

# Successful Lawns

by Cheryl Moore-Gough, Extension Horticulture Specialist, retired; Robert E. Gough, Professor of Horticulture; and Tracy Dougher, Associate Professor of Horticulture



## MontGuide

Features insights and information on establishing and maintaining a lawn. Topics include seeding, fertilizers, mowing, water, disease, weed and insect control.

MT199310AG Reprinted 8/09

**LAWNS TIE MOST HOME LANDSCAPES TOGETHER,** control soil erosion, dampen traffic noise and cool the air. But these things only happen if the lawn has been installed and maintained correctly.

### Lawn Establishment

#### *Provide Drainage*

Provide lawns with both surface and internal drainage during soil preparation. Allow at least a one percent slope (one foot drop per 100 linear feet or about one inch every eight feet) away from the house. Slopes as great as 33 percent (one foot drop per three linear feet) will support turf, but mowing and runoff water will cause problems. Steeper grades won't do for lawns. Instead, choose a low-maintenance ground cover for these planting sites. Horizontal Junipers work well on steeper grades.

If you must change the grade of your lawn area, remove the top six inches of soil, make the grade changes, then replace the topsoil. This conserves topsoil and helps reduce unevenness in the growth and appearance of the lawn due to the presence of mixed soils. If you must raise the grade around trees and shrubs more than two inches, well the plant at the dripline to allow for proper aeration of the root system.

Roll, fill and rake low spots to level the surface after grading and before seeding.

#### *Proper Soil*

Modify infertile and poorly textured soils before planting. Get a mechanical analysis of your soil from a soil testing laboratory or estimate it yourself using this method:

- Place a cup of representative soil into a large glass jar with a screw top and fill the jar with water.
- Swirl the soil and water until they are well-mixed, then let the soil settle overnight.
- Swirl it again the next day, then let it settle for a week. Soil particles of different sizes will settle in layers of sand (bottom), silt and clay (top). Organic matter will float.

Use this estimate of the proportions of sand, silt and clay in your soil to determine the need for soil modification. An

ideal lawn soil is a sandy loam containing about 70 percent sand, 15 percent silt and 15 percent clay.

Modify clay soils by adding coarse sand for a total soil sand content of 70 percent. The cost will be high, but small quantities of sand are ineffective and may aggravate soil problems.

Adding organic matter such as sawdust, ground bark, manure or peat moss also improves the structure of clay soils but can lead to nitrogen deficiency problems. Thoroughly incorporating 33 percent by volume (two inches) of rotted organic material into the top six inches of soil will substantially improve soil structure.

Organic matter also improves very sandy soils, thereby increasing water-holding capacity and fertility. To avoid the possibility of a future nitrogen deficiency caused by mulch decomposition, add about 24 pounds of actual nitrogen to each ton of organic matter to compensate for that lost to decomposition. For example, for each ton of organic matter added, you will need to apply 80 pounds of a 30-10-10, 240 pounds of 10-10-10, or about 150 pounds of 16-16-16 fertilizer.

#### *Pre-Plant Fertilizers*

Use a soil test to determine the need for nutrients, the soil pH and the presence of high levels of soluble salts. Phosphorus is fairly insoluble and moves slowly in the soil, so incorporate it prior to seeding if your soil needs it. Nitrogen and potassium are soluble and can be added later. If your soil has enough nitrogen and you plant in the fall, you may not need to use fertilizer until spring. If you are planting in spring, add a nitrogen starter fertilizer at one-half pound of actual nitrogen per 1000 square feet prior to seeding.

#### *Seedbed Preparation*

Bring soil to a very fine granular condition and remove all clods, sod, rocks and trash during final surface preparation. Settle loose soil with a light rolling. Adjust the weight of the roller so that only your sole prints appear on the soil surface. Soil must be firm and fine-textured.

## Seeding

You can seed a lawn in Montana in late April and May but seeding in mid-August to mid-September (around Labor Day) is better. Annual weeds do not have time to produce a crop of seed, and the grass has the entire fall and the early spring to become established before the heat and stress of summer.

For even coverage and seeding, sow half the seed in one direction and the other half at right angles to the first. Do this by hand or with a mechanical seeder.

Lightly rake and roll to incorporate the seed into the soil, but don't bury them more than one-quarter inch. Use organic mulch, such as clean straw, or hydro-mulch, (wood fiber sprayed with water onto the new lawn surface) to hold moisture, reduce erosion and hasten germination. Be sure to apply it evenly and no thicker than three-eighths inch.

## Grass Mixes

It is better to plant a mix of species due to variations in microclimate and shade.

For general lawn use under moderate irrigation, sunlight and fertility levels, use a mix of Kentucky bluegrass or one of its improved cultivars, creeping red fescue or its Chewings variety, and perennial ryegrass. A typical mix consists of about 60 percent Kentucky bluegrass, 30 percent red or Chewings fescue, and 10 percent perennial ryegrass. The perennial ryegrass is not permanent and serves as a nurse grass, making its presence in the mix optional.

- For shaded lawns, use the same species, but let the fescue predominate. A shade-tolerant mix should contain about 60 percent creeping red fescue or Chewings fescue, 30 percent Kentucky bluegrass, and 10 percent perennial ryegrass. Maintain lawns of these mixes at heights of about 2½ to three inches. Lawn mixes that contain a large percentage of perennial ryegrass or annual (Italian) ryegrass make inferior lawns in Montana.
- For semi-dryland lawns in eastern Montana, try sheep fescue or its subspecies, hard fescue, or the newer turf-type tall fescues. Because these differ in growth habit and texture, they are best planted alone rather than as a mix. Many are also clump-forming grasses and must be seeded thickly to form a decent lawn.
- Under very dry conditions or in non-irrigated Montana lawns, Fairway crested wheatgrass, streambank wheatgrass, meadow brome grass and smooth brome grass are good choices. These will become brown during drought periods and should not be mowed to heights of less than three inches. Except for crested wheatgrass, all are rhizomatous (spreading laterally under the surface) and form a reasonably good sod. They all have similar characteristics and can be mixed. Buffalograss and blue grama grass will grow with little moisture and will form a sod that can be mown at about 2½ inches in height.

Both have less desirable blue-green leaf color and go dormant (brown) during cold weather. As a note of caution, neither buffalograss nor blue grama can compete with weeds or cool season grasses in high rainfall areas or irrigated lawns. Also note that buffalograss and blue grama green up slowly in the spring and will brown very soon after the first cold weather in the fall. Although zoysiagrass and Bermuda grass are advertised as cold- and drought-tolerant, they are not appropriate grasses for Montana lawns.

## Seeding Rate

Seed Kentucky bluegrass/fescue/perennial ryegrass mixes at the rate of two to three pounds per 1000 square feet. Seed dryland grasses at the rate of three to five pounds per 1000 square feet to obtain a reasonably fine sod. Heavy seeding rates are especially important for the tufted, non-spreading grasses like sheep fescue and crested wheatgrass.

## Lawn Maintenance

### Fertilizers

Rates of application are given in pounds of actual nitrogen and the oxides of phosphorus and potassium. A 30-10-10 fertilizer contains 30 percent nitrogen, 10 percent phosphorus pentoxide, and 10 percent potassium oxide. A 100-pound bag will contain 30 pounds of available nitrogen (actual N) and 10 pounds each of the oxides of phosphorus and potassium. The remaining 50 pounds is inert material.

To figure how much of a given fertilizer you need to apply, use this formula:

$$\begin{aligned} & \text{lbs. of nitrogen you want} \\ & \div \text{the percentage of nitrogen in the fertilizer mix} \\ & = \text{lbs. of fertilizer mix needed.} \end{aligned}$$

For example, if you wished to apply 4 pounds of actual nitrogen using ammonium sulfate (21-0-0), you would need 19 pounds of the fertilizer. To get this value, divide the pounds of nitrogen wanted by the percent nitrogen in the fertilizer:

$$\begin{aligned} & 4 \text{ (lbs. of nitrogen needed)} \\ & \div .21 \text{ (decimal representing the percentage of nitrogen in} \\ & \text{the fertilizer mix)} \\ & = 19.04 \text{ (lbs. of fertilizer mix needed)} \end{aligned}$$

So, 19.04 lbs. of 21-0-0 provides 4 lbs. actual nitrogen. Similarly, if you wished to use ammonium nitrate (33-0-0):

$$4 \div .33 = 12.1$$

It will take 12.1 pounds of 33-0-0 to provide four pounds of actual nitrogen.

The cost per pound of actual nitrogen in slow release fertilizer is higher than that in readily available forms, but you can use it at higher application rates without danger of physiological burn. Also, loss of nutrients due to leaching is greatly reduced with this fertilizer form.

For most Montana conditions, apply two to four pounds of actual nitrogen per 1000 square feet of lawn per year. Make two to three applications so that no more than one and one-half pounds of available nitrogen per 1000 square feet are applied at one time. The precise times for fertilizing lawns vary across the state, but fertilizing around Memorial Day, Labor Day and Columbus Day (after the last mowing but about four weeks before the soil freezes) are good rules of thumb. If you only apply fertilizer once or twice a season, the two fall applications are the key fertilizing times. Your lawn will green faster in spring if you remember the Columbus Day application.

Use a fertilizer containing sulfur to reduce soil pH and make your grass more resistant to certain diseases such as rust and red thread. Inorganic nitrogen sources give better results in spring and late fall when soils are not warm enough to allow breakdown of organic materials. Organic fertilizers such as treated sewage sludge and plant and animal byproducts work best when applied in the early fall.

### **Mowing**

For a healthy lawn, mow twice a week and don't catch the clippings.

Mowing frequently enough to remove only one-third of the grass blade eliminates the need to catch clippings. Instead, allow them to decompose on the lawn to return nitrogen to the soil. Clippings don't cause thatch.

Keep mower blades sharp to avoid tearing the blade and the whitish cast to the lawn that results from it.

Mow Kentucky bluegrass/fescue/ryegrass mixes no lower than one and one-half inches. The Kentucky bluegrass will tolerate lower clipping, but the fescues and ryegrasses will thin when mowed short. Higher mowing heights help to conserve water. Set mowing heights high, particularly during hot spells.

### **Thatch**

Thatch is primarily the accumulation of dead, non-decomposed rhizomes. It interferes with the penetration of air, water and nutrients into the turf when it accumulates in a layer thicker than one-half inch.

In a healthy, well-maintained lawn, thatch will not accumulate. Most thatch problems are caused by over-vigorous growth and can be corrected by reducing nitrogen application and/or irrigation.

You must control excessive thatch. Mechanical thatch attachments and power rakes eliminate the need to hand rake thatch. The rotary mower blade with spring loaded "fingers" can scratch out thatch. To be effective, though, these and power rakes must be set to penetrate the thatch layer.

Dethatch before the grass has started to grow in the spring to reduce the damage to turf crowns which are also located in the thatch. Power raking after growth has started causes leaf bruising and requires more power to de-thatch through the vegetative cover.

### **Aeration**

Where thatch is heavy, removing a plug of soil will provide quicker results than dethatching. Aerating is best done with coring machines which remove cores one-quarter to three-eighths inches in diameter and three to four inches deep. Under extremely poor soil conditions, fill the holes with soil amendments such as sand, peat or calcined clay. (Only in rare cases should gypsum be used.) For best results, aerate when the soil is moist, to allow the tines to penetrate.

Devices that use solid spikes to "aerate" the lawn are not effective and actually contribute to soil compaction.

### **Watering**

Improper watering results in poor lawns. Frequent light watering forces shallow rooting that makes your lawn grass less able to tolerate drought conditions. Weeds such as annual bluegrass and rough stalk bluegrass thrive under frequent, light waterings.

### **Always water as heavily as possible for the soil in question, and as infrequently as possible.**

---

Early morning is the best time to water.

Over-watering can starve the roots of oxygen by saturating the soil and leach valuable nutrients away from the rootzone. Estimate water needs for your lawn by observing the water loss from a free-water surface like the evaporation pans used by climatologists, or a wide-mouthed bucket or washtub. Well-maintained bluegrass lawns consume about as much water as that evaporating from the pan. For most of Montana this amounts to between 1½ inches of water per week early and late in the season but may be as high as 2½ inches of water per week in mid-summer. The amount you use to irrigate should be this value minus the amount of rainfall since the last irrigation. See *The Montana Gardener's Book of Days* (EB165) for more information on plant water use.

### **Disease Control**

Although they are a minor problem, you may encounter several diseases in your lawn. Most are caused by fungi that attack leaves and cause thinning of the grass. Fertilizers containing sulfur (a fungicide in itself) reduce disease incidence. Maintenance practices which favor lush lawns, e.g., over-fertilization, over-watering, excessive thatch control and mowing can all lead to disease development.

Here are several diseases that may affect lawn grass in Montana:

**Gray Snow Mold (*Typhula* spp.)** – A fungus disease occurring in early spring, visible just after snow melt. It appears as a white webby mass on the top of the grass in a patch from a few inches to a few feet in diameter. Gray snow mold damage disappears as the temperature warms and the grass begins to grow. Raking can speed recovery. Avoid over-fertilizing in the fall to protect your grass from infection.

**Melting Out/Leaf Spot (*Drechslera poae* and *Drechslera triseptatum*)** – A fungus disease occurring during moist, warm conditions in spring. It attacks Kentucky bluegrass/fescue lawns and results in thinning of the turf and a yellowing of the lower leaves. Reddish-black spots surrounded by a yellow zone appear on the leaves.

Control includes fertilizing to encourage moderate growth. Apply water in early morning and water deeply and infrequently. Mow as high as the grass selection will allow. Remove thatch in spring if it accumulates to more than one-half inch. Prune woody landscape plants to remove dense shade. Fungicides are effective if cultural controls fail but not usually recommended for home lawn use. Contact your local county extension agent for current recommendations. Fertilizer with high nitrogen and/or nitrogen in a rapid release form promote this disease.

**Powdery Mildew (*Erysiphe graminis*)** – Appears as small colonies of white dust on the leaves and leaf sheaths. These grow together and cover much of the leaf surface, generally the lower ones. Leaves may become puckered and eventually yellow. It is usually observed in spring and fall during cool humid periods and most often found in shaded areas where air circulation is poor. Heavy fertilization favors this disease.

Control strategy includes a mix of shade-tolerant grasses. Pruning woody plants to reduce shade intensity and allow better air movement also helps to control powdery mildew. Mowing higher during disease periods and reducing fertilizer applications will reduce infection.

**Red Thread (*Laetisaria fuciformis*)** – Seen occasionally in Montana on red fescue and Kentucky bluegrass, this disease usually occurs in spring and fall and attacks nitrogen-deficient turf grass. Plants appear water soaked and die rapidly. When air is moist, colorful red disease strands are produced at the leaf tips, giving the turf a reddish appearance.

Maintain a balanced fertilizer program and water to prevent stress. Prune trees to increase light penetration to the lawn and to increase air movement. Collect grass clippings to reduce spread of the disease spores.



To order additional publications, please contact your county or reservation MSU Extension office, visit our online catalog at [www.msuextension.org/publications.asp](http://www.msuextension.org/publications.asp) or e-mail [orderpubs@montana.edu](mailto:orderpubs@montana.edu)

Copyright © 2009 MSU Extension

We encourage the use of this document for nonprofit educational purposes. This document may be reprinted for nonprofit educational purposes if no endorsement of a commercial product, service or company is stated or implied, and if appropriate credit is given to the author and MSU Extension. To use these documents in electronic formats, permission must be sought from the Extension Communications Coordinator, 115 Culbertson Hall, Montana State University, Bozeman MT 59717; E-mail: [publications@montana.edu](mailto:publications@montana.edu)

The U.S. Department of Agriculture (USDA), Montana State University and Montana State University Extension prohibit discrimination in all of their programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital and family status. Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Douglas L. Steele, Vice Provost and Director, Montana State University Extension, Bozeman, MT 59717.