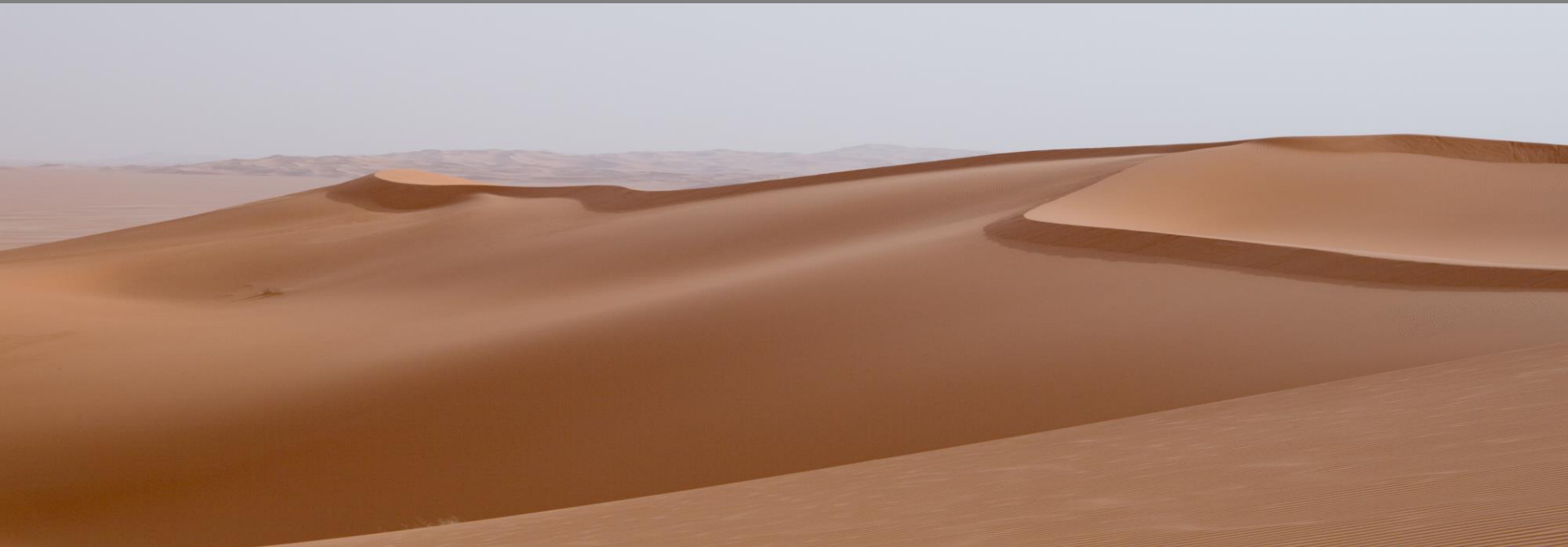
Dilution is the solution!

Roch Gaussoin
Extension Turfgrass Specialist
University of Nebraska-Lincoln




GRASS
THATCH
SOIL
METRIC 1
2
3
4
5


GRASS
THATCH
MAT
SOIL

Because of inherent ambiguity in terminology and sampling techniques, the term <u>"thatch-mat"</u> has appeared frequently since the late 2000's (McCarty et al., 2007; Barton et al., 2009; Fu et al., 2009).

and yet one more definition……..

SOM- Soil Organic Matter

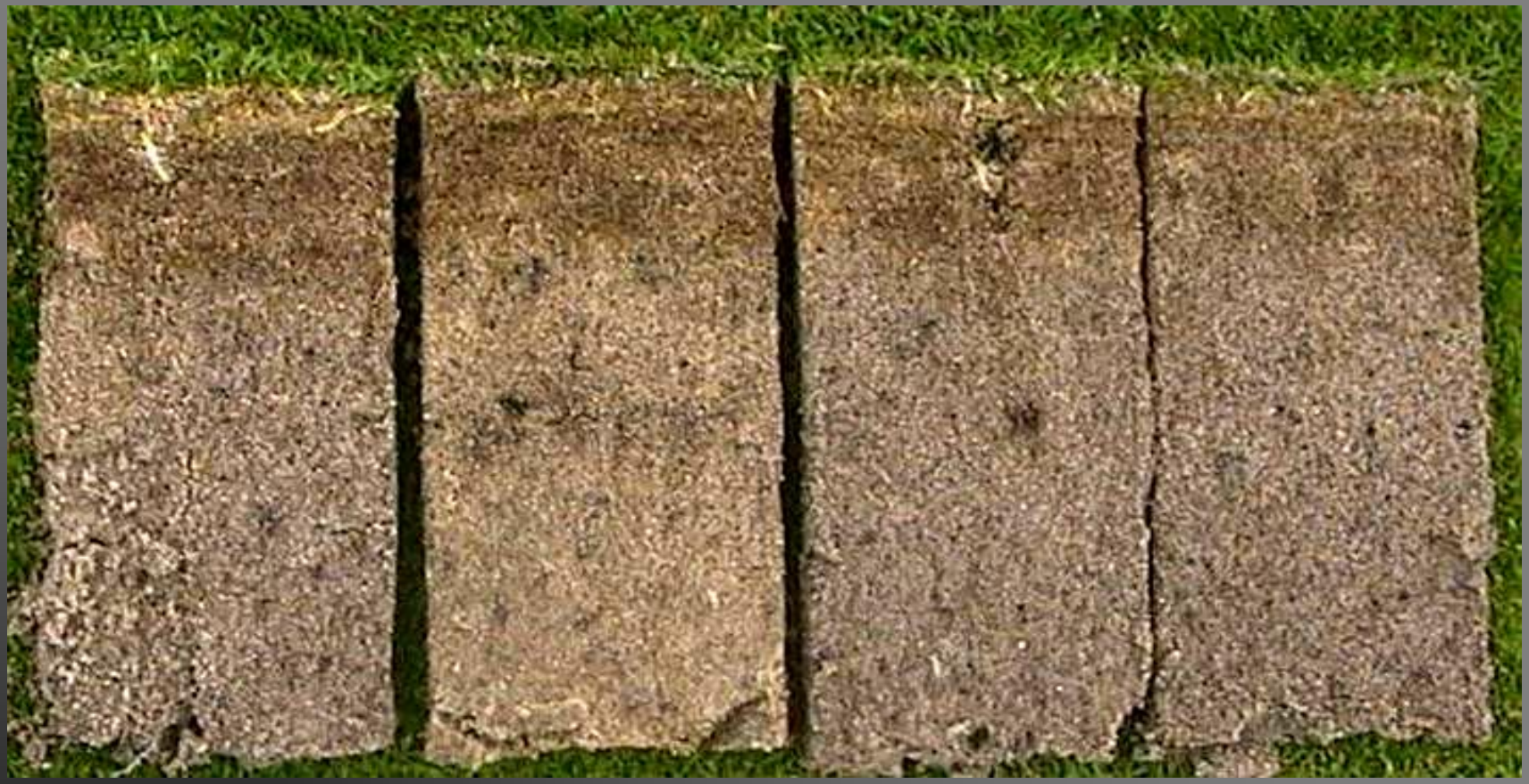
Infiltration

4 *3* *2* *1*

Green Age (years)

Mat development (cm)

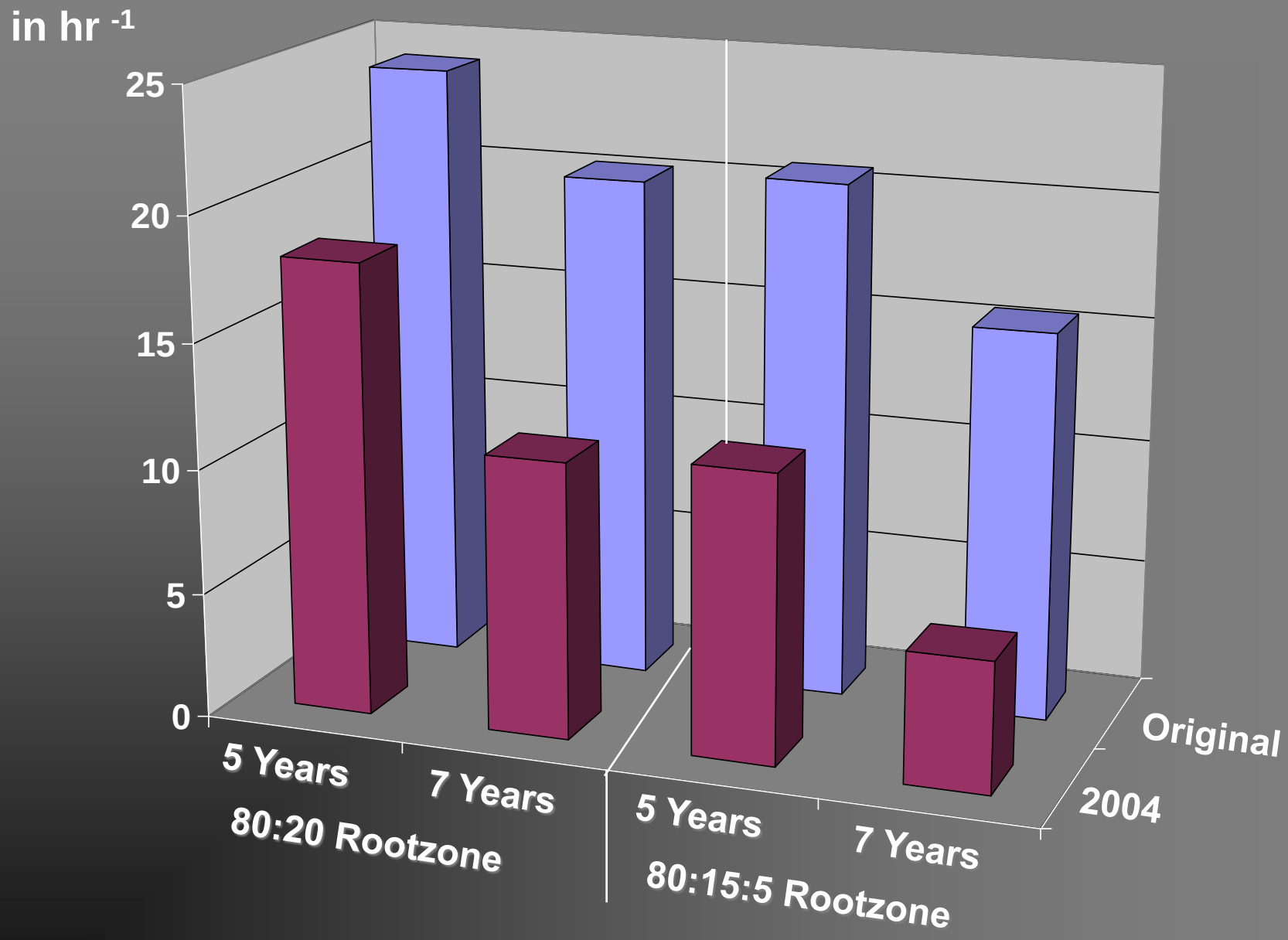
2.8 2.5 2.2 2



8 7 6 5

Green age (years)

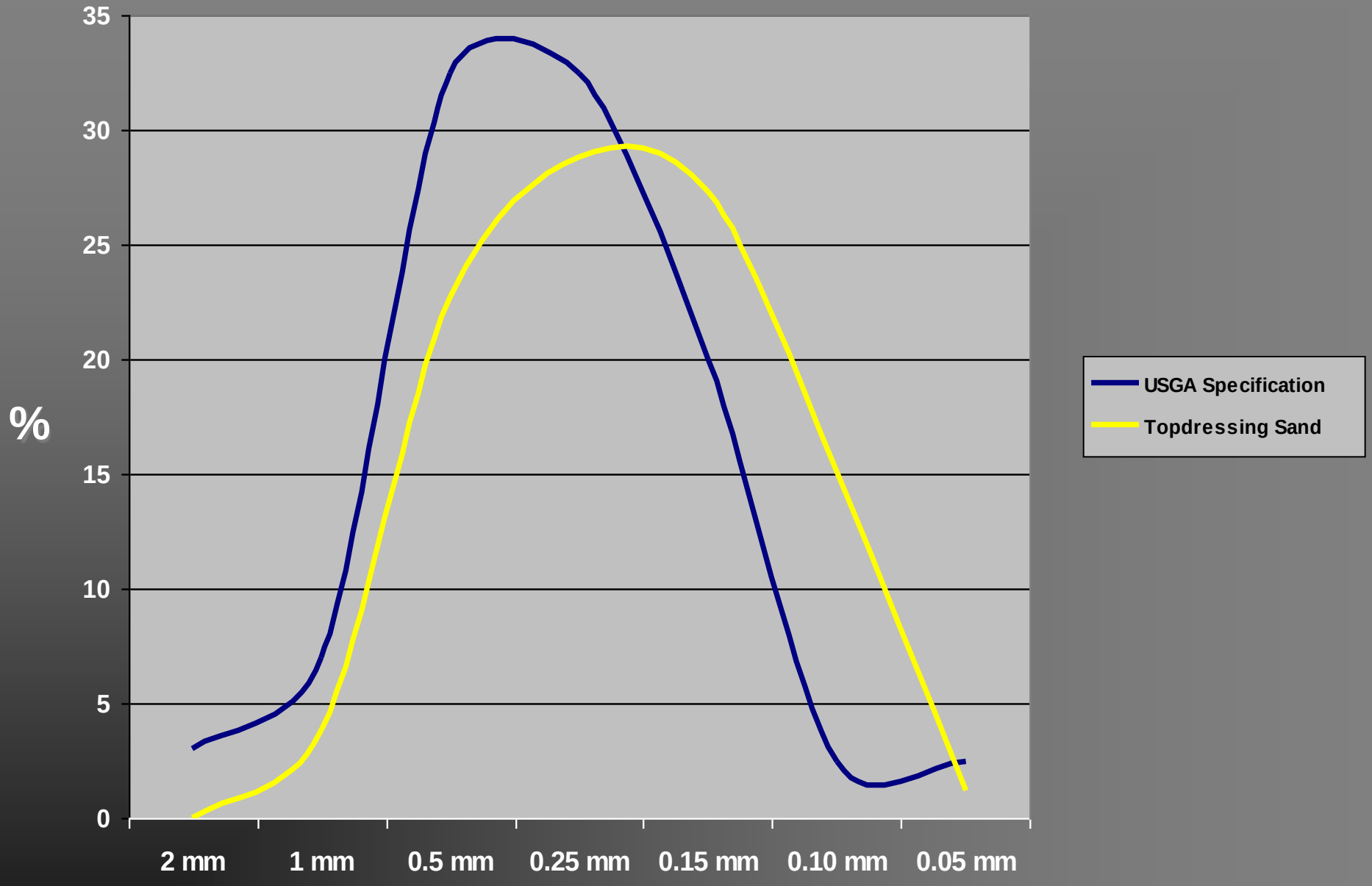
- 2004 USGA research committee site visit
- original rootzone
- mat development



Comparison of preconstruction K_{sat} values to K_{sat} values taken 10/04.

Change in Rootzone Particle Size Distribution

- All rootzones tested in 2004 showed increased proportion of fine sand (0.15 – 0.25 mm) with decreased proportion of gravel (> 2.0 mm) and very coarse sand (2.0 – 1.0 mm).
- 5 of 8 rootzones were significant (z-score) for increased fine sand content.



USGA sand specifications compared to sand used in topdressing program for USGA plots at Mead, NE.

Conclusions

- The K_{SAT} decrease over time ***may*** be due to organic matter accumulation above and in the original rootzone and/or the increased fine sand content originating from topdressing sand

Root Zone: Mat vs. Original

- pH:
  - Mat < Original for all USGA and California Greens.
- CEC, OM, and all Nutrients tested:
  - Mat > Original for all USGA and California Greens.

Want to know more?

- Gaussoin, R., R. Shearman, L. Wit, T. McClellan, and J. Lewis. 2007. Soil physical and chemical characteristics of aging golf greens. *Golf Course Manage.* 75(1):p. 161-165.

- Gaussoin, R., R. Shearman, L. Wit, T. McClellan, and J. Lewis. 2006. Soil physical and chemical characteristics of aging golf greens. [Online]*USGA Turfgrass Environ. Res. Online.* 5(14):p. [1-11].

- Gaussoin, R., and R. Shearman. 2003. Soil microbial characteristics of aging golf greens. [Online]*USGA Turfgrass Environ. Res. Online.* 2(3):p. [1-8].

Why is high OM considered to be "bad"?

- Loss of infiltration
- Decreased aeration
- Traps "toxic" gases
- Are these concerns real or imagined?
- Why the confusion?

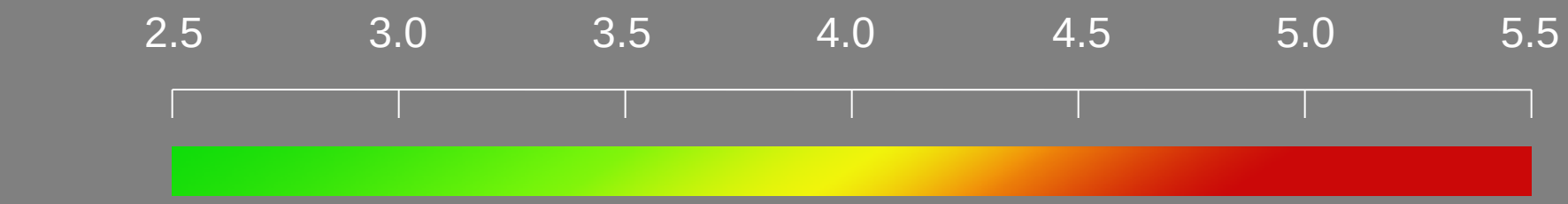
Organic Matter Thresholds

Private Lab B: < 3% - unrealistic
< 4% - difficult
< 5% - realistic & achievable

Lowe: < 3 - 4%

Private Lab A: 1.5 – 2.5% at a 0.25 to 1-in depth

Hartwiger & O'Brien: < 3.5 – 4.5%



Carrow: < 3%

McCoy: < 3.5%

J. W. Murphy: < 4.5%

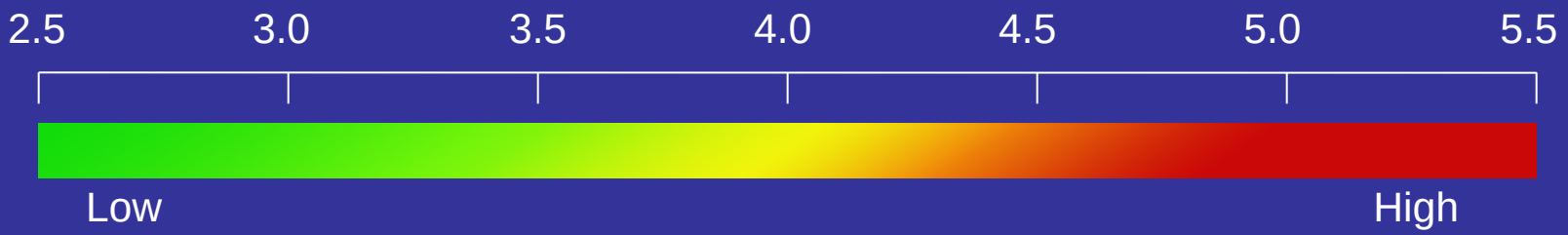
Adams: < 5%

N.Z. Turf In.: < 8%

Analysis Methods

- Many exist, but the most relevant is "combustion" or "loss on ignition"
- The sample represents both dead and *living* organic matter
  - Food for thought……

Organic Matter Sampling Protocols



1. thatch + mat layer

2. between 0.5” and 4.5”

3. between 0 and 35 cm

4. between 0 and 25 cm

There is no “magic” number

How do you get rid of OM?

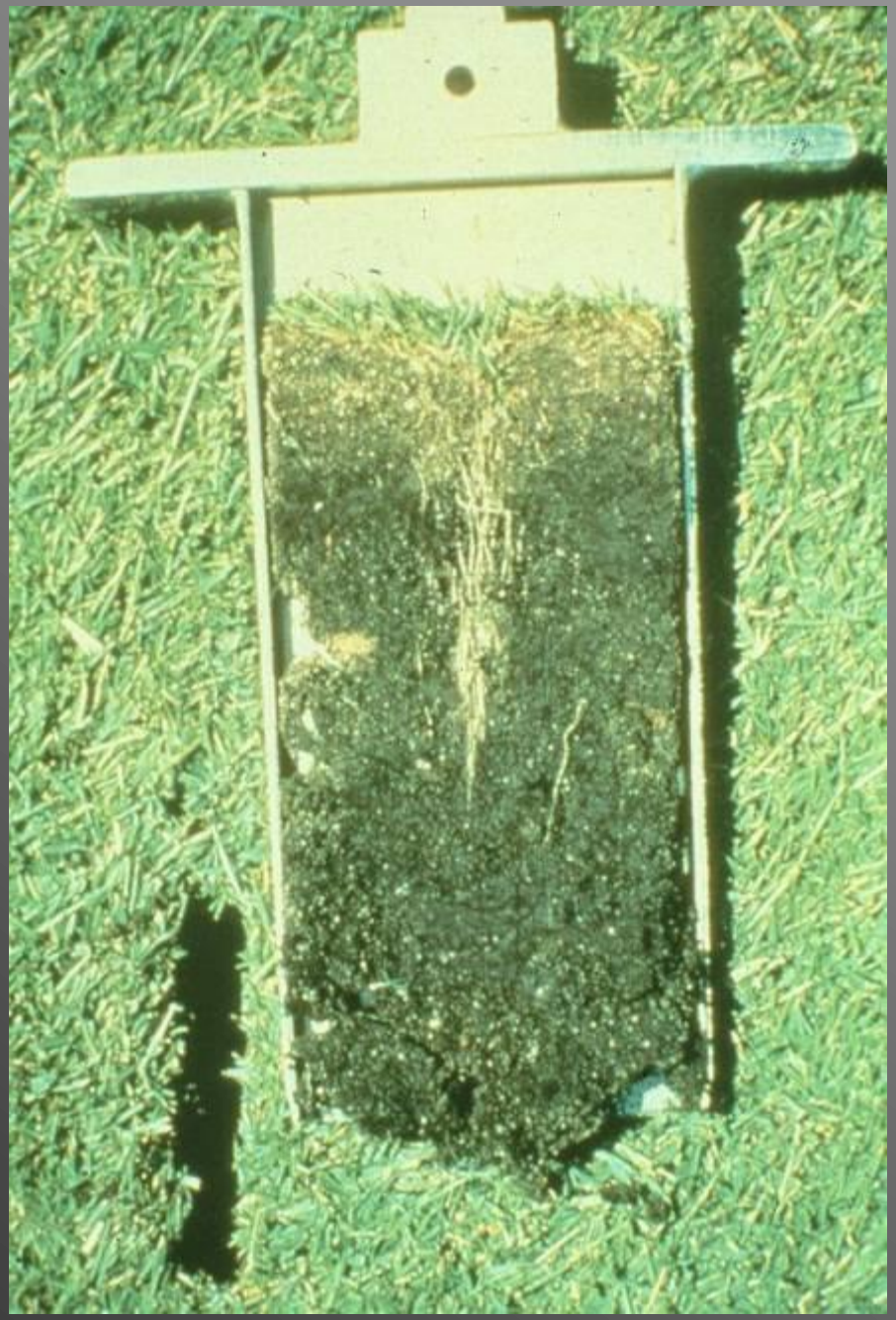
- Decomposition (microbial)
  - Increase surface area and aeration
  - Inoculation (???)
- Removal
  - Power raking, dethatching, core aerification
- Dilution
  - Topdressing

How effective is removal?

- **Surface disruptive, short and long term**
- **Core aeration is the most widespread practice recommended for OM management *and the favorite of golfers***

Tine Size and Surface Area Chart

Tine Size (in.)	Spacing (in.)	Holes/ft^2	Surface Area of One Tine	Percent Surface Area Affected
1/4	1.25^2	100	0.049	3.4%
1/4	2.5^2	25	0.049	0.9%
1/2	1.25^2	100	0.196	13.6%
1/2	2.5^2	25	0.196	3.4%
5/8	2.5^2	25	3.07	5.3%



Regardless of the cultivation/removal technique the ultimate objective is improved turf health & playability

Influence of Rootzone Organic Matter on Putting Green Quality and Performance

- **Funded by:**
  - **USGA (2006)**
  - **Nebraska Golf Course Superintendents Assoc. (2007-2009)**
  - **Golf Course Superintendents Assoc. of South Dakota (2006-2009)**
  - **Peaks & Prairies GCSA (2007-2009)**

Influence of Rootzone Organic Matter on Putting Green Quality and Performance

- USGA
- Environmental Institute for Golf

- Nebraska GCSA
- GCSA of South Dakota
- Peaks & Prairies GCSA

- Jacobsen, Toro, JRM & PlanetAir

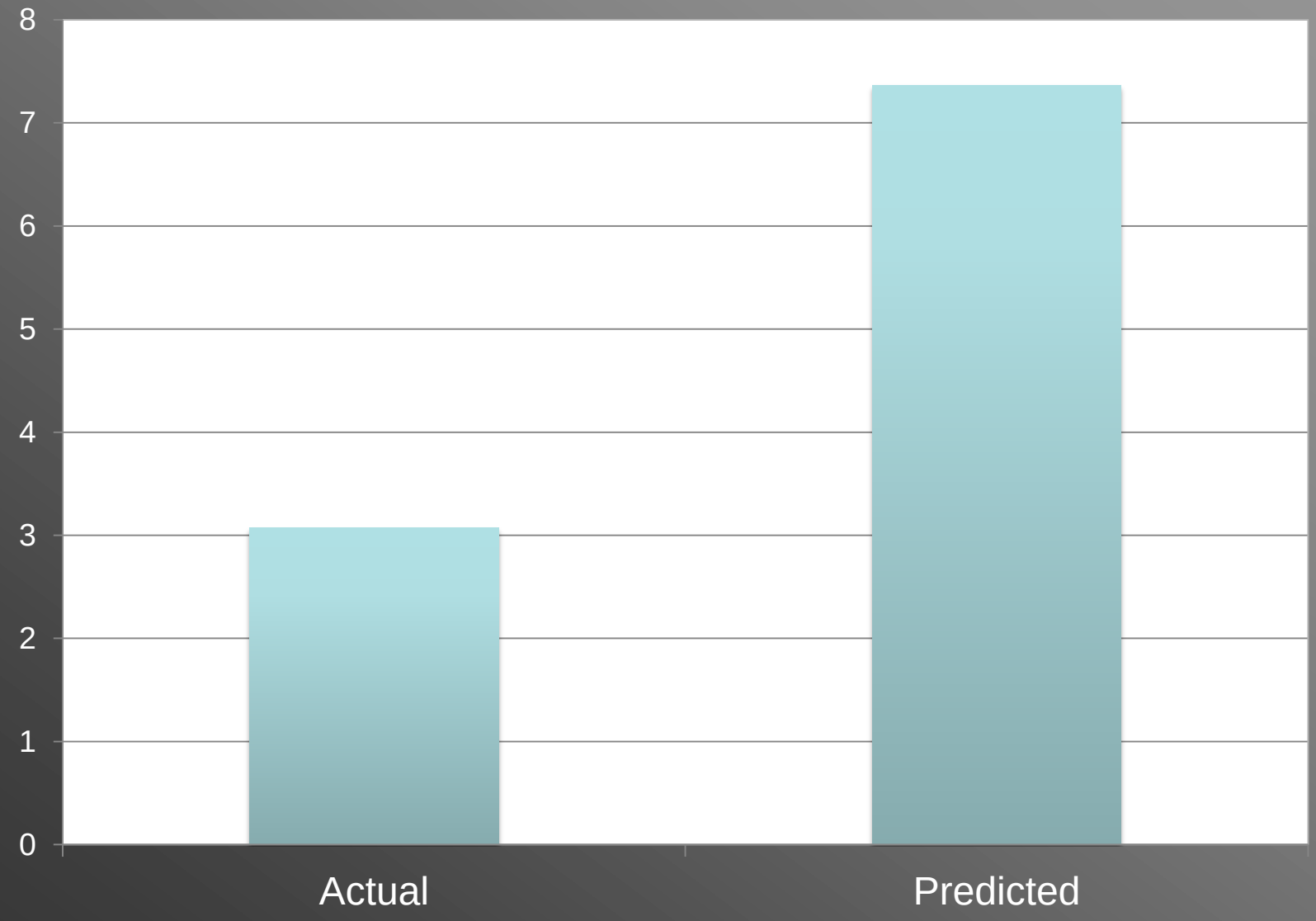
- Nebraska Turfgrass Association

Project Objective

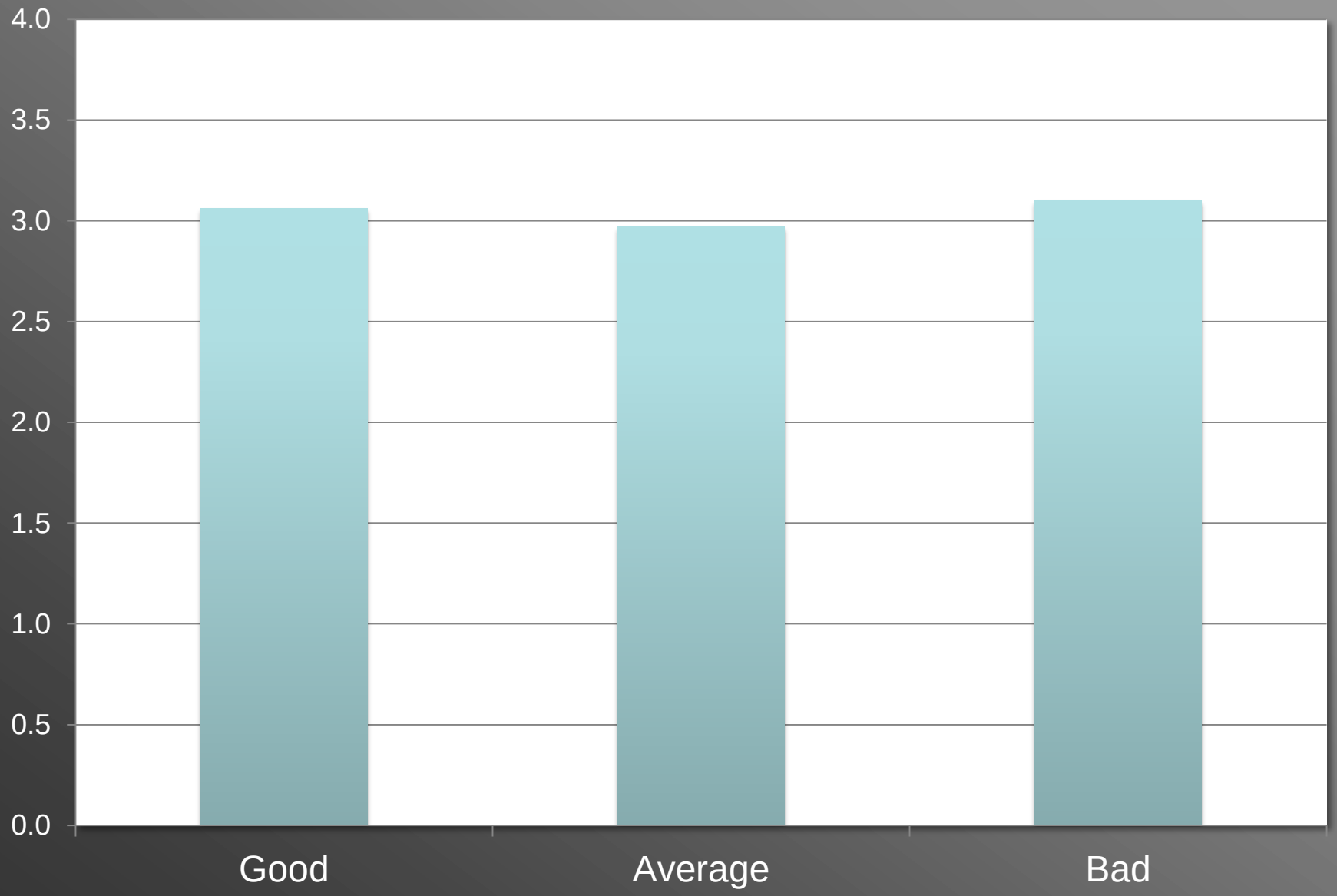
- **National Comprehensive Survey**
  - **(attempt to) determine cause and effect relationship among maintenance practices and their interactions relative to surface OM accumulation**

117 golf courses sampled; > 1600 samples

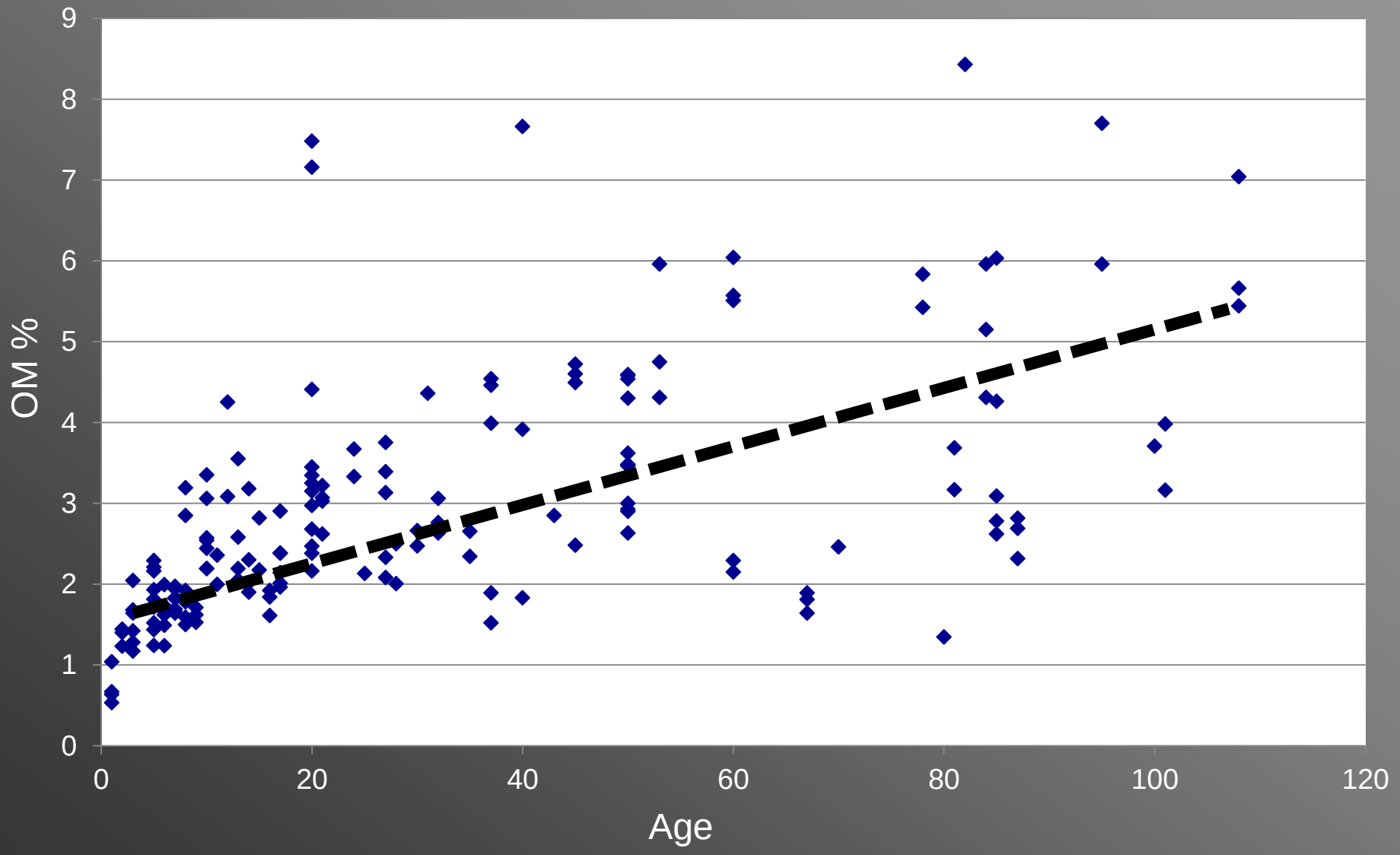
Superintendent predicted vs actual



Problematic vs Non-problematic



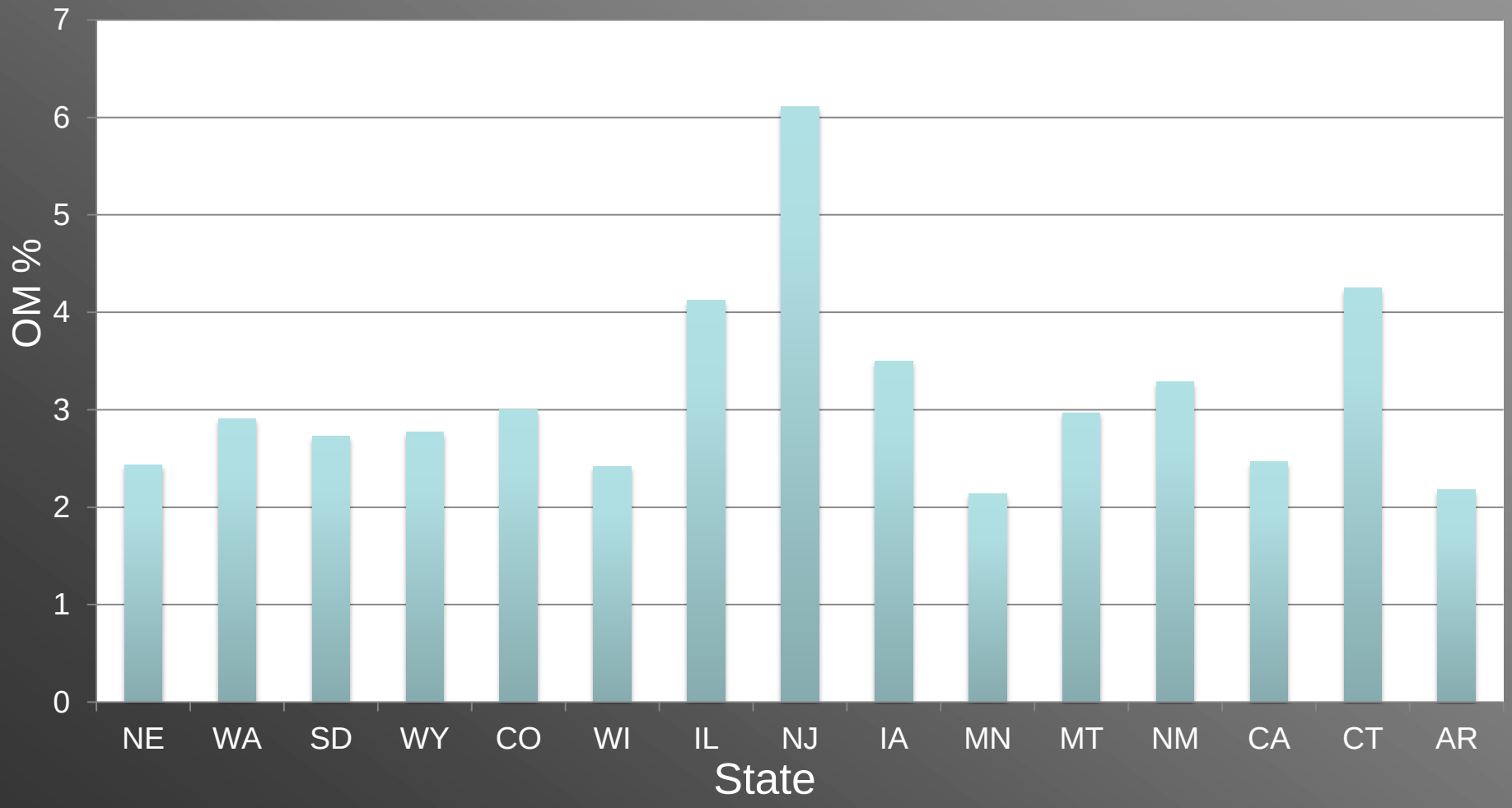
Green Age



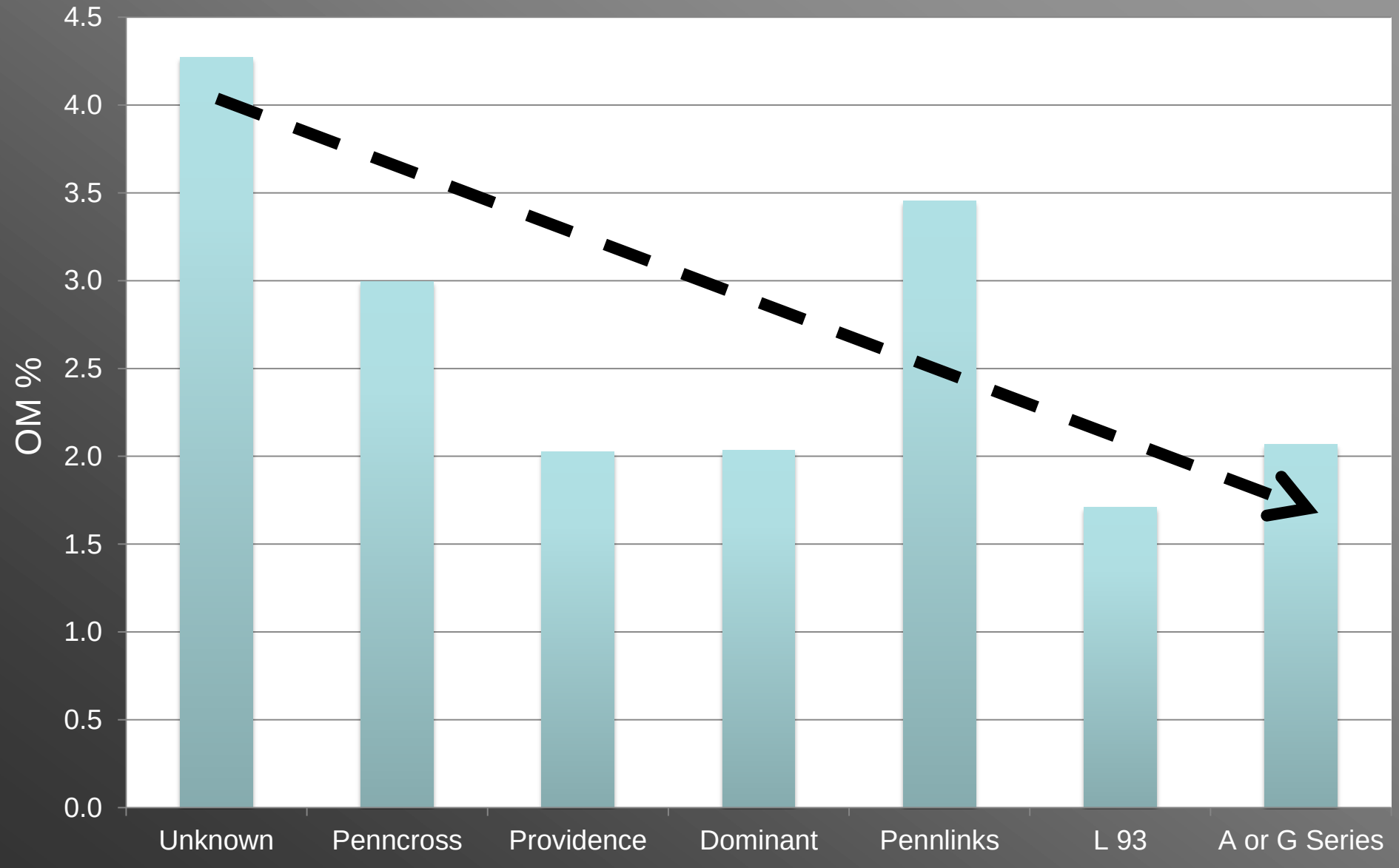
Is the age effect misleading?

- **Sampling issues:**
  - **Mat depth increases as green ages resulting in more OM in the same volume soil.**
  - **Assuming topdressing & management are relatively uniform, % per unit depth within the true mat layer is relatively uniform**

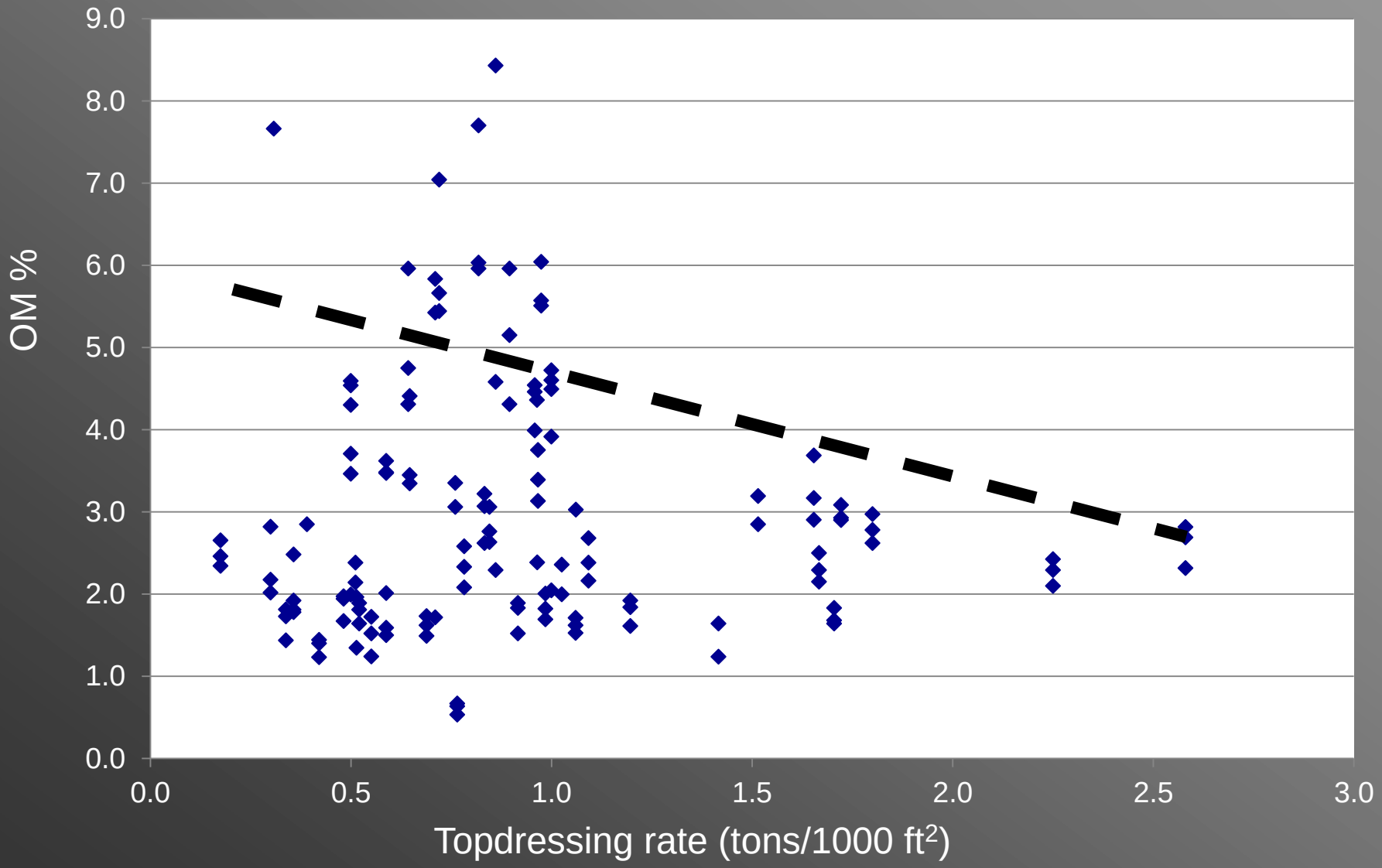
State Differences
(highly correlated with age)



Cultivar


OM %
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Unknown
Penncross
Providence
Dominant
Pennlinks
L 93
A or G Series

Topdressing



Survey Summary

- **None of the variables collected, by themselves, or in combination with others, *predicted* OM**
- **Courses using >18 cubic ft*/M of topdressing with or without "venting" had lower OM**

1 ft^3 = 100 lbs of dry sand; yd^3 = 2700 lbs

Organic Matter Management Study

Objectives

1. Determine if conventional hollow tine is more effective than solid tine aerification at managing organic matter accumulation

Organic Matter Management Study

Objectives

1. Determine if conventional hollow tine is more effective than solid tine aerification at managing organic matter accumulation

2. Determine if less invasive cultivation (LIC) methods are effective at managing OM accumulation

Treatments

Aerification
None
2X Hollow tine
2x Solid tine

Less invasive Cultivation (LIC)
None
PlanetAir
Hydroject
Bayonet tine
Needle tine

Treatments

Aerification
None
2X Hollow tine
2x Solid tine

Less invasive Cultivation (LIC)
None
PlanetAir
Hydroject
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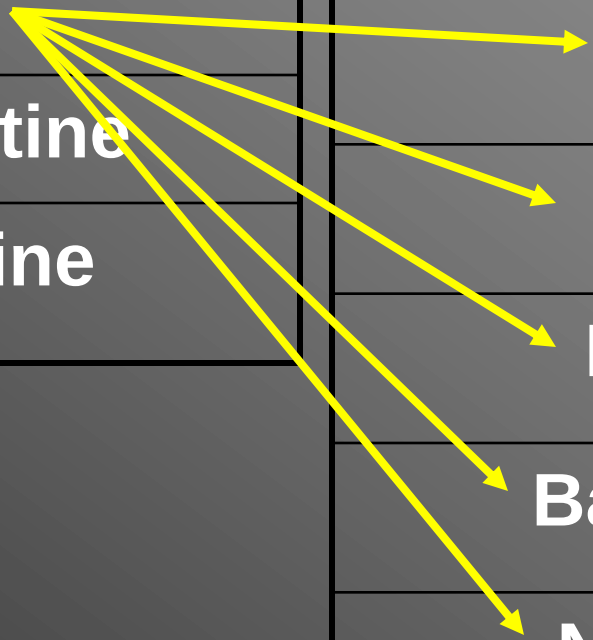


15 Trts per Rep

6 Reps per year

2 different years

= A whole lot of fun for one graduate student or 180 trts


TORO
HYDROJECT

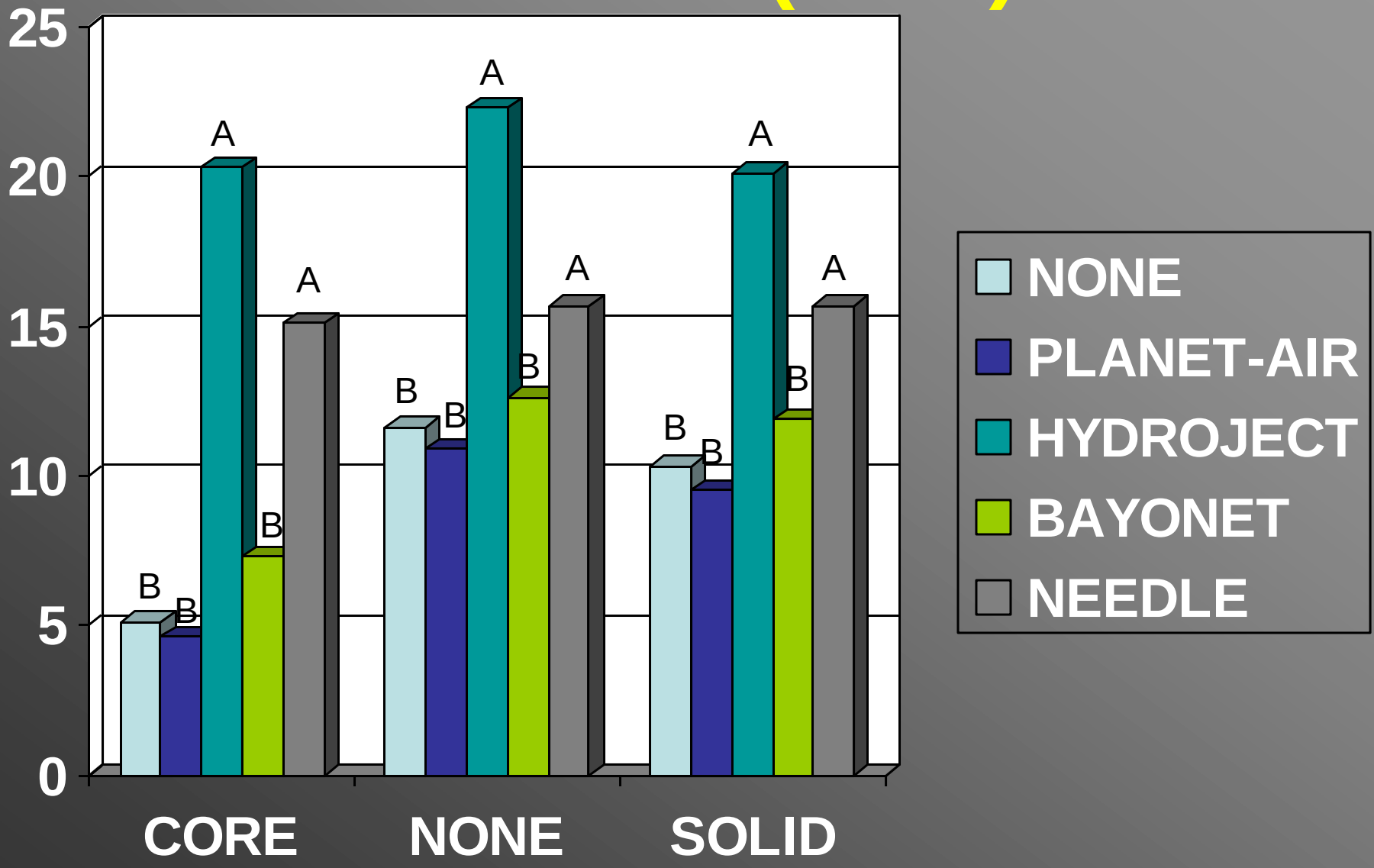

JACOBSEN

Materials and Methods

- **Green Age:**
  - **12 years**
  - **9 years**
- **Data collected:**
  - **OM% (pre-cultivation/monthly)**
  - **Single wall infiltration (monthly)**
  - **Ball roll ***
  - **Clegg (Monthly) ***
  - **Turfgrass quality rating (Monthly) ***

* = Data not shown due to time constraints

Infiltration (in/hr)



OM Data Analysis Year 2

- **No differences between green age except for higher % in older green**

OM Data Analysis Year 2

- No differences between green age except for higher % in older green
- **No differences among venting methods**

OM Data Analysis Year 2

- No differences between green age except for higher % in older green
- No differences among venting methods
- No interactions with solid/hollow/none

OM Data Analysis Year 2

- No differences between green age except for higher % in older green
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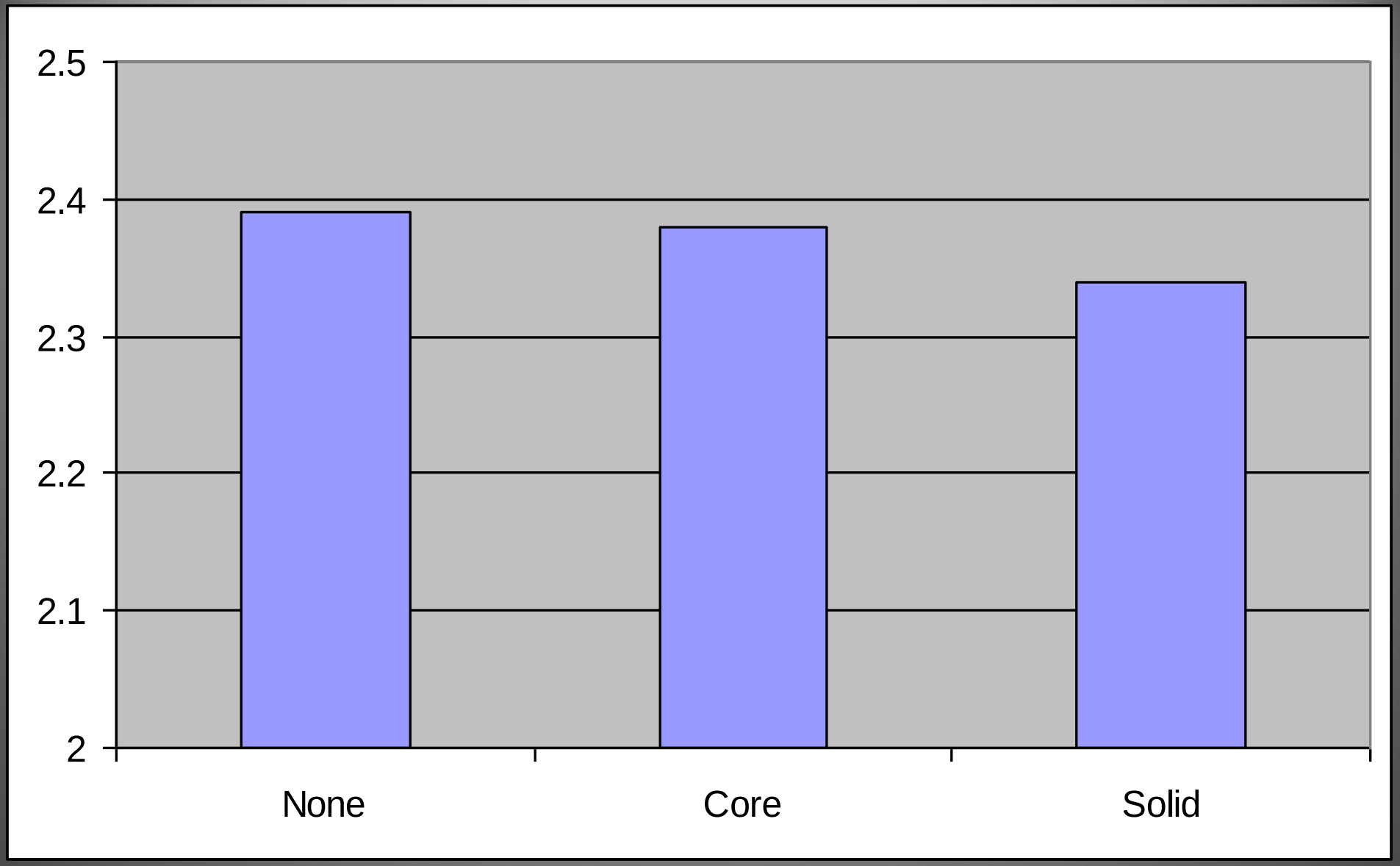

NOTE: ***All treatments received the same topdressing quantity but different frequency 22 cubic ft/M/Yr***

What these data do/don't suggest

- **Topdressing is the most consistent and repeatable factor in OM management**
- **Cultivation was insignificant as a means to control OM**
- **However, a superintendent must use whatever tools they have to insure sand is making it into the profile and not the mower buckets**

*Topdressing interval relative to Tine/LIC combinations (22 cu ft/M)**

- **NONE/NONE**
  - **5-10 days**
- **Solid & Hollow/NONE**
  - **7-14 days**
- **Solid & Hollow/LIC**
  - **14-18 days**

*Observed and calculated based on displacement and surface area opened

Topdressing

Old Tom Morris (1821–1908) is thought to have discovered the benefits of topdressing accidentally when he spilled a wheelbarrow of sand on a putting green and noted how the turf thrived shortly afterward (Hurdzan, 2004).

J.B. Beard is his classic textbook "Turfgrass Science & Culture, 1973 writes:

"The most important management practice for OM management is topdressing"

“the solution to pollution is dilution”

ASA Monograph (3RD Edition)

Chapter 12

Characterization, Development, and Management of Organic Matter in Turfgrass Systems

R.E. Gaussoin, Dep. of Agronomy and Horticulture, Univ. of Nebraska
W.L. Berndt, Dep. of Resort and Hospitality Management,
Florida Gulf Coast University
C.A. Dockrell, Teagasc College of Amenity Horticulture
Dublin, Ireland
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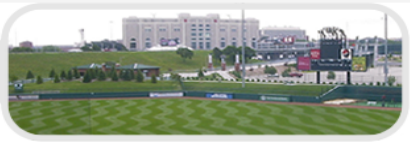

Sep-30-2010

UNL Agronomy & Horticulture Dept.

navigation >> HOME | TURF CALENDARS | PERSONNEL | HERBICIDE RATINGS | SEARCH SITE | GREEN EVENTS

Turf iNfo for the North Central US

rss feed

Adding insult to injury: Gray leaf spot damaging golf and sports turf
P : Sep-30-2010

Professional Use: How late is too late to control dandelions and other weeds?
P : Sep-20-2010

Options to PCNB when it's likely not available for snow mold applications this fall
P : Sep-15-2010

Renovating Turf: How long should I wait to seed after a glyphosate (Roundup) application?
C&P : Sep-09-2010

Turf 101: Why are broadleaf herbicides more effective in the fall than spring?
C&P : Sep-09-2010

Controlling ground ivy and/or violets
P : Aug-28-2010

Factors controlling Poa annua germination
P : Aug-28-2010

C = consumer recommendation, P = professional recommendation,
C&P = consumer and profesional recommendation
- Contact Roch Gaussoin or Zac Reicher with questions related to Turf iNfo

Go to the SEARCH SITE page to search for older articles and topics.

Stay up to date! Turf iNfo will be updated frequently throughout the growing season. To sign up for *automatic Turf iNfo updates* email turf@unl.edu. Provide your first name, last name and email address with "ADD" in the subject line.

Education Events & Field Days

- 2011 Nebraska Green Expo. (Jan. 10-12)

Animations

- Sources of Urban Runoff
- Turf Calendars

Links & Tools

- N.T.E.P. (National Turfgrass Evaluation Program)
- Backyard Farmer
- Hort Update Newsletter
- UNL Turf Entomology
- UNL Plant & Pest Diagnostic Clinic
- UNL Weed Science

Nebraska GREEN Events

- Calendar

Extension Presentations

09/10

Scientific Article - Foliar Nutreint Uptake by Turfgrass
Ewing Foliar Seminar 2009 : Roch Gaussion

Presentation File
Ewing Foliar Seminar 2009 : Roch Gaussion

Organic Matter - 2009
Desert Mountain Seminar : Roch Gaussion

Lawn and Landscape Weed Control
NE Master Gardeners Plant Sale 2010 : Roch Gaussion

Putting surface organic matter management

Turf Publications

Management | Diseases | Insects

Improving Turf in the Fall
Turf 2010a

Crabgrass Control in Home Lawns
Turf 2010b

Landscape Weed Management
EC1256

Guide for Weed Management in Nebraska
EC130

Irrigated Production of Warm-Season Grass Seed in the High

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