

IPM Series: Turf

Symptoms	Possible Causes	Controls/Comments
1. Problems with the general appearance of the lawn:		
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 webworm: brown caterpillars may be found at the base of the blades and in the thatch. Active from June through July.	Reseed with grasses with high levels of endophyte such as tall fescue, or spray with B.t. 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.
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.	Adjust terrain, raise mower blade or change mowing direction

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 or 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.

2. Problems on individual leaf blades

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 bluegrass 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 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.
Gray to black streaks in leaf blades	Striped smut: leaves split into ribbons and curl. Disease appears in irregular patches and infects primarily bluegrass in spring and fall.	Avoid drought stress and excessive thatch. Reseed with improved turf cultivars
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	Sooty 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 from June through 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.
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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.
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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.
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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.
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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.
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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.
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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.
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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.
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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 "AM-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.

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. Zoysia must be planted by plugs or sprigs as seed is not available. Zoysiagrass needs **full sun** and is very low-maintenance once established. For more details about Zoysiagrass, order publication "AM-69", "Planting and Care of Zoysiagrass" available from the Home and Garden Information Center.

FINE FESCUE

The fine fescues have very narrow blades. They tolerate shade and low fertility. However, they do not tolerate poorly drained soil or heavy traffic, and high heat or humidity can cause the grass to become dormant. Fine fescues prefer low fertilizer rates. There are several varieties of fine fescue. Creeping red fescue, is good for shady low maintenance sites. Chewings fescue and hard fescue will do well in sunny or shady, low maintenance locations

KENTUCKY BLUEGRASS

Popular for its deep color and fine blade, 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 than other cool season grasses.

PERENNIAL RYEGRASS

Because it germinates rapidly, perennial ryegrass is often selected to quickly establish a lawn or fill in bare spots. It is very tolerant of traffic but often damaged by cold temperatures. Ryegrass recovers slowly from damage, therefore it may require frequent reseeding.

BERMUDAGRASS

Bermudagrass is most often used as a turfgrass in the South since it is very sensitive to freezing temperatures. It tolerates heavy traffic and responds well to management, forming a dense, fine-textured turf. However, it has no shade tolerance. Only a few varieties are recommended for Maryland.

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 7.0. 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.

**Have your soil tested every 3 to 5 years.
Call the Home & Garden Information Center
at 1-800-342-2507 to receive the test materials.**

Lawn Fertilizers

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 (P₂O₅), and potash (K₂O). 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. If soil testing indicates adequate levels of phosphorous and potassium, use a fertilizer that has a low percentage of these two nutrients.

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 form. Slow release nitrogen sources are fertilizers that have 40% 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:

- 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%.
- 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:

	20-10-10	
	Guaranteed analysis	
Total nitrogen		20%
	8% Water insoluble nitrogen	
Available phosphates		10%
Water soluble potash		10%

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% divided by 20% x 100 = 40%. This fertilizer contains 40% 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.

Low Input Fertilizer Plan

Grass Type	Date of Application	Pounds of nitrogen per 1000 sq. ft.
Tall Fescue Bluegrass Ryegrass	Sept./Oct.	2 lbs a year- 1 lb. in September and 1 lb. in October
Fine Fescue	October	1 lb. in October
Zoysiagrass Bermudagrass	June	1 lb. in June (Bermudagrass gets another 1 lb. in July.)

Optional Applications

The fertilizer plans listed above are generally the minimal amounts of fertilizer needed for maintaining lawns in Maryland. Tall fescue and particularly Kentucky bluegrass may need moderate additional applications of fertilizer to maintain density and resist pest problems. The optional applications that follow may help your lawn if:

- clippings are removed (see page 6),
- there is a severe crabgrass problem,
- the lawn is heavily used,
- there has been pest or other damage.

Do not forget that cultural practices that keep lawns healthy, such as proper mowing, can also reduce the need for fertilizer. **If you apply fertilizer in November or late spring, use a slow release nitrogen source.**

Grass Type	Date of Application	Pounds of nitrogen per 1000 sq. ft.
Tall Fescue Fine Fescue	May/June	1/2 to 1 lb. in late May or early June
Bluegrass Ryegrass	November	1/2 to 1 lb. in November and/or 1/2 to 1 lb. in late May or early June
Zoysiagrass	July/August	1/2 to 1 lb. in July
Bermudagrass	July/August	1/2 to 1 lb. in August

Grasscycling

Leave grass clippings on the lawn. 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 25%. 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.

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%.**

Mowing Guide		
	Spring & Summer	Fall & Winter
Tall fescue	2½ - 3½ in.	2½ in.
Perennial ryegrass	2½ - 3	2 - 2½p
Kentucky bluegrass	2½ - 3	2 - 2½
Fine fescue	2½ - 3½	2½
Bermudagrass	½ - 1	½ - 1½
Zoysiagrass	½ - 1	½ - 1½

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.

Watering

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. You can check the depth with a screwdriver. Early morning watering allows the grass to dry before night and reduces the chance for disease. Shallow and infrequent watering, or watering in the evening, can damage your lawn.

Unless you have bluegrass, it is safe to let an established lawn go dormant during dry periods. Dormancy is a survival mechanism 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 compac-

tion. 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. Choose an aerator that removes small cylinders of soil. Tine or spike devices that merely puncture the soil do not work as effectively.

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 (¼-½ 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. Fescues and perennial ryegrass produce thatch slowly but zoysia, bermuda, and bluegrass tend to be heavy thatch producers.

Excessive thatch may:

- 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, and aerating the soil. Be aware that many insecticides and fungicides are 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 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.

- ✓ Try to 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 1 lb. of nitrogen per 1000 sq. ft. in any one application.

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**USE PESTICIDES WITH CARE.
READ LABEL DIRECTIONS. FOLLOW ALL SAFETY PRECAUTIONS.
PROTECT THE BAY. USE PESTICIDES AND FERTILIZERS WISELY**

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