

IPM Series: Turf

Symptoms	Possible Causes	Controls/Comments
1. Problems with the general appearance of the lawn:		
Drought		
General straw colored or browning of cool season turf grass cultivars	Drought - first signs will be evidence of foot prints and lighter green or gray color of turf	Cool season turf cultivars will recover when rain or irrigation increase soil moisture.
Rings or arcs of dead or green grass, mushrooms may be present	Fairy rings: rings or arcs of dead or green grass bordered by zones of darker green grass. More common on droughty sites and poorly nourished turf. Occurs on all turf cultivars year-round.	Aerate turf frequently, maintain adequate nitrogen fertility and adequate water during dry spells.
Circular, straw colored patches	Summer patch: circular patches that range from 3 - 12 inches in diameter. This disease occurs in bluegrass and fine fescue lawns 2 years or older, July through September.	Avoid excessive nitrogen especially in spring. Use slow release nitrogen sources. Increase mowing height, avoid light frequent waterings and reduce thatch build-up.
Irregular brown patches with white moths flying over the turf	Sod webworms: brown caterpillars may be found at the base of the blades and in the thatch. Active from May through September.	Reseed with grasses with high levels of endophyte such as tall fescue, or spray with Bt insecticide.
Localized yellow or brown areas	Chinch bugs: tiny black insects with shiny white wings found on crowns and stems. Damage usually occurs in sunny, well drained locations.	Reseed with grasses with high levels of endophyte such as tall fescue. Often controlled by natural predators such as big-eyed bugs.
Straw colored patches surrounded by a ring of dark green turf	Dog urine: may resemble some diseases. May kill the crown tissue.	Heavy irrigation will promote recovery of spots. Spot reseeding may have to be done.
Banded streaks or irregular patterns	Fertilizer or chemical injury: grass may be stimulated at the margins. May kill the crown tissue.	Calibrate spreaders and sprayers for uniform and accurate application of materials.
Black or dark spots or patches on lawn	Oil or gasoline damage: from leaking lawnmower.	Severe oil leak or spill requires removal of affected soil. Small gasoline leaks or spills volatilize quickly. Soil should be replaced if saturated.
Large yellow area near pool	Chlorine damage from pool water.	Leach chlorine through soil with water. Replant.
Grass over high spots looks scalped	Mower injury: crowns of plants exposed.	Raise mowing height or change mowing direction.

2. Problems on individual leaf blades

Shredded blade tips	Dull mower injury: tips appear gray and then turn tan.	Sharpen mower blades.
Patches of dead or dormant grass	Buried debris, insect injury or thick thatch: often follows a dry period.	Check for causes.
Pale green to golden yellow turf	Chlorosis: iron or nitrogen deficiency. Yellow streaks may form parallel to leaf veins.	Maintain adequate fertilizer levels.
Black greenish crust on soil	Algae growth: on bare soil or in thin turf. Occurs in poorly drained or compacted areas, usually more severe in shade.	Increase drainage and establish a thicker stand of turf. Aerate compacted areas and increase sunlight in shaded areas.
Small green plants growing with turf	Moss: on bare soil or in thin turf. Occurs in poorly drained or compacted areas, usually more severe in shade.	Increase drainage and establish a thicker stand of turf. Aerate compacted areas and increase sunlight in shaded areas.
Turf appears dry and bluish green in color	Drought: foot prints remain after walking on turf. Grass wilts.	Irrigate turf. Allow healthy tall fescue to go dormant in mid summer
Leaf Spots	Helminthosporium leaf spot: fungal leaf spots with tan centers. Lesions are round or elongate. Turf thins out. Common in wet spring weather and affects primarily Kentucky bluegrass, fine fescues, and ryegrass.	Avoid drought stress and light or frequent watering. Reduce thatch build-up and avoid spring fertilization with soluble nitrogen sources. Reseed with improved turf cultivars.
	Dollar spot: leaf lesions with a dark border and hour glass shaped spots. Disease affects all turfgrass species. Common in late spring and in fall on turf under low fertility.	Avoid drought stress. Prevent thatch buildup and soil compaction. Maintain adequate nitrogen fertility and reseed with improved turf cultivars.
	Brown patch: elongated fungal lesions with chocolate brown margins. Entire leaves may turn brown and thinning may occur. Occurs in mid summer especially on tall fescue.	Tall fescue turf maintained at proper mowing heights and fertility rates will recover in the fall.
Pink/reddish color on leaf blades	Red thread: red, thread-like growths extending beyond leaf blades. Disease appears in patches and occurs in spring and fall on fine fescue and perennial ryegrass species.	Maintain adequate nitrogen fertility levels.
Blades covered with red, orange or yellow powdery material	Rust diseases: turf may appear yellow or reddish from a distance. Occurs primarily on bluegrass, ryegrass, and zoysia.	Maintain adequate nitrogen fertility levels and reseed with improved turf cultivars.
Blade covered with a white coating	Powdery mildew: white coating, typically occurs in shady areas in the fall on bluegrass.	Reduce shade and improve air movement. Avoid excessive nitrogen and drought stress. Increase mowing height and reseed with improved disease resistant cultivars.
Blades covered with black sooty-like material	Slime mold: not harmful. It is easily wiped off or removed. Blades remain green underneath. Occurs primarily in spring or fall after rain.	Wash off sooty material with a hose or remove material by mowing.
Turf comes up easily, obvious lack of roots	White grubs: turf can sometimes be rolled up like a carpet. C-shaped grubs found in soil primarily from April - May, and late August - September. Can be severe on bluegrass, ryegrass and fine fescues.	Reseed the lawn in the fall with a tolerant turf species such as tall fescue or zoysia.

Turf blades can be pulled easily from sod

Billbugs: light tan, sawdust-like material (frass) in areas of heavy feeding. Small, legless grubs found near crowns and roots from June through August.

Water and fertilize grass to stimulate regrowth. Reseed with endophyte containing tall fescues. If necessary, use a registered insecticide April through mid May.

3. Other Occurrences:

Numerous bees flying close to the ground.

Ground bees: Small, fuzzy bees, nest in loose soil. Often in banks or road cuts. Not aggressive.

Males have no stinger. They establish a mating territory and only appear threatening. They are only around for a few weeks. No control necessary.

Mounds of soil in gravelly or bare areas in turf.

Cicada killers: Large, black wasp with yellow markings on abdomen, hover above the lawn, nest in loose soil. Not aggressive.

Control generally not necessary.

Blue-black wasp flying over lawn during the day

Scoliid wasps: 5/8 inch long, blue-black wasp, yellow stripe on each side of abdomen. Not aggressive.

Parasites of white grubs. Do not attack people. Control not necessary. Adults often seen visiting goldenrod flowers in late summer.

Trails of raised soil running along surface of the lawn

Moles: hairless pointed snout, small eyes, and no ears. Fore feet are large with webbed toes. Tunnel below ground, feed on grubs, beetles, other insects. Help aerate soil.

May need to control grub population. Flatten tunnels and use mole traps.

1-2" inch diameter holes in ground. 1-2" runways may be visible on surface.

Voles (meadow vole or pine vole): mice-like with shorter tails and small ears. Meadow voles have surface runways, and pine voles have underground tunnels.

Often a problem in orchards and ornamentals. Keep lawn mowed. Flatten tunnels and use mouse traps. Move mulch away from base of trees. Pile mulch no more than 1" deep.

Cone shaped holes in ground. Turf may be pulled up in patches

Skunks: feed on grubs in lawns.

Control grub population. Use hardware cloth to keep skunks from living under buildings.

Choosing a Turfgrass

Selecting a lawn grass and buying quality seed are important steps in the IPM process. Much of the seed available at retail stores is not the improved type recommended by turf specialists. However, many hardware stores and nurseries carry at least some of recommended cultivars. The improved cultivars often cost more than twice as much as the lowest priced seed but the quality is much better. When buying seed, compare seed labels and note differences between products such as the amount of weed seed and other seed and the date the seed germination rate was tested. For a list of recommended cultivars, request "TT -77" from the Home and Garden Information Center.

Turf-type Tall Fescue

Turf-type tall fescue is the most highly recommended turfgrass for Maryland. It has few pest and disease problems and tolerates heavy traffic, heat, and drought. It is best for **full sun to moderately shady lawns**. Cultivars can be seeded individually or as a blend of several varieties of tall fescue. Overseeding about every 3 years will help maintain lawn quality if some thinning has occurred.

Zoysiagrass

Zoysiagrass also has few problems, but because it is a warm season grass, it is light brown and dormant from mid-October to mid-May. Zoysiagrass must usually be planted by plugs or sprigs. Zoysiagrass needs **full sun** and is very low-maintenance once established. For more details about Zoysiagrass, see TT-69 Planting and Care of Zoysiagrass. Some recommended cultivars are seeded, but these are difficult for the homeowner to obtain.

Fine Fescue

The fine fescues have very narrow blades. They tolerate shade and low fertility. Although recommended fine fescue cultivars are very drought tolerant, they can become dormant in July and August. They do not tolerate poorly drained soil or heavy traffic, and drought can cause the grass to become dormant. Fine fescues prefer low fertilizer rates. There are several species of fine fescue. Creeping red fescue, chewings fescue, and hard fescue are good for shady low maintenance sites. Hard and chewings fescues will do well in sunny low maintenance locations as well.

Kentucky Bluegrass

Popular for its deep color and medium leaf texture, Kentucky bluegrass is cold tolerant and moderately wear and heat tolerant. However, it will not grow in heavily shaded areas. Kentucky bluegrass requires higher amounts of water and nitrogen fertilizer and are more prone to pest problems than other cool season grasses. There are new heat tolerant hybrids of Kentucky bluegrass and Texas bluegrass.

Perennial Ryegrass

Because it germinates rapidly, perennial ryegrass is often selected to quickly establish a lawn or fill in bare spots. It is tolerant of traffic. Perennial ryegrass recovers slowly from damage, therefore it may require frequent reseeding. It is not a recommended species for Maryland lawns due to susceptibility to many different diseases.

Bermudagrass

Bermudagrass is often used as a lawn and sports turfgrass. It is a warm season turfgrass so it will turn brown from mid-October through mid-May. It tolerates heavy traffic and responds well to management, forming a dense, fine-textured turf. It has poor shade tolerance.

Soil Testing

Poor soil conditions are often the cause of lawn problems. A soil test will provide the pH, nutrient content, and texture of your soil. The pH reading indicates soil acidity or alkalinity. The best pH levels for healthy grass range from 6.0 to 6.5. If the pH is too low, the soil needs an application of limestone. If it is too high, sulfur or iron sulfate can lower the pH. A recommendation included with soil test results will indicate how to reach the proper pH level.

Lawn Fertilizers

Always use a turf-type fertilizer rather than an all purpose general or garden fertilizer. Fertilizer packages are labeled with three numbers that indicate the percentage by weight of the three nutrients most essential to plants. The order is always nitrogen (N), phosphate (P_2O_5), and potash (K_2O). Nitrogen promotes overall grass shoot growth. Phosphate supplies phosphorus, which promotes strong root growth. Potash supplies potassium and helps grass withstand stresses such as drought or disease.

Most lawn grasses need to have some nitrogen added annually in order to insure proper growth and resistance to pests. Always use a turf-type fertilizer to avoid applying too much phosphorus to your lawn.

Always use a turf-type fertilizer rather than an all purpose general or garden fertilizer. Too much fertilizer, and fertilizer applied at the wrong time can harm your lawn. Excess fertilizer causes rapid, lush growth that is more susceptible to diseases and more attractive to pests.

Slow-Release Nitrogen Sources

The nitrogen in fertilizer can be in a water soluble or a water insoluble or controlled release form. Slow release nitrogen sources are fertilizers that have 30% or more of their nitrogen as water insoluble (WIN). Water insoluble sources provide nitrogen over a longer period than soluble sources. The result is more uniform plant growth, less chance of injury to the grass, and less potential for nitrate leaching.

Among your choices of slow release nitrogen sources are:

Organic Sources

- Materials made from manure, sewage sludge, or composted plant or animal products. The nitrogen content of these materials ranges from very low to around 10%.

Synthetic Sources

- Sulfur coated urea - 14-38% Nitrogen
- Resin coated urea - 24-35% Nitrogen
- IBDU - 30-31% Nitrogen
- Ureaformaldehyde and Methylene ureas 20-38% Nitrogen

Determining the % of WIN (Water Insoluble Nitrogen)

A fertilizer label may supply the following information:

	27-0-3
	Guaranteed analysis
Total nitrogen	27%
8% Water insoluble nitrogen	
Available phosphates	0%
Water soluble potash	3%

To calculate what % of the total N is WIN, divide the percent of water insoluble nitrogen by the percent of total nitrogen and multiply by 100. In this case the result is $8\% \div 27\% \times 100 = 30\%$. This fertilizer contains 30% WIN.

Fertilizer Timing

Cool season grasses (fescues, bluegrass, ryegrass) should be fertilized primarily in the late summer or early fall. This growth period is important for recovery from summer stresses. The warm season grasses, zoysiagrass and bermudagrass, should be fertilized in the early summer because that is when they are most actively growing. The low input fertilizer plan lists below the minimal amounts of fertilizer needed for maintaining lawns in Maryland. Do not forget that cultural practices that keep lawns healthy, such as proper mowing and cultivar selection, can also reduce the need for fertilizer.

UME Turf Fertilizer Recommendations		
Grass Type	Date of Application	Pounds of nitrogen per 1000 sq. ft.
Tall fescue	September/October	0.9 - 1.8 lbs a year- 0.9 lb. in September and 0.9 lb. in October
Kentucky bluegrass	September/October	0.9 - 1.8 lbs a year- 0.9 lb. in September and 0.9 lbs. in October
Fine fescue	October	0.9 lb.
Zoysiagrass	June	0.9 lb.
Bermudagrass	June/July	0.9 lb. in June and 0.9 in July
<ul style="list-style-type: none"> • If clippings are left on the lawn you may only need one application per year regardless of your lawn's age. • Healthy lawns established longer than twelve years may only need one application per year. • No fertilizer can be applied between November 15 and March 1. 		

Optional Turf Applications		
Grass Type	Date of Application	Pounds of nitrogen per 1000 sq. ft.
Tall fescue	Late May or early June	0.5 to 0.9 lb.
Fine fescue	Late May or early June	0.5 lb.
Kentucky bluegrass	Late May or early June	0.5 to 0.9 lb.
Zoysiagrass	July or August	0.5 to 0.9 lb.
Bermudagrass		
Tall fescue and particularly Kentucky bluegrass may need moderate additional applications of fertilizer to maintain density and reduce pest and weed problems. The optional applications may help your lawn if: <ul style="list-style-type: none"> • clippings are removed • there is a severe crabgrass problem • the lawn is heavily used • there has been pest or other damage • lawn was seeded the previous fall • the previous fall fertilization was missed 		

Mowing

Low and infrequent mowing may be the major cause of lawn deterioration. It is best to remove no more than 1/3 of the grass blade each time you mow. For example, to maintain a 3 inch height, do not let the grass get much taller than 4 inches. **Mowing to the proper height can reduce weed problems by as much as 50 to 80%.**

Sharpen or replace mower blades at least once a year or more frequently if needed. A dull mower blade can make turf more susceptible to disease and may cause the turf to have a brown cast or look ragged after mowing.

Mowing Guide	
Tall fescue	3 - 3 1/2 in.
Perennial ryegrass	3 - 3 1/2 in.
Kentucky bluegrass	3 - 3 1/2 in.
Fine fescue	3 - 3 1/2 in.
Bermudagrass	2 - 3*
Zoysiagrass	2 - 3*
* Recommended height for sport fields is 1 - 1 1/2"	

Grasscycling

Leave grass clippings on the lawn unless mowing has been missed and the lawn is much higher than recommended. It is a way to recycle nutrients. If you leave clippings on the lawn for 2 years or longer you may be able to reduce the amount of nitrogen fertilizer required by one application. Grass clippings left on the lawn do not cause excessive thatch buildup, however, if a heavy thatch layer is present, the clippings will decompose more slowly and may increase thatch buildup.

Watering

Shallow and infrequent watering, or watering in the evening, can damage your lawn. Once you have an established lawn, water only when needed rather than on a schedule. Water if the grass develops a blue-gray color or if walking on it leaves footprints. Water slowly to allow water penetration and to prevent runoff. Wet the soil to a 4-6 inch depth if possible. You can check the depth with a screwdriver. Early morning watering allows the grass to dry before night and reduces the chance for disease. Plant dormancy of turfgrass species occurs under extended dry periods. This is a survival mechanism of perennial turfgrass species and your lawn will usually recover when rainfall returns.

Soil Compaction

Compacted soil may result in poor rooting and reduced vigor. Clay soil, construction, or heavy foot traffic can lead to compaction. Poor drainage is an indication of compaction. Also, some weeds do well in compacted soil and their presence may indicate a problem. They include, annual bluegrass, broadleaf plantain, goosegrass, knotweed and spurge. Core aeration can help. It should be done when the grass is growing vigorously, usually in the fall. Choose an aerator that removes small cylinders of soil. Tine or spike devices that merely puncture the soil do not work as effectively and damage the soil by compaction.

Thatch

Thatch is the intermingled layers of living and dead stems, leaves and roots that exist between the soil and green vegetation. A thin thatch layer (1/4-1/2 inch) provides some benefits such as surface cushioning, increased wear tolerance, and temperature moderation. Excessive thatch (1 inch or more) can cause a variety of lawn problems. Zoysiagrass, bermudagrass, fine fescues, and Kentucky bluegrass tend to produce thatch layers.

Excessive thatch will:

- Prevent water and air from reaching the soil and root zone, thus reducing the turf's tolerance to drought and temperature extremes.
- Provide a protective home for insect pests (billbugs, chinch bugs and sod webworm larvae) and disease fungi.
- Prevent certain insecticides and herbicides from penetrating to the soil level, making them ineffective.
- Interfere with overseeding.

Thatch Removal

A vertical mower (cuts down through the thatch layer with rows of teeth) or core aerator can mechanically remove thatch. As with aerating, a good time to dethatch is when the grass is growing vigorously and will have time to recover. Another way to decrease the thatch level is to make the soil more hospitable to microorganisms that decompose organic debris. This can be done by adding lime if soil is too acidic, encouraging earthworm activity by adding organic matter, and aerating the soil. Be aware that some pesticides may be lethal to earthworms. Improper cultural practices such as light, frequent watering and over fertilizing can increase the rate of thatch buildup.

Weeds

A healthy, dense turf competes well against weeds. Therefore, proper mowing, fertilizing, and soil conditioning should be the first line of

defense. Presence of certain weeds can indicate cultural problems. For example, crabgrass and chickweed thrive in lawns that are mowed too low. Some weeds will appear in even the most carefully managed lawn. Digging or pulling can solve minor problems. If weeds overwhelm the lawn despite good cultural practices, consult the Home and Garden Information Center for advice regarding chemical control. Several products are available for either spot treatment or as preventative control.

Lawns, fertilizer, and water pollution

The large amount of pavement and stormwater drainage in cities and suburbs provides a direct route for nutrients and other pollutants to enter streams, rivers and the Chesapeake Bay. Careful application of fertilizer is one way you can prevent pollution. Follow these tips to make sure the fertilizer you use remains on the lawn and out of the water.

- ✓ Keep fertilizer off paved surfaces. If granular fertilizer gets onto paved surfaces, collect it for use later or sweep it onto the lawn.
- ✓ Use a drop spreader instead of a rotary spreader in restricted spaces, especially when near water, driveways or sidewalks.
- ✓ Calibrate your spreader to make sure you are not over-applying fertilizer.
- ✓ Fill and wash spreaders over grassy areas, not on hard surfaces.
- ✓ Avoid getting fertilizer into natural drainage areas on your property.
- ✓ Never apply fertilizer to frozen ground or dormant lawns.
- ✓ Do not use fertilizer to melt ice and avoid ice melting products that contain nitrogen.
- ✓ Test soil every 3 to 5 years, and then fertilize and lime your lawn accordingly.
- ✓ Leave grass clippings on the lawn. This recycles nutrients and can reduce the amount of fertilizer you need to apply.
- ✓ If you water your lawn, do not let water run off the lawn.
- ✓ If your soil is sandy, or if you live in an area with a high water table, use a slow release nitrogen source and do not apply more than .9 lb. of nitrogen per 1000 sq. ft. in any one application.

5/2002. Revised 2/2010 and 4/2012

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