Sustainable Turf Care

Charles H. Peacock
Grady L. Miller
North Carolina State University
Remember that Every maintenance practice, fertilizer application and chemical application has an impact on turf health.
Altering a practice--- provide customer with records indicating disease outbreak, cost of fungicide applications, turf replacement, etc . . . . in terms of both economic and ecological terms.
5 Steps in GreenScapes

• Build and maintain healthy soil
• Plant right plant for your site
• Practice smart watering
• Adopt a holistic approach to pest management
• Practice natural lawn care

www.epa.gov/GreenScapes/
November TurfTips
Fertilize your tall fescue lawn according to soil test recommendations in November (about the time the grass is green but not actively growing). Do NOT fertilize St. Augustinegrass at this time. Do NOT apply nitrogen to zoysiagrass at this time.

There are over 100 diseases that affect North Carolina turfgrasses. Fortunately, there are only about 11 turfgrass diseases that develop year after year. Following is a list of the most common diseases that affect North Carolina turfgrasses.

- Anthracnose
- Leaf Spot
- Red Leaf Spot
- Brown Blight
- Molding Out
- Red Thread
- Rust
- Brown Spot
- Septoria Patch
- Snow Mold
- Damping Off
- Pink Snow Mold
- Spring Dead Spot
- Dollar Spot
- Poudreury Disease
- Summer Patch
- Fairy Ring
- Pythium Blight
- White Patch

The following comprehensive guides provide information on turf maintenance as well as pest identification and management.

Carolina Lawns

Lawns are smooth, living carpets that add beauty and recreational space to your home. The benefits of a healthy lawn go beyond the obvious. As your grass grows, it is working to help the environment by stabilizing soil and reducing air pollution, noise, heat, dust, and glare. Surveys show that an attractive, well-landscaped lawn can even add to the value of your home. To reap the rewards of a handsome lawn, take great care in the selection, establishment, maintenance, and renovation of your lawn grass. With proper choices, a durable lawn will grow with minimal effort.
Goal

• Reduce water and chemical use (save money)
• Use plants that require less care (save time)
• Reduce Impact on Environment
  – Conserve water
  – Proper chemical use
  – Reduce organic yard waste
Best Turf for Site

- Sun or Shade?
- Soil pH?
- Pest resistance?
- Drought tolerance?
- Low maintenance
- Premium quality?
Landscape Grasses

- Tall fescue
- Tall fescue + bluegrass
- Zoysiagrass
- Bermudagrass
- Centipedegrass
- St. Augustinegrass
- Crabgrass or whatever grows
<table>
<thead>
<tr>
<th>Lawn grass</th>
<th>Shade</th>
<th>Heat</th>
<th>Cold</th>
<th>Drought</th>
<th>Wear</th>
<th>Color</th>
<th>Texture</th>
<th>Preferred season</th>
<th>Rate of establishment</th>
<th>Cutting height (inches)</th>
<th>Fertilizer (lb N/1,000 sq ft/yr)</th>
<th>Mowing frequency</th>
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<tr>
<td><strong>Western Region</strong></td>
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<td>good</td>
<td>fair</td>
<td>very good</td>
<td>good</td>
<td>good</td>
<td>med-dark</td>
<td>medium</td>
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<td>2.5 to 4</td>
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<td>fair</td>
<td>med-dark</td>
<td>fine-med</td>
<td>fall</td>
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<td>fall</td>
<td>fast</td>
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<td>very good</td>
<td>very poor</td>
<td>excellent</td>
<td>excellent</td>
<td>medium</td>
<td>medium</td>
<td>spr/sum</td>
<td>fast</td>
<td>0.75 to 1</td>
<td>4.5</td>
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<td>fine</td>
<td>spr/sum</td>
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<td>0.75 to 1</td>
<td>5 to 6</td>
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<td>good</td>
<td>good</td>
<td>poor</td>
<td>med-dark</td>
<td>coarse</td>
<td>spr/sum</td>
<td>moderate</td>
<td>1 to 2</td>
<td>1</td>
<td>high</td>
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<td>good</td>
<td>poor</td>
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<td>coarse</td>
<td>spr/sum</td>
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<td>1 to 2</td>
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<td>med-coarse</td>
<td>fall</td>
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<td>1.5 to 3</td>
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<td>med-dark</td>
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<td>fall</td>
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<td>fine-med</td>
<td>spr/sum</td>
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<td>0.75 to 1</td>
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<td>0.75 to 1</td>
<td>5 to 6</td>
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<td>spr/sum</td>
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<td>high</td>
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<td>poor</td>
<td>light</td>
<td>coarse</td>
<td>spr/sum</td>
<td>slow</td>
<td>1 to 2</td>
<td>0.5</td>
<td>low</td>
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<td>med-dark</td>
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<td>0.75 to 1</td>
<td>1.5</td>
<td>high</td>
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</tbody>
</table>

* Can be seeded.

Note: Some improved cultivars are better adapted and more pleasing in appearance than the comparison rating provided for a given lawn grass. Check with your county Cooperative Extension Center concerning specific cultivars that have improved characteristics of interest to you. See Table 2 for suggested months of establishment.

Establishment rate is dictated by planting dates, seeding and planting rate, intensity of culture, and environment.

Mowing frequency is dictated by season, intensity of management, and use.
Turf choices
Zoysiagrass

**Cultivars**

**Fine texture:** Emerald, Cavalier, Zorro, Zeon, Diamond

**Medium texture:** Meyer, El Toro, Crowne, Jamur, Palisades, Empire

**Seeded:** Zenith, Compadre
Cultivars

Pick a blend of tall fescue cultivars or a mixture with Kentucky bluegrass cultivars.

Suggest not recommend K-31

Tall fescue lawn
<table>
<thead>
<tr>
<th>Very Good</th>
<th>Good</th>
<th>Fair</th>
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<tbody>
<tr>
<td>Adventure II**</td>
<td>Adventure ***</td>
<td>Amigo</td>
</tr>
<tr>
<td>Barlexus</td>
<td>Amigo ***</td>
<td>Aztec</td>
</tr>
<tr>
<td>Bonanza***</td>
<td>Avanti ***</td>
<td>Bonsai</td>
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<tr>
<td>Fine Lawn Petite**</td>
<td>Apache ***</td>
<td>Era</td>
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<tr>
<td>Genesis</td>
<td>Barnone</td>
<td>Ky-31</td>
</tr>
<tr>
<td>Lancer</td>
<td>Crossfire ***</td>
<td>Monarch</td>
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<td>Marksman**</td>
<td>Emperor ***</td>
<td>Silverado***</td>
</tr>
<tr>
<td>Mini-Mustang</td>
<td>Finelawn</td>
<td>Trailblazer</td>
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<tr>
<td>Phoenix***</td>
<td>Finelawn 5GL</td>
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<tr>
<td>Rebel 3 D</td>
<td>Houndog</td>
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<tr>
<td>Safari</td>
<td>Jaguar II ***</td>
<td></td>
</tr>
<tr>
<td>Shenandoah***</td>
<td>Vegas</td>
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<td>Southern Choice**</td>
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<tr>
<td>Tarheel</td>
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<td></td>
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<tr>
<td>Taurus***</td>
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</tr>
<tr>
<td>Thoroughbred</td>
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<tr>
<td>Tomahawk</td>
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<tr>
<td>Wolfpack</td>
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</tr>
</tbody>
</table>

**Indicate superior performance in the Mountain Region

*** Demonstrated good drought tolerance based on greenhouse studies
Bermudagrass

**Cultivars**

Hybrids:
- Tifway,
- Tifsport,
- Celebration,
- Patriot,
- Yukon,
- TifGrand***

Seeded: Riviera or Princess for highest quality but many others with great quality
Landscape alternative
Landscape alternative
Introducing the New SYNlawn Synthetic Grass

Now offering the largest selection in the industry with over 40 styles of artificial grass products to suit any application at any budget.

SYNAugustine Collection

A combination of wide blades made of tape yarn and single strand blades made of monofilament blend to form the realistic characteristics of SYNAugustine. The tape yarn can also be fibrillated (or broken apart) to create varying blade widths to suit your liking. The multiple colors complete the look to create this replica of the popular St. Augustine grass.

Collection Overview

- **Number of Classes**: Available in SYNlawn, SYNlawn Premium and SYNlawn Platinum classes.
- **Number of Styles**: Available in 1 different style(s).
- **Price Range**: Starting at $2.99 s/f up to $2.99 s/f.

View all SYNAugustine products.

SYNBlue Collection

The SYNBlue collection consists of two styles made of 100% nylon fibers. Using nylon monofilament and textured nylon, SYNBlue provides resiliency and strength beyond that of any synthetic grass on the market. These characteristics, plus warranties from 8-10 years, help to make SYNBlue the ultimate performer in high traffic areas and to provide a safe clean environment for kids and pets.

Collection Overview

- **Number of Classes**: Available in SYNlawn, SYNlawn Premium and SYNlawn Platinum classes.
- **Number of Styles**: Available in 2 different style(s).
- **Price Range**: Starting at $4.99 s/f up to $6.29 s/f.

View all SYNBlue products.

SYNrye Collection

Like SYNBlue, the SYNrye collection is available in two styles of artificial grass made of 100% nylon. The SYNrye construction is modified slightly from SYNBlue and offers a tighter, more random appearance. With the introduction of the new Premium class, SYNrye now uses a light brown thatch in the root zone to further enhance its realistic appearance. SYNrye products carry a warranty up to 10 years and are ideal for high traffic, play areas, pet areas and sloped landscapes.

Collection Overview

- **Number of Classes**: Available in SYNlawn and SYNlawn Platinum classes.
- **Number of Styles**: Available in 2 different style(s).
- **Price Range**: Starting at $4.99 s/f up to $6.29 s/f.

View all SYNrye products.

SYNTipede Collection

Long blades and varying color help give the SYNTipede collection of artificial grass products its natural appearance. Using soft polyethylene monofilament fibers, this collection gives the illusion of natural grass with multi-directional blades. SYNTipede comes with warranties ranging from 5-7 years and are recommended for problem areas, low-light areas recommended for problem areas, low-light areas and moderate foot traffic.

Collection Overview

- **Number of Classes**: Available in SYNlawn, SYNlawn Premium and SYNlawn Platinum classes.
- **Number of Styles**: Available in 3 different style(s).
- **Price Range**: Starting at $2.49 s/f up to $3.49 s/f.

View all SYNTipede products.

SYNFescue Collection

SYNFescue utilizes polyethylene tape yarn and textured nylon to create varying blade widths and multi-directional blades. When installed, SYNfescue is broken up during the fibrillation process to provide the soft think blade appearance of natural Fescue. This collection of artificial turf products comes with a 5 year warranty and requires infill. SYNfescue is recommended for landscapes with moderate foot traffic.

Collection Overview

- **Number of Classes**: Available in SYNlawn, SYNlawn Premium and SYNlawn Platinum classes.
- **Number of Styles**: Available in 3 different style(s).
- **Price Range**: Starting at $2.99 s/f up to $2.99 s/f.
Using Tall Fescue in North Carolina

• Even though tall fescue is the cool-season grass best adapted to the transition zone and the upper to mid-South, it is nonetheless a cool-season grass being used in the southernmost area of its adaptation.

• Its heat and drought tolerance are good for a cool-season grass, but still not as good as those of the warm-season grasses.

• Stress encourages pests!!!
Smart Watering

- Amount and Timing – be familiar with your irrigation system if you have one.
- Deficit irrigation
- Hydrozoning
- Good soil practices (aerification)
- Dormancy/survival of turfgrass
- Smart Controllers
Turf Irrigation Management System
www.TurfFiles.ncsu.edu/TIMS
Water wisely

- Irrigate in early morning
- Within current restrictions
- Calibrate irrigation system
- Change controller run times at least monthly

http://www2.turffiles.ncsu.edu/tims

Table 8. North Carolina Northern Coastal Plain (Rocky Mount Area) Turfgrass Irrigation Requirements

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean Temperature(°F)</th>
<th>Average Rainfall</th>
<th>ETP *</th>
<th>Gross Irrigation Requirement *</th>
<th>Net Irrigation Requirement *</th>
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</thead>
<tbody>
<tr>
<td>Jan</td>
<td>40.5</td>
<td>3.67</td>
<td>0.66</td>
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<tr>
<td>Feb</td>
<td>43.7</td>
<td>3.53</td>
<td>0.81</td>
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<td>March</td>
<td>51.2</td>
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<td>1.76</td>
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<td>July</td>
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<td>5.08</td>
<td>7.66</td>
<td>5.12</td>
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<td>5.01</td>
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<td>Nov</td>
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<td>Dec</td>
<td>44.0</td>
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<tr>
<td>Total</td>
<td>45.83</td>
<td>43.70</td>
<td>23.96</td>
<td>29.94</td>
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* ETP is potential evapotranspiration or the reference water use based on climatic information calculated using a modified Blaney-Criddle method.
* Gross irrigation requirement is determined by subtracting the effective rainfall from the ETP. Effective rainfall is assumed to be 50 percent of the average monthly rainfall.
* The net amount of water required by the turfgrasses is quantified by the following equation: Irrigation Requirement = GIB Where GIB is the gross irrigation requirement and DU is the uniformity of distribution of the irrigation system.
Rain shut-off devices – A MUST!

Rain Sensor Mini-Click II
Turfgrass Water Stress Continuum

High

Relative Plant Health

Low

Dormancy Quiescent Severely Damaged or Dead

Recovery Possible

Moderately Dry

Optimum Health

Excessive Soil Water

Plant Health

Very Low <<<<<<<<<<<<<<<<<<<<<<<< Soil Moisture >>>>>>>>>>>>>>>>>>>>>>>> Very High

Dehydration

CH₂O Depletion

Meristem Death

More Discoloration

Leaf Firing

Dormancy

Decreased PS

Increased RS

CH₂O Reduction

Discoloration & Decreased:

Growth

Recovery

Pest

Resistance

Stress Resistance

Maximum:

Growth/Rooting

Recuperation

Density

Uniformity

CH₂O Balance

Stress Tolerance

Pest Resistance

Discoloration & Decreased:

Growth

Rooting

Recovery

Pest

Resistance

Stress Resistance

Credit: Dr. Richard White - Texas A&M University
Evaluation of ET-Based and Soil-Moisture Based Irrigation Control in Turf

Grabow, Bowman, Miller

- Treatments: schedule irrigation using two irrigation control technologies---based on ET or soil moisture sensor
- Tmt: Standard time-based irrigation schedule
- Tmt: irrigation frequency---1, 2, 7 days per wk
- Tmt: on-demand, 2-point soil moisture control

- Data: water applied and turf quality
Summary

• In first year, a dry year, frequency resulted in a savings in water amounts. Savings have been even greater in “wet years”.

• Two set-point soil moisture sensor produced high quality turf and maximized water efficiency.

• ET sensor followed weather trend and produced high-quality turf but applied more water than needed.
Best Irrigation Advice
---Conservation Minded---

- www.turffiles.ncsu.edu/TIMS for managing your irrigation

Or

- know your irrigation output rate, install a wafer-type rain shut-off device, and using extension publication AG-661, set your controller the first day of each month to irrigate at 60% of net irrigation requirement. Adjust up as needed.
### Table 5. North Carolina Southern Piedmont (Charlotte Area) Turfgrass Irrigation Requirements

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean Temperature(°F)</th>
<th>Average Rainfall</th>
<th>ETP</th>
<th>Gross Irrigation Requirement</th>
<th>Net Irrigation Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>41.2</td>
<td>3.72</td>
<td>0.66</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Feb</td>
<td>44.3</td>
<td>3.65</td>
<td>0.82</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>March</td>
<td>51.1</td>
<td>4.39</td>
<td>1.78</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>April</td>
<td>60.4</td>
<td>3.19</td>
<td>3.40</td>
<td>1.81</td>
<td>2.26</td>
</tr>
<tr>
<td>May</td>
<td>68.6</td>
<td>3.33</td>
<td>5.51</td>
<td>3.85</td>
<td>4.81</td>
</tr>
<tr>
<td>June</td>
<td>75.7</td>
<td>3.52</td>
<td>7.11</td>
<td>5.35</td>
<td>6.69</td>
</tr>
<tr>
<td>July</td>
<td>79.2</td>
<td>3.83</td>
<td>7.67</td>
<td>5.76</td>
<td>7.19</td>
</tr>
<tr>
<td>Aug</td>
<td>78.1</td>
<td>3.80</td>
<td>6.92</td>
<td>5.02</td>
<td>6.28</td>
</tr>
<tr>
<td>Sept</td>
<td>71.8</td>
<td>3.43</td>
<td>5.03</td>
<td>3.32</td>
<td>4.14</td>
</tr>
<tr>
<td>Oct</td>
<td>61.1</td>
<td>3.14</td>
<td>2.97</td>
<td>1.40</td>
<td>1.75</td>
</tr>
<tr>
<td>Nov</td>
<td>51.4</td>
<td>3.05</td>
<td>1.40</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dec</td>
<td>43.3</td>
<td>3.22</td>
<td>0.73</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>42.14</td>
<td>44.00</td>
<td>26.51</td>
<td></td>
</tr>
</tbody>
</table>

7.19 inches $\div 4 = \frac{1.8 \text{ inches}}{\text{week}} \times 60\% = 1.07 \text{ inches per week}$

\[
\frac{1.07 \text{ inches}}{1.5 \text{ inches/hr}} = 0.72 \text{ hour} \times \frac{60 \text{ min.}}{\text{hour}} = 43 \text{ min} \div 2 = 22 \text{ min. run time}
\]
Practice Natural Lawn Care

• Mowing higher, regularly, and leaving the clippings
• Use slow-release fertilizers (organic is one form of slow release fertilizer)
• Water appropriately
• Use seasonal planning calendar
  – www.turffiles.ncsu.edu
Recycle clippings
N Application Timing - Turf

<table>
<thead>
<tr>
<th>Turfgrass Species</th>
<th>Target pH</th>
<th>Intensity of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pounds N /1000 sq ft &amp; Application frequency within growing season</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Home Lawn</td>
</tr>
<tr>
<td>Tall Fescue</td>
<td>5.5-6.0</td>
<td>0.5-1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-3 times/yr</td>
</tr>
<tr>
<td>Kentucky Bluegrass</td>
<td>6.0-7.0</td>
<td>0.5-1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-3 times/yr</td>
</tr>
<tr>
<td>Creeping Bentgrass</td>
<td>5.5-6.0</td>
<td>NR</td>
</tr>
<tr>
<td>Hybrid Bermudagrass</td>
<td>6.0-7.0</td>
<td>0.5-1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-6 times/yr</td>
</tr>
<tr>
<td>Common Bermudagrass</td>
<td>6.0-7.0</td>
<td>0.5-1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-5 times/yr</td>
</tr>
<tr>
<td>Zoysia</td>
<td>6.0-7.0</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 times/yr</td>
</tr>
<tr>
<td>St. Augustine</td>
<td></td>
<td>0.5-1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 times/yr</td>
</tr>
<tr>
<td>Centipede</td>
<td>5.0-6.0</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-2 times/yr</td>
</tr>
<tr>
<td>Bahiagrass</td>
<td>5.0-6.0</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 times/yr</td>
</tr>
</tbody>
</table>

Tall fescue 0.5 to 1.0 pounds/1000 sq. ft., 2 – 3 times/year
Ideally, Cool-season turf should be seeded during the fall. Why is this?
Normal Tall Fescue Fertilization Schedule
Application methods can be as important as rate.
1. The Zoysia spp. cultivars included JaMur, Palisades, Empire, Ultimate, Pristine, Cavalier, Diamond, Zeon, and Zorro

2. Fertility treatments were either 1.5, 3.5, and 5.5 lb N/1000 ft²/year
Cavalier Turf Quality
Palisades Turf Quality
Zeon Turf Quality

![Graph showing Zeon Turf Quality from May 2008 to October 2008. The graph displays the quality score for different dates, with peaks and troughs indicating variations in quality over time. The quality scores are represented by different symbols and colors, with specific dates labeled for reference.]
# Dollarspot

<table>
<thead>
<tr>
<th></th>
<th>1.5 lb N/M</th>
<th></th>
<th>3.5 lb N/M</th>
<th></th>
<th>5.5 lb N/M</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short</td>
<td>Tall</td>
<td>Short</td>
<td>Tall</td>
<td>Short</td>
<td>Tall</td>
</tr>
<tr>
<td>JaMur</td>
<td>0.1</td>
<td>0.1</td>
<td>0</td>
<td>0.1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Palisades</td>
<td>4.9</td>
<td>5.5</td>
<td>1.4</td>
<td>2.3</td>
<td>0.7</td>
<td>0.3</td>
</tr>
<tr>
<td>Empire</td>
<td>0.1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ultimate</td>
<td>0.3</td>
<td>0.4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pristine</td>
<td>6.7</td>
<td>4.9</td>
<td>3.2</td>
<td>2</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Zeon</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cavalier</td>
<td>3.1</td>
<td>2.3</td>
<td>0.7</td>
<td>0.9</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Diamond</td>
<td>18.3</td>
<td>21.3</td>
<td>6.2</td>
<td>7.9</td>
<td>3.9</td>
<td>2.6</td>
</tr>
</tbody>
</table>
Soil

- Soil test – pH (lime), P, & K
- Aerify – increase oxygen and infiltration, i.e., deeper roots
- Organic – fertilizer or compost materials
Soil pH and Plant Nutrient Availability

- Nitrogen
- Phosphorus
- Potassium & Sulfur
- Calcium & Magnesium
- Boron
- Copper, Iron & Zinc
- Manganese
- Molybdenum

Soil pH:
- 4.5
- 5.5
- 6.5
- 7.5
- 8.5
CULTIVATION

Coring

Aerification

Reduce compaction to reduce standing water and increase rooting

Vertical Mowing

Dethatching

Power raking

Thatch management to reduce disease and insect incidence
• Aerify **Cool-Season** in Spring and Fall
• Aerify **Warm-Season** in Spring and Midsummer
• Aerify lengthwise **twice** & crosswise **once**
• Pulverize and drag
Premise of Organic Study

GC study on cool-season grass

- 3-year study comparing programmatic approach from Novozymes, Helena, Plant Food, Nutramax, Griggs Brothers, Emerald Isle, Sustane, and Floratine to 3.5#N, 1.5#P, 3#K, 2#Fe.
Summary of Study

• Performance of most of these products is not consistently or substantially different from traditional fertilizer applications.
• A few products offer nitrogen use reductions, but not consistent.
• Some resulted in increased disease incidence.
• Traditional programs always provide acceptable green turf (organic products did not).
• In some cases there were benefits to programs that had a mixture of organic + inorganic products.
Maintain Healthy and Vigorously Growing Turf to Reduce Weed Pressure
# Mowing Height

<table>
<thead>
<tr>
<th>Grass Type</th>
<th>Height (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bermudagrass</td>
<td>1 - 2</td>
</tr>
<tr>
<td>Zoysiagrass</td>
<td>1 - 2.5</td>
</tr>
<tr>
<td>Centipedegrass</td>
<td>1.5 - 2.0</td>
</tr>
<tr>
<td>St Augustinegrass</td>
<td>3 - 4</td>
</tr>
<tr>
<td>Tall Fescue</td>
<td>3 - 4</td>
</tr>
</tbody>
</table>
Mow High to Promote Root Growth
Mowing with sharp blades

<table>
<thead>
<tr>
<th>Sharp Blade</th>
<th>Dull Blade</th>
</tr>
</thead>
</table>

![Image of grass cut with sharp blade vs. dull blade](image-url)
Effect of Mowing Height on Large Crabgrass Incidence

• Bermudagrass mowing heights
  – 0.5”, 1”, 1.5”, 2.0”

• Tall fescue mowing heights
  – 1”, 2”, 3”, 4”
Effect of Tall Fescue Mowing Height on Crabgrass Incidence

Data Collected: 09-13-07, LSD (P=0.05), Sandhills Research Station, Sodman 90/10 (mixture w/ bluegrass)
Effect of Bermudagrass Mowing Height on Incidence of Crabgrass

Data Collected: 09-13-07, LSD (P=0.05), Lake Wheeler Field Labs
Holistic Approach to Pest Management

• Good cultural practices
  – Healthy soil – good nutrition
  – Good mowing practices
  – Accept some imperfections

• Use pesticides responsibly
  – Follow label
  – Calibrate your applicator
  – Treat only problem areas when practical
What is your threshold?
## Action Threshold: point at which action should be considered

<table>
<thead>
<tr>
<th>Pest</th>
<th>Number per sq. ft.</th>
<th>Monitoring method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armyworms</td>
<td>3 - 4</td>
<td>visual, soap flush</td>
</tr>
<tr>
<td>Billbugs</td>
<td>6</td>
<td>visual</td>
</tr>
<tr>
<td>Chinch bugs</td>
<td>20</td>
<td>flotation, soap flush</td>
</tr>
<tr>
<td>Cutworms</td>
<td>1</td>
<td>visual, soap flush</td>
</tr>
<tr>
<td>White grubs</td>
<td>3 – 4</td>
<td>visual</td>
</tr>
<tr>
<td>Mole crickets</td>
<td>1 - 2</td>
<td>visual, soap flush</td>
</tr>
<tr>
<td>Sod webworms</td>
<td>5 - 8</td>
<td>visual, soap flush</td>
</tr>
</tbody>
</table>
Each Turf Species Has Unique Problems

- **Tall Fescue**
  - brown patch, gray leaf spot, Pythium blight

- **Kentucky bluegrass**
  - dollar spot, summer patch, Pythium blight, rust, powdery mildew
Each Turf Species Has Unique Problems

- Centipede grass
  - large patch

- Bermudagrass
  - spring dead spot, dollar spot

- Zoysia grass
  - large patch, dollar spot, spring dead spot

- St. Augustine grass
  - large patch, gray leaf spot
Diseases are stress induced turfgrasses need protection when they are stressed and growing slowly.
Diseases are stress induced and turfgrasses need protection when they are stressed and growing slowly.
Rhizoctonia diseases are the most common and destructive in landscapes.
Summer Disease Management in Tall Fescue Cultural Practices

- Minimize nitrogen levels
- Mow regularly to keep canopy open and dry
- Irrigate before sunrise, deep and infrequent
- Improve drainage and soil infiltration
- Prune or remove trees and other obstacles to increase air movement
Brown Patch Control

Fungicides

• all of the labeled fungicides control brown patch effectively

• products differ in “residual control”, or the number of days of control

• For tall fescue, application intervals can be extended by 7 to 14 days
Brown Patch Control in Tall Fescue
Charlotte, NC

Treatments applied on 6 Jun and 3 Jul
Data collected on 2 Jul

Brown Patch Incidence (%)
Untreated Control

July 1, 2003
## Cost Analysis – Brown Patch Control

<table>
<thead>
<tr>
<th>Product</th>
<th>Rate (oz/1000 ft²)</th>
<th>Cost per lb</th>
<th>Cost per 1000 ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heritage 50WG</td>
<td>0.1</td>
<td>$365</td>
<td>$2.28</td>
</tr>
<tr>
<td>Eagle 40WP</td>
<td>0.6</td>
<td>$73</td>
<td>$2.75</td>
</tr>
<tr>
<td>Compass 50WDG</td>
<td>0.15</td>
<td>$300</td>
<td>$2.81</td>
</tr>
<tr>
<td>Banner MAXX 1.24MC</td>
<td>2</td>
<td>$289 (gal)</td>
<td>$4.52</td>
</tr>
<tr>
<td>Heritage 50WG</td>
<td>0.2</td>
<td>$365</td>
<td>$4.56</td>
</tr>
<tr>
<td>Compass 50WDG</td>
<td>0.25</td>
<td>$300</td>
<td>$4.69</td>
</tr>
<tr>
<td>Bayleton 50DF</td>
<td>1</td>
<td>$81</td>
<td>$5.06</td>
</tr>
<tr>
<td>3336 50WP</td>
<td>4</td>
<td>$22</td>
<td>$5.46</td>
</tr>
<tr>
<td>ConSyst 67WDG</td>
<td>8</td>
<td>$12</td>
<td>$6.23</td>
</tr>
<tr>
<td>Systar 80WDG</td>
<td>3</td>
<td>$43</td>
<td>$8.06</td>
</tr>
<tr>
<td>Prostar 70WP</td>
<td>3</td>
<td>$50</td>
<td>$9.38</td>
</tr>
</tbody>
</table>
Keys to Successful Brown Patch Control

- initiate applications when night temperatures consistently exceed 60°F
- spray in at least 2 gallons H₂O per 1000 ft² for best results
- minimize nitrogen fertilization during summer
- avoid extended periods of leaf wetness
- mow regularly at 3” to 3.5”
Turf Disease Diagnosis Services

- NC State Turf Diagnostics Lab
  - (ncstateturfdiagnostics.com)

Turffiles Disease ID Utility
- (www.turffiles.ncsu.edu)