Lawn Care Best Management Practices

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Turfgrass

Learning Objectives
At the end of this unit, you will be able to articulate and explain:
- Terms associated with turfgrass identification;
- Turf species grown in Maryland;
- Lawn establishment practices – seeding, sod, and site preparation;
- Cultural practices – fertilizing, mowing, watering, thatch control, aeration, and liming;
- Common lawn problems including, weeds, insect pests, diseases, and abiotic disorders.

Introduction
Lawns are an integral part of Maryland landscapes. In addition to enhancing the landscape, lawns provide practical benefits. A healthy lawn increases property values, controls soil erosion, filters pollution from runoff, moderates summer ground temperatures, and adds oxygen to the air. On the other hand, misapplication of pesticides and fertilizers greatly contributes to pollution of the Chesapeake Bay. Proper timing, selection, and correct application rates of these products can greatly reduce the negative impact the improper use of these products have on the health of the Bay. Proper cultural practices that encourage a healthy lawn are also essential.

Turfgrass Identification

Turfgrass terminology
Vegetative parts of a grass plant (Fig. 13-A) are useful for identifying a grass. Also consider:
- Leaf blade;
- Leaf sheath;
- Vernation;
- Collar;
- Ligule;
- Auricles; and
- Growth habit.

Figures 13-B to 13-H illustrate each of these and "in vivo" photographs of selected species.
Turfgrass Maintenance Practices

• Variety Selection
• Mowing
• Watering
• Fertilizing
• Aerating/Thatching
• Pest Management
Site Evaluation

- Shade/Sun
- Slope/Aspect
- Wet/dry
- Soil texture and nutrients
- Species present
- Use/traffic
- Functionality within the landscape
Turfgrass Quality Components

- Density
- Drought tolerance
- Persistence
- Pest Tolerance
- Color
- Uniformity
- Wear Tolerance
Turfgrass Identification

Fig. 13-A. Parts of a grass plant
- inflorescence
- culm (stem)
- node
- ligule
- leaf blade
- sheath
- flowering shoot
- tiller
- crown
- roots
- rhizome

Fig. 13-B. Leaf blade shapes and textures
- pubescent, sharply pointed
- smooth, boat-shaped
- coarse, blunt
Turfgrass Identification

Fig. 13-C. Leaf sheath types
- closed
- open
- overlapping

Fig. 13-D. Vernation types
- folded
- rolled

Fig. 13-E. Collar types
- divided
- broad
- narrow
Turfgrass Identification

Fig. 13-F. Ligule types
- absent
- smooth, membranous
- hairy

Fig. 13-G. Auricle types
- absent
- small
- prominent
Turfgrass Growth Habit

Fig. 13-H. Growth habits

- tiller
- stolon/tiller
- rhizome
Common Lawn Grasses of the Mid-Atlantic

- Tall Fescue
- Fine Fescue
- Zoysiagrass
Turfgrass Transition Zone

GROWING ZONES

COOL

TRANSITION

WARM

Courtesy of Sodsolutions.com
Mid-Atlantic Common Turfgrasses

• Tall fescue-
  – “Turf-type tall fescue”
  – Sunny areas, not shady areas
  – A “bunch-type” grass
    • Overseed thin areas for density
Mid-Atlantic Common Turfgrasses

- Fine fescue-
  - Fine leaf blade
  - More shade tolerant
  - Available in “Shady Mix”
Mid Atlantic Common Turfgrasses

- Zoysiagrass
  - Warm-season grass
  - Established by plugs or sprigs
  - Spreads
    - Stolons- above ground
    - Rhizomes -below ground
Other MD turfgrasses

- Bermudagrass - Typically used in athletic field or home lawns on Eastern Shore
- Kentucky bluegrass - Typically used on high-end athletic fields or in mixtures with tall fescue
- Perennial ryegrass - Typically used on golf courses
Table 13-A. Characteristics of turfgrass species

<table>
<thead>
<tr>
<th>Species</th>
<th>Drought tolerance</th>
<th>Full sun</th>
<th>Shade</th>
<th>High traffic tolerance</th>
<th>Insect and disease resistance</th>
<th>Days to seed germination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turf-type tall fescue</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
<td>7-14</td>
</tr>
<tr>
<td>Kentucky bluegrass</td>
<td>Good</td>
<td>Excellent</td>
<td>Fair - poor</td>
<td>Excellent</td>
<td>Poor</td>
<td>14-21</td>
</tr>
<tr>
<td>Fine fescue</td>
<td>Good - fair</td>
<td>Good - fair</td>
<td>Excellent - good</td>
<td>Poor</td>
<td>Good</td>
<td>7-14</td>
</tr>
<tr>
<td>Perennial ryegrass</td>
<td>Poor</td>
<td>Excellent</td>
<td>Fair - poor</td>
<td>Good</td>
<td>Poor (fair if seeds contain endophytes*)</td>
<td>5-10</td>
</tr>
<tr>
<td>Zoysia-grass</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Poor</td>
<td>Good</td>
<td>Good</td>
<td>N/A</td>
</tr>
<tr>
<td>Bermuda-grass</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Poor</td>
<td>Excellent</td>
<td>Good</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*Endophytes are beneficial fungi or bacteria that live within plant tissue. Perennial ryegrass and fescue turf with high endophyte levels are more drought resistant and less prone to damage from sod webworm and chinch bugs.*
How do you pick the best variety?

- University of Maryland Turfgrass Variety Recommendations
- Sod- Must be a good performing cultivar in MD/VA

Numerous new turfgrass cultivars continue to be developed and released by turfgrass breeders. However, while many of those cultivars are adapted to the environmental conditions that prevail in other regions of the country, many are not adapted to the difficult environmental conditions that occur in the transition zone, which includes Maryland and Virginia. Thus, to identify cultivars that will perform well in this region, extensive cultivar trials are evaluated each year at the University of Maryland and Virginia Polytechnic Institute and State University.

The cultivar performance data obtained at various locations in Maryland and Virginia are reviewed annually in a joint meeting of university researchers and representatives of the Departments of Agriculture of both states. The use of recommended cultivars usually results in a turfgrass stand of higher quality and density, greater stress tolerance, lower nutrient requirements, less water usage, and fewer pest problems. Also, the use of recommended cultivars generally has the benefits of a reduction in the need for pesticide applications, greater water infiltration, reduced water runoff, and the enhancement of the environmental benefits of properly managed turfgrass.

There has been extensive interest in recent years regarding turfgrass species that have reduced nutrient requirements, especially nitrogen. The two recommended turfgrass species with the lowest nitrogen requirements are the fine fescues and zoysiasgrass, while turf-type tall fescue and bermudagrass have intermediate requirements. Although Kentucky bluegrass generally has the highest nitrogen requirements, research is currently ongoing to identify Kentucky bluegrass cultivars that provide good quality under reduced nitrogen fertility and other maintenance inputs.

The following lists of recommended cultivars consist of two groups. ‘Proven’ cultivars represent those that have been performing well in trials in both states over multiple years, and have had certified seed tested by the MD and/or VA Departments of Agriculture. ‘Promising’ cultivars, listed in green italics, have shown good performance, but may have been tested in Maryland or Virginia for only 2 years, or may be difficult to find due to limited seed availability.

### Proven Turf-Type Tall Fescue Sod Cultivars

<table>
<thead>
<tr>
<th>Proven Turf-Type Tall Fescue Cultivars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alamosa®</td>
</tr>
<tr>
<td>Aragon II®</td>
</tr>
<tr>
<td>Belle Har®</td>
</tr>
<tr>
<td>Bluestem® X</td>
</tr>
<tr>
<td>Bookwood®</td>
</tr>
<tr>
<td>Bully B®</td>
</tr>
<tr>
<td>Country®</td>
</tr>
<tr>
<td>Cruiser®</td>
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<tr>
<td>Embrace®</td>
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<tr>
<td>Falcon®</td>
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<tr>
<td>Falcon®</td>
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<tr>
<td>Fastota®</td>
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<tr>
<td>Finest®</td>
</tr>
<tr>
<td>Forecaster® SL®</td>
</tr>
<tr>
<td>4® Montana®</td>
</tr>
<tr>
<td>Foothill®</td>
</tr>
<tr>
<td>Gangue® II</td>
</tr>
<tr>
<td>Gold Medal®</td>
</tr>
<tr>
<td>Grande®</td>
</tr>
<tr>
<td>OT®</td>
</tr>
<tr>
<td>Guardian®</td>
</tr>
</tbody>
</table>

### Promising Turf-Type Tall Fescue Cultivars

<table>
<thead>
<tr>
<th>Promising Turf-Type Tall Fescue Cultivars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gurney®</td>
</tr>
<tr>
<td>Allure®</td>
</tr>
<tr>
<td>Bermuda®</td>
</tr>
<tr>
<td>Advantage®</td>
</tr>
<tr>
<td>Pro Gold®</td>
</tr>
</tbody>
</table>
‘Vitality’ and ‘Top Choice’ blends

### Turf-Type Tall Fescue Sod

The following recommended and promising turf-type tall fescue cultivars may be seeded individually or in blends, and may be mixed with Kentucky bluegrass (see note below for percentages). Addition of Kentucky bluegrass may improve sod harvestability as well as improving overall performance and quality without increasing management inputs.

#### Proven turf-type tall fescue cultivars:

<table>
<thead>
<tr>
<th>Ast 9003</th>
<th>Guardian 21</th>
<th>2nd Millennium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avenger</td>
<td>Hemi</td>
<td>Shenandoah Elite</td>
</tr>
<tr>
<td>Barvado</td>
<td>Houndog 5</td>
<td>Shenandoah III</td>
</tr>
<tr>
<td>Bingo</td>
<td>Inferno</td>
<td>Sidewinder</td>
</tr>
<tr>
<td>Blackwatch</td>
<td>Integrity</td>
<td>Skyline</td>
</tr>
<tr>
<td>Bullseye</td>
<td>Justice</td>
<td>Spyder LS</td>
</tr>
<tr>
<td>Cochise III</td>
<td>Magellan</td>
<td>Sunset Gold</td>
</tr>
<tr>
<td>Constitution</td>
<td>Masterpiece</td>
<td>Tahoe II</td>
</tr>
<tr>
<td>Coyote II</td>
<td>Matador GT</td>
<td>Taos II</td>
</tr>
<tr>
<td>Dakota</td>
<td>Monet</td>
<td>Tarheel II</td>
</tr>
<tr>
<td>Darlington</td>
<td>Montana</td>
<td>3 Millennium SRP</td>
</tr>
<tr>
<td>Davinci</td>
<td>Mustang 4</td>
<td>Titanium</td>
</tr>
<tr>
<td>Daytona</td>
<td>Pedigree</td>
<td>Titanium LS</td>
</tr>
<tr>
<td>Endeavor</td>
<td>Penn 1901</td>
<td>Tombstone</td>
</tr>
<tr>
<td>Faith</td>
<td>Penn RK</td>
<td>Traverse</td>
</tr>
<tr>
<td>Falcon IV</td>
<td>Raptor II</td>
<td>Tulsa Time</td>
</tr>
<tr>
<td>Falcon V</td>
<td>Rebel Exeda</td>
<td>Turbo</td>
</tr>
<tr>
<td>Fidelity</td>
<td>Rebel IV</td>
<td>Van Gogh</td>
</tr>
<tr>
<td>Firecracker LS</td>
<td>Regiment II</td>
<td>Wolfpack II</td>
</tr>
<tr>
<td>Forte</td>
<td>Rendition</td>
<td>Wolfpack II</td>
</tr>
<tr>
<td>Grande II</td>
<td>Rendition Rx</td>
<td>Xtremesgreen</td>
</tr>
<tr>
<td>Greenkeeper WAF</td>
<td>Rambler SRP</td>
<td></td>
</tr>
</tbody>
</table>

#### Promising turf-type tall fescue cultivars:

<table>
<thead>
<tr>
<th>Ast 7002</th>
<th>Essential</th>
<th>LS 1010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladerunner II</td>
<td>Flat Cat</td>
<td>LS 12000</td>
</tr>
<tr>
<td>Braveheart</td>
<td>Firenza</td>
<td>Rocket</td>
</tr>
<tr>
<td>Cannavaro</td>
<td>Garrison</td>
<td>Speedway</td>
</tr>
<tr>
<td>Catalina</td>
<td>Gatsby II</td>
<td>SR 8650</td>
</tr>
<tr>
<td>Cezanne RZ</td>
<td>Gold Medallion</td>
<td>Talladega</td>
</tr>
<tr>
<td>Cochise IV</td>
<td>Greenbrooks</td>
<td>Umbrella</td>
</tr>
</tbody>
</table>
Where to buy quality seed?

- Site One Landscape Supply
- Newsom Seed - Fulton
- Chesapeake Valley Seed
  - Bowen’s Farm Supply, Annapolis
  - Riverhill Garden Center, Clarksville
  - Turf Center, Inc., Spencerville

*-Mention of companies does not imply endorsement of said organizations*
Cool-Season Grass Growth
Warm-Season Grass Growth

Warm Season Grasses

Winter  Spring  Summer  Fall  Winter

Shoot Growth

Root Growth
Mowing

• Crown- Turfgrass growing point is at the bottom of the plant.

• Height – Different grasses, different heights

• Cool-season- Higher height in summer

• Warm-season- Higher height in spring/fall
Mowing Height

- Tall fescue – 3”- 3 ½ ”
- Zoysiagrass- 1 ½” -3”
- Fine fescue- 3”- 3 ½ ”

- Why mow high?
  - Greater traffic tolerance
  - Deeper root growth
  - Water conservation
Mulch mowing—“Grasscycling”

- Mulch mow clippings
  - Consider a mulching mower
  - Use a “mulching blade” OR insert return plug in grass chute

Courtesy of www.turf.msu.edu/dealing-with-leaves
Mulch mowing- Why discard free fertilizer?

- Free fertilizer for your lawn
  - ~30% of seasonal needs
- Returning clippings – environmentally responsible
- Clippings DO NOT contribute to thatch development

Courtesy of www.turf.msu.edu/dealing-with-leaves
Mowing Tips

• Don’t remove more than one-third of leaf blade
  – If grass is too high, mow high, then lower next time

• Sharp blades = Clean cut = Less disease potential and better appearance
  – Sharpen blades in winter, consider sharpening again in mid-summer
Protecting Water Quality

- Sweep clippings and fertilizer back into lawn, not the street
- Wash mower on lawn, not the driveway or sidewalk
- Minimize chemical and fertilizer storage and be sure container is sealed/secure
- Always follow label directions
Lawn Watering

- 1” water / week in June, July, August
  - Measure with rain gauges or shallow cans
- Water deeply without creating puddles or runoff
- Water indicators:  - Footprinting  - Gray-blue color
Watering

- If needed, water in morning
- Use a water timer

Automatic irrigation systems
- Assess water schedule regularly
- Inspect the system monthly
- Install a rain shutoff device
Aerifying/De-Thatchting

- Cool-season: Fall or Spring
- Warm-season: May-August
Aerating

• Aerating (Coring)
  – Aerating - Relieves compaction to allow for infiltration of water, fertilizer
  – Reduces water runoff
  – Increases oxygen levels
  – Should be done during ‘primary windows of opportunity’
De-thatching

- Physically removes thatch
- Reduces water runoff
- Increases oxygen levels
- Should be done during ‘primary windows of opportunity’
Lawn Fertilization
Maryland Fertilizer Law

How to Fertilize Your Lawn Responsibly

Maryland’s Lawn Fertilizer Law in a Nutshell
Maryland’s lawn fertilizer law helps protect the Chesapeake Bay from excess nutrients entering its waters from lawns and other managed grassy areas. If you fertilize your lawn yourself, here’s what you need to know and do to prevent excess nutrients from washing off your property and into storm drains, streams, and rivers that feed the Bay.

- Do not over-fertilize. Follow University of Maryland fertilizer recommendations at extension.umd.edu/hgc.
- A single fertilizer application may not exceed 0.9 pound total nitrogen per 1,000 square feet which can include no more than 0.7 pound of soluble nitrogen per 1,000 square feet. For seasonal and yearly fertilizer rates, visit extension.umd.edu/hgc. Search for HG 112.
- Most Maryland lawns have sufficient phosphorus. Do not apply phosphorus to lawns unless a soil test shows that your soil is in the low to medium range or you are establishing or renovating your lawn.
- Keep fertilizer applications 10 to 15 feet from waterways.
- Fertilizer applications are prohibited between November 15 and March 1.
- Do not fertilize when the ground is frozen or if heavy rain is predicted.
- Do not use fertilizers to de-ice walkways and driveways.
- If fertilizer lands on an impervious surface, sweep it back onto the grass or clean it up.

From Maryland Department of Agriculture
“How to Fertilize Your Lawn Responsibly”
Factors Affecting Lawn Fertilization

- Soil Type
- Type and Age of Turfgrass
- Length of Growing Season
- Traffic
- Shade
Factors Affecting Lawn Fertilization

- Quality Desired
- Clipping Management
- Micronutrients
- Fertilization Application Equipment
Soil testing

- Best to soil test every 3 years for nutrient needs
  - Shows levels of major and minor nutrients, pH, organic matter content
  - Test will provide nutrient and lime recommendations
Cool-Season Grass Growth
Warm-Season Grass Growth
What do the numbers on the bag mean?
N-P-K

Nitrogen for top growth
(“Up”)

Phosphorus for root growth
(“Down”)

Potassium for overall stress tolerance
(“All around”)
Secondary Elements

- Sulfur (S)
- Calcium (Ca)
- Magnesium (Mg)
Micronutrients

- Needed in small amounts, but still “needed”
- Usually adequate in medium-heavy soils and acidic pH
- Sandy soil - more prone to deficiencies
- Soil test will indicate levels and recommendations, if needed
Micronutrients

- Iron (Fe)
- Manganese (Mn)
- Sodium (Na)
- Nickel (Ni)
- Cobalt (Co)
- Boron (B)
- Zinc (Zn)
- Chlorine (Cl)
- Copper (Cu)
- Molybdenum (Mo)
- Silicon (Si)
- Aluminum (Al)
Lawn Fertilization

• Choose products with at least 50% of N available as “slow release” or “water insoluble” for longer, sustained feeding and safety to turfgrass

• Avoid high P fertilizers if soil test indicates P is adequate

• “Water in” fertilizer to move it off the leaf blade into the soil

• Avoid fertilizing before a heavy rain

• Sweep fertilizer off hard surfaces!!!
<table>
<thead>
<tr>
<th></th>
<th>Tall Fescue</th>
<th>Fine Fescue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>0.9 lb. N/ 1000 ft²</td>
<td>0.5 lb. N/ 1000 ft²</td>
</tr>
<tr>
<td>Application</td>
<td>May/Early June</td>
<td>May/Early June</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>October</td>
</tr>
<tr>
<td></td>
<td>October</td>
<td>October</td>
</tr>
</tbody>
</table>

Apply 0.9 lb. N/ 1000 ft²/ application
Emphasize fall fertilization
Lawn Fertilization - How Much?

**Zoysiagrass**

0.9 lbs. N/ 1000 ft²

- June
- July/August (optional)

Apply 0.9 lb. N/ 1000 ft²/ application

Emphasize summer fertilization
Lawn Fertilization - How Much?

Fertilize at the Right Time

To prevent runoff, fertilizer should only be applied to lawns when the grass is actively growing. Fertilize warm season grasses (Bermudagrass and Zoysiagrass) in late spring or summer and cool season grasses (fescues, bluegrass) in fall, based on soil test results. Do not exceed single and yearly application limits.

<table>
<thead>
<tr>
<th>Grass</th>
<th>September</th>
<th>October</th>
<th>Late May</th>
<th>Early June</th>
<th>July</th>
<th>August</th>
<th>Maximum Yearly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tall fescue</td>
<td>0.9 lb</td>
<td>0.9 lb</td>
<td>0.5-0.9 lb if needed</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>2.7 lbs</td>
</tr>
<tr>
<td>Kentucky bluegrass</td>
<td>0.9 lb</td>
<td>0.9 lb</td>
<td>0.5-0.9 lb if needed</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>2.7 lbs</td>
</tr>
<tr>
<td>Fine fescue</td>
<td>—</td>
<td>0.9 lb</td>
<td>0.5 lb</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.4 lbs</td>
</tr>
<tr>
<td>Bermudagrass</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.9 lb</td>
<td>0.5-0.9 lb if needed</td>
<td>—</td>
<td>2.7 lbs</td>
</tr>
<tr>
<td>Zoysiagrass</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.9 lb</td>
<td>0.5-0.9 lb if needed</td>
<td>—</td>
<td>1.8 lbs</td>
</tr>
</tbody>
</table>

From Maryland Department of Agriculture
“How to Fertilize Your Lawn Responsibly”
Reading a fertilizer label

Guaranteed Analysis
Total Nitrogen 10%
  1.9% Nitrate Nitrogen
  0.5% Other Water Soluble Nitrogen
  7.6% Water Insoluble Nitrogen
Soluble Potash (K2O) 6%

Derived from: hydrolyzed poultry feather meal, nitrate of soda, potassium sulfate, bone meal and soybean meal.
Spreader Calibration

1) Calculate how much product is needed for 1,000 ft\(^2\).

2) For even coverage, fertilize in two different directions at half rate.

Example: 0.9 lb. of N using 10-0-6 on a 2,000 ft\(^2\) lawn

\[
\frac{0.9}{10\%} = 9 \text{ lb. product for 0.9 lb. N on 1,000 ft}^2
\]

9 lb. product per 1,000 ft\(^2\) x 2 = 18 lb. product for 2,000 ft\(^2\)
Fertilizer Application

- Use drop spreaders in narrow spaces
- Sweep sidewalks and driveways!!!
Be Careful !!!
IPM

What is IPM?
How do we use it in lawn care?
The IPM Process

1. Prevent problems with yard care practices
2. Evaluate control & modify yard care practices
3. Use chemical or biological pest control
4. Use physical or biological pest control
5. Identify pest & life cycle
6. Set pest tolerance threshold
7. Monitor pest
Integrated Pest Management

- Host tolerance/resistance ("Right grass, right place")
- Cultural controls (Fertilizing, Watering, Mowing, Aerating)
- Sanitation (Wash mower after each use)
- Biological controls (Example: Milky spore for grubs)
- Mechanical controls (Example: Handpicking weeds)
- Chemical controls (Select less toxic and biocontrols first!)
Pyramid of IPM Tactics

Plants

- CULTURAL
  - (site & plant selection, sanitation, rotations)
- PHYSICAL - MECHANICAL
  - (prune, weeding, mulch, traps, barriers, flaming)
- BIOLOGICAL
  - (predators, parasites, nematodes)
- CHEMICAL
  - (soaps, oils, baking soda, repellants, microbials, IGRs)
- Conventional pesticides
- Intervention
- Increasing toxicity
- Prevention
Applying Pesticides Safely

- Identify the pest
- Choose the correct product
- Read the label
- Wear protective clothing
Weed Identification

- Virginia Tech Weed Identification Guide
- Michigan State - Msuturfweeds.net
Weed Growth Habit

• **Rosette** – Dandelion, Carrot, Plantain

• **Creeping** – Clover, ground ivy
  – Stolons- Above-ground runners
  – Rhizomes- Below-ground runners
Weed Life Cycle/Biology

- **Perennials** – Live over multiple years

- **Annuals** – Complete life cycle in one year or less

- **Biennials** – Vegetative growth 1\textsuperscript{st} year, flower during 2\textsuperscript{nd} year
Weed Life Cycle/Biology

• Perennials (Examples: Dandelion, buckhorn plantain, white clover)

• Summer Annual grasses (Examples: Large and smooth crabgrass, goosegrass)

• Summer Annual broadleaves (Examples: Lambsquarter, spurge)

• Winter Annual grasses (Example: Annual bluegrass)

• Winter Annual broadleaves (Examples: Henbit, chickweed, purple deadnettle)
Weed Life Cycle/Biology

• **Summer Annual grasses** (Examples: Large and smooth crabgrass, goosegrass)

• **Summer Annual broadleaves** (Examples: Lambsquarter, spurge)

• **Winter Annual grasses** (Example: Annual bluegrass)

• **Winter Annual broadleaves** (Examples: Henbit, chickweed, purple deadnettle)
Weed control strategies

- Weeds are often symptoms of cultural problems
- Establish tolerance levels
- Think twice before using pesticides and ALWAYS read and follow label directions
- As last resort, spot spray - Don’t “blanket spray”
- Avoid broadcast spraying or “weed ‘n’ feeding”
- Overseed with seed/soil mix to fill in open and thin areas
Weeds as Indicators

http://www.purdue.edu/envirosoft/lawn/src/pest/indicators2.htm

- Acid soils- bentgrass, red sorrel
- Compacted soils- annual bluegrass, common chickweed, prostrate knotweed, mouse-ear chickweed, prostrate spurge
- Dry soils- black medic, red sorrel
- Dry and infertile soils- yarrow
- Low fertility soils- plantains, red sorrel, smooth brome, bentgrass
- Low mowing height- annual bluegrass, bentgrass
- Moist or poorly drained soils- annual bluegrass, bentgrass, common chickweed, ground ivy, mouse-ear chickweed, speedwells, violets, yellow nutsedge
- Moist infertile soil- white clover
- Moist shade- annual bluegrass, rough bluegrass, violets
- Shade- annual bluegrass, common chickweed, moss, ground ivy, mouse-ear chickweed, violets
Weeds as Indicators
University of Illinois Extension

http://web.extension.illinois.edu/cfiv/homeowners/980411.html

- **Acid soils** (bentgrass, red sorrel)
- **Compacted soils** (annual bluegrass, bermuda grass, common chickweed, goosegrass, knotweed, mouse-ear chickweed, prostrate spurge)
- **Dry soils** (black medic, carpetweed, red sorrel, sandbur)
- **Dry and infertile soils** (yarrow)
- **High fertility soil** (annual bluegrass, bentgrass, bermudagrass, crabgrass, mallow, purslane)
- **Low fertility soils** (plantains, red sorrel, smooth brome, timothy)
- **Low mowing height** (annual bluegrass, bentgrass, bermudagrass, crabgrass, white clover)
- **Moist or poorly drained soils** (annual bluegrass, bentgrass, common chickweed, crabgrass, goosegrass, ground ivy, mouse-ear chickweed, speedwells, violets, yellow nutsedge)
- **Moist fertile soils** (curly dock, henbit, yellow wood sorrel)
- **Moist infertile soil** (white clover)
- **Moist shade** (annual bluegrass, nimblewill, rough bluegrass, violets)
- **New seedings** (barnyard grass, crabgrass, henbit, purslane, yellow foxtail)
- **Shade** (annual bluegrass, common chickweed, ground ivy, mouse-ear chickweed, nimblewill, violets)
Weed Identification

Turfgrass Weed Control
for Professionals

2019 EDITION
PURDUE UNIVERSITY
Extension
Mechanical Weed Control

• Can be a viable option with small populations of non-creeping weeds
• Hand/Weed Tool Weeding
• Raking or de-thatching- weak rooted annuals.
Mechanical Weed Control

- Weed Hound
- Screwdriver
- Flame

Courtesy of gardeners.com
Types of Herbicides

- Pre-emergence
- Post-emergence
- Non-Selective
- Selective
  - Broadleaf
  - Grass

Courtesy: Engage Agro
Organic Weed Control

Table 5.4 - Some organic weed control products marketed for use in lawns.

<table>
<thead>
<tr>
<th>Active ingredient</th>
<th>Product(s)</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic acid</td>
<td>Weed/Grass Killer, Natural Weed Control, Erath Earth, Maestro-Gro BlackJack 21, Burnout Weed &amp; Grass Killer</td>
<td>Nonselective, seeding weed control</td>
</tr>
<tr>
<td>Ammoniated soap of fatty acid</td>
<td>Garden Safe Weed &amp; Grass</td>
<td>Nonselective, seeding weed control</td>
</tr>
<tr>
<td>Cinnamon Bark</td>
<td>AgraLawn Crabgrass Killer, Garden Weasel</td>
<td>Crabgrass control in warm-season lawns</td>
</tr>
<tr>
<td>Cinnamon oil, rosemary oil</td>
<td>Organic Weed Killer</td>
<td>Nonselective, seeding weed control</td>
</tr>
<tr>
<td>Citric acid</td>
<td>Burnout 2, Natural Weed Control</td>
<td>Nonselective, seeding weed control</td>
</tr>
</tbody>
</table>

HOME GROUNDS & ANIMALS 2020

Lawn: Weeds 5-13

Table 5.4 - Some organic weed control products marketed for use in lawns. (cont.)

<table>
<thead>
<tr>
<th>Active ingredient</th>
<th>Product(s)</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus oil (d-limonene)</td>
<td>Nature's Avenger, Worry Free Weed &amp; Grass Killer</td>
<td>Nonselective, seeding weed control</td>
</tr>
<tr>
<td>Clove oil</td>
<td>EcoSmart, Biorganic Weed &amp; Grass Killer, Burnout 2</td>
<td>Nonselective, seeding weed control</td>
</tr>
<tr>
<td>Ethanoic acid</td>
<td>Burnout Weed &amp; Grass Killer</td>
<td>Nonselective, seeding weed control</td>
</tr>
<tr>
<td>Thyme oil</td>
<td>Biorganic Weed &amp; Grass Killer</td>
<td>Nonselective, seeding weed control</td>
</tr>
<tr>
<td>Iron HEDTA</td>
<td>Weed Beater FE, Iron X, Fiesta Turf Weed Killer</td>
<td>Selective postemergence control or suppression of broadleaf weeds in turf</td>
</tr>
</tbody>
</table>

Less-Toxic Weed Control Products

Less-toxic alternative products

- **BurnOut (II)** - Acetic acid and clove oil
- **Bayer Natria Lawn Weed Killer** - Iron chelate (HEDTA)
- **Ortho Eco Sense Lawn Weed Killer** - Iron chelate (HEDTA)

- Organic/biorational products often require more than 1 app
Pre-Emergent- Summer annual grasses

- Targets crabgrass and goosegrass
- Crabgrass germination - 55° F soil temp for several days
- Apply during full forsythia or daffodil bloom
- Second application in 8-10 weeks
- Goosegrass germinates 2 weeks after crabgrass

Courtesy Virginia Tech Weed ID Guide
**Pre-emergent herbicides**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Trade Name</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>benefin</td>
<td>Balan</td>
<td>Good</td>
</tr>
<tr>
<td>benefin + trifluralin</td>
<td>Team, Team Pro, Frank’s Crabgrass</td>
<td>Excellent</td>
</tr>
<tr>
<td>dithiopyr</td>
<td>Dimension, Meijer Crabgrass, Spectracide Crab</td>
<td>Excellent</td>
</tr>
<tr>
<td>pendimethalin</td>
<td>Scott’s Weedgrass, Lesco Pre-M</td>
<td>Excellent</td>
</tr>
<tr>
<td>prodiamine</td>
<td>Barnicado, Vigoro</td>
<td>Excellent</td>
</tr>
</tbody>
</table>
Soil Temps For Weed Germination At 4 Inch Depth

- Crabgrass: 53-58 F
- Goosegrass: 60-65 F
- Barnyardgrass: 60 F
- Foxtails: 65 F

From Managing Turfgrass Pests, Watschke et al. and Best Golf Course Management Practices, McCarty
CRABGRASS DEVELOPMENT

Heavy Rainfall During Crabgrass Germination Periods Will Increase Weed Pressure

July-August Weather Conditions Favor Crabgrass Growth

Seedling Crabgrass
• In Central MD, Goosegrass will start to germinate in early May or when soil temp. reaches 60 - 65°F at 4 inches.
• Germination can occur throughout the season.
PREEMERGENCE CONSIDERATIONS

A) Residual Activity : Will the herbicide provide sufficient residual control during the period of annual grass germination. Also will there be any interference to fall overseeding due to length of herbicide residual?

B) Cost

C) Plant phytotoxicity and root pruning effects

D) Type of Formulation and Application Equipment
2014 Mowing Height Study at UMD on a Tall Fescue Turf

Table 4. The effect of mowing height on annual grass encroachment in turf-type tall fescue (no annual grass herbicides applied).

<table>
<thead>
<tr>
<th>Mowing Height</th>
<th>Annual Grass Coverage % coverage (July 23, 2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch</td>
<td>85%</td>
</tr>
<tr>
<td>2 inch</td>
<td>45%</td>
</tr>
<tr>
<td>3 inch</td>
<td>10%</td>
</tr>
<tr>
<td>4 inch</td>
<td>1%</td>
</tr>
</tbody>
</table>
Japanese Stiltgrass
Japanese Stiltgrass
Pre-emergent

- If planning soil disturbance, such as aeration, do it before application.
- Apply prior to seed germination which begins, in early spring a couple of weeks before crabgrass seeds germinate.
- Water after application, according to label.
- A second application may be possible, usually 6-8 weeks later (see product label).
- Consult label for specific waiting period between application and overseeding.
Post Emergent Annual Grasses

- Fexoxaprop
- Fluazifop
- Sulfentrazone
- Quinclorac
- Sethoxydim
- Mesotrione

Goosegrass

Courtesy Virginia Tech Weed ID Guide
Post-Emergent Perennial Grasses

- Bermudagrass (wiregrass)
- Nimblewill
- Orchardgrass
- Fenoxaprop
- Fluazifop
- Combined with Triclopyr
Traditional Broadleaf Herbicides

- Mixes containing 2,4-D, 2,4-DP, dicamba, mecoprop, or quinclorac.

- Other active ingredients: Penoxsulam, triclopyr, sulfentrazone, carfentrazone

- Ready-to-use formulations are easier to use, don’t require mixing

- Best used as a spot spray

- Think twice before using pesticides and ALWAYS read and follow label directions
### Table 5.9 Broadleaf Weed Control in Bluegrass, Tall Fescue, Perennial Ryegrass, and Common Bermudagrass.

<table>
<thead>
<tr>
<th>Weed</th>
<th>Classification</th>
<th>2,4-D + dichlobenil</th>
<th>2,4-D + MCPA</th>
<th>2,4-D + dicamba</th>
<th>2,4-D + Tribufentrazone</th>
<th>Preferred Time to Treat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedstraw</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>I-S</td>
<td>Spring</td>
</tr>
<tr>
<td>Bindweed - Field</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>I-S</td>
<td>Fall</td>
</tr>
<tr>
<td>Hedge</td>
<td>1-S</td>
<td>1-S</td>
<td>I-S</td>
<td>S</td>
<td>I-S</td>
<td>Fall</td>
</tr>
<tr>
<td>Bittercress</td>
<td>WA</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Fall</td>
</tr>
<tr>
<td>Black Medic</td>
<td>SA &amp; P</td>
<td>S</td>
<td>1-S</td>
<td>S</td>
<td>S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Buttercup</td>
<td>WA &amp; P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Buttercup - Virginia</td>
<td>P</td>
<td>R-I</td>
<td>R-I</td>
<td>I-S</td>
<td>I-S</td>
<td>Spring Sequential</td>
</tr>
<tr>
<td>Carpetweed</td>
<td>SA</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Spring</td>
</tr>
<tr>
<td>Cress - Wild</td>
<td>B</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Fall</td>
</tr>
<tr>
<td>Cress - Carolina</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Fall</td>
</tr>
<tr>
<td>Chickweed - Common</td>
<td>WA</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Mouseear</td>
<td>WA &amp; P</td>
<td>S</td>
<td>I-S</td>
<td>S</td>
<td>S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Chicory</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Fall</td>
</tr>
<tr>
<td>Cineraria - Common</td>
<td>A</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Spring</td>
</tr>
<tr>
<td>Clover - Crimson</td>
<td>SA</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Spring</td>
</tr>
<tr>
<td>Hop</td>
<td>SA</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Spring</td>
</tr>
<tr>
<td>White</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Daisy - Oxeye</td>
<td>P</td>
<td>1</td>
<td>1</td>
<td>I-S</td>
<td>S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Dandelion</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Dandelion</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Dichondra</td>
<td>P</td>
<td>I-S</td>
<td>I-S</td>
<td>I-S</td>
<td>I-S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Dock</td>
<td>P</td>
<td>I-S</td>
<td>I</td>
<td>I-S</td>
<td>I-S</td>
<td>Spring</td>
</tr>
<tr>
<td>Dogfenset</td>
<td>P</td>
<td>I</td>
<td>R-I</td>
<td>I-S</td>
<td>I-S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Garlic - Wild</td>
<td>P</td>
<td>I</td>
<td>1</td>
<td>I</td>
<td>1</td>
<td>Fall</td>
</tr>
<tr>
<td>Geranium - Carolina</td>
<td>WA</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Ground Ivy</td>
<td>P</td>
<td>I</td>
<td>I</td>
<td>I-S</td>
<td>I-S</td>
<td>Spring</td>
</tr>
<tr>
<td>Hawkweed</td>
<td>P</td>
<td>I</td>
<td>I</td>
<td>I-S</td>
<td>I-S</td>
<td>Fall</td>
</tr>
<tr>
<td>Healsall</td>
<td>P</td>
<td>S</td>
<td>I-S</td>
<td>S</td>
<td>S</td>
<td>Fall</td>
</tr>
<tr>
<td>Henbit</td>
<td>WA</td>
<td>I-S</td>
<td>I</td>
<td>S</td>
<td>S</td>
<td>Fall</td>
</tr>
<tr>
<td>Honeysuckle</td>
<td>P</td>
<td>S</td>
<td>I-S</td>
<td>S</td>
<td>S</td>
<td>Spring &amp; Summer</td>
</tr>
<tr>
<td>Horse nettle</td>
<td>P</td>
<td>R-I</td>
<td>I</td>
<td>1</td>
<td>I</td>
<td>Spring</td>
</tr>
<tr>
<td>Horseweed</td>
<td>WA &amp; SA</td>
<td>I-S</td>
<td>I-S</td>
<td>I-S</td>
<td>I-S</td>
<td>Spring &amp; Fall</td>
</tr>
<tr>
<td>Knobwheat</td>
<td>P</td>
<td>I</td>
<td>I</td>
<td>I-S</td>
<td>I-S</td>
<td>Fall</td>
</tr>
</tbody>
</table>

When is the best time of year to apply broadleaf herbicide?
When is the best time of year to apply herbicide?

Spring- New weeds are smaller, but autumn is generally better for effective broadleaf control

- Flowering landscape plants are more sensitive in the spring
- Weeds are translocating food stores to their roots
- Cooler weather means less volatilization
Nutsedge/kyllinga

- Damp conditions
- Tend to appear in summer
- Active ingredients: Halosulfuron, sulfentrazone
Reading a Pesticide Label

Choosing Pesticides Wisely

Applying Pesticides Safely
Applying Pesticides Safely

- Equipment
  - Separate herbicides, fungicides, insecticides
  - Ready-to-use products eliminate mixing
  - Avoid “hose-end” application equipment

- Mix carefully!
  - Choose a location to reduce impact from spills
  - Use protective equipment
  - Don’t place hose end in pesticide tank
Applying Pesticides Safely

• Avoid damage from drift!!!
  – Avoid windy conditions
  – Use low pressure and a large nozzle
  – Avoid hot weather (> 80° F)

Try to “spot spray” or “local spray” instead of blanket spraying
Applying Pesticides Safely

• Cleaning up
  – Triple rinse sprayer and apply to a legal area
  – Never rinse pesticides down the storm sewer!!!

• Pesticide Storage
  – Store in original container in a dry, mild place
  – Plan ahead! Buy only what you need!
  – Triple rinse container and disable before disposal
Safe Herbicide Application

• Don’t spray when it’s windy

• Don’t apply when rain is forecast

• Don’t apply when soils are saturated

• Don’t walk on until dry or past REI on label
Pesticide Safety Tips

Safety Tips

• Never eat, drink, or smoke while applying pesticides or before cleaning up.

• After applying pesticides, remove your clothes and wash them; then thoroughly wash hands, face, and body.

• Each time you use a pesticide, read the directions!

• Work outdoors with good light and ventilation when mixing or loading pesticides.

• Never mix or apply pesticides on windy days.

• If you splash or spill a pesticide while mixing or loading, stop immediately. Remove contaminated clothing and wash thoroughly. Control, contain, then clean up the spill.
Diseases- Cultural Controls

- Proper fertilization
- Judicious irrigation- Leaf wetness period is key
- Mowing height- 3-3 ½” for cool-seasons, 1-1 ½” for warm-seasons
- Air movement
- Sanitation
Diseases - Biological Controls

• Disease-resistant (tolerant) varieties

• Biological controls

From Virginia Tech “Pest Management Guide: Home Grounds and Animals”
Main Lawn Diseases in the Mid-Atlantic

- Brown Patch
- Red Thread
- Summer Patch
- Rust

Courtesy Dr. Lane Tredway, NC State
Brown Patch

• Major problem of tall fescue, perennial ryegrass, and creeping bentgrass in Mid-Atlantic

• Daytime temps 80’s, Night time temps- upper 60’s
  – 8-10 hours of high humidity
  – > 6 hours leaf wetness (especially in rainy weather!)
Brown Patch

- Large, irregular shaped areas
- Light brown to straw colored surrounded by dark brown-gray
- Leaf blighting
- Mycelium look “cob-webby” in the morning

Courtesy NC State University
Red Thread

• Fall or Spring disease in cooler weather

• Perennial rye grass, Fine fescues, Tall fescues

• Presence of pink/red mycelium with red sclerotia at leaf tips → eventually straw colored

• Patches start out circular then become irregular
Red Thread

• Cooler temps in May-June and September-early November
• Symptoms are most noticeable under low fertility conditions
• Favored by periods of high humidity, extended leaf wetness
• Will remain as sclerotia and fungal threads in leaf litter when fungus is not active

Courtesy NC State University
Summer patch

- Root-disease
- Ky. Bluegrass
- Preventative fungicide once soil temps above 60
- Drought symptoms
Rust Diseases of Grasses

- Rust Diseases: Stem Rust, Stripe Rust, and Leaf Rusts
- Favored Host Plants: perennial ryegrass, tall fescue, Kentucky bluegrass, and Zoysiagrass
- Conditions Favoring Disease:
  - 1) Low Nitrogen Fertility
  - 2) Overcast and cool moist conditions in the Fall and Spring
Symptoms and Signs

- Early symptoms are light yellow spots on leaves which will eventually lengthen.
- Spores (urediopores) are produced inside the leaf lesion and eventually rupture the leaf resulting in orange pustules.
- Heavily infected turf will appear thin and weak.
- When teliospores (overwintering spores) are produced, the lesion areas will turn black in color.
Lawn Diseases - Cultural Controls

- Fertility
- Irrigation
- Mowing Height
- Air Movement
- Sanitation
Lawn Diseases - Biological Controls

- Beneficial animals, insects, and organisms
- Disease Tolerant/Resistant Varieties
  - NTEP data and VT / U. of Maryland recommendations.
### Table 5.1 - Common Active Ingredients

<table>
<thead>
<tr>
<th>Condition</th>
<th>azoxystrobin</th>
<th>fluoxastrobin</th>
<th>myclobutanil</th>
<th>propiconazole</th>
<th>thiophanate-methyl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown patch</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Dollar spot</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Fairy ring</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gray leaf spot</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Large patch</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Melting-out/leaf spot</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Microdochium patch (pink snow mold)</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Pythium blight</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Red thread</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Rust</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Spring dead spot</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Summer patch</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

- Active ingredient is (+) or is not (-) labeled for control of disease.
- If control level is not satisfactory, additional products are available to certified professional applicators. Refer to PMG Horticulture and Forest Crops.
- Concentration of most fungicide active ingredients are much lower than professional products. Application use rates may vary among consumer products. Always carefully read full label instructions before making any pesticide application.
Lawn Insects

Curt Laub, Research Associate, Entomology, Virginia Tech

Above ground feeders

- Suck plant juices
  - aphids

- Chew leaves
  - armyworms
  - cutworms
  - sod webworms

Below ground root feeders

- chinch bugs
- wireworms
- white grubs
White Grub Damage
Annual White Grub Species

- Masked Chafers (North America - N, S, SW, W, SE)
- Japanese Beetle (eastern NA)
- Oriental Beetle (northeastern NA)
- European Chafer (northeastern NA)
- Asiatic Garden Beetle (northeastern NA)
- Green June Beetle (south-transition NA)
- May/June Beetles (southern only)
May/June Beetle
  green June beetle
  European chafer
  masked chafer
  Japanese beetle
  Oriental beetle
  Asiatic garden beetle
Grub Complex

- **May/June Beetle**
  - green June beetle
- European chafer
- Japanese beetle
- Masked chafer
- Oriental beetle
- Asiatic garden beetle
Japanese Beetle Life Stages

- Egg
- 1st instar larva
- 2nd instar larva
- 3rd instar larva
- Pupa
- Adult
Japanese Beetle Annual Cycle
Lawn Grub Control

VT publication

“Beetlemania- White Grub Control in Lawns”

Figure 13. A soap flush is used to aid in the identification of surface insect pests.

Figure 14. A white grubworm is the larval stage of many forms of beetles that feed on turfgrass roots.

Figure 15. The life-cycle stages of most annual beetles include above- and belowground activity.
Lawn Grubs- Biological Control

• Milky Spore Disease- Slow acting, mixed results

• *Beauveria bassiana* - Insect pathogen

• Entomopathogenic nematodes-
  – Apply only when pest is present
  – Apply later in the day to minimize photodegradation
  – Water before and after application
  – Avoid *Steinernema carpocapsae*
Entomopathogenic Nematodes

- Apply only when pest is present
- Apply when soil temps are above 60º F
- Apply later in the day to minimize photodegradation
- Use *Steinernema riobrave* or *Heterohabditis*
Lawn Grubs - Cultural control

- Tall fescue vs. Ky. Bluegrass
- Balanced fertility
- Drier conditions in very late summer-early fall
Lawn Grubs – Chemical Control

- Chlorantraniliprole- “Softer” conventional pesticide- Needs to be applied early in May
- Bifenthrin
- Carbaryl
- Clothianidin
Lawn Renovation/Rejuvenation

Table 13-D. Seeding: advantages and disadvantages

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower initial cost.</td>
<td>Limited time-period for establishment. Seed needs to be sown in late summer to early fall for greatest success rate.</td>
</tr>
<tr>
<td>Desired cultivars of turfgrass can be sown.</td>
<td>Daily watering is necessary, sometimes twice a day, depending on weather conditions during initial establishment period.</td>
</tr>
<tr>
<td>Less labor and time is required.</td>
<td>Takes a longer time for lawn to become established. Seeded areas need to be restricted from use for up to two months.</td>
</tr>
<tr>
<td>Greater flexibility in planting a mixture for specific site conditions (e.g., mixture that performs better in the shade or on high traffic areas can be sown).</td>
<td>Greater chance of weed encroachment during establishment.</td>
</tr>
<tr>
<td></td>
<td>Heavy rain can wash seed away.</td>
</tr>
</tbody>
</table>

Site Preparation

Site preparation is the same for seeding and laying sod. The following steps are crucial for successful lawn establishment. After the lawn is established it is difficult and costly to try to improve the soil.

1. Test soil
2. Rough grade. Rough grading involves removing all debris, including large stones or wood left by construction work. Where topsoil is to be replaced or brought in, grade the area to the contour of the desired finished grade to facilitate uniform distribution of topsoil. Slope the soil away from buildings to prevent water problems. Steep slopes should be terraced, contained with a retaining wall, or planted with a low-maintenance ground cover.
3. Lime according to soil test results. Grass growth will be unsatisfactory if soil pH is not in the 6.0 to 6.8 range. If the soil is too acidic as indicated by a soil test, broadcast
Lawn Renovation

When to Renovate:

• Lawn is >30-40% weeds
• Thatch accumulation = 2”+
• Lawn has been extensively damaged by insects or disease
• Lawn is otherwise an unsalvageable mess
Establishment Timing

• Seeding
  – Optimal window for cool-season: Late summer- early fall
• Sod
  – Optimal window for cool-season: Late summer- early fall
  Spring is 2nd choice
  -- Warm-season: May-mid-July
# Sod vs. Seed

## Table 13-C. Sod: advantages and disadvantages

<table>
<thead>
<tr>
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<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be installed any time of the year as long as the ground is not frozen and daytime temperatures are below 95 degrees.</td>
<td>Higher initial cost.</td>
</tr>
<tr>
<td>Immediate results are obtained and establishment is faster.</td>
<td>Limited choice of turf cultivars.</td>
</tr>
<tr>
<td>Quicker erosion control. Can be used successfully in areas prone to soil erosion such as steep banks or culverts.</td>
<td>More labor required for installation.</td>
</tr>
<tr>
<td>Fewer problems with weed encroachment.</td>
<td>Not always readily available.</td>
</tr>
</tbody>
</table>

## Table 13-D. Seeding: advantages and disadvantages

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</table>
Lawn Renovation Steps

- Soil test
- Rough grade
- Lime and basic fertilizer as per soil test
- Incorporate organic matter (rototill)
- Finish grade
- Fertilize with ½ lb. P
- Seed
- Rake lightly
- Topdress with compost
- Keep damp through germination
Lawn Renovation

- Mow as short as possible, then de-thatch, roto-till, or cut sod
  - Work in 10-15% compost. Lime, if needed, based on soil test recommendations.

- Grade/level with topsoil and roll to smooth surface

- Pre-seeding starter fertilizer application must be based on soil test

- Seed, rake in lightly, and mulch with compost to keep moisture in

- Seed—Tall fescue- 6-8 lbs./1,000 ft²
  Fine fescue (creeping red or hard fescue)- 3-4 lbs./1,000 ft²
Lawn Renovation

• Topdress using compost to ¼”- ½” depth to reduce seedbed water evaporation

• Water lightly and frequently to keep the soil surface moist for 10-14 days for germination
Renovation Scalping
Thatch Removal
Seeding Rates for Lawn Establishment

- Tall fescue 6-8 lbs/1000 ft$^2$
- Kentucky bluegrass 2-3 lbs/1000 ft$^2$
- Fine fescue 4-5 lbs/1000 ft$^2$
Maryland Master Gardener Website

The Program
Overview | How to Become a MG | Find a MG Program | MG Assistance

Training
Overview | Basic Training | Advanced Training | Annual Conference

Management
Overview | Policies & Applicant Resources | Tracking Volunteer Hours | GET Resources | Logos | Recognition | Brochure | Newsletter | Minutes

The Maryland Master Gardener Program, a volunteer education program taught and administered by University of Maryland Extension (UME), puts research-based knowledge and environmental power into the hands of people who want to create sustainable gardens and landscapes, and protect and improve natural resources. Master Gardeners are citizens from all walks of life who combine their passion for gardening with their commitment to serving their community.
Diagnosing problems “remotely”

- Sun or shade?
- Type of grass?
- Approximate age of lawn?
- When did problem first start? (Weather conditions, etc.)
- Fertilizer regime?
Diagnosing Problems

“Remotely”

• Soil type and conditions?
• Disease- stand pattern + leaf signs/symptoms
• Root depth?
Maryland Extension
Publications and Resources

The Turfgrass Technical Updates (TT-Bulletins) of the University of Maryland's Department of Natural Resource Science and Landscape Architecture are featured here. These are the most current versions of the publications.

New/ Updated

TT 116 Nutrient Management Guidelines for Turfgrass Seeding and Sod Installation.pdf
Establishment of Lawns With Compost and Microclover In The Chesapeake Bay Watershed.pdf
TT-121 Microclover_ Tall Fescue Lawns in the Mid-Atlantic.pdf
TT-120 Amending Soil With Compost to Reduce Stormwater Runoff and Lawn Fertilizer Use.pdf
TT-119 Nutrient Management For Athletic Fields.pdf
TT-77 Recommended Turfgrass Cultivars For Certified Sod Production And Seed Mixtures in Maryland.pdf

Turfgrass Fertility

TT-83 Gypsum Use on Turfgrass.pdf
TT-115 Fertilizer Recommendations for Comercially Maintained Lawns in Maryland.pdf
Thank You!

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