TURFGRASS MANAGEMENT

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General

Lawns enhance the beauty and utility of the landscape. A carpet of grass reduces dust, mud, erosion, heat, glare and noise. Lawns provide suitable areas for outdoor recreation and relaxation. Grasses also produce oxygen and consume carbon dioxide, thus contributing to efforts to reduce global warming trends.

In the landscape, lawns provide the setting for all landscape elements - trees, shrubs, flowers, and buildings - so that unity is apparent. Imagine a lawn as the carpeted floor of an outdoor living room. It should be pleasing to the eye from early spring to late fall. Turf is a complex ecosystem, however, and requires careful management to remain healthy and attractive.

Botanical Characteristics

High-quality lawns are composed primarily of one or more perennial grass species. Although some homeowners prefer to include clover or other broadleaf plants in a lawn area, the focus of this chapter is on turfgrasses and broadleaf components will not be discussed.

Botanically speaking, grasses are monocots. As such, they have long, narrow leaves with parallel veins. The leaves and roots join at a compact crown. Grass plants may form bunches or tufts, or they may spread to form a sod. Spreading may occur either by above ground stems (stolons) or underground stems (rhizomes). Some grasses spread by both rhizomes and stolons. Typical bunch and spreading grasses are shown in Figure 15-1.

Grass leaves consist of several parts. The leaf sheath is a cylindrical portion surrounding the stem and its growing point. The sheath arises at a node and ends in a pale-colored region, the collar. The collar is transitional to the outer, usually flat portion of the leaf - the blade. The collar usually has a membranous outgrowth or ligule. In ryegrass and certain other grasses, the collar produces small, clasping outgrowths, which are the auricles.

The leaves may have parallel or tapered margins, with tapered, boat-shaped, or pointed tips. Before the leaf unfolds, the new leaf blade is rolled in some species, folded in others. General leaf characteristics are shown in Figure 15-2.

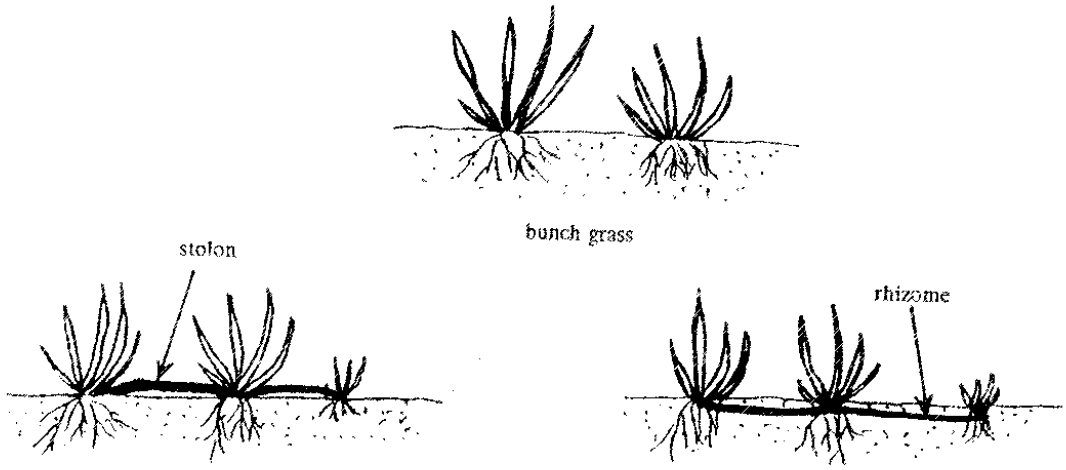

Figure 15-1. Examples of typical bunch grasses (A) and grasses that spread by stolons (B) and rhizomes (C).

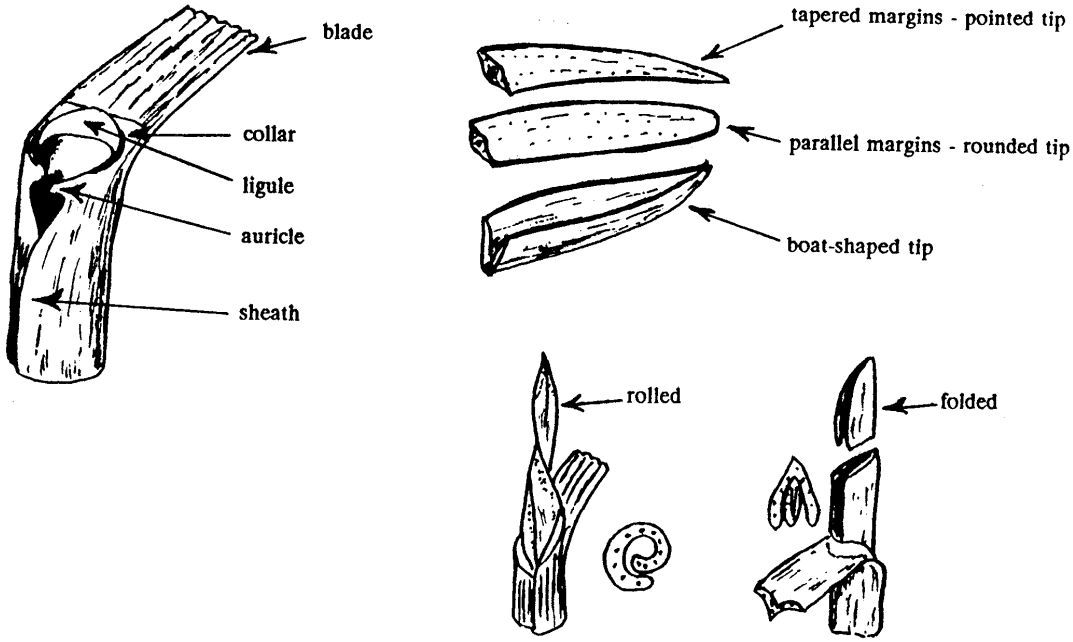

Figure 15-2. General leaf characteristics

Selecting a Variety

Selecting the proper species and varieties of grass are critical to the establishment and maintenance of a high-quality lawn. Make sure that the grass or grasses you select are adapted to your climate, specific site, and intended use.

In terms of climate and site, take into account minimum winter temperatures, summer high temperatures, amount of available water and soil moisture-holding capacity, and the amount of sun or shading.

Decide what your intended use is before you select a variety. Will the grass have to withstand heavy traffic, such as a playground, or simply serve as a backdrop in a landscape? Will the turf be kept mowed very short or can it grow somewhat taller?

Five kinds of turfgrasses are commonly used in Montana and Idaho: Kentucky bluegrasses, fine-leaf fescues, tall fescues, bentgrasses and perennial ryegrasses. In addition, buffalograss and other drought-tolerant species are gaining popularity for water-conserving, low-maintenance lawns. Distinguishing traits of selected turfgrass species are summarized in Table 15-1.

Turfgrasses may be established alone but are more often blended with other varieties or other species. While many of these blends have merit, be sure that all of the species and varieties used in a blend are adapted to the site and will provide a uniform, durable, attractive turf.

Some turfgrasses such as tall fescue, creeping fescue and perennial rye have symbiotic associations with endophytic fungi. A symbiotic relationship is a relationship between two organisms that is usually mutually advantageous. An endophyte is an organism living within a plant. Endophytic fungi provide certain benefits to the host grass and are generally considered to be desirable. See page 15-19 for more information on endophytes.

Kentucky Bluegrass

Kentucky bluegrass is an aggressive grower under favorable conditions and can spread rapidly by underground creeping rhizomes. Therefore, it can heal injuries and fill in bare areas quickly. Most bluegrass varieties produce dense turf when mowed at 2 1/2 to 3 1/2 inches but some varieties can be successfully maintained with lower mowing heights. Kentucky bluegrass grows most rapidly during cool, moist weather and will go dormant in periods of heat and drought. This grass prefers full sun. It should be sown at 1-2 pounds per 1000 sq. ft. for pure stands but can be blended with other species. Most sod grown for commercial sale is Kentucky bluegrass.

Kentucky bluegrasses are the most widely used lawn grasses in Idaho and Montana. When managed properly they produce a dense, vigorous, durable, and attractive turf. They require moderate to high levels of nutrition and moisture, and perform best in a deep, well-drained loam soil. They are quite winter hardy and are moderately resistant to drought, diseases, and pests.

Tall Fescues

Turf-type tall fescues have been developed from selections of pasture and forage tall fescues. Plant breeders through hybridization and other techniques have modified these grasses substantially to produce acceptable turfgrasses. Tall fescue was selected by plant breeders because of its disease and insect resistance, durability, and survivability under severe conditions of heat, drought, poor soils, salt, and shade. Varieties of tall fescue have been selected for their deep root systems, drought tolerance, leaf texture and slow growth habits.

The drought avoidance system of tall fescues involves closing the stomata, thereby retarding moisture loss. Stomata are the small pores in the leaves through which water and gases diffuse. These grasses maintain an acceptable green color during periods of summer heat stress when other ornamental turf grasses may become unattractive. The seed should be sown thickly at approximately eight pounds of seed per 1000 sq. ft. Tall fescue is generally sown alone, but blends can be successful.

Perennial Ryegrasses

Perennial ryegrasses are bunch grasses that can produce excellent turf. They may be used alone or in mixtures with bluegrasses when fast establishment and ground cover are important. Improved perennial ryegrasses have been developed that have fine texture and good wear tolerance. When properly managed, they make an attractive turf. The common seeding rate is 4-5 lb. per 1000 sq. ft.

Ryegrasses are not as cold hardy as other cool-season turfgrasses, but are suitable in areas where temperatures do not drop below -30 F. Perennial ryegrasses tend to die out after 4-6 years. Some ryegrasses contain beneficial fungi, called endophytes, which are important in pest and disease resistance.

Fine-leaf Fescues

Fine-leaf fescues, which are most frequently used in mixtures with bluegrasses, are generally more drought tolerant than other turfgrasses. They are also more tolerant of shade and generally perform well on northern exposures of buildings or under shade trees. When managed properly they make an excellent turf. Like perennial ryegrass some fine fescues contain endophytes that play key roles in pest and disease resistance. Fescues are usually seeded at the rate of 3-4 lb. per 1000 sq. ft.

Three species of fine-leaf fescues are used for turf: creeping red fescue, chewings fescue, and hard fescues. Creeping red fescues have a spreading or rhizomatous system and will spread over damaged areas of the lawn. Chewings fescues are bunch-type species that don't spread unless they are allowed to go to seed. This species should be planted thickly enough to ensure a dense and even turf. Hard fescues are also bunch-type, make an excellent turf, have extensive root systems and tolerate drought conditions. The hard fescues are best for shady areas.

Bentgrasses

Bentgrasses require extra management and care, including frequent mowing, close mowing, frequent watering, and relatively heavy rates of fertilizers. When given proper management, they produce the fine, beautiful turf found on some golf greens or specialty lawns. They are not commonly used for home lawns. The bentgrasses are generally more susceptible to winter diseases and are less hardy than other common turfgrasses. Because of their specialized management requirements bentgrasses should be planted alone and not mixed with other grasses. Bentgrasses can be very invasive and quickly take over large areas of lawn, but unless their special care requirements are continuously met they die out and leave large bare areas. Bentgrasses are seeded thinly at a rate of ½ lb. per 1000 sq. ft.

Buffalograss

Buffalograss use in lawns has increased because it withstands heavy traffic, tolerates heat and cold extremely well, requires little or no irrigation once established, controls weeds, resists diseases and pests, doesn't require fertilization, reduces the need for frequent mowing, and doesn't require thatching. It's an aggressive grass that quickly recovers from injury, but is considered non-invasive and is easily controlled around flowerbeds and sidewalks. It does best under arid conditions and does not do well with heavy irrigation.

Because it is a warm-season grass, buffalograss doesn't green up as early in the spring as do the cool-season grasses described above, but remains a golden-brown from late fall into the spring. Adequate irrigation will delay browning and give a more attractive appearance later into the fall. It requires full sun and doesn't tolerate shade. Buffalograss naturally grows about 4 inches tall, but can be mowed to about 1.5 inches.

Although many species of grasses have commonly been called buffalograss, Buchloe dactyloides is the species discussed here. Buffalograss is native from central Montana and Idaho to western Minnesota and northwestern Iowa, south to western Louisiana, Texas, Arizona, and northern Mexico.

Buffalograss occurs mostly on soils of high clay content and is tolerant of some salinity. It does not occur on sands and does not succeed on sandy soils.

Sodding, seed, plugs, or stolons are used to establish buffalograss lawns. Plugs or sod pieces are the most practical. Establishment is less effective when stolons are used alone. Plugs or seed should be placed in a prepared seedbed for best results. Sod pieces or plugs about 3 or 4 inches in diameter placed one foot apart usually produce a complete sod cover by the end of the growing season. When establishing a lawn from seed, plant in late spring using locally adapted seed for best results. Weed control and watering during dry periods are important in establishing a continuous sod in one season in semiarid regions.

Blends of Grasses

Lawn grass seed is frequently packaged and sold as blends of two or more varieties of the same species or as blends of several species. One common blend is Kentucky bluegrass and creeping red fescue. Blends of two or three bluegrasses are also packaged. While many turfgrass varieties are excellent performers, seed blends provide more genetic variability and may adapt better to a given site than a monoculture of a single variety or species. Be sure that all of the species used in a mixture and varieties used in a blend are adapted to the site and will provide a uniform, durable, attractive turf.

From the standpoint of appearance, ryegrasses and Kentucky bluegrasses mix very well and complement one another by offsetting each other's weaknesses. For example, Kentucky bluegrasses characteristically have only moderate disease and pest resistance, and exhibit poor tolerance of traffic, shade, and drought, as well as a tendency to develop thatch. Perennial ryegrass, on the other hand, performs well in these areas. Ryegrass also grows faster than bluegrass and its thick, fine texture provides an excellent appearance. Kentucky bluegrass/perennial ryegrass seed blends often contain 40 to 60% ryegrass.

Table 15-1. Distinguishing traits of selected turf grass species

	Kentucky Blue Grass	Perennial Rye Grass	Turf-type Tall Fescue	Creeping Fescue
Scientific Name	*Poa pretensis*	*Lolium perene*	*Festuca arundinacea*	*Festuca rubra*
Growth habit	rhizomes	bunch type	bunch type	rhizomes
Establishment rate	slow	very fast	medium	medium
Mowing frequency	medium	high	medium	low to medium
Close mowing tolerance (1-2")	fair	very good	medium	good
Water use	high	medium	medium	low
Fertilizer requirements	medium to high	medium to high	low to medium	lowest to medium
Insect resistance	poor	high with endophyte	high with endophyte	high with endophyte
Disease resistance	fair to good	high with endophyte	high with endophyte	low
Shade tolerance	fair *	medium	good	excellent
Drought tolerance	poor to good	fair	excellent	good
Competitiveness	medium	high	medium	medium
Evaporative cooling potential	high	medium	high	low
Rooting depth	4"-14"	6"-18"	18"-72"	6"-18"
Salinity tolerance	low to medium	medium	high	low
Thatch former	high	none	none	medium
Traffic tolerance	medium	excellent	high	medium

* depends upon variety

Review

A. Describe the following types of grasses, giving at least one example of each.

Bunch Grass _____

Stoloniferous Grass _____

Rhizomatous Grass _____

B. Draw typical grass plants showing stolons and rhizomes. Include a close-up, identifying the blade, collar, ligule, auricle, and sheath.

C. Write a short description, including typical uses, advantages, and disadvantages of each of the following grasses.

Kentucky Bluegrass _____

_____

Perennial Ryegrass _____

_____

Tall Fescue _____

_____

Creeping Red Fescue _____

_____

Buffalograss _____

_____

D. Explain why grass blends are used, listing typical examples of such uses. _____

_____

_____

Establishing a Lawn

Preparing the Site

Completely remove all trash and debris from the future lawn area. To ensure proper drainage, slope the lawn area away from the house, dropping 3 to 5 inches per 100 feet. Avoid steep, difficult-to-maintain slopes if possible. Terraces can be used to break up long slopes.

Provide for adequate soil drainage and prevent future water pockets by filling in depressions. All extensive fills and trenches for water and sewer lines must be thoroughly filled, packed and settled before planting to avoid future depressions in the lawn.

Get weeds under control before seeding. Contact herbicides may be used to control deep-rooted perennials, such as bindweed and quackgrass. If weed infestations are bad, 2 or 3 applications at 2 to 3-week intervals may be necessary. Allow several weeks after the last treatment for the herbicide to dissipate before the lawn seed is planted. Always follow label directions.

Applying the Topsoil

Under many conditions in Montana and Idaho applying 6 to 8 inches of topsoil to new lawn sites is desirable. The added topsoil should be free of stones and debris. A sandy topsoil with added organic matter has good aeration, good water drainage, and is less likely to compact than a heavier clay soil. Mix the added topsoil (including amendments) thoroughly into the top 6 to 8 inches of soil. Adding topsoil that is drastically different from the underlying soil can cause a layering effect that disrupts air and water movement through the soil. The final surface should be smooth and firm, and should slope away from the house. The topsoil should be at least 6 inches below the house siding and 1 to 2 inches below established sidewalks.

Installing the Sprinkler System

Supplemental irrigation is necessary in Montana and Idaho to establish and maintain a healthy lawn. Portable sprinklers or an underground sprinkler system may apply supplemental water.

An underground system should be installed after the final grade has been established and before the grass is seeded or sod applied. After the irrigation system is in place, make certain that all the holes and trenches are filled and settled by tamping or soaking to avoid future setting. Whatever irrigation system is selected, make sure you can provide a thorough, uniform application of water.

Applying Starter Fertilizers

Starter fertilizers should be applied during the final stages of seedbed preparation, 1 to 2 weeks before the lawn is planted. Have soil samples analyzed by a laboratory to determine the appropriate plant nutrients or soil amendments needed for optimum growth. State Cooperative Extension offices can provide information on soil sampling and analysis.

Starter fertilizers are usually mixtures of nitrogen, phosphorus, and potassium. A good starter formulation is 16-20-10 applied at 1 to 2 pounds of nitrogen per 1,000 square feet of lawn area. This fertilizer should be raked or tilled into the upper 4 inches of soil about one week before planting. Water thoroughly after the fertilizer is incorporated. Phosphorus is relatively immobile in many soils and must be present in the root zone to be effective.

Seeding

The best time to seed a lawn in Idaho and Montana is late August to mid-September, about 1 month before freezing temperatures are expected. Fall conditions are often dry, so frequent light sprinkler irrigation (several times a day) is necessary to promote rapid seed germination and growth. Once the seed germinates the seedlings must be kept constantly moist or they will die. Germination rates vary according to the type of seed used. Ryegrass can

germinate in a week, while bluegrasses can take up to three weeks to germinate. Germination will be slower at cooler temperatures.Turf may also be seeded in the spring after the soil is warm and workable. Allow time for the rough grade to settle. Preparation the previous fall would allow for maximum settling. As soon as the soil warms in early spring, weed seeds will germinate and a final seedbed preparation may be necessary to ensure a clean site.

Grass seed is best sown with a mechanical seeder, although small areas can be seeded by hand. Calibrate the grass seeder carefully and plant one-half of the seed while traveling in one direction and the remainder in the opposite direction. If possible, plant different species of grass separately since seed sizes vary. This is not possible with many blends of grass seed.

After sowing, rake the soil surface lightly but not more than 1/4 inch deep. After raking, roll the surface to firm the seedbed and to ensure firm contact between the soil and seed. Rolling is especially important in light, sandy soils. Do not work the soil when it's wet and likely to crust.

Mulching

After planting you may want to mulch the seed area to ensure uniform and rapid germination and establishment. Mulch reduces moisture loss and controls water and wind erosion of the new seedbed. Controlling wind and water erosion is especially important in fall-seeded lawns. Peat moss, applied at the rate of 50 pounds per 1,000 square feet, is a good mulching material. Apply clean, weed-free straw at a rate of 75 to 100 pounds per 1,000 square feet. Other mulches include sawdust and shredded bark. When using mulches apply starter fertilizers as described above to avoid depleting the soil nitrogen.

Sodding

Sodding has become popular way to establish lawns. Sodding is desirable on steep slopes and where complete cover is needed immediately. Most turf farms produce Kentucky bluegrass sod. Some specialized farms produce sod of several turfgrass species.

Sodding costs more than seeding but results in an "instant" lawn. Advantages include reduced opportunity for weed invasion, reduced mud problems and uniform establishment. One often-neglected factor in sodding is soil preparation. A sodded lawn requires the same soil preparation as a seeded lawn. Areas to be sodded should have fertilizer tilled into the soil, just as in seeding, according to soil test recommendations for that soil. An application of 1/2-pound nitrogen per 1000 square feet can be applied immediately to newly sodded turf.

Sod can be installed any time the ground isn't frozen, however sufficient water is critical. For sodding during hot, dry periods, you'll need irrigation equipment capable of keeping the sod moist.

The following steps should be followed when installing sod:

1. Lay sod immediately - don't allow it to remain stacked and rolled for more than two days, and then only when absolutely necessary.

2. Lay sod on moistened soil. Stagger the joints and fit the pieces as closely together as possible. Use short wooden pegs spaced one foot apart to anchor sod on a steep slope.

3. Soak the turf immediately after laying the sod and water it daily (unless it rains) until the sod is firmly rooted into the soil (two to three weeks or longer). Once the turf is established, treat the sodded area as you would any established lawn.

Hydroseeding

Hydroseeding is the process of mixing water, mulch and seed together to form a thick slurry. The mixture is sprayed under pressure onto bare soil. The mulch creates a mat that holds the seed in place, retains soil moisture, resists wind and water erosion, and creates a favorable environment for seed germination. The mulch is usually made from wood fibers, chopped newsprint or chopped cardboard. Fertilizers are sometimes used in the slurry but fertilizing about two weeks after seeding is suggested.

Vegetative Planting

Besides using sod there are several methods of establishing a turf using vegetative plant parts, rather than seed. Some grasses can be established from stolons, sprigs or plugs. Propagation with stolons is the most commonly used of these methods. Vegetative planting methods are most commonly used with the warm season grasses such as buffalo grass.

For vegetative planting, prepare the soil as if it were to be seeded. The stolons, available from specialized root nurseries, are usually shredded in 3- to 6-inch lengths and bagged. Approximately 8 to 10 bushels of stolons are necessary to plant 1,000 square feet. Spread the stolons uniformly over the area and press them into the upper inch of soil with a disk-like roller. Water frequently and mulch, if necessary, during drought periods.

Review

A. List four steps that should be taken before spreading topsoil when establishing a lawn.

1. _____ 2. _____ 3. _____ 4. _____

B. Describe suitable grass seed for a high-use playground area. _____

_____

_____

C. Describe what a starter fertilizer is and make a recommendation for its use in establishing a lawn.

_____

_____

D. What are the best times to seed a lawn in Idaho or Montana?

_____

_____

E. What are the advantages of sodding a lawn?

_____

_____

F. List three advantages of hydroseeding over conventional seeding techniques. _____

_____

Maintaining the Lawn

Fertilization

Turf fertilizers are commonly sold in mixtures of N-P-K-S. Laws require that the percentages of these plant nutrients be shown on the bags. A complete fertilizer for maintaining an established lawn should have an N-P-K-S ratio of 3:1:2:2. Detailed information on determining fertilizer needs for turfgrasses is given in Chapter 3 of this manual.

Many soils in low rainfall areas have a relatively high pH. When soil pH is higher than desired, it may be lowered temporarily in a lawn area by applying elemental sulfur or fertilizing regularly with ammonium nitrate. Soils, however, have a tremendous buffering capacity (resistance to change) and tend to revert to their natural pH, especially when irrigation waters are also alkaline. For these areas, select grass varieties that are adapted to higher pH soils and high summer temperatures. Some horticulturists also recommend applying iron and zinc to lawns growing on alkaline and calcareous sites. Iron is typically applied to the soil as ferrous ammonium sulfate at 4 to 5 pounds per 1,000 square feet of lawn. Under high pH soil conditions, the added micronutrients are quickly tied up in the soil and applications will have to be repeated.

Few Montana and Idaho soils are too acidic (below 5.5) for grass growth. If such soils are found the pH can be increased to a desirable level by adding lime. Determine the amount of lime needed by having a liming requirement soil test performed by a reputable laboratory. Try to attain a final pH of about 6.0. Periodic liming will probably be required in naturally acidic soils. See Chapter 1 for more information on soil pH. The following tips may help you to develop an effective turf fertilization program.

- Have a soil analysis performed to determine the proper type and amount of fertilizer to use. Don't over-fertilize.
- Apply no more than 1 pound of nitrogen per 1,000 ft^2 in a single application if using quick release fertilizers.
- Apply phosphorus, potassium, and sulfate fertilizers in the fall rather than the spring.
- To reduce plant stress, don’t fertilize during the dry, hot months of July and August.
- Use fertilizers that contain herbicides or fungicides only when necessary, and rotate your use among several different active ingredients.
- Apply fertilizers evenly over the entire lawn. For each application, spread half of the fertilizer in one direction and half in a direction at right angles to the first.
- Rotary or broadcast spreaders are faster and provide more uniform coverage than drop spreaders and are less likely to create stripes in the lawn due to uneven fertilizer application.
- Do not apply fertilizers to wet grass.
- Water the lawn immediately after fertilizing.
- Sweep up any fertilizer spread or spilled on paved surfaces.
- Never apply fertilizers to frozen ground.

Irrigation

Adequate moisture is necessary to promote optimum growth, density, color, and durability of your turfgrass. For strong root growth, the soil in the root zone should be moist but not saturated. Lawns watered excessively appear dark gray and dehydrated, and the leaf blades don't spring back when walked upon. Lawns that are watered lightly but too frequently develop shallow, fragile root systems easily subject to desiccation, disease, as well as drought and physical damage.

Occasional deep watering is better for lawn grass than daily, light applications. The amount and frequency of watering depends upon soil type, climate, and topographic features. Lawns on shallow, sandy soils require more frequent irrigations than those on heavier loam soils. An average sandy loam soil requires from 1 to1.5 inches of water once a week during summer, depending on the lawn species. Determine the application rate for an irrigation system by setting several straight-sided, open containers in the application area. Measure the depth of water in the containers every 15 minutes until the required amount is applied. The soil should be moistened 8 to 12 inches deep. When the top 2 to 3 inches of soil becomes dry, irrigate again. A simple test of soil moisture is to push a screwdriver 4 to 6 inches into the soil. If it's difficult to insert the screwdriver to that depth, irrigation is necessary on most loam soils.

Mowing

Proper mowing is necessary to maintain the appearance, health, vigor, and density of a lawn. When to mow should be determined by the species and variety, growth rate and cutting height - not by the calendar. More frequent mowing is required during rapid growth periods in the spring and fall than during mid-summer. Keeping a turfgrass very short requires more frequent mowing than does maintaining the same variety at a taller height. Table 15-2 lists common turfgrass varieties according to their frequency of mowing and recommended heights.

Set the mower cutting bar by first placing the mower on a smooth surface, such as a sidewalk, and measuring the bar height with a small ruler. Mow frequently enough so that you remove only 1/3 of the grass at any one mowing. For example, to maintain your lawn at a 2-inch height, mow the grass when it reaches 3 inches. Closer mowing stresses the plants and depletes root reserves. Maintaining turf near the maximum recommended height encourages deep-rooted turf that is more drought tolerant.

To maintain a well-groomed lawn, keep the mower blades very sharp at all times. This may require frequent sharpening. Dull blades shred and bruise the leaves, causing light-brown tips on the grass blades giving the lawn a whitish cast. Damaged grass is more susceptible to stress and diseases than healthy grass.

Reel and rotary mowers are the two principal types used on home lawns. Properly adjusted reel mowers give a high-quality cut and are usually best for closely clipped lawns. Rotary mowers are popular and easily operated. Rotary mower blades must be sharpened regularly. Be cautious when operating these high-velocity revolving blades.

To Bag or Not To Bag

Returning grass clippings to the lawn is one of the most important principles of lawn care. Most lawn mowers sold today have a mulching option that can repeatedly chops grass blades into small pieces that quickly filter-down into the lawn, returning nutrients and organic matter to the lawn. Grass clippings usually contain over four percent nitrogen, about two percent potassium and around one-half percent phosphorus, as well as lesser amounts of other essential plant nutrients. Fertilizer use is greatly reduced by recycling the clippings back into the lawn, and consequently problems with surface and groundwater pollution are also reduced.

Table 15-2. Recommended mowing heights and frequencies

Species	Cutting height (inches)	Mowing Frequency
Bentgrass	0.25 to 0.75	most frequent
Ryegrass	2 to 3	intermediate
Kentucky bluegrass	1.5 to 3	intermediate
Tall fescue	2 to 4	intermediate
Fine-leaf fescue	2 to 2.5	least frequent
Buffalograss	1.5 to 2	least frequent

For most lawns there is no need to remove the clippings from the lawn as long as they are small enough to work down into the grass. Clippings that are too long remain on the turf and can pack it down, damaging the growing plants. These clippings should be raked off to allow the grass to continue growing. Compost the clippings, provided that herbicides have not been recently applied to the lawn, and use the compost to fertilize the lawn and gardens.

Grass clippings are rapidly decomposed by bacteria and fungi, and do not contribute to thatch. While thatch has always been associated with the return of clippings to the lawn, clippings and thatch are simply not connected.

Thatch Control

Thatch is an accumulation of tightly meshed dead and living stems, roots and crowns that builds up between the green vegetation and the soil surface. Thatch accumulations less than one-half inch thick are usually not detrimental to the lawn but thicker accumulations can cause problems. A thick layer of thatch may cause a shallow root system with roots growing only in the thatch and consequently may increase disease, pest, and stress problems, increase scalping during mowing, and create dry spots in the lawn.

Thatch develops when the rate of organic matter accumulation exceeds the decomposition rate. Factors that contribute to thatch buildup include: acidic soils (pH below 6) which reduce earthworm, insect and microorganism activity; compacted or over-irrigated soils which restrict oxygen levels that impairs bacterial activity; excessive nitrogen or irrigation that can increase growth beyond healthy levels; overuse of pesticides, which can reduce soil microbe and earthworms that help breakdown organic matter; and using very vigorous growing varieties of turfgrass.

High maintenance lawns may require thatch control treatments annually due to vigorous growth, while low maintenance lawns may never develop an excessive amount of thatch. Control measures should be based on the presence of a thatch problem rather than as a routine treatment. Cutting a small pie-shaped cross-section in the turf, lifting it, and examining the extent of thatch build-up can determine the need for thatch control. If the depth exceeds one-half inch, take steps to reduce the thatch and prevent further accumulation.

Aeration reduces thatch build-up by increasing the rate at which water and oxygen move into the soil, thereby creating a better environment for thatch-decomposing organisms. Soil plugs brought to the surface during aeration gradually break down and distribute organisms that decompose thatch in the turf.

Microorganisms such as bacteria, fungi, insects, and earthworms are responsible for thatch decomposition. To support healthy populations of these organisms limit pesticide use, keep the soil moist, and aerate when necessary.

A vertical mower, sometimes called a power rake, can be used to remove excessive thatch. A vertical mower has blades or tines that slice perpendicularly into the soil surface. The amount of thatch removed by vertical mowing depends on the depth to which the blades penetrate into the turf and soil, the weight of the machine and the

size of the power unit. In some cases it may be necessary to go over the lawn several times for adequate thatch reduction. Compost the thatch and other organic materials removed from the turf during power raking.

Vertical mowing damages many living grass plants, so it's important to allow for at least 30 days of favorable growing conditions after dethatching. Late summer or early fall thatching creates fewer weed problems than spring removal. To hasten recovery, fertilize the lawn shortly before and irrigate soon after vertical mowing.

Vertical mowing is also an excellent way to prepare an old or damaged lawn for over-seeding into the existing grass. Exposed soil during seeding greatly improves germination of over-seeded grasses.

Aeration

An aerator is a machine that removes plugs of soil from the lawn leaving holes about one-half inch in diameter and up to 3 inches deep. The plugs of soil are typically left on the turf surface to gradually break down and filter back into the turf. Aeration helps reduce soil compaction caused by foot or vehicle traffic. It also increases water and oxygen infiltration into the turf, and reduces thatch accumulation.

Aeration is best done when the grass is vigorously growing and can recover quickly. For best results the soil should not be too wet. Topdressing with sand, gypsum or compost can increase the benefits of aeration. Aerators that only punch holes in the sod, without removing a plug of soil, are of limited value.

Depending on the soil, moisture conditions, and temperatures, natural aeration can take place through alternating freezing and thawing of the soil during the winter. Soil moisture expands when frozen, causing heaving and fragmentation of the soils. Heaving results in increased pore spaces in the soil, which is beneficial. Excessive heaving, however, can damage turf (especially bunch grasses), shrubs, and buildings. Aeration is most beneficial where compaction caused by heavy traffic is a continual problem, such as parks, campuses, and golf courses.

Weed Control

Proper lawn maintenance is the most important weed control practice used on a home lawn. Thick, densely growing turf keeps weed problems to a minimum, and proper fertilizing, mowing, watering, aeration, and thatch control are the first line of defense against weeds.

Herbicides, which kill existing weeds or prevent weeds from germinating, should be used after proper lawn maintenance practices have been established - not before. In this way herbicides need be used only occasionally to treat weed problems.

To control broadleaf weeds, such as dandelion, plantain, or clover, selective post-emergent herbicides can be used. These kill certain plants (in this case broadleaf weeds) without damaging the grass plants. Apply them when the weeds are young and actively growing, taking care to prevent any herbicide drift onto desirable broadleaved plants such as flowers, shrubs, vegetables, or trees. In Montana and Idaho the first application is usually mid- to late-April. A second application six weeks later may be beneficial in a turf heavily infested with undesirable broadleaved weeds. A single fall application, when broadleaf weeds have another growth spurt, can weaken the root going into winter.

Pre-emergent herbicides generally provide the most effective control of annual grass weeds, such as crabgrass and foxtail. These herbicides kill the weed just after the seed germinates so the herbicides must be on the soil when the weed seeds germinate. During a normal year, apply pre-emergent herbicides to control crabgrass in mid spring. Don’t wait until weeds have emerged to apply a pre-emergent herbicide. The best method is to apply the herbicide to areas of the lawn that had an annual grass weed problem the previous year.

Perennial grass weeds such as quackgrass or orchardgrass can be controlled chemically with nonselective, post-emergent herbicides. These materials can kill or damage all plants that they contact including desirable grass plants. Consequently, they are only applied to weed hot spots. You may have to re-seed or re-sod the spot-treated areas. Granular fertilizers that contain pelleted herbicide are convenient, but are the least effective way to control weeds. These products can cause damage to shrubs and flowerbeds if granules land nearby.

All standard pesticide cautions and considerations should be observed when using herbicides: whether or not it will control the weeds present, which plants it kills and which are not affected, environmental conditions when it should or should not be applied, the rate and method of application, and safety precautions associated with its use. Whether the herbicide is a pre-emergent or post-emergent is critical information in deciding when to apply the material. For specific information on weed control contact State University Cooperative Extension Service offices.

Revitalizing An Old Lawn

Established lawns may eventually deteriorate. Which restoration steps to use depend on the nature of the deterioration: poor soil conditions, non-adapted grass species, weed infestation, diseases and pests, or a history of generally poor maintenance practices.

Maintenance Practices

Poor maintenance is one of the main causes of the deterioration of lawns. Proper fertilization, irrigation, mowing, aeration, use of necessary chemicals, and occasional removal of old thatch are often enough to restore poor quality lawns.

Soil Conditions

Poor soil conditions frequently cause problems in old lawns. Fine clay-silt loam soils may become compacted under heavy traffic, creating drainage problems and oxygen starvation of the roots.

Mechanical aeration, as described previously, can be used to improve old lawns. After extensively coring the lawn, spread about an inch of sand and compost mix over the turf and work it into the holes. Then over-seed the lawn using a desirable grass variety. Fertilize, water, and maintain the lawn as described in the previous sections.

If a more extensive lawn renovation is warranted, working liberal applications of medium/coarse sand and organic compost into the top 6 inches of soil will help eliminate soil compaction. This procedure involves removing the sod with a sod cutter and completely reworking the soil, using at least 60 percent sand. Heavy traffic areas, such as school grounds, may need even more sand to prevent future soil compaction. Re-establish the lawn with new sod or seed.

Old lawns often have uneven surfaces that prevent proper mowing and care. If severe, complete removal of the existing lawn and reestablishment using the techniques described in the preceding sections is the recommended.

Smaller areas can be leveled with the addition of compost or topsoil and then seeded. Rolling water-soaked turf with a heavy roller will smooth the surface somewhat but will cause compaction.

Poor Grass Varieties

Some lawn problems develop because the grass varieties originally selected aren't adapted to particular sites. The most effective treatment when this problem exists is to completely remove the old sod with a sod-cutter and re-establish the lawn with pure, improved lawn seed or sod. Some undesirable grass plants have deep rhizomes that should be destroyed and removed completely before seeding or sodding. Sparse clumps of undesirable grasses can be eliminated with nonselective, post-emergent herbicides such as glyphosate. The treated spots may then be re-seeded or re-sodded.

Pests and Diseases

Pests and diseases can usually be eradicated. First identify the pest or disease and related problems. Pest problems, for example, may be associated with thatch buildup. In these cases, the proper procedure is to remove the excessive thatch before treating with a pesticide. Areas severely damaged by pests or diseases are best re-seeded, although improved cultural practices may eventually restore the lawn if only minor damage has occurred.

Shade

Heavy shade from trees, shrubs, and buildings may cause some sun-loving turfgrasses to die out. Under trees this problem may be corrected by pruning the branches to allow sunlight to reach the grass surface, but this may ruin the landscape value of the trees. In light shade establish shade-tolerant grasses, such as creeping red fescues.

Instead of trying to maintain turf in a heavily shaded area, consider using groundcovers that don't require full sunlight. Popular groundcovers include vinca, ajuga, lamium, and pachysandra. Large trees with ground covers beneath them may require extra irrigation. For heavily shaded or otherwise hard-to-maintain areas, consider using bark chips, or gravel to replace turf.

Review

A. Describe for a customer how to apply fertilizer to a lawn. _____

_____

B. What are the advantages of a broadcast spreader over a drop spreader for fertilizing turf?

_____

C. Describe a method of determining when turf needs to be irrigated.

_____

D. How do you determine when to mow, and how much grass should be removed at one time?

_____

E. Describe the advantages of both reel mowers and rotary mowers.

_____

F. A customer asks you whether he should remove clippings from the lawn or let them remain. What is advice? Explain your reasoning.

_____

_____

G. What is thatch, and what causes it? _____

_____

H. What are some of the problems associated with excessive thatch?

_____

I. Describe two methods of reducing thatch buildup. _____

_____

J. What is aeration and when is it used? _____

_____

K. What is the single best way of controlling weeds in turf? _____

_____

_____

Common Diseases

Lawn diseases can be separated into two groups: non-infectious (non-pathogenic) and infectious (pathogenic). Microorganisms called pathogens cause infectious diseases. Fungi, bacteria, viruses, and mycoplasma-like organisms are all plant pathogens that can cause diseases, but fungi cause most plant diseases.

Non-infectious diseases are caused by unfavorable plant growing conditions such as soils that are too dry or too wet, extremely high or low soil pH, nutrient deficiencies or excesses, salt toxicity, dog urine, and stresses caused by excessive heat, cold, or shading. The most common of these in Montana and Idaho is winter desiccation caused by low soil moisture in the fall and subsequent poor winter conditioning of the plants combined with lack of snow cover.

Disease may seriously damage lawn grasses. Given proper fertilization, watering, mowing, and aeration, however, most lawns recover. Good lawn care is the best preventive measure for lawn diseases. The following section describes common turfgrass diseases found in Idaho and Montana and how to control them.

Snow mold

Snow mold is the most common lawn disease in Montana and Idaho. Symptoms appear when the snow melts in the spring. Diseased grass is covered with white, pink, or dirty-gray mycelium (the body of a fungus). The affected grass is bleached and killed, usually in a circular pattern. This symptom is most common in wet, shaded areas where snow accumulates and is slow to melt. Infection begins in the fall under wet snow and may continue through winter until spring. Fungal growth stops when the surface freezes or dries. Snow mold damage can be minimized on lawns by mowing the turf and removing all heavy grass clippings, leaves, and other debris from it before snowfall. Avoid using nitrogen fertilizer in late fall prior to dormancy. Brushing or sweeping the mold off in the spring can also reduce damage.

Rust

Symptoms are orange to reddish-brown spots on grass blades. The rusty-looking material rubs off on fingers and shoes. Rust may be a problem in August or September and a heavy infection can cause grass blades to yellow and die. Rust is rarely a problem where proper fertilization, watering, and mowing are practiced.

Leaf Spot (Melting Out)

Symptoms begin as dark-brown or purple spots on the leaves in the fall or spring, and affected plants may suddenly die in the summer. The leaf spot stage usually doesn't cause serious damage. However, in cool, wet periods leaf tissue is killed and the sheaths and crowns may be invaded. Then during dry periods, large or small irregularly shaped areas of the lawn die suddenly. Excess water and nutrients can increase leaf disease problems.

Raising the mowing height and proper watering and fertilizing can generally control leaf spot and melting out. Over-seeding with resistant cultivars will reduce problems from this disease. Fungicides need to be applied early in the development of the disease, which is usually during cool, wet growing conditions. If leaf spot symptoms are already present results of treatment with fungicides are typically poor at this time.

Powdery Mildew

This disease, which appears as a white dust on the leaves, is common in cool, shaded areas of the lawn in fall and spring. Mildew often results in thin turf areas in dense shade under trees or on the north side of buildings. Improving light penetration, mowing frequently, and increasing air movement reduces mildew problems. Over seed the affected lawn with shade-tolerant and mildew-resistant cultivars.

Fusarium Blight

This "disease" is now known to be a complex of similar appearing diseases including Necrotic Ring Spot, Rhizoctonia Yellow Patch, Summer Patch, and Brown Patch. These diseases are most serious on well-maintained new lawns.

Circular areas of red-colored, straw-colored, and normal leaves are the first symptoms. As the patch becomes older, the center may become green with straw- and red-colored blades around the outer portion of the ring. The roots are covered with dark strands of the fungus and crowns of affected plants are dark brown. Plants are weakened and are very susceptible to summer heat and drought.

Yellow Patch develops under wet conditions and is often present on newly laid sod on heavy soils. Damage is most severe in lawns with heavy thatch and compacted soil. Thatch in yellow patch areas often decomposes, producing a sunken appearance in the lawn.

A ring of dark, water-soaked grass that fades and dries to a light brown most often characterizes turf infected with Brown Patch. Reduce thatch, fertilize, and irrigate as described in previous sections.

Fairy Ring

This disease appears as a ring of fast-growing, dark green grass, often surrounded by a ring of thin or dead grass. After rains or watering, mushrooms may develop in the dark green ring. Several soil-inhabiting fungi cause fairy rings. Growth usually starts at a central point, and the fungus grows outward equally in all directions, developing a circle. Fairy rings are difficult to control. The most satisfactory treatment is to mask the rings by using a root feeder attachment and injecting water deep (12 inches) into the soil within the rings of dead grass. This treatment, in conjunction with aeration and adequate fertilization, helps hide the symptoms of fairy ring. Mushrooms can be broken up with a rake or lawn mower.

Slime Mold

Slime molds generally appear when there is a nutrient or water imbalance in the turf. Symptoms appear following heavy rain or watering. Small, colored or white, slimy beads develop on the grass. When these beads dry they form a powdery mass. Slime molds don't usually damage grass but are unsightly, and fortunately they disappear quickly. Deposits can be removed with a rake or a forceful spray from a garden hose.

Common Insects

Proper insect management on lawns involves a thoughtful process of detection, identification, and evaluation. Complete elimination of insect pests is impractical, and the goal should be to manage the insect pest populations at levels that do little damage to the lawn. Damage varies according to the condition of the turf, pest species, and pest populations. Fortunately most lawns in Montana and Idaho rarely have significant problems with insects.

Vigorous lawns can withstand larger pest populations than severely weakened ones. Proper fertilization, watering, mowing, and other maintenance practices are important pest controls. For information on chemical controls for pests contact State University Cooperative Extension Offices.

The presence of an insect on a lawn may not indicate a problem since not every insect is a pest. Some insects, spiders, and other organisms in turf are beneficial and help to control pests. Insects on lawns should be controlled when they cause damage, not simply because they exist. Even if an insect is a pest species, they may not be present in enough numbers to cause a problem. Effective pest control begins with knowing what pests are present, what population levels cause damage, the time of year that the pests can be controlled, pest growth stages that are susceptible to control, and the best methods to regulate the pest populations.

Identifying the insects present is the first step in good lawn insect control. Be sure to examine an area of grass that contains living as well as damaged grass plants. The most serious lawn insects feed on living plants and aren't found in dead areas. Insects found in completely dead patches generally aren't responsible for the damage.

If a lawn looks wilted and water-starved a root-feeding insect may be involved. Peel the sod back, examine the roots, and look for any root-feeding pests. Search the thatch carefully because some insects hide there feeding on grass blades. Damage from these pests appears as brown patches after mowing. Other pests live on the grass blades and suck sap from the plant. Close examination of the grass blades reveals this type of pest. Once an insect is found, determine what it is. The following information can help identify the most common lawn pests.

Cutworms

This is the insect pest most likely to do serious damage to lawns in Montana. The adults are usually dark moths that fly at night. The larvae, which do the damage, look like typical cutworms – plump, smooth, and usually grayish or brown in color, sometimes with spots or stripes. They can reach two inches long but are usually smaller.

Adults lay their eggs in late summer, which hatch soon after. The caterpillars over winter and begin feeding on new growth and seedlings in the spring. The larvae feed only at night and leave small, brown patches 1 to 2 inches wide in the turf. They mature as adults in mid- to late summer.

Examine the turf at night to determine the presence of cutworms. A concentration of about 10 worms per square foot of surface area will require treatment. Granular Bt mixed with bran is a safe and effective treatment. Fortunately there are many predators, including ground beetles, rove beetles, toads, snakes, and spiders. In August ravens feed heavily on cutworms.

Sod Webworm

This blade-feeding lawn pest is occasionally found in Idaho and Montana. The adults are frequently called lawn moths. They are light-colored moths or "millers" that make short, erratic, darting flights and fold their wings back closely against their bodies when resting, giving them a very narrow appearance.

The moths lay their eggs in the lawn. After hatching, the worms feed at night on the grass leaves. Some species damage plant crowns or roots as well as leaves. During the day, the worms hide in silk-lined tunnels or burrows at or slightly below the soil surface. When fully grown, the worms are a dirty white to light brown with darker spots and are about 3/4 inch long.

Closely examine the thatch to detect sod webworm. Flooding the area with water forces the worms to the surface, where they can be counted. A population of 15 worms per square yard can seriously damage turf. Look for

this pest in June and again in early August, since sod webworms have two generations a year. Water lawns a day or so before applying insecticides, then delay further watering until at least 3 days after treatment.

White Grubs

White grub is a generic name for the larvae of several species (scarab beetle, June bugs and others). Skunks often dig small holes in lawns feeding on white grubs. Detection and control are similar to the methods described for cutworms and webworms. Before utilizing chemical controls determine that the infestation is warranted, as many beneficial insects and organisms are killed when chemicals are used.

Beneficial Insects and Non-Pests

There are many insects or insect-relatives that live in grass but do not cause direct feeding damage.

Chinch Bugs

These insects are about 1/4 inch long, brown, and generally found in dead areas of the lawn. They cause no damage and don't need to be controlled.

Ants

Ants are common in lawns. Their preference for nesting in areas of sparse vegetation might cause you to think that the ants are causing the poor lawn development, but this is generally not true. Ants do not feed on plants and pose no direct threat to lawns. There are at least two cases where it may become necessary to control ants, however.

Some species of ants create large nest mounds that can be unsightly in a lawn and make mowing and other care difficult. Some ants also 'farm' aphids, much as we do cattle. The ants care for the aphids during the winter and deposit the aphids on plants during the growing season. The ants then feed on secretions from the aphids. When a serious outbreak of aphids occurs on landscape plants in conjunction with a large number of ants on the affected plants, the best aphid control might be to eliminate the ant colony involved.

Earthworms

Nightcrawlers and other earthworms are beneficial and should be tolerated whenever possible. Large populations, however, can cause lumpiness and in extreme cases, reduce the value of the lawn for recreation. Vertical mowing can help reduce lumpiness and also the amount of food available for the worms. Rolling the lawn is not recommended because it increases compaction. A reduction in watering – less often and deeper – allows the worms to stay farther below the surface and will help alleviate future problems.

Endophytes

One of the latest and most promising advances in the production of top quality turfgrass is the discovery of endophytic fungi. These organisms live within grass plants and derive their nutrients from the plants. The fungi produce chemicals, especially alkaloids, which are released into the grass plant and are circulated in its vascular system and act as natural insecticides. These compounds are toxic to many serious insect pests, including sod webworms, billbugs, and armyworms. Endophytes may also improve a grass's resistance to nematodes. Using endophytic-bearing grasses may help to reduce the amount of pesticides used on turf.

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Review

A. What pathogen causes most turf diseases? _____

B. List 4 cultural practices that help prevent turf diseases.

1._____ 2. _____ 3. _____ 4. _____

C. Early in the spring a customer tells you that her lawn is covered with masses of dirty white residue. Identify the problem and recommend steps to control it.

_____

D. What are the symptoms of powdery mildew, and how can it be controlled?

_____

E. Provide advice to a customer about a three-foot wide ring of mushrooms on his lawn.

_____

F. You've been given a sample of turf showing purple spots on the leaf blades. Areas of grass with similar symptoms died suddenly last July. What is the disease and what can be done to treat it?

_____

G. Explain what an endophyte is and what role it plays in a turf environment.

_____