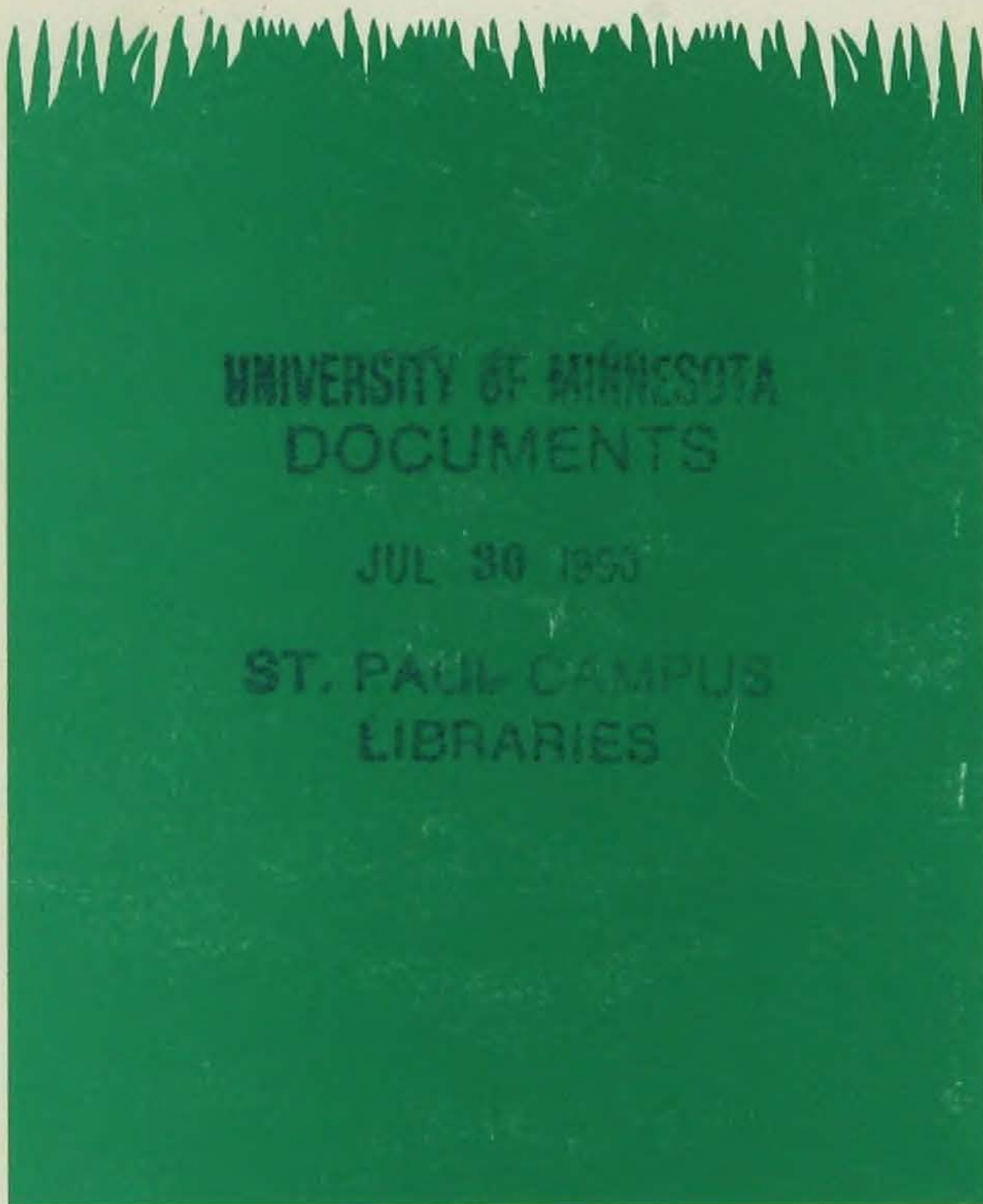


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# The HOME LAWN



MINNESOTA EXTENSION SERVICE  
UNIVERSITY OF MINNESOTA

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# The HOME LAWN

The home lawn is an important part of the urban and rural environment. A well-trimmed, dense, and uniform lawn adds beauty and value to a home, as well as practical benefits such as cooling the area, reducing glare, and reducing wind-blown dust and soil erosion. Proper lawn care cuts down on the work and problems of maintaining a quality lawn. This publication describes some proper management practices for lawn care in Minnesota.

## **STARTING A NEW LAWN**

When starting a new lawn, consider two zones of soil: topsoil and subsoil. Topsoil is soil from the surface down about 8 to 12 inches where grass roots grow. Subsoil is below the root zone.

Start planning with the subsoil. The most important trait of the subsoil is good drainage. Generally existing subsoil at a site can be used, but where options are available, a sandy soil is best. Be sure to loosen and grade subsoil before applying topsoil. Never roll or pack subsoil: its grade should parallel the finished surface grade.

Good topsoil is difficult to find. At construction sites, existing topsoil should be saved during the construction process, then returned in a uniform layer over the subsoil. If the existing topsoil contains too much clay or is too sandy, adding 1 to 2 inches of fibrous peat, then tilling to a depth of 4 to 6 inches will help in establishing and maintaining the turf. The peat helps open a tight clay soil so that water and air can flow into the soil more rapidly. Peat also adds water-holding capacity to a droughty, sandy soil.

When applying topsoil, first mix about 2 inches of it with the subsoil. Then apply remaining topsoil to a minimum depth of 4 inches (preferably 6 to 8 inches). Soil sold as "black dirt" is generally not suitable as topsoil because it compacts too easily, often hampering water flow into the soil.

The finished grade should drop at least 1 foot in 100 feet away from the house or in the direction of desired surface water flow so that any surface runoff will flow away from the house (figure 1). Follow grading with a light rolling to eliminate humps and hollows. Correct surface irregularities by raking or dragging a 10-foot long, 2-inch by 10-inch plank across the soil surface. A piece of chain link fence drawn across the finished surface makes a nice seedbed for grasses.

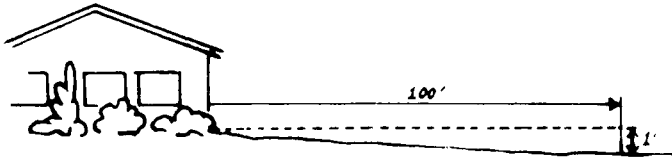


Figure 1

Before seeding have the topsoil tested for nutrient status and pH. Information and instructions on soil testing as well as the actual test can be arranged through the local county extension service. The soil test report includes information about the soil's pH, organic matter, phosphorus, and potassium. It also includes recommendations on how to correct any deficiencies.



## SELECTING GRASSES

Several species of grass are suitable for lawns in Minnesota. These include Kentucky bluegrass, fine fescue grasses, and perennial ryegrass. Kentucky bluegrass is the most important grass for lawns in this region. It produces a beautiful, dense turf of soft-leaved plants that spread and fill in bare or damaged areas quickly.

Chewings fescue, creeping red fescue, and hard fescue are fine-leaved fescue grasses suitable for lawns. Fescues are particularly well suited to shady lawns and to lawns with very droughty, sandy soil and lawn areas which are not watered. Perennial ryegrass withstands wear and is particularly well suited to lawn areas with a lot of foot traffic.

*Kentucky bluegrass* is the most important cool-season grass for lawns in North America because of its desirable qualities. It is adapted to a wide range of environmental conditions but does best in soils of moderate to high fertility, and soil pH of 6 to 8, moderate mowing heights, full-sun to light-shade conditions, and slight to moderate foot traffic.

Many varieties of Kentucky bluegrass have been developed, each differing in aggressiveness, tolerance to low mowing, resistance to various diseases, shade tolerance, and level of management required. Although all the differences in individual varieties are beyond the scope of this publication, it may help to group some of the varieties according to suitability for low maintenance lawns.

Common Kentucky bluegrass and varieties with similar characteristics typically require a higher mowing height (1½ to 3 inches), need less fertilizer, and are more drought tolerant than the improved, aggressive varieties of Kentucky bluegrass. This makes them important in low maintenance lawns. Some Kentucky bluegrass varieties which are particularly well-suited to low maintenance situations include: Aquilla, Monopoly, Nassau, Newport, Nugget, Park, Ram I, Rugby, and South Dakota Certified.

The improved, aggressive varieties of Kentucky bluegrass form a more dense turf and fill in damaged areas faster, tolerate closer mowing (¾ to 1½ inches), require higher levels of fertility, are typically more disease resistant, require more thatch control, and are more likely to require irrigation during summer than are the common-type varieties of Kentucky bluegrass. Most named varieties of Kentucky bluegrass other than those just listed are better suited to these higher maintenance practices.

#### **Kentucky Bluegrass Properties**

- Forms a beautiful, dense, soft turf.
- Spreads vigorously by rhizomes (underground stems).
- Mows cleanly and easily.
- Adapted to a wide variety of conditions.
- Goes dormant during dry periods.
- Does poorly in shade.

The *fine fescue grasses* are narrow-leaved, shade-tolerant, and drought-tolerant. They are adapted to poor soils and low fertility levels. The fine fescues have narrow, tough leaf blades that are not easily crushed, will rarely stain clothes, but can be difficult to mow. These properties make the fine fescues particularly well-adapted to low maintenance, shady lawns. For seeding a home lawn, a mixture of fine fescues and Kentucky bluegrasses is usually preferable to using straight fine fescues.

#### **Fine Fescue Properties**

- Does well in shade.
- Adapted to droughty, sandy soils.
- Has narrow blades which can be difficult to mow.
- Growth can be bunchy due to minimal spreading ability.
- Mixes well with Kentucky bluegrass.
- Adapted to low maintenance lawns.

*Perennial ryegrass* is a cool-season, medium-textured, and wear-tolerant grass particularly well adapted to high foot traffic areas. Because plants tolerate wear and damage, perennial ryegrass is often used on athletic fields and park areas. Perennial ryegrass is more difficult to mow cleanly than Kentucky bluegrass.

Perennial ryegrass is a bunch-type grass that does not spread rapidly. If a perennial ryegrass turf is allowed to thin out due to low maintenance, the turf becomes very bunchy and loses quality. For home lawns, perennial ryegrass mixes well with Kentucky bluegrasses. This helps reduce bunchiness, improves mowing quality, and gives more disease tolerances to the lawn.

Perennial ryegrass is not as tolerant of cold climates as either Kentucky bluegrass or the fine fescue grasses. Consequently, for Minnesota, choosing varieties with improved cold tolerance is critical. Varieties currently available which have shown good cold tolerance include: Blazer, Delray, Diplomat, NK 200, and Pennant. Additional testing and variety development will certainly add to this list of perennial ryegrass varieties suited to Minnesota.

#### **Perennial Ryegrass Properties**

- Germinates and becomes established quickly and vigorously.
- Is very wear tolerant.
- Bunchy growth is prevalent if not highly maintained.
- Some varieties are not cold-tolerant enough for Minnesota.
- Mixes well with Kentucky bluegrass.
- Adapted only to high-maintenance conditions.

## Grasses Not Recommended for Lawns in Minnesota

*Annual ryegrass* has been widely used as a temporary grass in lawn mixtures. It is short-lived and is not recommended for lawn use as the plants will all die during the winter.

*Creeping bentgrass* is adapted for golf course use and requires a great deal of care. Since it can be mowed down to a height of less than 1/4-inch, it is ideal for golf greens; however, creeping bentgrass requires too much care to be acceptable in a home lawn situation. In fact, bentgrass patches in Kentucky bluegrass lawns are a major weed problem in the northern United States.

Turf-type *tall fescue* varieties are suitable for athletic fields and low-maintenance lawns in some areas of the country, but do not have sufficient cold-tolerance for Minnesota conditions. Further testing and variety development may lead to some varieties of tall fescue that will consistently withstand Minnesota winters. At present, however, tall fescue is not recommended for Minnesota home lawns.

*Zoysiagrass* is a warm-season grass that can survive Minnesota conditions, but the tops turn straw-colored with the first fall frost and normally do not green up again until late spring. Many home owners who have tried zoysiagrass soon ask how to remove it from their lawns.



### SEEDING

A mixture of 60 to 70 percent Kentucky bluegrass and 30 to 40 percent fine fescue grasses is suitable for most sunny lawns. A mixture of 60 percent fine fescue grasses and 40 percent Kentucky bluegrass is best for most shady lawns. For high traffic lawns with high maintenance practices, a mixture of 60 percent Kentucky bluegrass and 40 percent perennial ryegrass may be best.

#### Recommended Seeding Rates Per 1000 Square Feet of Lawn

Kentucky bluegrass .....	2-3 pounds
Fine fescue.....	4-5 pounds
Kentucky bluegrass/fine fescue mix .....	3-4 pounds
Kentucky bluegrass/perennial ryegrass mix .....	3-4 pounds



No more than 5 to 10 percent of a mixture should be annual ryegrass. High percentages of this grass are commonly found in cheap mixtures that give unsatisfactory results. It is a soft, short-lived grass that germinates rapidly and is useful only for temporary and rapid cover.

The best time to seed a lawn in Minnesota is between August 15 and September 10 when these grasses normally seed in nature. Most annual weeds do not germinate after August 15. A lawn seeded during late summer can become established before winter and be growing in spring before weeds start to germinate. The second best time to seed is early spring as soon as the ground can be worked.

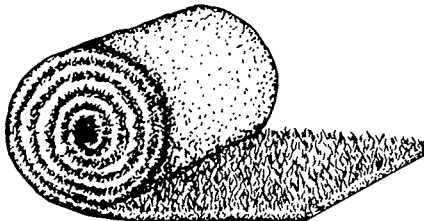
Seeding is easiest on a calm day. If seeding by hand, mix the seed well and divide it into four equal lots; then spread each lot in a different direction. If seeding mechanically, divide the seed into two equal lots and sow it in two directions. Mechanical seeding can be accomplished more easily by first mixing the seed with a well-processed natural organic fertilizer, dry sawdust, or sand to add bulk.

Rake the seed in lightly, leaving about 10 percent showing. Then roll the seedbed lightly to firm seed into the soil, and water it lightly.

It is best to water newly seeded areas two or three times a day for 10 to 20 minutes at a time. Never allow the seedbed to dry out once it has been watered, but avoid letting it go into the night in an excessively wet condition. As seedlings develop, apply water in greater quantities and at longer intervals until the grass is well established.

When grass blades are 3 to 4 inches tall, mow the new lawn to a height of 2 1/2 inches with a sharp mower. After several mowings the cutting height can gradually be reduced to the desired mowing height for an established lawn.

Seeding costs less than sodding and, if successful, gives the homeowner a great feeling of accomplishment. It ordinarily takes 6 to 12 weeks to establish healthy lawn from seed, but it usually takes almost a full growing season before the lawn can be considered well-established and ready for extensive foot traffic.



## **SODDING**

The real advantage is escaping the problems of time and turf establishment—the sod grower has already done that.

In purchasing sod, look for a reputable landscape firm or sod producer. The grass in the sod field should be freshly mowed at lawn height and weed free. In most situations, either peat or upland (mineral soil) sod is satisfactory.

One often-neglected part of sodding is soil preparation. A sodded lawn requires the same soil preparation as a seeded lawn. If you use peat sod, it is best to mix peat with the topsoil before laying the sod.

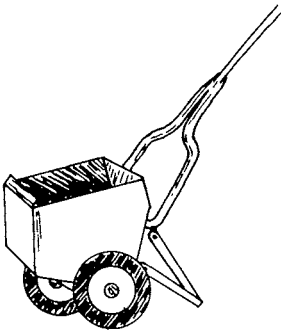
Areas to be sodded should have phosphorus and potash tilled into the soil, just as in seeding, according to soil test recommendations for that soil. An application of 1/2 pound nitrogen per 1000 square feet can be applied immediately to newly sodded turf.

Sodding can be done soon after spring growth starts, continuing anytime until October. For sodding during hot, dry periods, watering equipment capable of keeping the sod continually moist is necessary.

Lay sod immediately; don't allow it to remain stacked and rolled for more than a day or two, and then only when absolutely necessary.

Lay the sod on moistened soil. Stagger the joints and fit the pieces as closely together as possible. Always lay sod across a slope. You can use short wooden pegs, spaced 1 foot apart, to anchor sod on a slope.

Soak the sodded area immediately after laying and water it daily (unless it rains) until the sod is firmly rooted into the soil (2 to 3 weeks). After establishment, treat the sodded area as any established lawn.



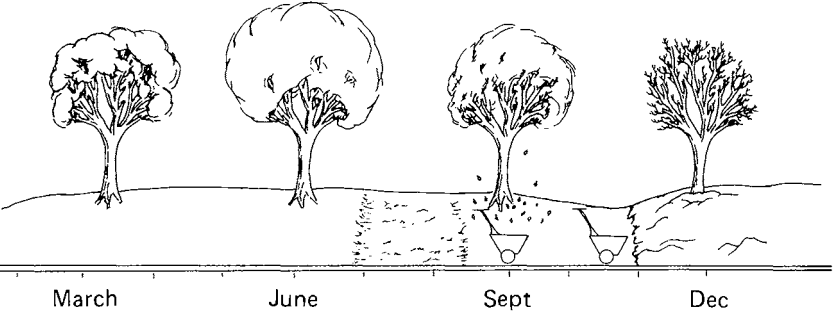
## FERTILIZING

Normally three nutrients or essential elements are important to consider in fertilizing a lawn: nitrogen (N), phosphorus (P), and potassium (K). Though many other elements are necessary for proper plant growth, natural soil processes usually provide sufficient quantities of all except these three.

Adequate *nitrogen* causes the plants to develop a dark green color and to grow vigorously. The amount of nitrogen required by a lawn varies with maintenance practices because a lawn kept growing vigorously during summer with watering requires more nitrogen than an unwatered lawn.

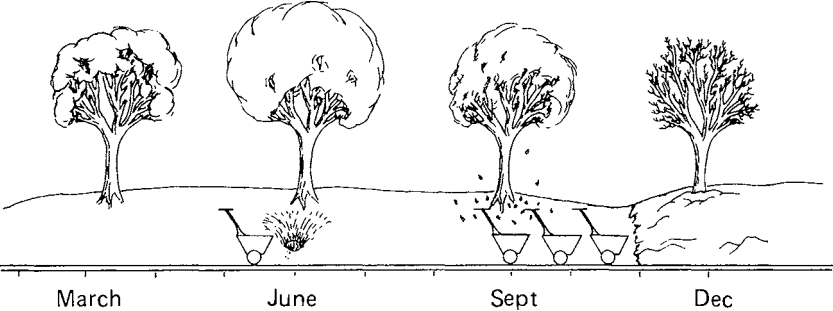
Since nitrogen applied at excessive rates can burn the grass plants and cause other problems, it is best to apply moderate amounts of fertilizer on a regular basis rather than large amounts infrequently. If quickly available forms of nitrogen are used, no more than 1 pound of N/1000 square feet should be applied in one application. Always water fertilizer in as soon as possible after it has been applied.

At a rate of 1 lb N/1000 ft<sup>2</sup>, a low maintenance lawn will require one or two applications of fertilizer in late August and perhaps late October to early November (figure 2).



**Figure 2**

For high maintenance lawns, 3 or 4 applications of 1 lb N/1000 ft<sup>2</sup> each are required to maintain fairly constant growth (figure 3).



**Figure 3**

As can be noted from these drawings, most lawn fertilizer should be applied in late summer and fall. Fertilizing in fall rather than spring leads to a lengthened period of green in fall, early spring green-up, higher level of energy reserves in the plants in spring and summer, and most important, increased tolerance of summer stresses such as disease.

Nitrogen fertilizers can be broadly grouped as *quickly available* or *soluble* materials and *slowly available* materials. The quickly available fertilizers are water soluble and the nitrogen is readily available to the plants. The results are a sudden flush of growth and a rapid depletion of the available nitrogen. It will be necessary to make frequent, light applications of these materials to obtain uniform growth over a long period of time and to prevent possible burning.

Slowly available nitrogen materials depend on soil bacteria or moisture to gradually decompose the materials and transform the resultant compounds into nitrogen forms available to plants. These forms release nitrogen to the plant over a longer period of time. Under high temperatures and adequate moisture supply, the breakdown of these materials is accelerated and nitrogen is supplied more rapidly to the plant. Under conditions of low temperatures or dry soil, release of nitrogen to the plants is minimized.

The amount of *phosphorus* and *potassium* that should be applied to a lawn depends on the soil's ability to provide these two nutrients. Some soils have high native levels of phosphorus and potassium, making additional fertilizer unnecessary. Other soils have low levels of phosphorus or potassium and additions through fertilizers are very important. The only way to determine the proper amount of phosphorus and potassium fertilization is to have the soil tested. This can easily be arranged through the local county extension office.

Lawn fertilizer bags list nitrogen, phosphorus, and potassium contents as a series of three numbers called the fertilizer *grade*. In figure 4, the fertilizer contains 20 percent nitrogen, phosphorus equivalent to 5 percent  $P_2O_5$ , and potassium equivalent to 10 percent  $K_2O$ . The proper grade to use depends on the soil test. For a soil high in phosphorus and potassium, a fertilizer grade of 34-0-0 or 45-0-0 would be suitable, while a soil with low phosphorus or potassium would require a fertilizer such as 20-5-10 or 18-5-9.

The following calculation can be used to determine fertilizer use at a rate of 1 pound of nitrogen per 1000 square feet:

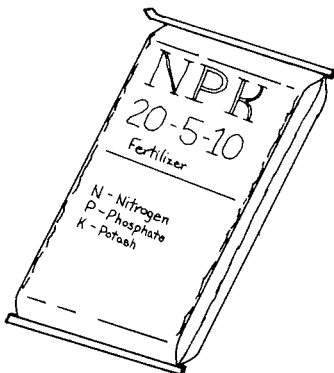


Figure 4

Weight of bag  $\times$  nitrogen in fertilizer (fractional basis)  $\times$  1000 = square feet of lawn the bag of fertilizer will cover.

Example:

Using a 20-lb bag of the fertilizer in figure 4,

$$20 \times 0.20 \times 1000 = 4000 \text{ ft}^2$$

(wt of bag)  $\times$  (%N as a fraction)  $\times$  (1000) = (square feet to cover).

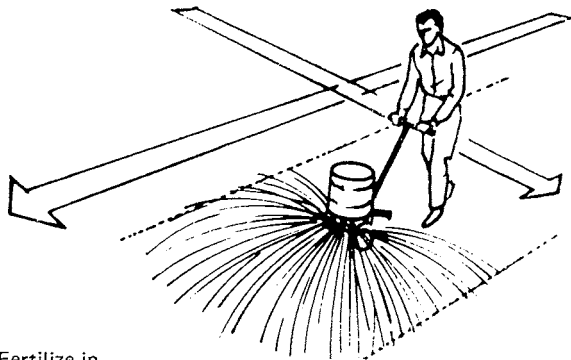
This bag would cover 4000 square feet of lawn area at the rate of 1 pound of nitrogen per 1000 square feet.

There is public concern that lawn fertilizers are contributing to groundwater and lake contamination. Proper lawn fertilization should not cause groundwater or lake pollution problems. However, misapplication such as excessive nitrogen in a single application, leaving fertilizer on paved surfaces to be washed into storm sewers, then streams and lakes, can add to environmental problems. For a more detailed discussion of this issue and ways to avoid problems see the University of Minnesota Extension Service's publication AG-FS-2923, "Preventing Pollution Problems from Lawn and Garden Fertilizers."

The following tips should promote the best results from lawn fertilizing.

### Tips on Lawn Fertilizing

- Obtain a soil test to determine the proper grade and amount of fertilizer to use.
- Apply no more than 1 lb N/1000 ft<sup>2</sup> in a single application if quick-release fertilizers are used.
- Fertilize mostly in fall rather than spring.
- For each application, spread the fertilizer in two directions.
- Use a rotary spreader for speed and to avoid definite stripes.
- Water your lawn immediately after fertilizing.
- Sweep up any fertilizer spread or spilled on paved surfaces.
- Never apply fertilizer to frozen ground.



**Figure 5**

Fertilize in two directions for best coverage.

## MOWING

Mowing at the right height and on the proper schedule helps maintain a dense, smooth, uniform turf and reduces the competitiveness of many weeds. Different grasses grow best when mowed at different heights. The following table gives the recommended cutting heights for common lawn grasses in Minnesota.

### Recommended Mowing Heights

Kentucky bluegrass .....	1 to 2 1/2 inches
Fine fescue grasses .....	1 1/2 to 3 inches
Perennial ryegrass .....	1 to 2 inches
Bluegrass/fescue mixture .....	1 1/2 to 2 1/2 inches
Bluegrass/ryegrass mixture .....	1 to 2 inches

High-maintenance lawns, growing vigorously, can be mowed at a lower height than low maintenance lawns. High maintenance lawns can be mowed near the lowest height listed in the table for that grass; low maintenance lawns will do best when mowed in the upper half of the range listed.

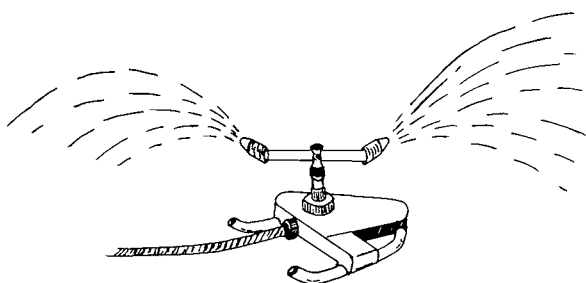
The mowing schedule should be determined by how fast the grass is growing rather than by a routine weekly or 10-day schedule. Lawns should be mowed frequently enough so that no more than 1/3 of the vertical height is removed with each mowing. This helps the plant maintain sufficient leaf area for quick recovery and continued growth. This rule means that if the mowing height is 2 inches, mowing should be scheduled again before the lawn is 3 inches tall.

This mowing schedule should be maintained into fall as long as the grass continues to grow. The lawn should go into winter at the height it has been maintained during the growing season. The last mowing in Minnesota is often late October or even early November.

A reel or rotary mower is adequate for a home lawn as long as it is sharp and well-adjusted. A rotary mower is simple and versatile, but can be very dangerous. Safety precautions in the owner's man-

uals should be followed. Where children are mowing the lawn or where a higher quality cut is desired, a reel mower may be preferable. Always pick up sticks, stones, wire, and other debris before mowing. With any mower, pay attention to routine sharpening, engine maintenance, and safety to add years to its operation and to assure a better quality cut for the lawn.

There is no need to remove the clippings from most lawns as long as these are small enough to work down into the grass. In fact, leaving the clippings has positive benefits because they gradually decompose and reduce the need for fertilizer. Clippings that are too long remain up on the plants and can pack down totally covering the growing plants. These clippings should be raked off to allow the growing plants to continue growth. If children or pets are around when the lawn is being mowed with a rotary mower, it is recommended that a clippings catcher be used for added safety.



## **WATERING**

Minnesota's climate, along with the natural ability of many turfgrass plants to survive dry periods, often makes lawn watering optional. Low maintenance lawns typically aren't watered in Minnesota. During spring and fall natural precipitation is usually adequate to cause excellent growth and color. During summer when rainfall is often insufficient for plant growth, the lawn may turn brown and go dormant. Most plants, however, do not die and new growth begins again with adequate rainfall. To promote vigorous growth and green color, even during dry periods, high-maintenance lawns are usually watered.

If watering is the practice, it should be scheduled so that 1 inch of water is received by the turfgrass plants each week during summer. Any rainfall during the week should be considered and watering reduced accordingly. The amount and distribution of water from a sprinkling system can be measured by placing straight-sided cans at various locations on the lawn during a normal watering, then measuring the depth of water in the cans.

If the lawn is healthy, water it heavily and then let the soil dry out between times. This helps develop deep root systems and plants tolerant of stress conditions. Where the lawn is newly established from seeding or sodding or is affected with patch disease symptoms, frequent watering is necessary to keep it alive.

## AERIFICATION

An aerifier is a machine which removes plugs of soil from the lawn leaving holes about  $\frac{1}{2}$ -inch in diameter and up to 3 inches deep (figure 6). The cores of soil are typically left on the soil surface to gradually break down and filter back into the turf. Aerification has several distinct advantages in a turfgrass situation including: relieving soil compaction, increasing water and oxygen infiltration into the soil, and helping to control the development of thatch.

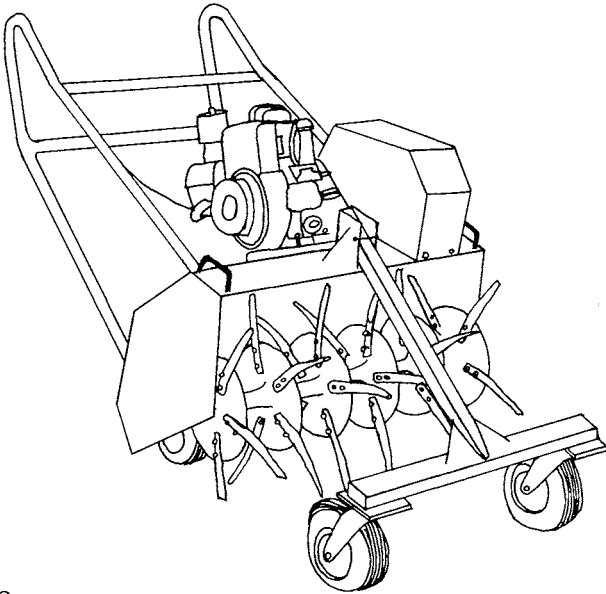


Figure 6

Aerification is particularly helpful when the soil is compacted because of poor soil preparation before lawn establishment or from considerable foot traffic. Compacted soils result in shallow-rooted lawns particularly susceptible to disease, insect, and environmental stresses. This also causes inefficient watering as more water runs off the surface to low areas rather than flowing into the soil.



Aerification is best done in the cool weather of late summer (August 20 to September 20). By aerifying then, the lawn recovers quickly and is completely healed by winter.

### CONTROLLING THATCH

Thatch is an accumulation of tightly meshed dead and living stems and roots that build up between the zone of green vegetation and the soil surface (figure 7). A less than 1/2-inch thatch accumulation is usually not detrimental to the lawn, but when more than 1/2 inch accumulates, problems may occur. A thick layer of thatch may cause a shallow root system with roots growing only in the thatch, increased disease and insect attack, increased scalping from mowing, dry spots in the lawn, and reduced tolerance to environmental stresses.

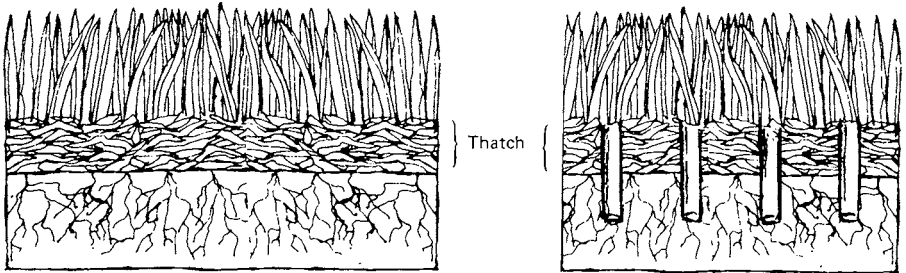


Figure 7

With aeration

Thatch develops when the rate of organic matter accumulation exceeds the decomposition rate. Cultural or environmental factors that stimulate growth or impair thatch decomposition will promote thatch accumulation.

### Factors That Contribute to Excessive Thatch

- Acidic soils with pH below 6, which reduces earthworm, insect, and micro-organism activity.
- Compacted soils with restricted oxygen levels which impair activity of decomposing organisms.
- Excessive nitrogen or irrigation that stimulates shoot growth.
- Infrequent mowing or excessively high mowing height.
- Use of the more vigorous growing turfgrass varieties.

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 an actual thatch problem—not just done routinely. Determine the need for thatch control by cutting a small pie-shaped, cross-section in the turf, lifting it, and examining the extent of thatch build-up. If the depth exceeds  $\frac{1}{2}$  inch, take steps to reduce it and prevent further accumulation.

Aerification is an effective way to increase thatch decomposition and to reduce thatch build-up. Aerification allows water and oxygen to move into soils more quickly, creating a better environment for the thatch-decomposing organisms. As the soil cores brought to the surface in aerification gradually break down and work back into the thatch, its decomposition by micro-organisms increases.

An active earthworm population in the lawn is a preventive biological control. Since micro-organisms, fungi, insects, and earthworms are responsible for thatch decomposition, encourage them by maintaining a soil pH between 6 and 7, moist thatch and soil, and aerification. Use soil insecticides or fungicides only when needed to control specific, identified pest problems; pesticides can adversely affect the micro-organism, insect, and earthworm populations.

A vertical mower, sometimes called a power rake, can be used to remove thatch when a lawn has an excessive amount. A vertical mower has blades or tines that slice into the turf perpendicular to the soil surface (figure 8). 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. Depending on the vertical mower used and the amount of thatch to be removed, it may be necessary to go over the lawn several times for adequate thatch reduction. The large quantity of organic material brought to the surface during vertical mowing should be removed from the lawn. Vertical mowers, as well as aerifiers, can frequently be rented from hardware stores, garden centers, or rental outlets.

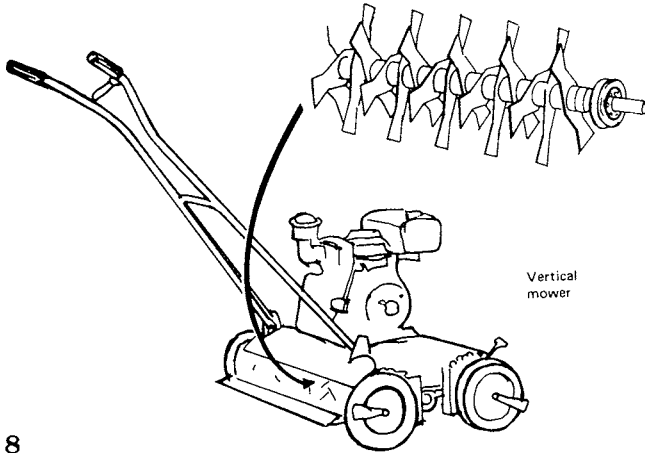
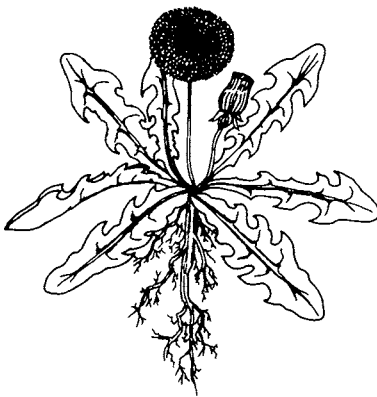


Figure 8

Since vertical mowing damages and thins many of the living plants, it is important to space vertical mowing so that there are at least 30 days of favorable temperature and moisture following the operation. In Minnesota, a late summer or early fall vertical mowing is preferable to minimize weed invasion. For quick recovery, the lawn should be fertilized shortly before and watered soon after vertical mowing.

Aerification or vertical mowing is also an excellent way of preparing an old or damaged lawn for overseeding (applying grass seed into the existing grass). Soil at the surface during seeding greatly improves germination of overseeded grasses.



### CONTROLLING WEEDS

Proper lawn maintenance practices should be the most important weed control method used on a home lawn. A thick, densely growing lawn keeps weed invasion to a minimum; consequently, proper fertilizing, mowing, watering, aerification, and thatch con-

Control should be the first line of defense against weeds. Herbicides are materials used to kill existing weeds or to prevent expected weeds from coming up. They should be used after proper lawn maintenance practices have been established, not before. In this way they can be used occasionally rather than routinely to treat weed problems.

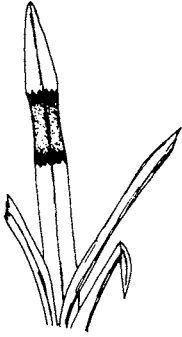
To control *broadleaf weeds* such as dandelion, plantain, clover, or creeping charlie; *selective postemergent herbicides* can be used. These chemicals can kill certain broadleaf weeds without damaging the grass plants. Chemicals should be applied when the weeds are young and actively growing. The herbicide should not drift to desirable broadleaved plants such as flowers, shrubs, vegetables, or trees as they will also be killed or damaged.

Most effective control of *annual grass weeds* such as crabgrass and foxtail is achieved with *preemergent herbicides*. These chemicals kill plants just after the seed germinates. To be effective, the herbicide must be on the soil when the weed seeds germinate. In Minnesota, preemergent herbicides to control crabgrass should be applied by May 15 in a normal year. Since a preemergent herbicide application precedes weed growth, the best method is to apply the herbicide to areas of the lawn where crabgrass or foxtail problems were seen the previous year.

Chemical control of most *perennial grass weeds* such as quackgrass or tall fescue can only be achieved by using *nonselective postemergent herbicides*. These chemicals kill all plants they touch, including the desirable grass plants. Consequently, they are only applied to spots of weed invasion and reseeding of the area is necessary.

Before using an herbicide you should carefully read the label so that you know:

- Whether it is a preemergent or postemergent herbicide (this is critical to application decisions).
- Whether or not it will control the weeds you have.
- Whether it is safe to use on grass plants you have.
- Environmental conditions when it should or should not be applied.
- The rate and method of application.
- Any safety precautions associated with its use.



## CONTROLLING DISEASES

Lawn grasses may be seriously damaged by diseases; however, with proper fertilizing, watering, mowing, and aerifying, most home lawns will recover and the home owner may not even see the disease. Good lawn care, described in this publication, is the best preventive measure for lawn diseases.

Disease prevention practices on home lawns include the following:

- Grow grasses adapted to your area and level of management.
- Apply fertilizer according to local recommendations and based on a soil test.
- Water when it is needed but avoid keeping the grass wet for long periods.
- Mow frequently at the recommended height for your grass type and use.
- Maintain thatch layer at less than  $\frac{1}{2}$  inch.
- Thin or prune trees and shrubs to allow air movement and light penetration.
- Improve drainage and reduce compaction by aerifying.

If a disease is damaging your lawn, the following summary of common Minnesota turfgrass diseases may help you recognize and properly treat it.

*Snow mold* is seen when the snow melts in the spring. Diseased grass is covered with white, pink, or dirty-gray mycelium (thread-like structures). 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 the wet snow and may continue through winter until spring. Fungal growth stops when the surface freezes or dries. Snow mold damage can be reduced on home lawns by keeping the turf surface free of a heavy mat going into the winter. Mow the grass until it goes dormant and rake leaves off the lawn so that the surface can dry quickly. Brushing or sweeping the mycelium off in the spring can also reduce damage.

*Leaf spot and/or melting out* symptoms begin as a dark-brown or purple spot on the leaves in fall or spring and may result in the sudden dying of whole plants in summer. The leaf spot stage usually does not cause serious damage; however, in cool, wet periods the leaf tissue is killed and the sheath and crown may be invaded. Then during dry periods, large or small irregularly shaped areas of the lawn die suddenly. Leaf spot and melting out are managed by raising the cutting height, watering, and fertilizing to meet the needs of the grass plants. Excessive water and nutrients can increase leaf disease problems. If leaf spot and melting out is your problem, overseeding with resistant grasses will reduce the damage. Chemical treatment requires application in cool, wet growing conditions early in disease development. If melting out symptoms are already present, treatment results are poor.

*Powdery mildew* appears as a white dust on the leaves. It is common in cool, shaded lawn areas in fall and spring. Mildew often thins turf areas in dense shade under trees or on the north side of buildings. Improving light penetration, mowing frequently, and increasing air movement by pruning shrubs reduces mildew. Overseed with shade-tolerant and powdery mildew-resistant cultivars.

*Dollar spot* symptoms are round, bleached, circular areas 4 to 6 inches in diameter. If severe, the spots may grow together, forming large irregular areas. Symptoms are more severe when dew forms and grass grows slowly (warm days and cool nights). Water and fertilize to stimulate growth.

The disease symptoms formerly labeled *fusarium blight* are now known to be a complex of similar appearing diseases including *necrotic ring spot*, and *Rhizoctonia yellow patch*. These diseases are most serious on well-maintained new lawns. First, a circular area of red-colored, straw-colored, and normal leaves appears. As the patch ages, the center may be green with straw and red-colored blades around the outer portion of the ring. Plants are weakened and are very susceptible to summer heat and drought. The roots are covered with dark strands of mycelium, and crowns of affected plants are dark brown. Damage is more severe in lawns with heavy thatch on compacted soil. Thatch often is decomposed in patch areas producing a sunken appearance. Thatch reduction treatment such as aerification and power raking are required to improve root growth. Fertilize to reduce thatch development and promote root growth. Water to prevent wilt but don't keep turf excessively wet.

*Fairy ring* 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. Fairy rings are caused by several soil-inhabiting fungi. 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 with a root feeder attachment which injects water deep (12 inches) into the soil within the rings of dead grass. This treatment—with aerification

and adequate fertilization—will hide the symptom. Mushrooms can be broken up with a rake or mower.

*Slime mold* symptoms appear following heavy rains or waterings. Small, colored, or white slimy beads develop on the grass, and when dry form a powdery mass. Slime molds do not damage grass but are unsightly. They soon disappear, or you can remove the deposits with a rake or a forceful spray from a garden hose.

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

*Moss* and *algae* are simple plants usually found in densely shaded and moist lawn areas. Improving soil drainage and increasing air circulation and light penetration often prevents this problem. If grass does not receive adequate light, replace with shade-tolerant ground covers or specifically selected shade-tolerant grass varieties.



## CONTROLLING INSECTS

Proper insect management on lawns involves more than spraying three times a year. It involves a process of detection, identification, and evaluation. It is important to remember that complete elimination of insects is impractical: try to manage the insect population at a level that does little damage to the lawn. Damage control and not insect control is the ultimate goal. Lawn damage varies with grass condition, the insect species, and its population level. Vigorous lawns can withstand greater pest numbers than severely weakened ones: proper watering and fertilization can help prevent damage. Fortunately, lawn insects do not often present major problems in Minnesota.

The mere presence of an insect may not be a problem, since not every insect is a pest. Even if the insect is a pest, its presence in small numbers may not cause a problem. It is essential to know what insect you are dealing with and what population levels cause damage; the stage or stages and time of year when it is most susceptible to control; and the best methods to regulate the populations. Insects on lawns should be controlled only when they cause damage, not simply because they exist.

Detecting the presence of an insect 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 in Minnesota feed on living plants and are not found in dead areas. Insects found in completely dead patches generally are not responsible for the damage.

If the lawn looks wilted and water-starved, a root-feeding insect may be involved. Peel the sod back, examine the roots to check for any root-feeding pests. Some insects hide in the thatch and then feed on the grass blades. Damage from this type of feeding appears as brown patches when the blades are clipped off: search the thatch to find the insect. Others live on the blades and withdraw the plant's sap. Close examination of the grass blade will reveal this type of pest.

Once detected, identify the insect with the help of the following information. The insects are listed according to where they are found. Specific pesticide suggestions can be found in *Controlling Lawn and Turf Insects* (AG-F0-1008).

## Root Feeders

*White grubs* are the larvae of the common May beetles or June bugs that fly to lights in the spring. The adults lay eggs in spring and summer. The damaging grubs are whitish with brown heads. They feed on the roots of grass, and heavy infestation will loosen sod so that it can be rolled back easily. The grubs are usually found curled in a "C" shape. Population levels of 3 to 10 grubs per square foot can be expected to produce noticeable damage: control is justified when a random check of the lawn shows this level.

The most common species in Minnesota feed on the roots for 3 years before they reach the adult stage. The first year, grubs are up to 1/2 inch-long and produce little damage. The second year, grubs range from 1/2 to 3/4 inch, and damage becomes more apparent. This is the best time to control them since damage usually is not extensive and chemicals are effective controls. The third year, grubs grow to 1 inch or more and damage becomes very apparent, particularly in hot, dry weather. Unfortunately, control is not effective at this time since damage is generally complete and the large grubs are difficult to kill.



The best method of control is to examine the lawn annually and treat with a suggested insecticide when 3 to 10,  $\frac{1}{2}$ -inch grubs are found per square foot. Getting the insecticide into the root zone is important in successful grub control. This is best done by wetting the lawn the previous evening, applying the recommended insecticide, and immediately watering thoroughly. Do not treat in the fall, as the grubs move down into the soil for winter.

*Bluegrass billbugs*, as adults, are long-snouted,  $\frac{1}{4}$ -inch, gray-to-black beetles with a strongly tapered abdomen. They can be found walking on hard surfaces in early spring prior to depositing eggs in grass stems. The plump, legless white larvae that hatch, feed on stems first and then on available roots. Infested lawns have off-color, irregularly shaped areas that yellow and finally turn brown in late July. Areas of advanced infestation will peel back, but with more resistance than that found for white grubs. However, these areas can contain individual plants that offer little resistance when pulled.

Billbugs are best controlled in May as the females are laying eggs. Application of an insecticide is suggested about 10 days after adults are sighted. Billbugs, like white grubs, also can be controlled when the larvae are feeding on the roots, preferably in June or early July. About 10 larvae per square foot are considered sufficient to cause noticeable damage. Treatment is not suggested in late July or August, as the larvae complete their feeding and move 1 to 2 inches into the soil to pupate.

## Blade Feeders

*Sod webworm* is the most common blade-feeding lawn pest in Minnesota. The adults frequently are called lawn moths. They are light-colored moths or "millers" that make short, erratic, darting flights. They fold their wings back closely against their bodies when resting, giving them a very narrow appearance.

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

Close visual examination of the thatch will detect this pest. Flooding the area with water will force the worms to the surface, where they can be counted. A population of 15 worms per square yard may damage turf seriously. Examinations should be made in June and again in early August, since sod webworms have two generations a year. The lawn should be watered well a day or so before applying the insecticide; then delay further watering for at least 3 days after treatment.

*Aphids* or *leafhoppers* are small insects that can be found feeding on the exposed blades. They suck the sap from the plant. Established lawns are seldom damaged. However, new lawns can suffer from feeding by these sap-sucking insects. Control is suggested for new lawns only.

*Greenbugs* are aphids that can damage established lawns. Insects are small and yellow to green, and can be found by sweeping a hand over suspected areas. Greenbugs are carried into Minnesota on southerly winds and can show up overnight. Damage is almost always to lawn areas shaded by trees or shrubs. Only bluegrass is attacked. Control is important when greenbug populations are first seen.

### **Insects That Live in Grass**

There are a few very common insects or insect-relatives that live in grass but do not cause direct feeding damage.

*False chinch bugs* are about 1/4-inch long, brown, and generally found in dead areas of the lawn. Control is not recommended since they do not cause damage.

*Ants* are to be expected in lawns. Their preference for nesting in areas of sparse vegetation may indicate the ants are causing the poor lawn development. This is not true. Ants do not feed on plants and are no threat to lawns. Ant control is not justified on the basis of lawn protection.

*Night crawlers* are beneficial and should be tolerated whenever possible. However, large populations can cause lawn lumpiness and in extreme cases, reduce its recreational value. Vertical mowing can help reduce lumpiness and limit the amount of feed available for night crawler development. Pesticide application also can be used to reduce night crawler populations.

Other University of Minnesota Extension publications on lawns include:

- Fertilizing Lawns (AG-FO-3338). 50 cents
- Preventing Pollution Problems from Lawn and Garden Fertilizers (AG-FS-2923). 20 cents
- Watering Lawns and Other Turf (AG-FS-2364). 20 cents
- Patch Diseases of Lawns (AG-FS-3034). 20 cents
- Lawn Diseases (AG-FO-3386). \$1
- Controlling Lawn and Turf Insects (AG-FO-1008). 50 cents
- Weed Control in Lawns and Other Turf (AG-FS-1137). 20 cents
- Thatch Control in Lawns and Turf (AG-FS-1123). 20 cents

These are available through your county extension office or can be ordered from:

Distribution Center  
3 Coffey Hall  
1420 Eckles Ave.  
University of Minnesota  
St. Paul, MN 55108

Minnesota residents add 6% sales tax.

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