Turf 101

Dr. Trey Rogers
Michigan State University

There are relatively few new ideas, only technology to carry the original ones forward.
Sports Turf Field Construction

1. PAT System
2. USGA
3. Sand Cap
4. Sand Cap build up
5. ASTM Specs

Sports Turf Research at Michigan State University - 1988-2009

- Crumb Rubber
- *Poa supina* Management
- Summer Weed Management
- Athletic Field Systems
- Root Zone Engineering
- Quantification of Cultural Practices
- Establishment Studies
- PGR
- Sand Cap Field Construction
- Organic Matter Accumulation Studies
- Sand Cap built-up systems

- Crumb Rubber
- Poa supina Management
- Summer Weed Management
- Athletic Field Systems
- Root Zone Engineering
- Quantification of Cultural Practices
- Establishment Studies
- PGR
- Sand Cap Field Construction
- Organic Matter Accumulation Studies
- Sand Cap built-up systems

Circa 2000 – In-fill systems

What’s in Field Turf?
An artificial turf field like FieldTurf is made up of plastic grass fibers held in place by up to 21 layers of different-sized crumb rubber particles and sand.

Increased Complexity

There are relatively few new ideas, only technology to carry the original ones forward.
Reinforced Natural Turf Systems

1995 2015

Sports Turf Research at Michigan State University - 1988-2009

- Crumb Rubber
- Poa supina Management
- Summer Weed Management
- Athletic Field Systems
- Root Zone Engineering
- Quantification of Cultural Practices
- Establishment Studies
- PGR
- Sand Cap Field Construction
- Organic Matter Accumulation Studies
- Sand Cap built-up systems

Turf Management Cultural Practices

1. Mowing
2. Fertilizing
3. Irrigation
4. Soil Cultivation
5. Pest Management

1. Mowing
2. Fertilizing
3. Irrigation
4. Soil Cultivation
5. Pest Management
All about Turf

Briggs and Stratton’s “The Yard Doctor”

How to get through to the these guys?

Tips and Tricks for the Ultimate Turf from the Guru of Grass

LAWN GEEK
TREY ROGERS
Top Ten Yard Tips

1. Never cut more than one-third of the grass blade during any one mowing.
2. Alternate your mowing pattern.
3. Leave grass clippings on the lawn.
4. Control weeds while they’re young.
5. Give your mower a checkup.
6. Look for a high-quality engine when buying a lawn mower.
7. Water early in the day.
8. Buy high-quality grass seed.
9. Avoid a fertilizer overdose.
10. Protect the environment while saving your lawn.

Top Ten Turf Tips

1. Never cut more than one-third of the grass blade during any one mowing.
2. Alternate your mowing pattern.
3. Leave grass clippings on the lawn.
4. Control weeds while they’re young.
5. Give your mower a checkup.
6. Look for a high-quality engine when buying a lawn mower.
7. Water early in the day.
8. Buy high-quality grass seed.
9. Avoid a fertilizer overdose.
10. Protect the environment while saving your lawn.

Mowing

70% of all problems in the lawn are directly or indirectly related to mowing practices.

Mowing Tips

1. Never cut more than one-third of the grass blade during any one mowing.
2. Alternate your mowing pattern.
3. Leave grass clippings on the lawn.
4. Give your mower a checkup.
The One-Third Rule

Desired Mowing Height

1”  2”  3”  3”  4”  4.5”  6”

Mowing following 1/3 Rule

Sports Turf Research at Michigan State University - 1988-2006

- Crumb Rubber
- *Poa supina* Management
- Summer Weed Management
- Athletic Field Systems
- Root Zone Engineering
- Quantification of Cultural Practices
- Establishment Studies
- PGR
- Sand Cap Field Construction
- Organic Matter Accumulation Studies

Plant response to mowing heights

Continual Scalping

Materials and Methods

Factor 1 = Mowing Frequency

- Level 1: Mow 1x/week at 3.8 cm (Low)
- Level 2: Mow 2x/week at 3.8 cm (High)

Factor 2 = Fertilization Rate and Frequency

- Level 1: 5 g N m⁻² @ 5 apps/yr. (Low Infrequent)
- Level 2: 2.5 g N m⁻² @ 8 apps/yr. (Low Frequent)
- Level 3: 5 g N m⁻² @ 7 apps/yr. (High)
Traffic Simulation

Brinkman traffic simulator

50 passes made from 24 August through 15 Nov. 2000.

Cady traffic simulator

50 passes made from 27 August through 16 Nov. 2001.

Cady Traffic Simulator

Forward

Backward

Effect of Mowing and Wear on Plant Counts

Cady traffic simulator

Plots per 100 cm²

Low mow

High mow


0 passes 10 passes 14 passes 18 passes 22 passes 25 passes

LSD(0.05)=27

LSD(0.05)=15

LSD(0.05)=25

LSD(0.05)=18

NS

NS

Robotic Mowing??

Soil/Cultivation

Turfgrass

Mowing

Irrigation
Top Ten Turf Tips

6. Look for a high-quality engine when buying a lawn mower.
7. Water early in the day.
8. Buy high-quality grass seed.
9. Avoid a fertilizer overdose.
10. Protect the environment while saving your lawn.

Irrigation

• Timing
• Rates
• Coverage
• Efficiency

Top Ten Yard Tips

6. Look for a high-quality engine when buying a lawn mower.
7. Water early in the day.
8. Buy high-quality grass seed.
9. Avoid a fertilizer overdose.
10. Protect the environment while saving your lawn.

Irrigation Rates

Water to equal 1.0 inch/week

• Lower at beginning and end of season
• All moisture counts in total

Irrigation Timing

Water early in the day

• Wind is minimal
• Sun will dry off leaves
• Greatest efficiency

Irrigation Rates

• There are far more negative consequences from over-irrigated turf compared to under irrigated turf.
Consequences of over irrigated turf

- Increase nuisance pests (mosquitoes)
- Leaching of nutrients & pesticides
- Moss
- Mushrooms
- Scald
- Scalping

Consequences of over irrigated turf

- Wet wilt
- Waste of money
- Waste of water
- Wear on heads (nozzles) and pumps
  - Labor cost

Irrigation Rates

Irrigation does not lie!

There are far more negative consequences from over-irrigated turf compared to under irrigated turf.

Given this fact the only way anyone would over irrigate is by mistake.
Fertility

- Fertilizer does not lie.

Fertilization

- Fertilizer does not lie, but people do.
**Fertility**

- Twice as much is rarely, if ever, twice as good.
- You can always add more, but can’t take it back.

---

**Rotary vs Drop**

- Follow the Directions, on the back of the bag, this is science in action.
- Be wary if there are no directions on the back of the bag.
Weeds are an effect of poor quality turf, not the cause.

Quantification of the Effect of Cultural Practices on Wear Tolerance of an Athletic Field

Materials and Methods

Factor 1 = Mowing Frequency
(Zero turn rotary, push mower)
Level 1: Mow 1x/week at 3.8 cm (Low)
Level 2: Mow 2x/week at 3.8 cm (High)

Factor 2 = Fertilization Rate and Frequency
(Scott's 18-5-18)
Level 1: 5 g N m² @ 5 apps./yr. (Low Infrequent)
Level 2: 2.5 g N m² @ 8 apps./yr. (Low Frequent)*
Level 3: 5 g N m² @ 7 apps./yr. (High)

Effect of Cultural Practices and wear on Plant Counts

Cady traffic simulator

Plants per 100 cm²

Effect on wear:
- Low mow, Low infrequent fert., Low cult.
- High mow, High fert., High cult.

LSD(0.05)=35

Games Simulated

How many games can I expect out of my field?
Optimizing Cultural Practices to Improve Athletic Field Performance

R. Calhoun, L. Lundberg, J. Rogers, and J. Crum
Michigan State University Extension
Bulletin E 18TURF
December 2002

You have 70 days to get a field ready during the summer time, what do you do while minimizing cost?

Effect of Fertilization, Mowing Frequency and Cultivation on Number of Simulated Football Games with Acceptable Turf Cover

- High Fertility – 7# N/M/YR, Mow 2x per week, Cultivation 2x per year, Total Annual Cost – $5,377
- Medium Fert. – Infrequent at 5# N/M/YR, Mow 1x per week, Total Annual Cost – $2,686

Sports Turf Research at Michigan State University - 1988-2006

- Crumb Rubber
- Poa supina Management
- Summer Weed Management
- Athletic Field Systems
- Root Zone Engineering
- Quantification of Cultural Practices
- Establishment Studies
- PGR
- Sand Cap Field Construction
- Organic Matter Accumulation Studies

Fertility Treatments applied on May 31

Factor B - Fertilizer –
1) 46-0-0 – July 1 @ 1# N/M – Urea
2) 46-0-0 – 0.33# N/M every 2 weeks – Urea 2w
3) 39-0-0 – SCU @ 3# N/M – SCU
4) 43-0-0 – Polyon @ 2# N/M – Poly 2
5) 43-0-0 – Polyon @ 3# N/M – Poly 3
6) 44-0-0 – Polyon @ 4# N/M – Poly Thin

13-25-12 starter fertilizer @ 1.0# N/M was also applied with the treatments. All other nutrients were applied uniformly across the treatments as needed.
Pesticides are a shortcut to sound cultural practices.

**Healthy Turf – Healthy Body?**

- Adequate Fluids
- Proper nutrition
- Consistent Exercise
- Watering correctly
- Proper fertilizing
- Consistent mowing/cultivation

**Medicine = Pesticides**
World Cup 2010

Teams shouldn't tear up grass fields just yet. ESPN.com

• More thought needs to be put into saving grass fields. Maybe that means paying big money to the right person to nurture the field. That should be a position that's not taken lightly.

John Clayton, 15 Nov. 2002

Four Rules of Life

- Show up.
- Pay attention.
- Tell the Truth.
- Don’t be attached to the outcome.
Crumb Rubber from used tires

<table>
<thead>
<tr>
<th>Rubber depth, mm</th>
<th>% Cover Oct. 94</th>
<th>% Cover Dec. 94</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>53</td>
<td>42</td>
</tr>
<tr>
<td>3.8</td>
<td>62</td>
<td>51</td>
</tr>
<tr>
<td>7.6</td>
<td>72</td>
<td>63</td>
</tr>
<tr>
<td>9.5</td>
<td>73</td>
<td>66</td>
</tr>
<tr>
<td>19.1</td>
<td>89</td>
<td>88</td>
</tr>
<tr>
<td>LSD</td>
<td>11</td>
<td>14</td>
</tr>
</tbody>
</table>

Crumb Rubber vs No Crumb Rubber
United States Patent:
No. 5,622,022

“Method for reducing abrasion of turfgrass on activity fields.”
J.N. Rogers, J.T. Vanini, April 1997

Houghton Lake HS – Nov 2004

10,000X - Sand Particle
10,000X - Rubber Particle

Its never so bad…

…it can’t get worse!