Turf and Athletic Field Management
Matt Elmore, Ph.D.

General Guidelines

- 200 hours/yr – To maintain field in excellent condition
- 400 hours – Reduction in quality
- 600 – Poor conditions can be expected

Liebig’s Law of Minimum

- Well-oxygenated soil
- Sunlight
- Water
- Fertile soil (pH, nutrients)

Drainage

1-1.5% slope
Surface Runoff
Clay vs Sand

Drainage

- 12-18"
Fine over coarse
slow infiltration
increased runoff

Dr. Jim McAfee

Drainage

Shape of slope depends on
sport

Shortest distance to drain and
away from high traffic areas

12-18"

Drainage
Traffic Patterns

Movable goals – Communication with coaches

Things you can control - Management
Mowing

More prone to scalping on uneven terrain at low HOC

Structure of a Grass Plant
- blade
- crown
- tiller
- stolon
- rhizome
- root system

1/3 rule
Maintains photosynthetic tissue

Dr. Jim McAfee
Casey Reynolds, PhD
Clippings contain nutrients and do not contribute to thatch.

Mowing Height
- Can increase ET
- But can increase rooting potential

At the lower end of recommended mowing height
- Cultural practices increase

Frequency, Height
- Better to go from low to high than high to low
- Less scalping
- Hybrid bermudagrass: 0.75 – 1.5 inches
  Common bermudagrass: 1 – 2 inches

If you mow lower, you are making a commitment to mowing more frequently.
Too much grooming can reduce traffic tolerance.
Aerification

Liebig's Law of Minimum

Well-oxygenated soil
Sunlight
Water
Fertile soil (pH, nutrients)

Reason #1

Soils

Water
Air

Mesopores
Micropores

Compaction from Traffic

Goosegrass
Compaction
**Compaction**

**Prostrate Knotweed**

**Weeds**

**Why control weeds?**

**Traffic Tolerance**

**Surface Hardness**

**Rotational Resistance**

**Reason #2**

**Brosnan et al. 2014**
As necessary. May be 3+ times per year

Can help break up hardpans

Remediation

Advantage of Deep Tine Aeration
Aerification

Slicing - Aerway

Drill and Fill

Gravel layer 20” below silt loam soil

Deep layer of fines over coarse

102,000 hand-drilled holes
Reason #2 for aerification

Verticut only in Thatchy Areas!
Verticut only in Thatchy Areas!

Primary Nutrients

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>% Dry weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>2.5 – 5%</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.2 – 0.5%</td>
</tr>
<tr>
<td>Potassium</td>
<td>1.5 – 3%</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.3 – 1.2%</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.2 – 0.9%</td>
</tr>
<tr>
<td>Sulfur</td>
<td>0.2 – 0.5%</td>
</tr>
<tr>
<td>Iron</td>
<td>0.005 – 0.015%</td>
</tr>
<tr>
<td>Manganese</td>
<td>0.002 – 0.010%</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.002 – 0.0055%</td>
</tr>
<tr>
<td>Copper</td>
<td>0.0005 – 0.0020%</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>0.0001 – 0.0004%</td>
</tr>
<tr>
<td>Boron</td>
<td>0.0005 – 0.0001%</td>
</tr>
<tr>
<td>Chlorine</td>
<td>0.0002 – 0.001%</td>
</tr>
<tr>
<td>Nickel</td>
<td>&lt; 0.000001%</td>
</tr>
</tbody>
</table>

No soil test?

Soil Type

Liébig's Law of Minimum
Nitrogen
Too Much
Just Right
Not Enough

Fertilizer Requirement – Athletic Fields

<table>
<thead>
<tr>
<th></th>
<th>N/1000 ft(^2)/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bermudagrass</td>
<td>4-6</td>
</tr>
<tr>
<td>Hybrid Bermudagrass</td>
<td>5-6</td>
</tr>
<tr>
<td>Other Lawn Grasses</td>
<td></td>
</tr>
<tr>
<td>Zoysiagrass</td>
<td>2-3</td>
</tr>
<tr>
<td>Buffalograss</td>
<td>1-2</td>
</tr>
</tbody>
</table>

Quick-Release Nitrogen
Water-soluble

- Ammonium sulfate
- Ammonium nitrate
- Diammonium phosphate
- Urea

Slow-Release Nitrogen
Sulfur/poly-coated

Inexpensive form of slow-release

Slow-Release Nitrogen
Methylene urea
Organic sources
Slow Release vs Quick Release?

> 5 lbs per year

Mowing

GARANTEED ANALYSIS

Total Nitrogen (N) 29.0% Urea Nitrogen 29.0%
Soluble Potash (K₂O) 1.3%

Derived from: Polymer Coated Urea, Urea and Muriate of Potash.

25% N by weight

1 / 0.25 = 4 lbs product/1000

25-0-4

50 lb bag

Q1 – How many lbs per 1000 ft² get one lb N?

21% N by weight

1 / 0.21 = 4.75 lbs product/1000

21-0-0
Rotary Spreader Distribution

Wheel track to wheel track

After Application

Sweep prills from hardscapes

Light irrigation if possible
0.25 inches – cycle soak

minimizes volatilization