Getting the most bang for your buck in sports turf management

Zac Reicher

http://turf.unl.edu

Student interns?

- 3 Creek Ranch, Jackson Hole, WY
- Anchorage Country Club, Anchorage, AK
- Bandon Dunes, Bandon, OR
- Blackstone Country Club, Pears, AZ
- Brickman Group, Brookfield, IL
- Castle Pines Country Club, Castle Rock, CO
- Columbus Crew, Columbus, OH
- Desert Mountain CC, Scottsdale, AZ
- Erin Hills GC, Erin, WI
- Haymarket Park, Lincoln, NE
- Hazeltine National, Chaska, MN
- Indianapolis Indians, Indianapolis, IN
- Lakeshore Country Club, Chicago, IL
- Louo Lloyd Country Club, Kansas City, MO
- Milwaukee Brewers, Milwaukee, WI
- Minnesota Vikings, Eden, MN
- Oakland Hills, Bloomfield, MI
- Oakmont Golf Club, Oakmont, PA
- Philadelphia Phillies, Philadelphia, PA
- Sand Hills, Munford, Nebraska
- Shadow Creek GC, Las Vegas, NV
- TD Ameritrade Park, Omaha, NE
- The Broadmoor, Colorado Springs, CO
- The Plateau Club, Sammamish, WA
- The Powder Horn, Sheridan, WY
- TPC Dear Run, Shelby, IL
- TruGreen, Lincoln, NE
- USGA Green Section, Memphis
- Walt Disney World, Orlando, FL
- Westwood CC, Vienna, VA
- Wilmington CC, Wilmington, DE

Contact Anne Streich (astreich2@unl.edu) or Zac Reicher (zreicher2@unl.edu)

Costs of Managing a Bermudagrass Football Field in Tennessee

$10,000/year
- 2/3rd product costs
- 1/3rd labor + equipment
- ~175-200 hrs/yr
- $10.00/hr estimate(?)
- More likely ½ and ½
Reducing costs

- Labor
  - More efficient equipment (?)
  - More efficient mowing
  - More efficient painting
- Products?
  - Paint
  - Fertilizer
  - Pesticides
- Water?
  - Increase efficacy in all inputs

Product selection-Paint

- Combining with Primo?
- Extends visibility over aerosol significantly
- Added to backpack or field sprayer, Primo @ 1 oz/1000 sq ft or 0.135 oz/gal:
  - Yellow: Extends visibility 0 to 14 days
  - White: 3 to 10 days
  - Red: 0 to 4 days
  - (Fry et al, 2014)

Product selection-N sources

- Plant takes up N in two forms:
  - NO₃
  - NH₄
- N in fertilizers is only in
  - Urea
  - NH₄
- Slow release allows fewer applications at higher rates and thus less labor costs
- Fast release requires more frequent applications and higher labor, but more control
- Turf fertilizers have smaller particle size and are usually cleaner, higher quality, slow release
- Ag ferts are better than nothing

Product selection

- Branded vs post patent?
- Limited differences in control seen to date
- But depending on manufacturer and/or distributor........
  - Service?
  - Return to the industry?
  - Developing new ai’s for the future?

UNL Crabgrass control trials 2010

- QP Protiotrow
- Barricade
- LSD(0.05) ~2

Crabgrass cover in check plots was 58%

Crabgrass Control 22 Aug 2010

UNL Crabgrass Control Trials - 2010

- QP Dithiopyr
- Dimension Ultra 40 WSP
- LSD(0.05) ~2

Crabgrass cover in check plots was 58%
Mowing height

- Set it at playing height and forget it
- 1.5 – 2.5” for bluegrass
  - Higher the better
  - Deeper roots
- Raising mowing heights in summer for deeper roots, better drought resistance?

Mowing frequency

- Constant mowing (period)
- “out of sight, out of mind”??????
- Fields require attention whenever they are green and/or used
- Primo or Trinexapac out of season
**Fertilization**

- Constant traffic requires constant growth
- Constant growth requires constant fertility
- Fall fertilizer critical for cool-season grasses
- Potassium?
  - Expensive insurance so use only where essential (high use, low soil test results)
- Phosphorus?
  - Use at establishment

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**Root and Shoot Growth of Cool Season Turfgrasses**

- **Roots**
- **Shoots**

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**Fertilization-Fall use (aggressive)**

- Sep 1.0 lb N/1000
- Oct 1.0 lb N/1000
- Nov 1.0 lb N/1000 (currently)
- After growth flush: 0.75 lb N/1000*
- June 0.5-0.75 lb N/1000*
- July 0.5-0.75 lb N/1000*
- Aug 0.5-0.75 lb N/1000*
- **Total ~ 5.25-6.0 lbs N/1000/yr**

*Reduce where you can to save $ and N inputs
Fertilization - Spring-summer use

- Sep  1.0 lb N/1000
- Oct  1.0 lb N/1000
- Nov  1.0 lb N/1000 (currently)
- Pre-season 0.5-0.75 lb N/1000
- Late May 0.5-0.75 lb N/1000
- June  0.5-0.75 lb N/1000
- July  0.5-0.75 lb N/1000
- Aug.  0.5-0.75 lb N/1000
- Total ~ 4.5-5.25 lbs N/1000/yr

*Reduce where you can to save $ and N inputs

Growth chamber methods

- Three grass species (creeping bentgrass, Kentucky bluegrass, annual bluegrass)
- Four N rates (0, 0.5, 1, 2 lbs N/M)
- Three temperature regimes (Sept. 15, Oct. 15, Nov. 15)
- Three replications, two growth chamber runs

Growth Chamber Results: N Uptake

Field Studies Wisconsin and Minnesota

Applied 0.5 or 1.0 lbs N/1000 in Sep, Oct, or Nov and monitored uptake through the following June.
**Total fertilizer N uptake: Fall - June**

- September 15th:
  80% of fertilizer N applied was taken up
  86% recovered 28 days after application
- October 15th:
  19% of fertilizer N applied was taken up
  79% recovered 28 days after application
- November 15th:
  11% of fertilizer N applied was taken up
  61% recovered 28 days after application

**Conclusions**

- Fall N does not stimulate deeper rooting that fall
- Fall N uptake potential is low in fall, and even lower in spring
- Color can be enhanced in fall/winter/spring with much smaller amounts of N

**Why? Water uptake**

- Plant depends on water to move nutrients to root surface
- 90% of water in plant is used for cooling
- Low cooling need in fall = low water uptake
- How does this work in other climates with longer falls and extended green and growth than in MN or WI?
- Maximum rooting = maximum water uptake = maximum cooling = maximum nutrient uptake, etc. etc. etc.

**But.......**

- Fall-use football, soccer, etc. fields, or heavily damaged areas from summer (2011) have to GROW!!!
- 1.0 lb N/1000 September (fast release)
- 1.0 lb N/1000 early Oct (fast release)
- 0.5-0.75 lb N/1000 near last mowing (fast release)

**Soil test primer**

- Phosphorus and potassium are determined by soil tests
- Take a good a sample
- Use a reputable lab
- Stick with the same lab
- Every three to five years or as needed
- SLAN – Sufficiency level of the available nutrient - University approved method
- Avoid BCSR – Basic cation saturation ratio or SPE – Saturated paste extract or water soluble extract
- If someone recommends calcium for your property, don’t listen
**Table 2. Recommended total lbs P2O5/1000 sq ft applied between soil tests, given the type of soil test, soil test results, and specific turf area. Soil tests should be run every 3 to 5 years after establishment. A corrective one-time application of the amount of phosphorus recommended can be made or a series of applications totaling the amount recommended can be made to gradually build-up the phosphorus level. Modified from the University of Wisconsin’s “Interim Turf Nutrient Management Guide” at http://www.turf.wisc.edu/docs/dnr1100-TurfNutrientManagement.pdf.**

<table>
<thead>
<tr>
<th>Bray P1 Soil Test</th>
<th>Melich III Soil Test</th>
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<tbody>
<tr>
<td>Soil test results</td>
<td>Established, lower traffic turf (lawns, parks, golf course roughs)</td>
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<tr>
<td>ppm P2O5</td>
<td>ppm K</td>
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<td>----------------</td>
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<tr>
<td>0-5</td>
<td>0-25</td>
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<td>6-10</td>
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<td>&gt;200</td>
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<tr>
<td>&gt;30</td>
<td>&gt;200</td>
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</table>

**Table 3. Recommended total lbs K2O/1000 sq ft applied between soil tests given the specific turf area.**

<table>
<thead>
<tr>
<th>Soil test results</th>
<th>Established, lower traffic turf (lawns, parks, golf course roughs)</th>
<th>Established high traffic turf (athletic fields, greens and tees)</th>
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<tbody>
<tr>
<td>ppm K</td>
<td>lbs K2O/1000 sq ft/yr</td>
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<tr>
<td>0-25</td>
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<tr>
<td>25-50</td>
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<td>50-75</td>
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<tr>
<td>75-100</td>
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<tr>
<td>&gt;100</td>
<td>0.5</td>
<td></td>
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</tbody>
</table>

**Iron (Fe)**

- 0.25 lb Fe/1000 will provide ultra-quick green-up for a special event
- It stains everything though
Calibration questions

1. Have you ever used a rotary spreader?
   a. Yes
   b. No

2. How often do you calibrate your spreaders?
   a. We never calibrate and use settings off the bag
   b. We calibrate once/year
   c. We calibrate whenever a new product is used

3. Do you check the distribution pattern of your rotary spreaders?
   a. Yes
   b. No
4. When using a rotary spreader, how much distance or overlap between passes?

A: edge to edge (~0% overlap)
B: Edge of pattern back to previous wheel track (50% overlap)
C: overlap about 25% or so

Recent surveys (240 respondents)

1. Calibration
   - 13% never calibrate and use settings off the bag
   - 21% calibrate once/year
   - 57% calibrate whenever a new product is used
2. 26% check the distribution pattern of their rotary spreader
3. Overlap?
   - 9% spread edge to edge (~0% overlap)
   - 68% spread edge to wheel track (50% overlap)
   - 21% overlap about 25% or so
Amount of product applied
Distance in feet across lawn

Trim pass with guard down and 3rd hole closed

Potential problem: Delivery pattern for a rotary spreader throwing heavy to the right

Center of spreader (wheel/track)

Target rate (100%)
~140% of target rate
~60% of target rate
19-0-6 with 0.10% Dimension

20-0-8 with 0.10% Barricade

0-0-7 with 0.10% Dimension
What we learned

• Distribution patterns are only accurate when the spreader is at/near your target setting
• Every spreader is different
• Big difference depending on product
• You have to adjust to get best distribution

What’s it take?

1. Time
2. Concrete/asphalt surfaces
3. Shallow boxes (roughly 12” wide are best)
4. Something to visually measure product or weigh it
How would you determine the application rate of a rotary spreader?

1. Weigh product and pour it into the spreader
2. Run a calibration course of a known distance
   
   Length is convenient distant (in feet), longer the better

   Width of course is from center of wheels to edge of pattern (in feet)

3. Weigh the product remaining
4. Math: lbs applied/sq ft of calibration course, convert to lbs/1000 sq ft
Traffic management

- Remove all excess traffic
- Turf manager must play in decisions to use during inclimate weather
- Rotate traffic
- Avoid fixed structures (bleachers, goals, fences, observation towers vs lifts)
- Fields require a break from use during the growing season
  - Aug-Nov is ideal
  - Mar-July is next best
  - Mar-May is third best

Compaction

- Decreases soil aeration
- Increases soil strength
- Increases soil H2O holding capacity
- Increases soil temperature extremes (reduces change in soil temps)
Aerification

• UT: $60.00/field DIY
• Contractor estimate: $760-1200/acre
• Bad: No money savings
• Bad: No immediate response
• Good: better long-term health (big bang for the buck)

% Surface area affected

<table>
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<tr>
<th>Tine spacing</th>
<th>Holes/sq ft</th>
<th>1/2&quot; tine</th>
<th>3/4&quot; tine</th>
<th>1&quot; tine</th>
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<td>4.9</td>
<td>11.1</td>
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<td>2x3</td>
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<td>2x4</td>
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<td>2x6</td>
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<td>0.8</td>
<td>1.8</td>
<td>3.3</td>
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Aerification/overseeding

• Can never over-aerify
• Largest tines
• Most holes/sq ft
  Target is 20-40 holes/sq ft
• (Almost) always seed when you aerify, especially at end of year

Kentucky bluegrass cover when seeded from Sep through May and rated throughout the following year.
Post-seeding care

- 1.0 lb P2O5/1000 starter fertilizer once germination begins
- Repeat every 4-6 growing weeks
- Irrigation throughout summer
- Mow as soon as needed
- No PRE herbicide except Tenacity or maybe Tupersan
- Quinclorac/Tenacity for POST crabgrass/BDLV
- QuickSilver is safest BDLV

Poa annua control options?

- No good controls
- No PRE’s because of regular seeding
- Prograss is good on PRYE
- Tenacity on KBG and young PRYE
- FMC’s Xonerate?

Tenacity

- Tenacity is not labelled for Poa annua
- Very safe on KBG including seedlings and also PRYE seedlings
- Three applications at 5.3 oz/A 7-10 days apart is typical
- More frequent applications improve control
- Include 0.25% v/v NIS + 2.5% v/v UAN (urea-ammonium nitrate 28% N)
- 20 GPA most effective
- 1.0 lb N/1000 w/urea shortly after applications start
- Fall applications effective, but inconsistent with only 3 fall +/- 1 spring applications
- Control from fall apps are equal to or better than Prograss
- Univ of Illinois:
  - >70F or hotter
  - 5 apps @ 3.2 oz/A applied 1-2X/week
% Poa cover in fairway height bluegrass after three years of late summer/fall herbicide treatments at Firethorn GC (UNL, 2010)

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>App timing</th>
<th>10/7/10</th>
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<td>8</td>
<td>19</td>
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<td>29</td>
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<td>46</td>
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<tr>
<td>Tenacity 8 oz/A (PRE)</td>
<td>Aug</td>
<td>6</td>
<td>21</td>
<td>8</td>
<td>10</td>
<td>15</td>
<td>51</td>
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<td>Barricade 0.65 lb ai/ A X 2 (PRE)</td>
<td>Aug + Nov</td>
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<td>27</td>
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<tr>
<td>Tenacity 8 oz/A X 2 (PRE)</td>
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<td>Tenacity 5.3 oz/A X 2 (POST)</td>
<td>Oct-Nov</td>
<td>7</td>
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<td>15</td>
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<td>LSD (P=0.05)</td>
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<td>3</td>
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<td>LSD (NS)</td>
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</table>

LSD (P=0.05) 25 45 27
Xonerate
- Amicarbazon (Arysta)
- Good activity on Poa
- Narrow margin for safety on bent, but better safety margin on KBG
- Apply in late spring/summer >80F, not in fall
- Partially root absorbed so water in
- Wait only 1 week to apply after seeding
- *Wait 4 months to seed after application*
- Maybe synergism on *Poa annua* as well as *Poa triv* control when applied with Tenacity?

Tenacity + Xonerate?
- Preliminary Illinois data
- Start in mid-to late summer
- Initial application
  - 4 oz/A Tenacity
  - 1.4 oz/A Xonerate 4S
  - 1.0 lb N/M Urea in or close to application
- Repeat applications (every 3-4 days)
  - 3 oz/A Tenacity
  - Safe on KBG, unknown on other species

Primo on bluegrass?
- IL research suggests it will reduce ABG in KBG
- Improves density of KBG which may reduce ABG
- 26 oz/ A applied every *400 GDD* (Daily high/Daily low)/2

Poa control in KBG fairway after season-long growth regulator applications (Branham, Univ of Illinois 2013)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>oz/A</th>
<th>Interval</th>
<th>% Poa Control 10/10/13</th>
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<td>Primo</td>
<td>17.5</td>
<td>400 GDD</td>
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<td>Trimmit + Primo</td>
<td>8 + 26</td>
<td>800 GDD</td>
<td>31 b</td>
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<tr>
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<td>800</td>
<td>6 a</td>
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<tr>
<td>Cutless + Primo</td>
<td>8 + 26</td>
<td>800 GDD</td>
<td>36 b</td>
</tr>
</tbody>
</table>

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