

For many, the ideal landscape around homes and businesses includes an area of turfgrass. The lush greenery not only beautifies our landscapes but also provides favorable environmental influences such as cooler temperatures, higher humidity, and reduced dust. Unfortunately, the desire to have an aesthetically pleasing lawn and actually having one are often two different things.

Turfgrass is susceptible to many different types of diseases. Once established in a turfgrass planting, these diseases can be devastating (Figure 1). Thus, maintaining healthy, attractive lawns takes hard work and management practices that reduce the likelihood of disease.

Managing lawns begins before the grass is planted. Selecting the turfgrass variety, evaluating the planting site, preparing the site, and installing the turf are all important components in building a healthy lawn. Once established, how that lawn is cared for plays an enormous role in the overall health and appearance of the lawn.

Selecting a Turfgrass Species

In selecting the type of turf, you should consider the use of the turf, climate, soil type, maintenance requirements, and susceptibility to various pests. For information on appropriate turfgrasses for New Mexico, see NMSU Extension Guide H-508, *Turfgrasses for New Mexico* (http://aces.nmsu.edu/pubs/_h/H508.pdf).

Use of the Turf

The use of the turf is an important aspect to consider because different species vary in their tolerance of traffic. Additionally, some species are better for erosion control, slopes, and roadsides. Home lawns or turf used for aesthetic purposes around buildings, cemeteries, and



Figure 1. Once established, turf diseases can spread quickly. This image shows the progression in a turf area of the fungal disease *Bipolaris* sp. over a couple of weeks.

parks should be of fine texture, and finer-textured varieties of bermudagrass and zoysiagrass or Kentucky bluegrass and perennial ryegrass are common choices for these areas. Other grasses tend to hold up better under heavy traffic, such as on athletic fields, schoolyards, and golf fairways. Bermudagrass, Kentucky bluegrass, tall fescue, perennial ryegrass, and zoysiagrass are often selected for these areas.

The growth habit of the turf species must also be considered in selecting grass for particular uses. For example, bermudagrass should be avoided in areas where distinct grass areas will be kept separate from other garden areas, or in cemeteries, where its invasive, creeping growth habit is difficult to control and manicure around headstones. Buffalograss and blue grama are popular choices where low water use and low maintenance are the primary selection criteria. However, keep in mind that these two species can be dormant for 6 to 7 months of the year and may not provide the expected green color.

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Key Points for Maintaining Healthy Lawns

- Select an appropriate turfgrass species to meet your expectations and the maintenance you are willing to provide.
- Select an appropriate turfgrass species for the location. Consider:
 - Use of the turf area
 - Climate
 - Shade (light and air circulation)
 - Soil type and conditions
 - Terrain
 - Maintenance requirements
 - Susceptibility to pests
- Prepare the site before planting:
 - Remove debris
 - Grade the area
 - Provide good drainage
 - Take a soil test and amend soil as needed
 - Eliminate weeds
- Avoid watering late in the day or at night.
- Apply enough water in each application to completely wet the root zone.
- Apply the appropriate amount of water based on species, soil, and climate.
- Provide adequate light penetration and air circulation.
- Apply the appropriate amount of fertilizer (based on a soil test).
- Mow frequently, maintaining the tallest height recommended for the species.
- Be sure to use mowers with sharp blades.
- Leave clippings on the lawn surface.
- Dethatch by aerating, raking, or vertical mowing as needed.

Climate

Grasses are adapted to geographic regions by temperature and rainfall, but light may also be a factor in certain species' adaptability to a given location. Choosing a variety appropriate for the climate is important. Although water can be supplemented through irrigation, it is not possible to alter regional temperatures.

Grasses are usually classified as either cool- or warm-season. Cool-season grasses (such as ryegrass, bluegrass, bentgrass, and fescue) grow best in temperate and subarctic climates when the temperature is between 60 and 77°F. If planted in areas likely to have prolonged periods of high temperatures or drought (as in much of New Mexico), cool-season grasses will require adequate moisture during times of stress. Thus, these grasses are not selected for low water use landscapes.

Warm-season grasses (such as bermudagrass, zoysiagrass, buffalograss, and blue grama) grow best when temperatures are between 77 and 95°F. These grasses are used extensively in warm climate regions and are particularly useful for low water use plantings. These grasses are dormant for up to 5 to 6 months during the winter and spring, and can also go dormant during the summer if not irrigated appropriately.

Light intensity and shading should also be considered in selecting grass species. Low light or heavily shaded turf will generally grow slowly, creating succulent leaf blades that are more susceptible to disease. Fine fescue and zoysiagrass are two species that are best suited for reduced light conditions. However, shaded turf areas can suffer from increased competition for water and nutrients from other plants, increased humidity, decreased air circulation, and greater temperature fluctuations. All these situations tend to favor the development of many turfgrass diseases.

Soil Type and Conditions

Soil type refers to the texture and structure (aeration) of a soil. These properties are difficult to alter to any great extent and should therefore be considered when choosing grass species and sites. Other soil conditions, such as acidity or alkalinity and fertility, can be modified more easily.

Species vary in their adaptability to different soils. In general, fertile, permeable soils that have good water holding capacity with relatively rapid subsoil drainage are best suited for most turfgrass species. High-quality turf can also be maintained on less than ideal soils as long as it is provided with sufficient care.

Maintenance Requirements

Some grasses require intensive management in order to maintain their appearance and health. Others are more tolerant of some neglect. However, no grass can tolerate extensive neglect or poor treatment. Most species used as home lawns require a moderate amount of care to maintain their appearance.

Susceptibility to Pests

Grasses vary in their susceptibility to insects, weeds, and diseases. It is a good idea to determine the most prevalent pests in your area and then try to select varieties tolerant to these pests. This is not always an easy task, but if you make an effort to select tolerant varieties, you will have greater success in maintaining a healthy lawn.

Selecting the Planting Site

Planting site selection ties into selection of turfgrass species. If you have a sloping area, then you would select a species that requires little irrigation or mowing and has good erosion control properties. Keep in mind that planting turf on slopes is prohibited in some areas of New Mexico, for instance in Albuquerque. If you have a choice of locations, it is best to choose a flat area with good subsurface drainage. You also want to consider the trees, shrubs, and tall buildings in the area. These features may shade the turf area and decrease air circulation, both of which affect growth and susceptibility to disease.

Preparing the Site

Preparing the site before planting can go a long way in establishing a healthy lawn. Consideration should be given to grading and providing drainage, improving the soil, controlling weeds, adjusting pH, and adding fertilizer. For more information, see NMSU Extension Guide H-509, *Turfgrass Establishment* (http://aces.nmsu.edu/pubs/_h/H509.pdf).

Grading and Drainage

Drainage is one of the most important characteristics of lawns in terms of disease prevention. Turf that remains wet for too long or accumulates freestanding water will be predisposed to many disease organisms. Good surface drainage can be provided by grading the lawn area such that there is a slight slope. It is best to slope the lawn away from buildings and sidewalks. Additionally, the area should be devoid of high mounds, which may dry out too quickly or be subjected to scalping injury when mowing. Remove low spots where water tends to collect. Extreme slopes make maintaining good-quality turf

difficult. If the selected area is a naturally steep slope, consider putting in block or rock retaining walls to break up the area and reduce the angle of the slope. You might also consider using ornamental ground covers instead of turf in areas with a steep slope. A 1–2% slope (6–12 inches per 50 linear feet) is recommended for good surface drainage. Slopes greater than 3–4% should be avoided.

Subsurface drainage is equally important. However, many people ignore this when constructing a lawn. To check the site's drainage, wet the area with 2–4 inches of water. After the water has moved into the soil, apply another 2–4 inches of water. If the water pools on the surface and penetrates the soil slowly, the subsurface drainage is probably poor. If the natural subsurface drainage is inadequate, then a system of tile drains is required. Drain tile installed at about 20-ft intervals and 3–4 ft below the surface will provide good subsurface drainage. The subsurface drainage system should be designed to follow the natural slope of the area. If the area is relatively flat, a herringbone design with a center or main drainage line and lateral lines coming into it at 45-degree angles is the best design. The lateral lines should be approximately 20 ft apart.

Improving the Soil

Improving the soil involves several tasks. First, remove all large debris from the site. Break up the soil with a rototiller. This will help to reduce soil compaction, which may have occurred if vehicles have been driven over the site (such as with newly constructed homes and buildings). If the soil is very poor, you may want to consider bringing in topsoil. However, you may find beneficial effects from improving the soil you have. Soil that is too heavy, too sticky, or too light (sandy) should be improved before seeding or sodding the area. These soil conditions can be improved by adding organic matter to heavy soils, or adding organic matter and loam clay to light soils. Incorporate these soil-improving amendments into the existing soil by rototilling uniformly and as deeply as possible. Avoid layering of the organic material.

Controlling Weeds

Many weed problems can be reduced or eliminated if the area is treated prior to planting. Chemical herbicides provide the most effective control. It is important to use a product that is effective and decomposes quickly without leaving residues in the soil. To select the most appropriate herbicide, you will have to identify the weeds you want to eliminate because there are several different types of herbicides and many products are available. Additionally, new and improved products are developed each year. Check with your county Extension office

(<http://aces.nmsu.edu/county/>), chemical distributor, or landscape consultant for current information on weed control. When using chemicals, be sure to read and follow all label directions carefully.

pH

Soil pH is the degree of acidity or alkalinity of the soil. In general, grass plants grow best at a neutral (pH 7.0) or slightly acidic pH (pH between 6.5 and 7). However, most turfgrasses grow adequately at a wide range of soil pH, from acidic to alkaline. Soil amendments can be incorporated into the root zone that can raise or lower pH as needed. Much of the soil in New Mexico is on the alkaline side of the scale (high pH), so the pH needs to be lowered. Sulfur is probably the most common amendment for lowering soil pH.

Fertility

Soil fertility is the native level of nutrients in the soil. The best way to learn about your soil is to take a soil sample and send it to a testing laboratory for analysis. These services provide important information that can help you determine your soil pH, salinity (salt), and nutrient levels. From this information, you can determine the appropriate amounts of amendments or fertilizers to add to the soil. In most cases, the soil testing lab will include recommendations in their report. Several laboratories offer this service. Check with your local county Extension office (<http://aces.nmsu.edu/county/>) for a list of soil testing services, or visit http://aces.nmsu.edu/aes/documents/labs-to-consider-for-new-mexico-soils-table_landscape.pdf. For more information on how to take a soil test, see NMSU Extension Guide A-114, *Test Your Garden Soil* (http://aces.nmsu.edu/pubs/_a/A114.pdf).

Installation: Seed vs. Sod vs. Plugs

There are three ways to establish a turfgrass area: seed, sod, and plugs. The primary advantage of sodding a turf area is the immediate impact on the area. However, seeding is the cheapest of all approaches and may provide a stronger turf in the long run because the roots are immediately incorporated into the soil.

Seeding

The first rule of thumb is to purchase high-quality seed from a reputable dealer. When selecting seed, consider seed mixes that contain more than one grass species or variety. Mixed-variety plantings will often survive best. This is true when one of the species is more tolerant of



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disease or environmental extremes than another. It is often difficult to find the best combination of environmental and pest tolerance in a single variety.

When establishing a lawn by seed, it is best to plant the seed just before the most favorable conditions for grass growth will occur. Seed should be broadcast over the entire turf area as uniformly as possible. Once distributed, cover the grass seeds lightly by hand raking or dragging with a brush or mat in two directions. Some of the seed may still be visible after raking. Firm the seeded area with a light, empty roller after raking. Newly emerged seedlings should be kept moist until well established. To avoid saturated soil conditions, which favor “damping-off” diseases, you may need to apply light applications of water several times a day.

The first mowing should be done when the tallest grasses are about 1 to 1 1/2 inches taller than the normal mowing height. Whenever new growth exceeds one-third above the desired cutting height, the grass should be cut again. For example, if the optimal height is 3 inches, you would mow when the grass is one-third above this height, or when the grass is 4 inches tall. This practice will keep clippings to a minimum so they can be left on the surface of the grass without concern for matting.

Sodding

Sod is grass-covered earth tightly knit together by roots, rhizomes, and stolons. Sodding is a fast way to establish a turf area. Sod can be laid any time of the year, provided the ground is not frozen. Sodding is more expensive than seeding. However, in some cases it may be the best and most appropriate way to establish a lawn, for example, on steep slopes where irrigation has a tendency to wash seed to the bottom, or in high-traffic areas.

If possible, choose sod with a soil similar to that of the planting site. If the soil in the sod roll is different from the planting site, rototilling compost into the planting site will help with sod establishment. Otherwise, the soil is prepared the same as for seeded lawns. Moisten the soil to a depth of 6 inches, but allow the excess moisture to drain away before laying the sod. Roll the soil to create a smooth, flat surface. Lay the sod side by side as tightly as possible until the entire turf area is covered. To avoid the appearance of lines in the turf, stagger the sod. The newly laid sod should be rolled to set it firmly in place. After sodding, keep the grass well watered until the area is established.

Plugging

Plugging is the vegetative establishment of lawns by planting small blocks of sod at measured intervals. Plugs vary in size, although plugs 2.5 inches in diameter and 2–3 inches deep are often used. A core of soil the same size as the plug should be removed to ensure good contact with the soil. The spacing varies depending on the turf species used. The distance is determined by the speed at which the grass grows. In general, plugs are spaced approximately 1 ft apart; however, slow-growing species such as zoysiagrass should be spaced approximately 6 inches apart. It is essential that plugs be kept moist for two to three weeks after plugging to prevent the roots from drying out.

Managing Established Turf

Turfgrass diseases are best controlled with good management practices. These practices include watering, fertilizing, mowing, and aerating.

Watering

It is important to provide lawns with adequate moisture. However, there is a line between keeping the area too moist and too dry. Extremes in soil moisture lead to disease problems. Drought conditions stress the plants and predispose turfgrass to attack by certain types of fungi, while some fungi thrive in excessive moisture.

Avoid watering in the late afternoon and evening. Instead, turfgrass should be watered in the early morning. This allows the leaves of the grass to dry quickly. Many diseases, particularly foliar diseases, require 14 hours of continuous leaf wetness to penetrate the leaf surface. Anything that can minimize the length of time the leaf surface stays wet will help to control these diseases.

Water deeply so that water moves completely through the root zone. This will help to develop a deep root system, which will tolerate temperature and moisture extremes better than a shallow root system. The amount of

water needed to maintain healthy turf will vary depending on the type of grass, the condition of the turf, and the time of year. Be guided by the needs of the turf rather than by a set schedule, and you will have better luck keeping your lawn in peak condition. For more information, see NMSU Extension Guide H-504, *How to Water Your Lawn* (http://aces.nmsu.edu/pubs/_h/H504.pdf).

Light penetration and air circulation are other factors that influence the duration of leaf wetness in turf. It is important to decrease shade and increase air circulation to enhance drying of the grass blades. If heavily shaded turf is desired, then select shade-tolerant varieties when establishing the lawn. Shade-tolerant turf also tends to be more tolerant of the diseases favored by shaded conditions.

Fertilizing

Apply fertilizer at the proper rates and times. All lawns need fertilizer for strong growth. Nutrients also influence disease organisms in the soil. Some diseases prefer nutrient-starved turf, while others like a lot of nitrogen and may be more apt to attack grass immediately following high nitrogen applications.

Fertilizer recommendations vary depending on the growing region. However, a good general recommendation is to provide at least one of your fertilizer applications in the fall. During this time, cool-season grasses produce most of their tillers and store carbohydrates in the roots. Having nitrogen available during tillering helps create a thicker lawn. Additionally, applying fertilizer in the spring is helpful to re-establish turf that has been dormant during the winter. In some cases, it may be useful to apply slow-release nitrogen fertilizers. This will help to provide an even source of the nutrient and avoid the flush of excess nitrogen that triggers so many diseases.

Mowing

Mowing is one of the most important cultural management practices in caring for lawns. Turfgrass should be maintained at appropriate heights, which vary depending on grass species and use. In general, turf should be maintained at the tallest recommended height that still allows for the designated use of the turf. For example, Kentucky bluegrass and tall fescue lawns can be mowed at 2 inches or even higher. If grasses are mowed at less than the recommended height, it adds stress and makes them more susceptible to disease.

Avoid cycles of tall and short grass. This means you will have to mow fairly frequently when the grass is actively growing. Cycling grass between too-tall and too-short conditions interferes with the plants' production of carbohydrates, which serve as an energy source for

growth. Without adequate carbohydrates, the plants cannot maintain strong growth.

Maintain mowers in good working condition. Keep the blades sharp. Dull mower blades will leave jagged cuts, which will be more susceptible to diseases than smooth, clean cuts and will leave a tattered appearance in the lawn.

When grass is mowed properly, the clippings can be left on the surface of the lawn. Clippings do not contribute to thatch buildup or influence disease in this situation. However, if the grass has grown too tall before cutting, the clippings will need to be removed, adding unnecessary biomass to our landfills. If too many clippings are left on the lawn surface, they block light from the plants and cause matting. The grass beneath the clippings will die as if you had placed a solid object on it.

For more information, see NMSU Extension Guide H-505, *Mowing Your Lawn* (http://aces.nmsu.edu/pubs/_h/H505.pdf).

Aerating

Aeration is the soil's capacity for air penetration. It also influences surface drainage. Penetration of air and water into the soil is directly influenced by the thatch layer. Thatch is a mixture of living and dead roots, rhizomes, and stolons that develops between the layer of green vegetation and the soil surface.

A little thatch is good because it reduces water loss due to evaporation, reduces temperature fluctuations, and creates a cushion in turf used for athletic events. However, when the thatch layer becomes greater than 3/4 to 1 inch, it can start to interfere with the movement of air and water into the soil. In addition, when the thatch layer is thick, the roots will tend to grow into the thatch instead of into the soil. Roots in the thatch layer are more susceptible to drought and high-temperature stress. These roots also are impaired in their ability to take up nutrients from the soil. Additionally, thatch harbors many plant pathogens, which use thatch as a nutrient source.

Thatch buildup can be avoided altogether through proper fertilization and mowing. However, if the layer has become too thick, there are several ways to combat excessive thatch, including aeration, thinning, raking, and vertical mowing.

Aerating, also called aerification or coring, consists of punching holes or slits in the turf for the purpose of improving the drainage and air exchange. Aeration increases beneficial microbial activity in the soil, which aids in decomposing the thatch layer. Lawns exposed to heavy traffic usually require aeration twice a year during the growing season. Early spring and mid-fall are the best times for the cool-season grasses, while late spring and summer are best for warm-season grasses.

Thinning and raking the turf on a regular basis keeps thatch from accumulating, and in some cases can help to reduce an excessive thatch layer. However, sporadic treatment is not likely to provide much help.

Vertical mowing may be necessary on lawns with a heavy thatch layer. Vertical mowing is cutting with blades or tines that move perpendicular to the soil surface. This mowing cuts or slices the turf and acts like a mechanical rake. The result is thinned turf with reduced thatch. Vertical mowing should be done only when the grass is growing vigorously. Early spring or late summer is the best time for cool-season grasses, while late spring or summer is best for warm-season grasses.

In some cases, dethatching will create thin or bald spots in the lawn. Weeds may become troublesome in these areas; therefore, weed management can be important following dethatching.

Other Cultural Practices

Other management practices that contribute to the overall health of turf include overseeding, topdressing, and pest control.

Overseeding a lawn area may become necessary if the turf has been neglected over a long time. This activity involves seeding the lawn area and treating it like a newly seeded area until the new seedlings are established. Overseeding is often a component of turfgrass renovation. In some situations, such as on golf courses, cool-season grasses may be overseeded into warm-season grasses to prolong actively growing, green areas.

To topdress a lawn, spread a thin layer of soil, sand, compost, or humus over its surface. Topdressing is often used in combination with fertilizing, aerating, raking, or vertical mowing for the control of thatch. Topdressing is also a common practice following sodding. It may also help to level the turf for improved water penetration and mowing. This practice is mostly used on golf courses. However, avoid adding a thick layer of new or different material onto existing turf. A new and distinctly different layer will prevent water from percolating through the soil profile and create a saturated zone of an unfavorable condition, just like thatch can do.

Conclusions

The management practices described here will help to maintain lawns in a healthy condition. However, pests will occasionally invade a lawn area, and their control is critical to the long-term health of the lawn. Pesticides may be required from time to time. When controlling pests, identify the pest, select the appropriate means to control it, and apply the control at the appropriate time. For more help with turfgrass diseases, visit the NMSU Plant Diagnostic Clinic website at <http://aces.nmsu.edu/ces/plantclinic>.



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