 2005**

Materials and Methods

- **Equipment:**
  - **Toro Flex 21**

  - **DMI Speed Roller**
    - **Three 38 inch rollers**
    - **465 lbs. without operator**

Materials and Methods

- **Management Practices**
  - **Fertility, irrigation, and cultivation were conducted within standardized practices for each region.**
  - **Fungicides were applied as a curative after disease incidence occurred.**

Data Collection

- **Turfgrass quality rating**
  - **1-9 scale (6 being acceptable)**
- **Incidence of disease**
  - **Number of incidents per plot**
- **Root Length**
  - **3 samples per plot**
- **Putting green speed**
  - **Ball roll distance**

Results

Turfgrass quality on a creeping bentgrass putting green during summer heat stress, June – August, 2004.

	2004		
Treatment	June	July	August
Mowing	8.00AB	7.67AB	7.00CD
Mowing w/ rolling	8.00AB	7.5BC	6.67D
Alternating mowing w/ rolling	8.33A	8.17AB	8.00AB

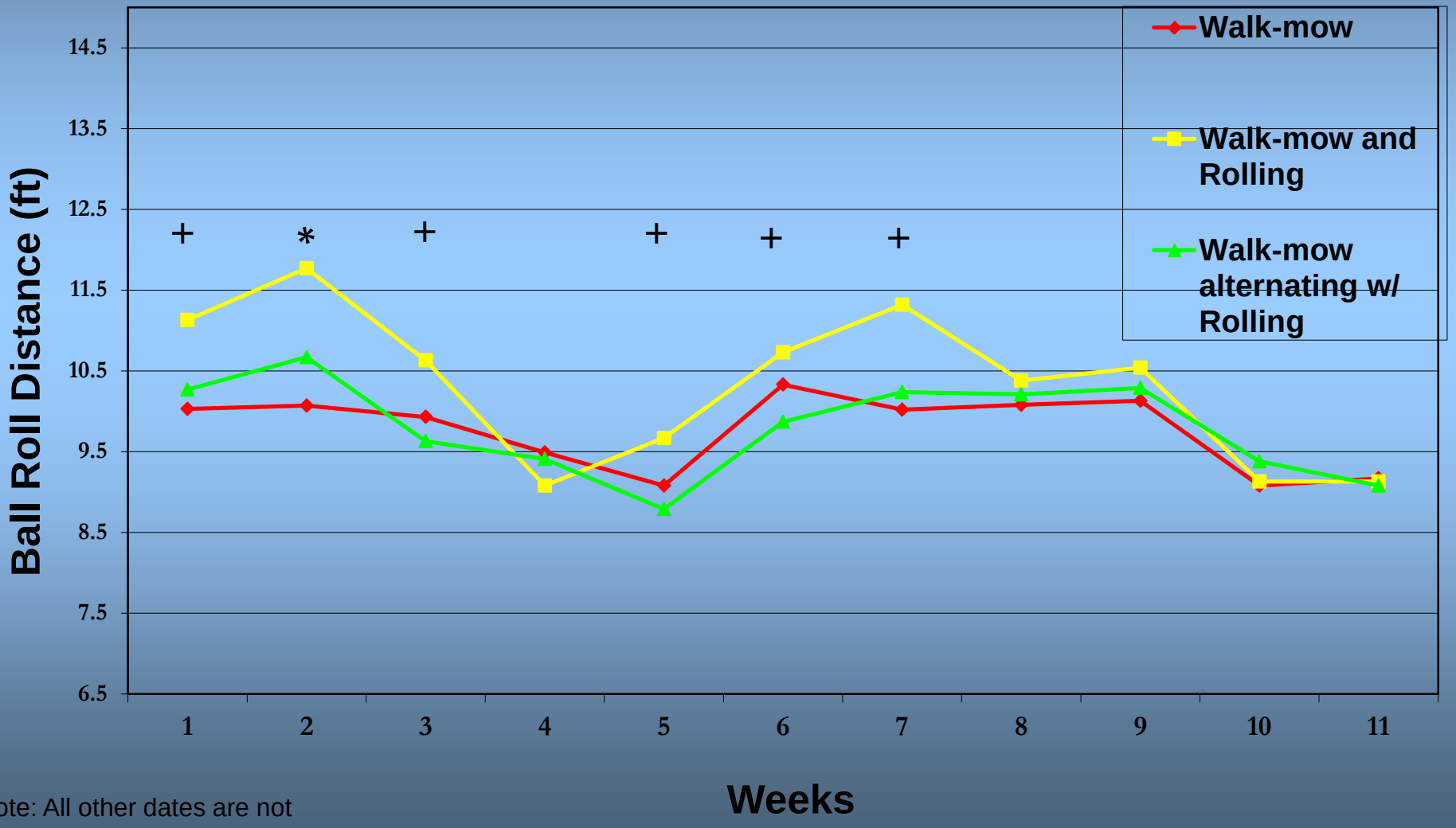
Interaction means followed by the same letter are not significantly different according to $LSD_{(0.05)}$.

Turfgrass quality on a creeping bentgrass putting green during summer heat stress, June – August, 2005.

	2005		
Treatment	June	July	August
Mowing	7.00A	7.00A	6.00B
Mowing w/ rolling	7.00A	6.23B	5.43C
Alternating mowing w/ rolling	7.00A	7.00A	6.87A

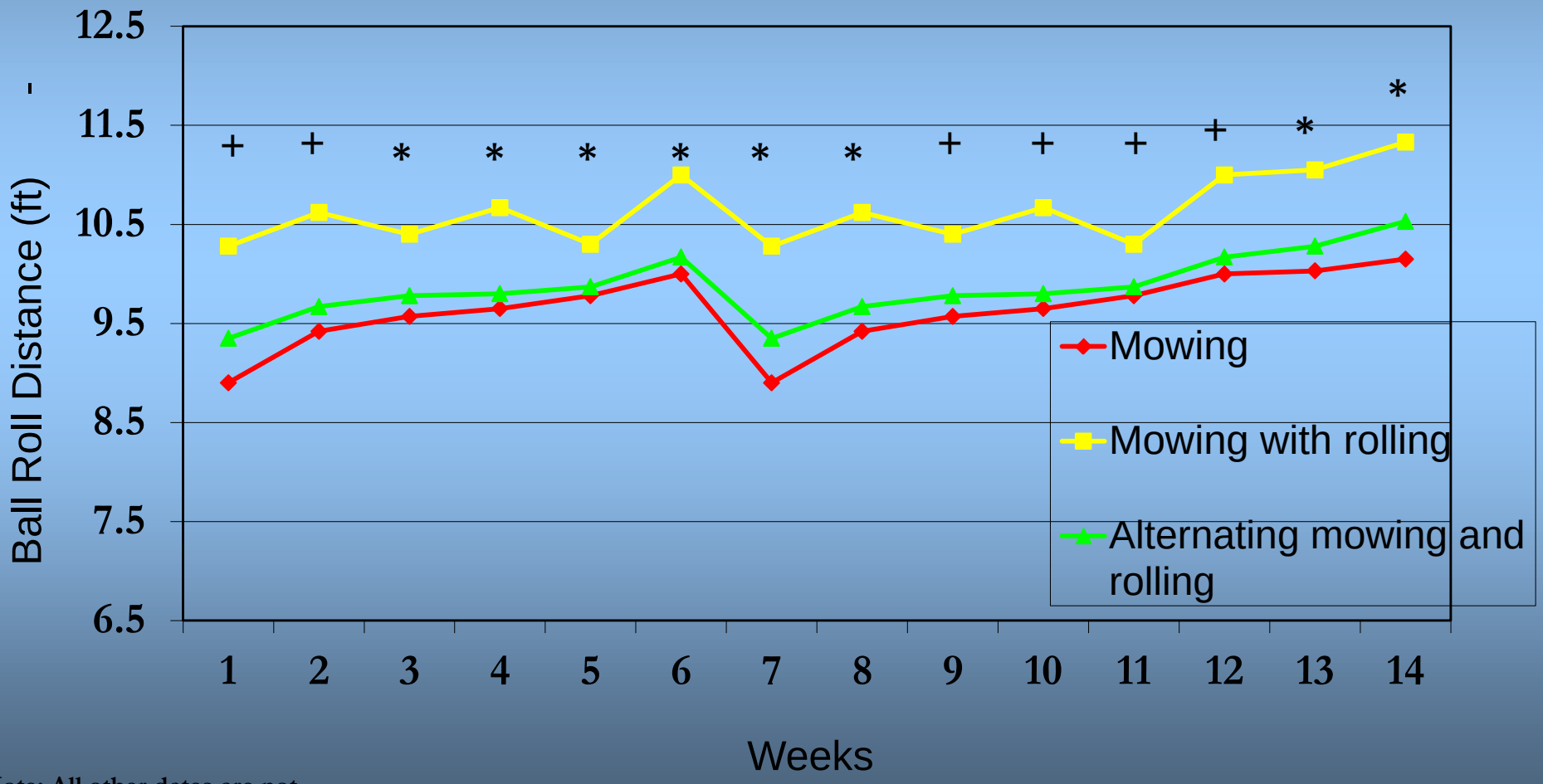
Interaction means followed by the same letter are not significantly different according to $LSD_{(0.05)}$.

Treatment Effects for Green Speed: Knoxville, TN (1 June – 1 September 2006)



Note: All other dates are not significant at 0.05 probability level.

Treatment Effects for Green Speed: Knoxville, TN (1 June – 1 September 2005)



Note: All other dates are not significant at 0.05 probability level.

Conclusions

- **During Indirect Heat Stress**
  - **Quality increased by alternating mowing with rolling (AMR)**
  - **No difference for disease occurrence or root lengths**

Conclusions

- **Statistical differences are not realistic for ball roll distance.**
- **Differences of 6 inches are not noticeable by the average golfer (Karcher et al., 2001).**
- **Speed differences for treatments greater than 6 inches**
  - **4 of 37 collection dates for AMR compared to MOW**

Conclusions

- **Superintendents should consider:**
  - **Alternating mowing with rolling during periods of heat stress**
    - **Improve turfgrass quality**
    - **Maintain reasonable green speeds**
  - **Potentially reduce costs?**

Partial Budgeting Analysis Comparison of Golf Course Management Systems

	Public		Private	
Management System	Triplex	Walk Behind	Triplex	Walk Behind
Mowing Six days week^{-1}	$14,464.75	$36,293.07	$10,334.18	$54,590.40
Mowing Six days week^{-1} and rolling three days week^{-1}	$18,677.05	$40,505.37	$15,580.89	$59,837.11
Alternating Mowing with Rolling	$11,444.67	$22,358.83	$10,413.80	$32,541.91
MOW vs AMR Difference	$3,020	$13,934	$-79	$22,048

Conclusions

- Golf courses using triplex mowers
  - May reduce costs
  - Depends on the course size
- Golf courses using walk behind mowers
  - Significant reduction of costs
  - Regardless of course size
- Should not be considered cost reduction, but cost adjustment instead!

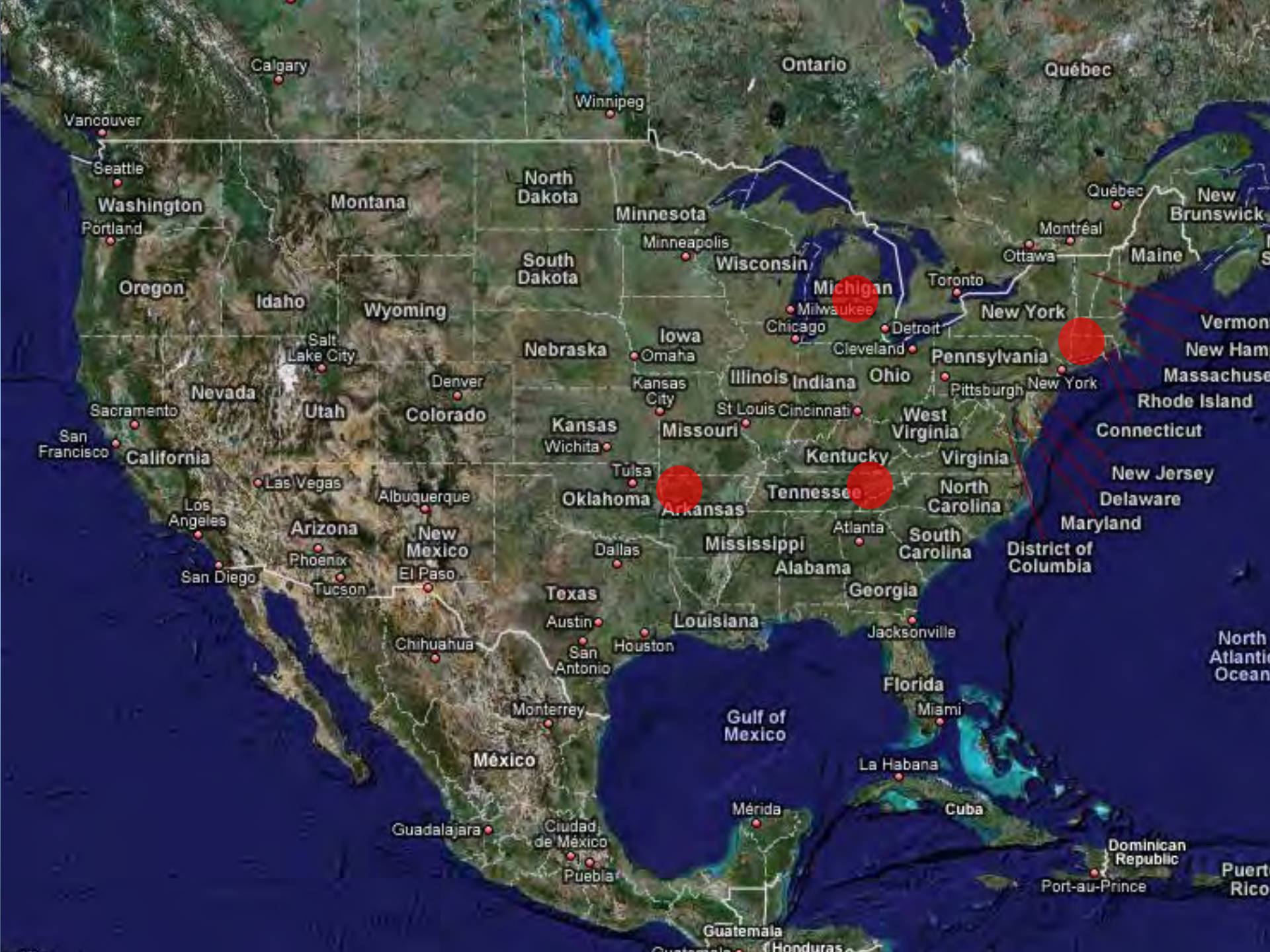
Conclusions

- Important for superintendents to educate membership regarding significance of putting green speeds and putting green quality

- Many superintendents are now alternating mowing and rolling year round

Now what?

mowing height,
mowing frequency,
and rolling frequency


Calgary
Ontario
Québec
Winnipeg
Vancouver
Seattle
Washington
Portland
Montana
North Dakota
Minnesota
Québec
New Brunswick
Montréal
Ottawa
Maine
Minneapolis
Wisconsin
South Dakota
Oregon
Idaho
Wyoming
Michigan
Toronto
Milwaukee
Chicago
Detroit
New York
Vermon
Salt Lake City
Nebraska
Iowa
Omaha
Cleveland
Pennsylvania
New Ham
Massachuse
Denver
Kansas City
Illinois
Indiana
Ohio
Pittsburgh
New York
Nevada
Utah
Colorado
Sacramento
St Louis
Cincinnati
Rhode Island
San Francisco
California
Kansas
Missouri
West Virginia
Connecticut
Wichita
Kentucky
Virginia
Tulsa
New Jersey
Las Vegas
Albuquerque
Oklahoma
Tennessee
North Carolina
Delaware
Los Angeles
Arizona
New Mexico
Arkansas
Atlanta
Maryland
Phoenix
Dallas
Mississippi
South Carolina
San Diego
El Paso
Alabama
District of Columbia
Tucson
Texas
Georgia
Austin
Louisiana
Jacksonville
Chihuahua
Houston
San Antonio
North Atlantic Ocean
Florida
Monterrey
Miami
Gulf of Mexico
México
La Habana
Mérida
Cuba
Guadalajara
Ciudad de México
Dominican Republic
Puebla
Port-au-Prince
Puert Rico
Guatemala
Honduras

Treatments

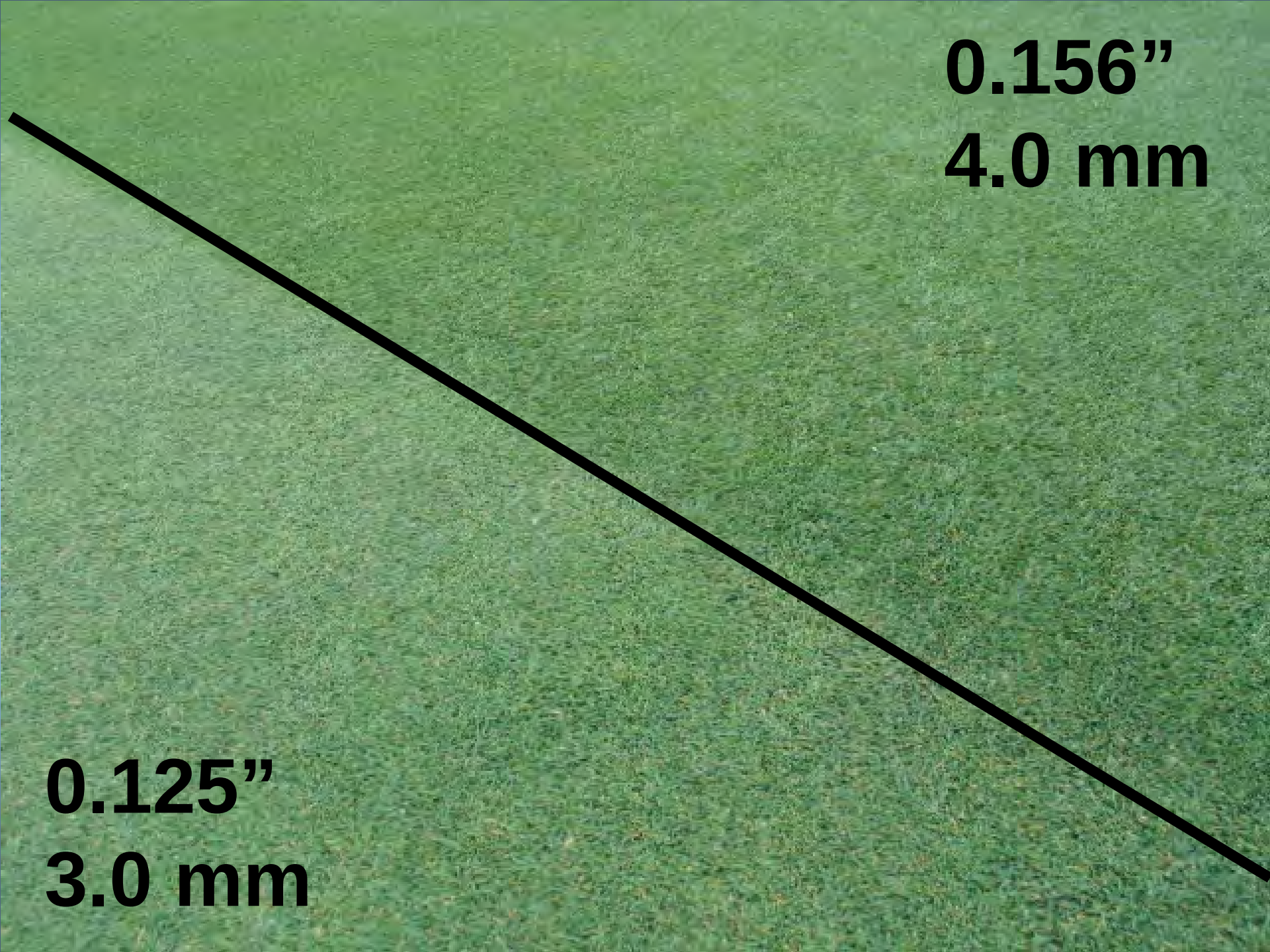
1. **Mowed 0.125”, Control**
2. Mowed 0.125”, Rolled 3X
3. Mowed 0.125”, Rolled 6X
4. Mowed 0.125” (3X), Rolled 3X
5. Mowed 0.125” (3X), Rolled 6X
6. **Mowed 0.156”, Control**
7. Mowed 0.156”, Rolled 3X
8. Mowed 0.156”, Rolled 6X
9. Mowed 0.156” (3X), Rolled 3X
10. Mowed 0.156” (3X), Rolled 6X


VOLUNTEERS

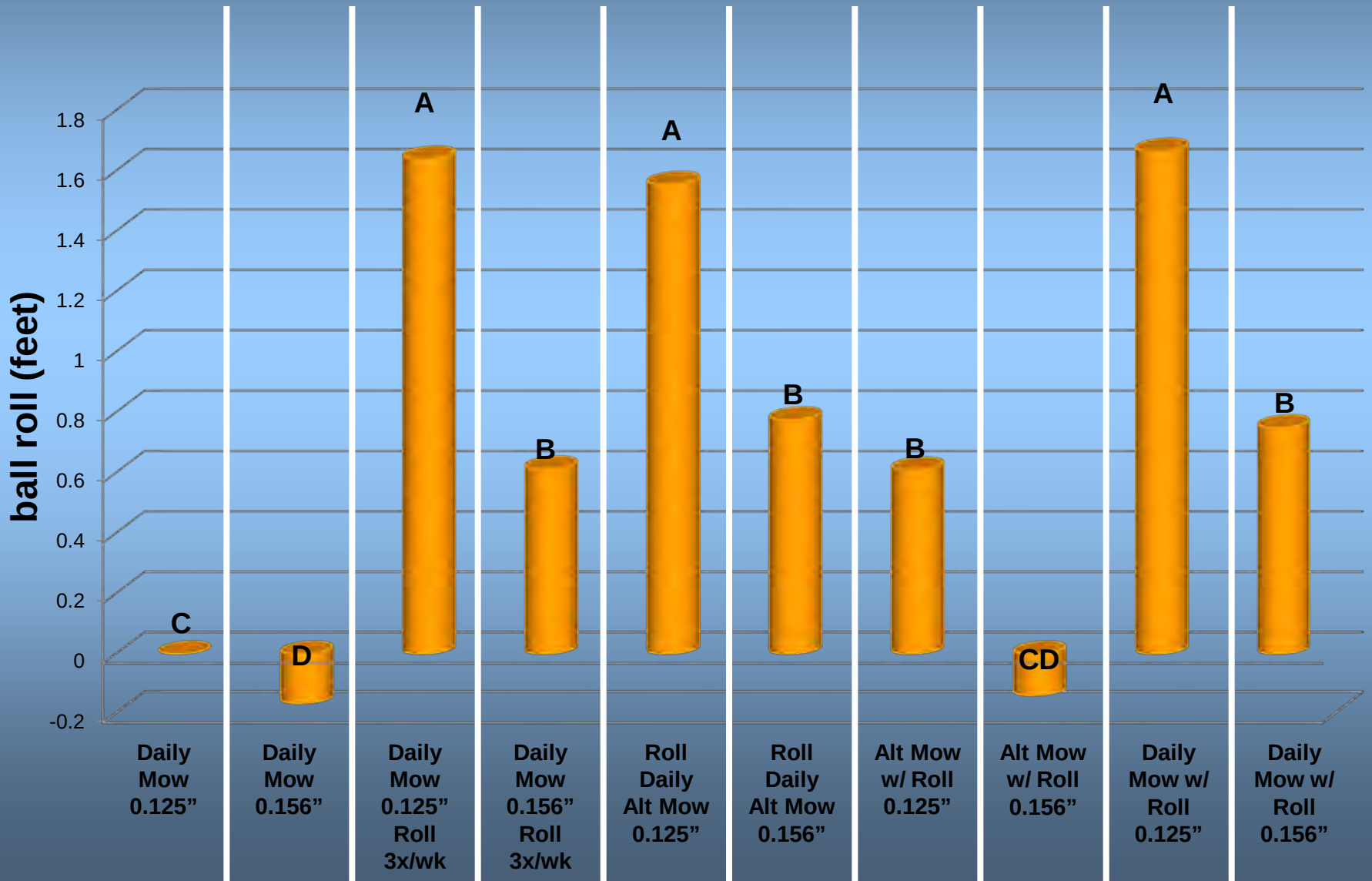
Tru-Turf RS48-11C Golf Roll ‘n’ Spike


125 MD
101


125 M-Mn F
RTRS
67


0.156”
4.0 mm
0.125”
3.0 mm

Putting green speeds as influenced mowing frequency and light weight rolling: Knoxville, TN – June 2008.



Turfgrass Species

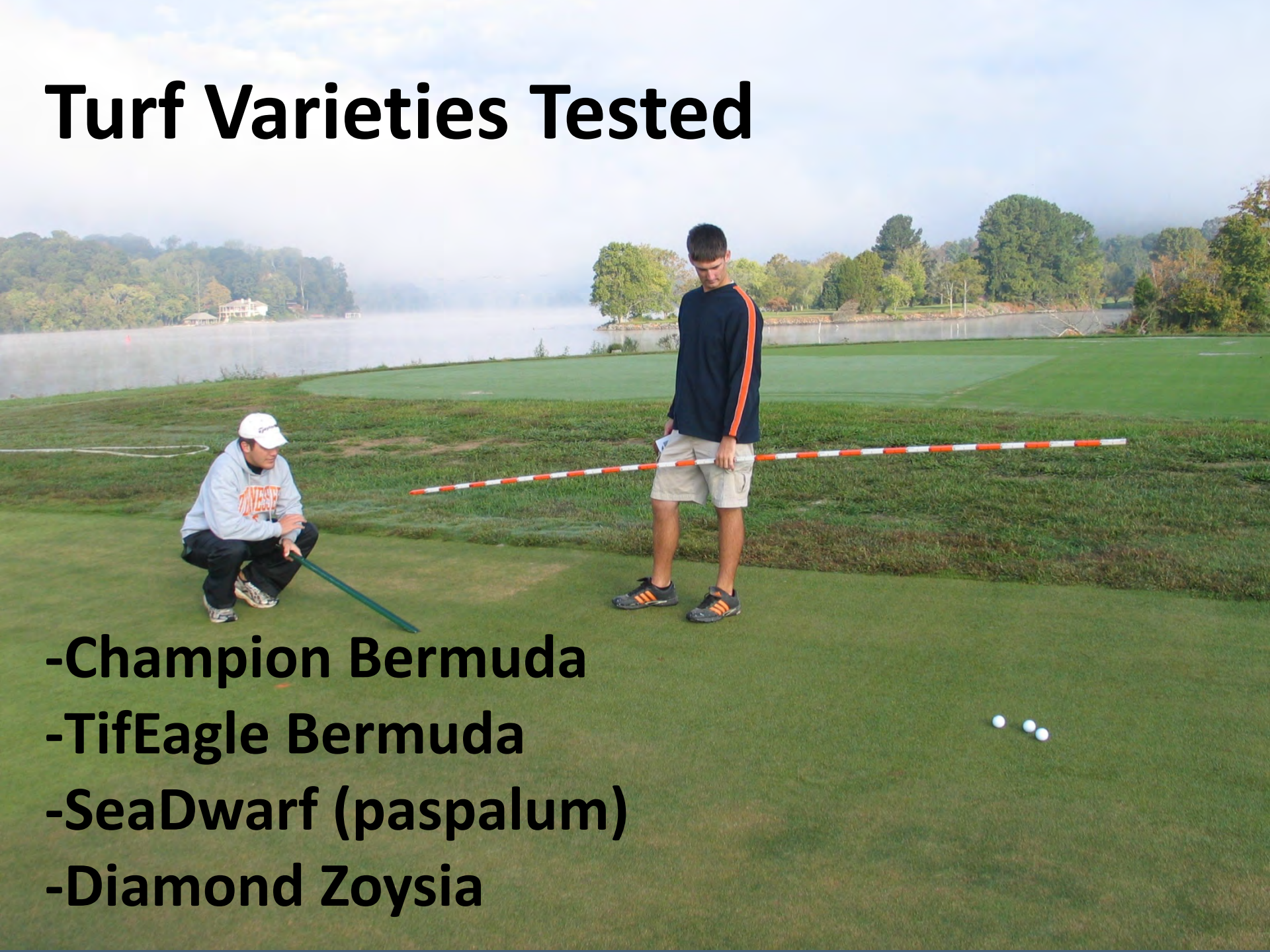
Effects of Light Weight Rolling on Four – Ultradwarf Turfgrasses

Materials and Procedures

Procedure

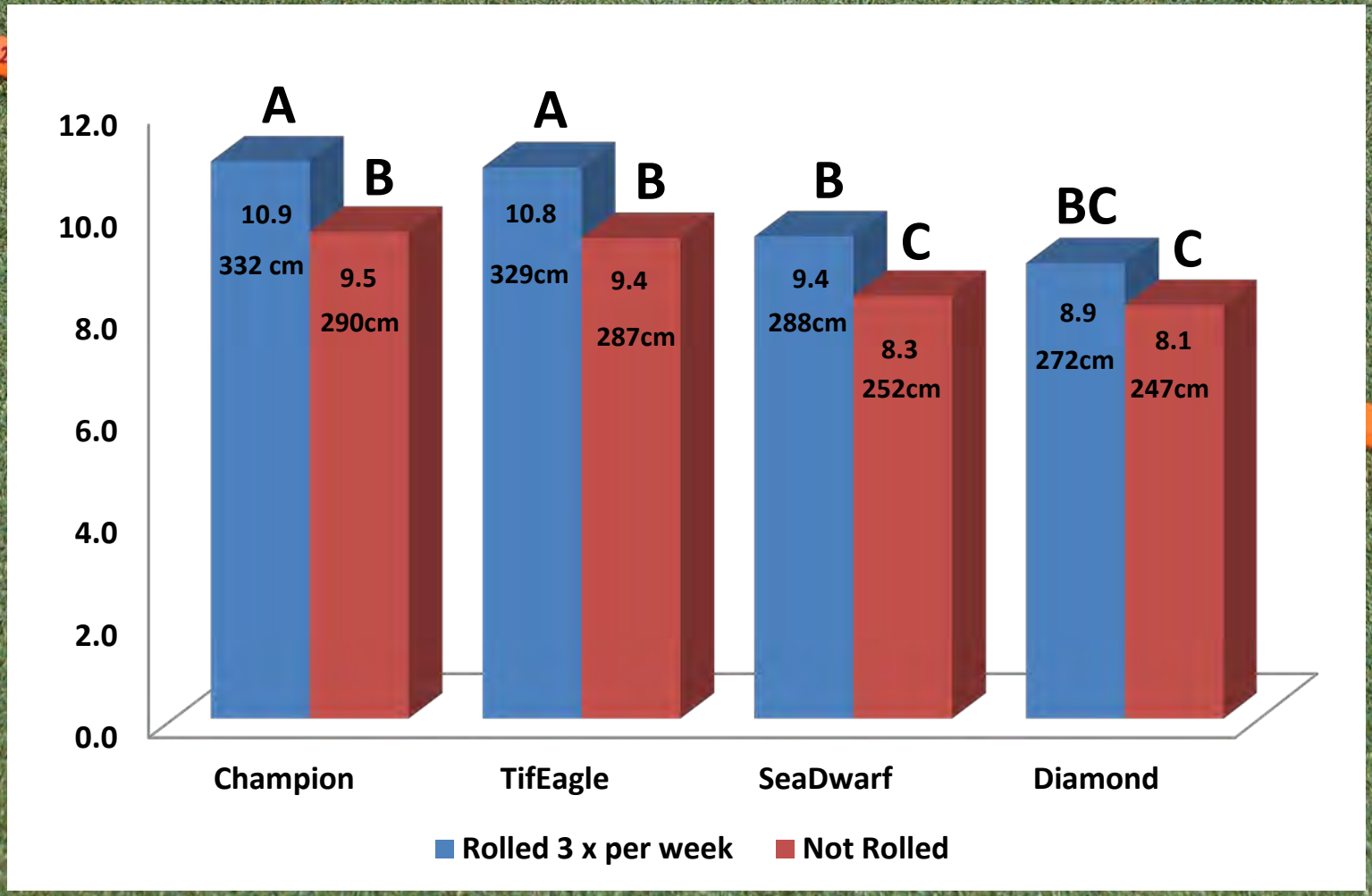
- Each variety replicated 12 times
- All plots were mown daily at 0.125” (~3mm)
- Rolling treatment was 5 x per week
- All plots were Stimped 5 x per week (20 Aug – 8 Oct, 2010)

Turf Varieties Tested

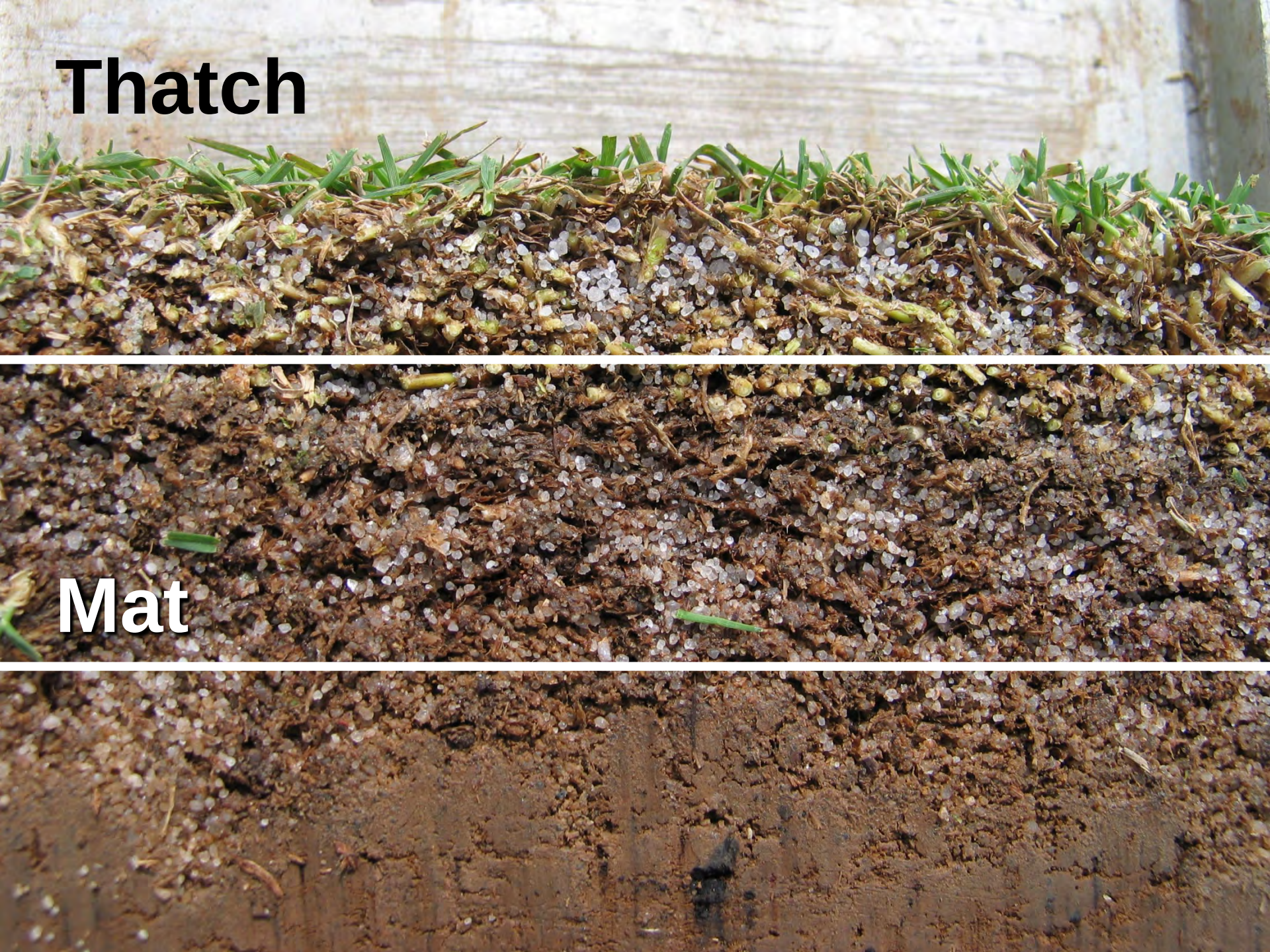


-Champion Bermuda
-TifEagle Bermuda
-SeaDwarf (paspalum)
-Diamond Zoysia

Average Putting Greens Speeds from 20 August – 8 October, 2010



Vibratory Rolling Enhances Topdressing Incorporation on Ultradwarf Bermudagrass Putting Greens


Thatch
Mat

Materials and Methods

- Conducted on a ‘TifEagle’ bermudagrass putting green in Knoxville, TN
- Mowed at 0.156” (4 mm) six times per week

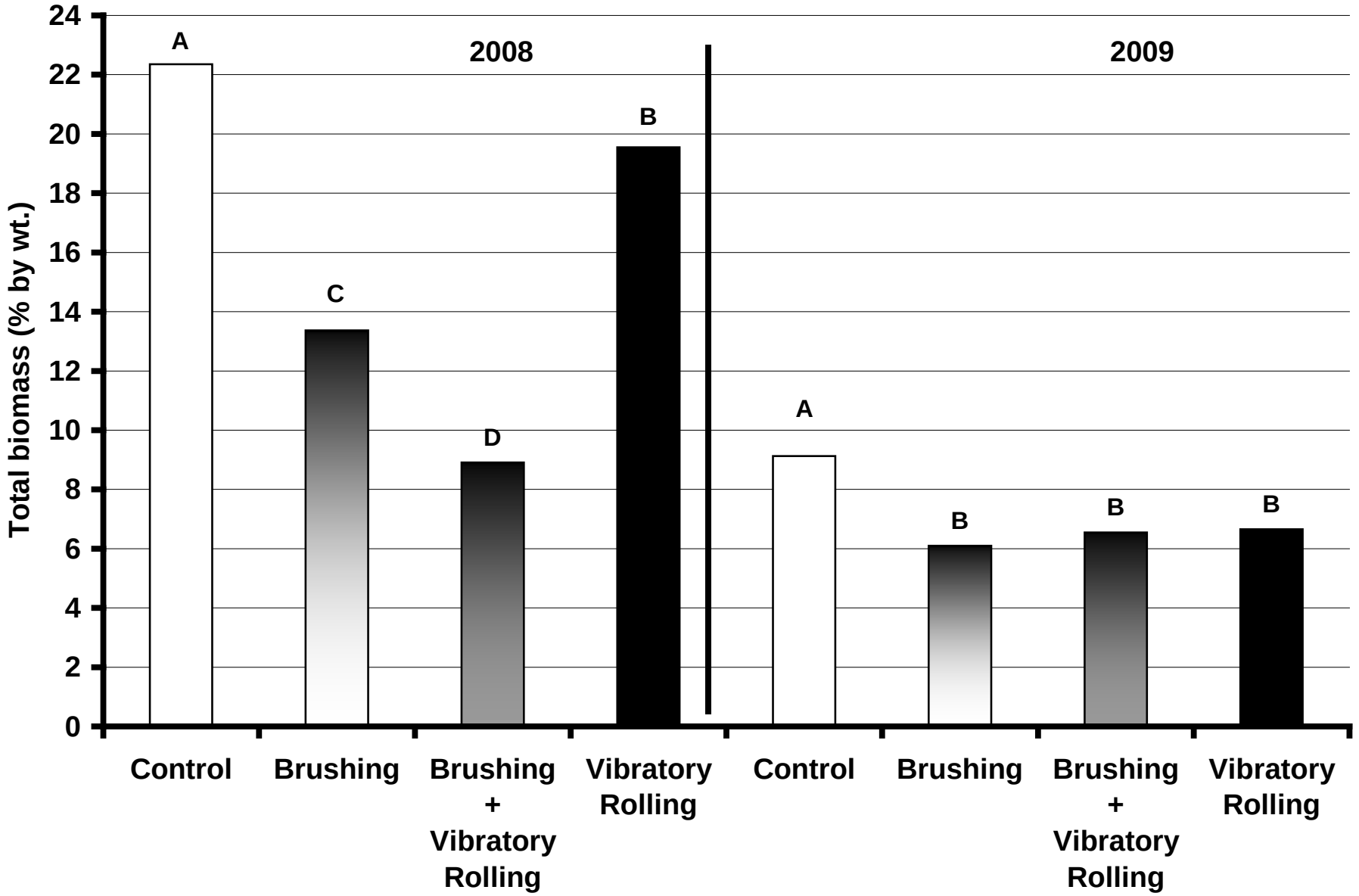
Materials and Methods

- Topdressing incorporated by brushing alone, vibratory rolling alone, and combination of vibratory rolling and brushing
- Topdressed at ~3 mm depth every two weeks
- Control plot not topdressed

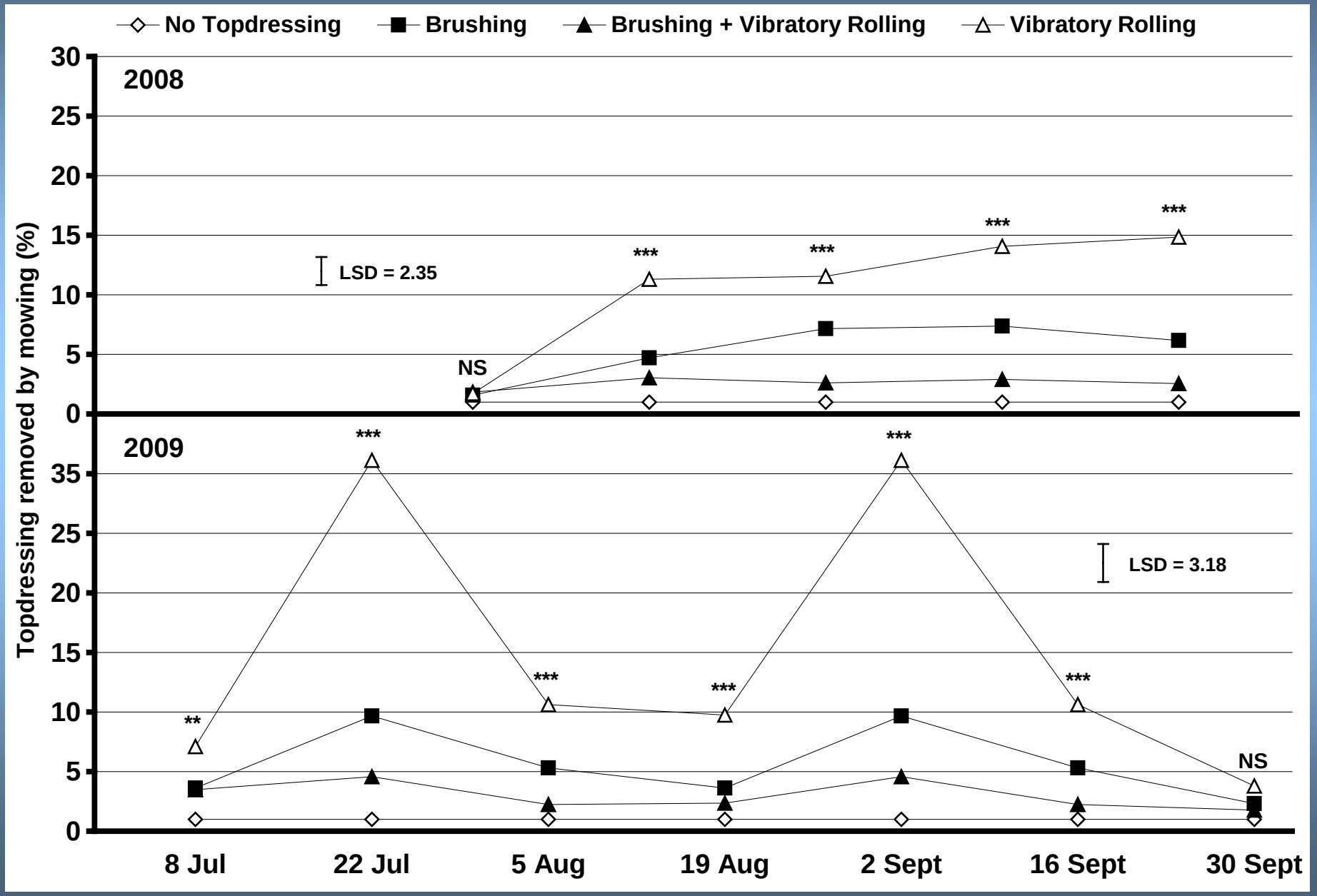
Evaluations

- Organic matter concentration in top inch of rootzone
- Total biomass concentration in top inch of rootzone
- Topdressing sand removed by mowing
- Thatch depth
- Surface hardness

Total Biomass



Topdressing removed



1
2
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6

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0
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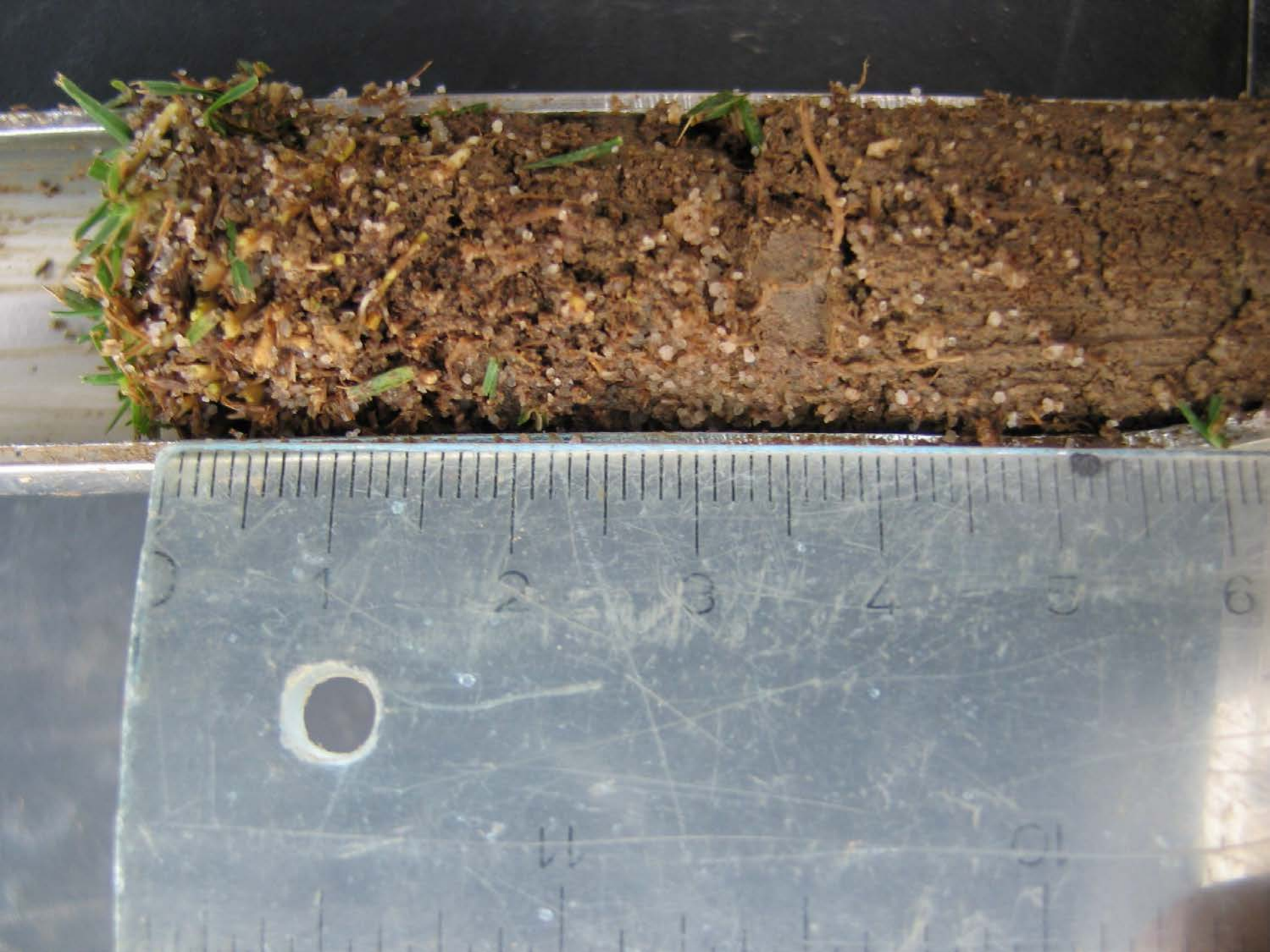
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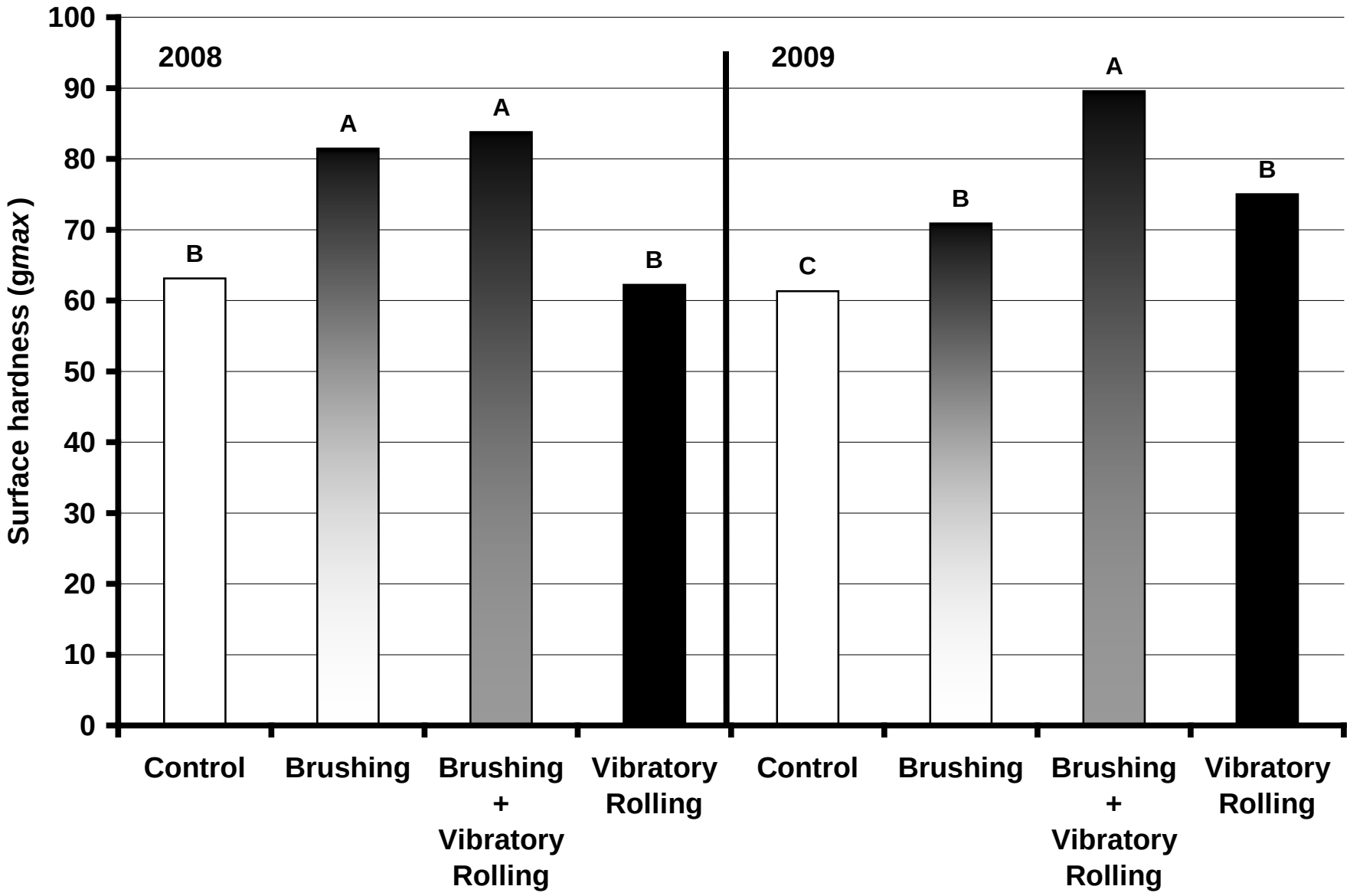
Surface Hardness



Results

- Vibratory rolling alone not sufficient
  - More sand was picked up at mowing from vibratory rolling alone than any other treatment
- Combining vibratory rolling and brushing picked up less sand than all other treatments
  - Vibratory rolling and brushing was not different from untreated control

Thank you