Lawn and Turf

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The Purpose of Turf

In addition to their aesthetic value, turf areas play important functional, recreational, environmental, and ornamental roles.

Functional purposes include stabilizing soils and controlling wind and soil erosion along roadsides; around schools and industrial developments, such as industrial parks and airports; and around housing developments. Turfs reduce noise and air pollution and provide a moderate microclimate around buildings by preventing heat buildup. Turf areas also have an economic impact on urban and commercial developments by providing aesthetic appeal and increasing property values.

Recreational sports and outdoor activities, such as baseball, football, golf, and soccer, use turf as a playing surface. Turf and the underlying root zone provide a cushioning effect that minimizes injuries, a fact that even has even been recognized by a number of professional sports organizations. The move away from artificial turf and back to natural grass playing surfaces in the National Football League supports this fact. The mental and physical health derived from all the activities played on turf even benefit the economy, as healthy people in the workforce are more productive and have fewer sick days.

From an environmental standpoint, turf also can play an important role in filtering and purifying water as it passes through the root zone. The organic matter at the turf-soil interface, also referred to as thatch, contains a very diverse system of microorganisms that binds, metabolizes, breaks down, and ultimately removes a variety of chemicals that could pollute ground water. This makes turfs very good areas for irrigation with low-quality water. Golf courses have been effectively used in the regreening of reclaimed areas. Studies that have compared stream water quality before entering and after leaving a golf course have shown that water quality improved.

Imagine a city without ornamental green spaces in which turf often plays a central role. Together with bushes, trees, and flowers, the contrast of a cool and pleasant looking turf in parks and gardens with the surrounding paved areas provides an environment that has a relaxing and soothing effect on people. Such effects are of increasing importance to the mental health of people in our fast-paced and hectic world.

Turfgrasses for New Mexico

Turfgrasses can be divided into two major groups, the cool-season and the warm-season grasses. Representatives of the cool-season grasses are perennial ryegrass, Kentucky bluegrass, fine fescues, creeping bentgrass, and tall fescue. Optimum growth of these grasses occurs within a temperature range from 60 to 70°F and need considerably more water compared to warm season grasses. Warm season grasses, such as bermudagrass, blue grama, buffalograss, St. Augustinegrass, and zoysiagrass, grow best at temperatures between 80 and 95°F, use water more efficiently, and can tolerate higher salt levels in the root zone. Because of their optimum growth rate at lower temperatures, cool-season turfgrasses generally are adapted to temperate and subarctic climates, while warm-season grasses grow best in arid, semiarid, tropical, and subtropical zones. In New Mexico, cool-season grasses generally can be used anywhere north of Socorro, in the Ruidoso/Cloudcroft area, and in the Silver City area, while warm-season grasses are more adapted to the southern part of the state.

This general rule somewhat oversimplifies the situation. In most parts of New Mexico, the climate is semiarid, and diurnal temperatures can fluctuate widely, due to the high altitude. This creates a dilemma as to which turfgrass species are the most suitable. On the one hand, the climate is semiarid with low precipitation, suggesting that warm-season grasses are more appropriate. On the other hand, low temperatures, particularly in the winter, due to high elevations can make cool-season grasses the better

choice. Under regular irrigation conditions, because of the cool fall, winter, and spring and relatively cool summer nights, cool-season grasses can be grown successfully almost anywhere in New Mexico. However, if water consumption is of concern, the lack of sufficient precipitation makes warm-season grasses the better choice. Thus, buffalograsses, zoysiagrasses or the newly developed cold tolerant bermudagrasses can be grown successfully, despite cold winters and cool nights (table 1).

New turfgrasses, such as Texas bluegrass (Reveille), supina bluegrass, crested hairgrass (turtle turf), and seashore paspalum, have been introduced recently to the turf market but have not been tested under New Mexico's climatic conditions.

Table 1. Turfgrasses for New Mexico.

Grasses Grown	Grass Type (C: cool season; W: warm season)	Area in New Mexico Where Grass Can be (N: North; S: South)
Bentgrass	C	N, S
Bermudagrass	W	N, S
Blue Grama	W	S
Buffalograss	W	N, S
Fine Fescue	C	N, S
Kentucky Bluegrass	C	N
Perennial Ryegrass	C	N, S
St. Augustinegrass	W	S
Tall Fescue	C	N, S

Warm-Season Turfgrasses

Bermudagrass

Bermudagrass is a warm-season perennial grass that is distributed widely throughout New Mexico and can be used for all kinds of turf areas. It spreads aggressively by stolons (above ground runners) and rhizomes (below ground runner) and becomes a nuisance when it invades flower beds and gardens. Used for turf, it is extremely wear-tolerant and recuperates well from traffic stress. It is best adapted to warm, humid and warm, semiarid regions and thrives best under warm to hot weather conditions when irrigated. Newly developed, cold-tolerant cultivars of bermudagrass now can be grown in areas that were historically not considered suited to grow bermudagrass. Bermudagrass grows best in full sun and will do fairly well in shade when it gets sun for at least part of the day.

Varieties: Bermudagrass varieties can be classified as either hybrids or seeded. Hybrid bermudagrass cultivars, such as Santa Ana, Tifgreen, Tifway, Tifsport, Tifton, and Texturf are sterile and must be propagated vegetatively by sod, sprigs, or plugs. They are finer textured and tolerate low mowing heights. Seeded varieties, such as Common, Sahara, Princess, Guymon, Sultan, and Sonesta are, with the exception of Princess, coarser-textured and need to be mowed at greater mowing heights.

Blue Grama

Blue grama is a native, low-growing, perennial bunch type grass that is considerably drought and cold tolerant. Blue grama is ideal for low-maintenance and low-quality turf areas. It is slow-growing, shows little wear resistance and does not tolerate low mowing heights.

Varieties: Available seeded varieties are Hachita, Halma, and Lovington.

Buffalograss

Buffalograss is a native, fine-textured, perennial turfgrass. It is a low-maintenance grass with a grayish green color that can tolerate relatively low mowing heights (down to 0.75 inches). Buffalograss does not perform well under heavy irrigation and heavy fertilization. Buffalograss is the only dioecious turfgrass species: it produces male and female plants.

Varieties: Available seeded buffalograss cultivars include Bison, Cody, Texoka, and Tatanka, and 609 and Prairie, which are vegetatively propagated.

St. Augustinegrass

St. Augustinegrass is a stoloniferous, coarse-textured, perennial turfgrass. It has very little cold tolerance and can only be grown in the southernmost parts of New Mexico. Of all grasses that grow in New Mexico, St. Augustinegrass has the best shade tolerance. It can be used for lawns and general-purpose turf. Because of its low wear tolerance, it cannot be recommended for sports turf or other heavily trafficked areas.

Varieties: Common, Floratam, Seville, Raleigh, Bitter

Blue, and Palmetto.

Zoysiagrass

Zoysiagrasses are quite tolerant of drought, heat, and cold stresses. Although well adapted to New Mexico's climate, they may be one of the most underused and underappreciated turfgrasses in the state.

Within the genus of zoysiagrass, there are three species that can be used as turfgrasses: Japanese (or Korean) lawngrass (Zoysia japonica), Manilagrass (Zoysia matrella), and Mascarenegrass (Zoysia tenuifolia). Of the three zoysiagrasses, only Japanese lawngrass (such as Meyer zoysiagrass) and hybrids of Zoysia japonica and Zoysia tenuifolia (such as Emerald and El Toro) show adequate cold tolerance and may be successfully used as turfgrasses in New Mexico.

Zoysiagrasses spread by stolons (above ground runners) and rhizomes (below ground runners), and grow from early spring through late fall, providing their temperature, moisture, and nutrient requirements are met. At a mowing height of 0.5 to 2 inches this grass forms a very dense and uniform turf. A disadvantage of zoysiagrass is its slow establishment. It may take more than one growing season to fully establish a zoysiagrass lawn.

Although zoysiagrass is considered to be a drought-tolerant species, it ceases growth and begins to discolor during extended dry periods. During prolonged droughts when water could be limited, weekly applications of as little as 0.5 inch of water are adequate to keep the grass alive. During dry winter months, zoysiagrass requires occasional irrigation to prevent desiccation and serious loss of stand even though the grass may be dormant.

Varieties: Zoysiagrasses usually are propagated by sprigs or by sod, but also can be established by seed. Commercially available cultivars include Companion, Meyer, Emerald, Midwest, Zenith, Zen 400, Zen 500, Crown, and Palisade.

Cool-Season Turfgrasses

Bentgrass

Bentgrasses include the families of Colonial bentgrass, Creeping bentgrass, and Velvet bentgrass. They are fine-textured grasses with a very high tolerance for low mowing heights. New cultivars in the family of creeping bentgrass can be mowed as low as 1/16 inch. All three bentgrasses require high fertility and moisture levels. In New Mexico, bentgrasses are used only on golf course greens and tees. In most cool-season home lawns, bentgrass is considered a weed and indicates overwatering of the area.

Varieties: Cultivars that are used on golf courses include Crenshaw, Penncross, Pennlinks, Penneagle, Providence, L-93, A4, and G1.

Fine Fescues

The fine fescues include the creeping red fescues and the chewing (or hard) fescues. They either grow as bunch types (Chewing fescues) or produce stolons (creeping fescues). Both have fine-textured leaves, grow well in shaded areas and are drought-tolerant. Of all the cool-season grasses, the fine fescues require the least amount of water. They recuperate slowly from wear injury and cannot be recommended for highly trafficked sports turf. The normal cutting height for red fescue is 1 to 2 inches.

Varieties: Cultivars of fine fescues include Barcrown, Durlawn, Novarubra, (creeping); and Barfalla, Koket, and Jade (Chewings).

Kentucky Bluegrass

Kentucky bluegrass forms a medium-textured, very dense turf. It spreads through rhizomes and withstands traffic moderately. Because of its rhizomes, Kentucky bluegrass recuperates well from wear injury. Kentucky Bluegrass requires medium to high levels of irrigation and goes dormant in prolonged periods of high temperature. In New Mexico, it grows primarily in northern regions and higher elevations and only under extreme irrigation practices in the south. Kentucky bluegrass can be established by seed and sod, and performs best at a mowing height of 0.75 to 2 inches.

Varieties: Several varieties of Kentucky bluegrass have been developed and are currently available. The new and improved varieties differ widely in characteristics, such as disease resistance, color, texture, density, and tolerance to environmental stresses. Cultivars include Adelphi, Baron, Bristol, Limousine, Majestic, Midnight, and Touchdown.

Perennial Ryegrass

Perennial ryegrass is a fast-growing, medium-textured, bunch-type turfgrass with poor drought tolerance that can only survive as a year-round ground cover in New Mexico's cooler and moister areas. However, perennial ryegrass has become very popular in the south for overseeding athletic fields, golf courses, and lawns during winter months to provide green color throughout the year. Perennial ryegrass establishes quickly from seed (rapid germination and rapid seed growth), which makes it ideal for protection against erosion on newly prepared sites in the fall. It shows moderate to good tolerance to salt stress and recuperates well from wear stress.

Varieties: More than 50 perennial ryegrass cultivars have been developed over the past 20 years. These include Blazer, Citation, Derby, Loretta, Manhattan, Pennfine, and Regal.

Tall Fescue

Tall fescue is a tall-growing, coarse to medium-textured, bunch-type turfgrass that can be established by seed or sod. Tall fescue resists heavy wear and high temperatures. When adequately irrigated, it can be grown successfully in all parts of New Mexico. In warmer areas in the south, a tall fescue stand can be weakened and can deteriorate through the invasion of bermudagrass. Due to its good heat and drought tolerance, compared to all the other cool-season grasses, it is a good general purpose turfgrass for New Mexico.

Varieties: Commercially available cultivars include Jaguar, Mustang, Rebel, Falcon, and Olympic. Also, the breeding for new and improved tall fescue cultivars has made low growing and fine textured varieties available.

Turf Maintenance

Mowing, fertilization, and irrigation are the three primary turf maintenance operations. They are necessary to sustain a minimum level of turfgrass quality, and they are highly interrelated. Changes in one of the three measures usually requires adjustment of the others. If, for example, the mowing height of a home lawn is lowered to increase density and quality, mowing frequency, irrigation, and fertilization need to be adjusted. On most established home lawns, additional cultural practices are not needed if the three primary cultural measures are performed satisfactorily.

Mowing

Mowing is the most basic of all practices, and turfgrasses survive this rather rigorous continuous defoliation program through adaptation mechanisms that evolved under the selection pressure of grazing animals. It involves the periodic removal of a portion of the turfgrass' aboveground plant material (leaves and stems), primarily to increase turf density. This in return improves the appearance of the area or provides a uniform playing surface for certain sports. Effects of close mowing include increased shoot density but decreased root growth. Closer mowing produces a denser turf that has more plants per surface area and is considered to be of greater quality, as the canopy is more uniform and esthetically more pleasing. However, closer mowing produces a turf that is less tolerant of environmental stresses and more prone to diseases. The shallower root system requires more frequent irrigation and fertilization to compensate for the plants' reduced ability to secure moisture and nutrients from the soil. A common practice has been to raise the mowing height during periods of increased environmental stresses, such as heat and drought stress in the summer months.

Turfgrass areas should be mowed frequently enough to never have more than 30 percent of the aboveground tissue removed. For example, if a preferred mowing height of a turfgrass area is 1 inch, it should be mowed when a height of 1.5 inches is reached. If the desired mowing height is 2 inches it should be mowed at 3 inches. If the proper mowing frequency is followed, clippings can be left on lawns, as they will return valuable nutrients to the grass plants and will not contribute to thatch accumulation. Clippings contain approximately 4 percent nitrogen, 0.5 to 1 percent phosphorous, and approximately 2 percent potassium, as well as essential micronutrients. Grass clippings returned to the lawn can reduce fertilizer use by 25 percent.

Three types of mowers are commonly used for mowing turfgrass: flail, reel, and rotary. The mowing component in a flail mower consists of numerous small knives hinged to a horizontal shaft. The shaft rotates, and the knives cut any kind of vegetation and debris to a finely ground mulch. The mowing quality of flail mowers is rather low and the mowing

Table 2. Mowing heights for warm- and cool-season turfgrass species.

Grass Species		Mowing Height (in.)
Cool-season	Fine Fescues	0.5-1.5
	Kentucky Bluegrass	0.75-2
	Perennial Ryegrass	0.75-2
	Tall Fescue	1.5-3
Warm-season	Bermudagrass	0.5-1.5
	Buffalograss	1.5-4
	St. Augustinegrass	1-3
	Zoysiagrass	0.5-2

action can be compared to the chopping of an axe. They are used on infrequently mowed turfs, where appearance does not play a major role (e.g. roadsides). Reel mowers cut like scissors using a shearing action in which the blades of grass are caught between the rotating reel and the bedknife. They provide the highest quality cut of all three types of mowers and are best suited for low-cut areas, such as greens; tees; and high-quality, low-cut athletic fields. Rotary mowers are the primary type of mower used on most home lawns. They cut using the same principle as a scythe with a horizontally rotating blade cutting the grass. Rotary mowers range in size from small, push-behind units to large riding units that mow large areas in a short time. Recent advancements in rotary mower technology led to the development of mulching mowers. Modifications of rotary mowers include specially designed mulching blades and/or restrictions on the grass discharge ports. These modifications give very small clippings that can be easily decomposed within the turf canopy and on the soil surface. Clippings do not have to be collected and sent to a landfill.

Fertilization

An attractive, stress-tolerant lawn must have an adequate supply of mineral nutrients available in the soil. Thirteen mineral elements within the soil are considered essential for plant growth. Depending on the relative amounts required for growth, these minerals are grouped into macronutrients (nitrogen, phosphorus, and potassium), secondary nutrients (sulfur, calcium, magnesium), and micronutrients (iron, manganese, boron, copper, zinc, molybdenum, chlorine). The macronutrients are supplied most often in commercial fertilizers. Turfgrasses are most responsive to nitrogen, which promotes shoot growth and enhances green color. Fertilization with nitrogen should be based on turfgrass growth, while phosphorous and potassium should be based on a soil test. A complete turf fertilizer contains all three macronutrients at a balanced ratio in the range of 1-.1-.5. This means that for each unit of nitrogen the fertilizer contains 0.1 units of phosphorous and 0.5 units of potassium. For slow and even turf growth, using a slow-release nitrogen fertilizer, such as sulfur coated urea or ureaformaldehyde, is recommended. Secondary nutrients are adsorbed by turfgrasses at levels almost as high as those of phosphorous. In most soils in New Mexico these secondary nutrients are present at levels that do not necessitate additional fertilization. Of all the micronutrients, iron is the most likely one to be deficient in turf, especially in soils and root zones that are high in pH. Deficiencies usually manifest themselves as chlorosis (yellowing of leaves). Iron can be applied as a foliar spray of ferrous sulfate or chelated iron.

Irrigation

Proper irrigation is essential to a healthy lawn. Irrigation should be applied deeply and infrequently. Deep watering encourages an extensive root system to develop. A well-developed root system can use the nutrients and water in the soil more efficiently than shallow root systems. Frequent and shallow watering encourages a shallow root system that makes a lawn more susceptible to drought and grub damage.

The amount of irrigation water to be applied to the turf and the irrigation frequency depend on the water use, also called evapotranspiration. Evapotranspiration or ET is the total amount of water needed for turfgrass growth and the quantity evaporated from the soil. Turfgrass water use rates depend on the grass species, the soil type, management intensity and atmospheric conditions. Atmospheric water losses increase as temperature, solar radiation, and wind increases. Grass on fine-textured soils (clay and loam) generally needs to be watered less frequently because of the greater water-holding capacity of these clayey soils. Sandy soils drain faster and have to be watered more frequently in smaller amounts. On sloping sites with slowly permeable soils, water should be applied intermittently for short periods of

Table 3. Nitrogen requirements per growing month and application dates for different turfgrass species in a medium maintenance level lawn.

Grass Species		Pounds Nitrogen/1,000 Square Feet Growing Month	Application Dates
Cool-season	Fine Fescues	0.25-0.5	
	Kentucky Bluegrass	0.75-1	
	Perennial Ryegrass	0.75-1	mid-April, mid-September,
	Tall Fescue	0.5-0.75	beginning of November
Warm-season	Seeded Bermudagrass	0.75-1.5	mid-May, mid-June,
	Hybrid Bermudagrass	0.5-1	beginning of August, mid-September
	Buffalograss	0.25-0.5	mid-May, mid-August
	St. Augustinegrass	0.5-0.75	every 8 weeks in growing season
	Zoysiagrass	0.25-0.5	mid-May, mid-August

time to reduce runoff.

Cool-season grasses, such as perennial ryegrass or Kentucky bluegrass, may need up to 2.25 inches of water per week under hot, dry, windy summer conditions. Turf type tall fescues may perform adequately with less water, if a deep and extensive root system has developed. However, if a high-quality, dark green, tall fescue lawn is desired, it may need as much water as bluegrass or ryegrass. Warm-season grasses are much better adapted to the warmer climate and may need only 1.5 to 2 inches of water per week to sustain the same quality level. Buffalograss or blue grama lawns can remain green for weeks without watering, even during the hottest summer weather.

The best time to water is early morning, because water pressure is usually high and no water is lost through evaporation and wind, as compared to watering midday when temperatures are higher and winds are heavier. Lawns also should be watered during excessively dry periods in winter to prevent desiccation.

Water Conservation

The key to a successful, water-conserving irrigation is to water as little as possible while still retaining a green and growing lawn. This can be achieved by selecting a turfgrass that is well-adapted to the location. Drought-tolerant grasses don't necessarily use less water, as drought tolerance only describes the grass plant's ability to survive and to recover from extended periods of drought. If a grass with this ability is to be maintained in an attractive condition, it will need about as much water as a grass that is not as drought tolerant. However, drought tolerance does become important during periods of water restrictions.

Irrigation should be applied as infrequently as possible. Water when the turf shows the first signs of drought stress, when the leaves turn to a dull bluish green. Operate automatic irrigation systems for maximum efficiency and have them run long enough to drench the root zone 6 to 8 inches deep. To determine the water penetration depth, push a spade or sharp probe into the soil 2 to 4 hours after the irrigation. The irrigation system should be checked regularly for even spray pattern, damaged sprinkler heads, and leaks. Use a "rain-out" or "shut-off" sensor that shuts off the system automatically when it is raining.

Turfgrass Establishment

Many problems encountered in established turfs can be directly related to mistakes or omissions made prior or during turf establishment. A new turfgrass site should always be prepared in such a way that existing problems are corrected and potential problems are avoided. The first step in turfgrass establishment is to select a grass that is adapted to the area and suits the future use of the turf.

Turfgrass Selection

Certain turf characteristics such as color, quality, traffic tolerance, climatic adaptation, water use, as well as maintenance requirements and available resources are all factors that need to be considered when selecting a

turf species. Climatic adaptation and traffic tolerance (which largely determines the future use of the turf area) are certainly the two most important factors.

If turf areas will have intensive traffic, (athletic fields, some home lawns), turfgrasses that have adequate wear tolerance and the capacity to recover quickly from injury should be selected (table 4). Although tall fescue is one of the most wear-resistant, cool-season turfgrass, it may not be suitable for many sports turf areas, because of its poor adaptation to low mowing heights. Kentucky bluegrass and perennial ryegrass both have adequate wear resistance and are equally suited to highly trafficked areas. Among the warm-season grasses, bermudagrass and zoysiagrass have excellent wear resistance, however only bermudagrass has excellent recuperative capacity. Zoysiagrasses recover very slowly from injury.

Site Preparation

Site preparation can include various operations, such as controlling weeds, clearing, tillage, grading, soil modifying, installing an irrigation system, and fertilizing.

The absolute minimum soil depth for a lawn is 4 inches. However, for deep root penetration and the benefits that come from an extensive and deep root system, a depth of 6 inches is recommended. Loams and sandy loams with a pH of 6.0 to 7.0 are the very best soils for producing a beautiful lawn. Unfortunately, this ideal soil is seldom found on any property, and soil modification and/or the addition of topsoil may be necessary. Have your existing soil tested for suitability before you start the establishment process.

Preplant Weed Control

If an existing turf area gives undesirable plant cover and needs to be entirely replanted, a nonselective, systemic herbicide should be applied before breaking and grading the lawn. Most of the undesirable weedy grasses and broadleaved weeds can be eliminated by applying glyphosate. Glyphosate moves or translocates downward in plants to also kill underground portions. Two applications 4 to 8 weeks apart may be necessary for deep-rooted perennial grasses. Directions for application rates on the label must be **followed closely**. A waiting period of 7 days after glyphosate application may be necessary before tilling or sod disturbance. Do not use pre-emergent or residual type herbicides during this phase.

Clearing and Grading

Around newly constructed buildings, clear the site of all building materials (wood, cement, bricks), as well as of any buried stumps, rocks, stones larger than 2-3 inches in diameter, or other debris. Grade the entire area to eliminate any possible drainage problems on the property. This includes sloping the grade away from building foundations and filling low-lying areas. On large areas a tractor-mounted blade and/or box are most often used for rough grading. Hand tools, drags and rototillers perform well on areas that are smaller in size. The grading will probably uncover more debris that should be removed and not buried.

Soil Modification

If the minimum soil depth cannot be achieved (e.g., if

Table 4. Traffic tolerance and recuperative capability for turfgrasses in New Mexico.

Grass Species		Traffic Tolerance	Recuperative Capability
Cool-season	Bentgrass	Low	High
	Fine Fescue	Medium	Medium
	Kentucky Bluegrass	Medium/High	Medium
	Perennial Ryegrass	High	High
	Tall Fescue	High	Medium
Warm-season	Bermudagrass	High	High
	Blue Grama	Low	Low
	Buffalograss	Medium	Low
	St. Augustinegrass	Low	Low
	Zoysiagrass	High	Low

a caliche layer is close to the surface) or if the soil test shows that the existing soil is unsuitable for turfgrass growth, topsoil and/or soil amendments should be added. Add topsoil (loamy sand, sandy loam or other soil suitable for the area) and organic matter to achieve a total topsoil depth of 4-6 inches after firming. If at all possible, affordable, or available, peat or compost should be incorporated into the topsoil at the rate of 50 to 100 pounds per 100 square feet. Depending on soil test results, additional soil amendments and preplant fertilizer can be added at this point. Rototill the mixture to a depth of at least 6 inches. This will control most annual weeds, alleviate subsoil compaction, and permit a bonding of the topsoil mixture to the subsoil, which will improve root penetration and water movement. Contact your county agent if you have questions regarding the soil test, local compost quality, or the extent of soil modification required.

Preplant Fertilization

Starter fertilizer, a fertilizer that is low in nitrogen and high in phosphate and potassium should be used as your preplant fertilizer at a rate of 0.5 to 1 pounds. of K_20 and 1 to 1.5 pounds P_2O_5/1,000 square feet. The starter fertilizer should be worked into the soil prior to seeding or laying the sod to prevent injury to the newly developing turfgrass roots.

Irrigation System

Install the irrigation system after rough grading the new site. This a good time to install, because the soil settling in the trenches can be repaired during the fine grading process, and the system can be tested for design and operation flaws before planting. Proper care must be taken to ensure that irrigation components are not damaged during the grading operations. Use marking flags on all sprinkler heads and valve locations. Be sure to follow local plumbing codes and obtain proper permits. Use only licensed irrigation designers and installers.

Fine Grading

Prior to fine grading, settle the area by applying irrigation water. Fine grading levels and smoothes the soil surface in preparation for planting. Large areas that allow the operation of heavy machinery should be fine graded with a tractor-mounted box blade or a heavy-duty rake. Fine grade the entire site manually by using a rake or a steel drag mat to smooth out high spots on smaller to medium-sized areas. Remove any additional construction debris brought up during the grading process. At this point, set sprinkler heads at the proper height: flush with the ground for seeding or 0.5 inch to 0.75 inch above the soil level if sodded. Apply water again to finish settling the soil and to provide adequate soil moisture for the seeding or sodding process. Any weed growth prior to planting should be controlled with a nonresidual contact herbicide.

Turfgrass Seeding

Timing

A lawn can be successfully started from seed anytime during the growing season. However, it is easier to establish cool-season grasses, such as Kentucky bluegrass or tall fescue, in late summer. Warm-season grasses, such as Buffalograss or bermudagrass, are usually seeded in May or June. A guide for seeding is to develop 1,000 to 2,000 seedlings per square foot. Since seeds of turfgrass species differ in size and weight, different seeding rates for different turf species have to be used. The seeding rates are given in pounds needed per 1,000 square feet of planting area.

Seeding Practices

Hand seeding is most practical where small areas are to be established. Larger areas should be seeded by using a drop type fertilizer spreader that is calibrated for delivering the appropriate seeding rate. Drop spreaders generally are preferred for seeding, because they are more accurate. Their spreading pattern is less influenced by wind and differential seed size compared to that of a rotary spreader. When using a rotary spreader, larger seeds are thrown farther than smaller seeds, resulting in uneven distribution of grass species within the area. Spread the seed with several applications, using crisscrossing patterns. Follow up with a light raking and lightly roll the area to ensure good seed-to-soil contact. Be careful not to bury the seed too deeply or it may not germinate.

Turf Maintenance During Grow-In

Starting immediately after seeding or sodding, main-

taining turfgrass areas during the grow-in period includes irrigation, fertilization and mowing. These measures are the three crucial components to ensuring a dense and weed-free turf stand in the shortest time possible.

Watering

Irrigation is the most important cultural practice favoring seed germination. If not enough water is provided, turf will establish slowly (if at all) and sparingly. Insufficient watering is the major cause of unsuccessful turf establishment. Seedlings are very susceptible to desiccation, and the seedbed should not be allowed to dry out. A newly seeded lawn may have to be watered three to four times daily, depending on the weather conditions. Apply enough water to moisten the top inch of the soil profile, but avoid overwatering and puddles. As the seedlings develop and reach a height of about two inches, the frequency of irrigation should be reduced, and the area must be watered more deeply. After the lawn has been mowed several times, deep and infrequent irrigation should be applied.

Mowing

Mowing should begin when the first shoots reach a sufficient height to be mowed. Immature turf plants are uprooted easily by dull mowing equipment, especially when the soil is wet. All cutting equipment should be sharp, and mowers should be adjusted precisely to the proper mowing height. Wait for the surface of the root zone to dry and become firm prior to mowing. Do not wait too long to mow a newly seeded lawn, mow early and often. The one-third rule (never remove more than one third of the aboveground grass plant) also applies to immature turf stands.

Fertilization

Newly seeded or sodded turf plants have a poorly developed root system and cannot uptake nutrients from the soil effectively. Therefore, it is important to fertilize frequently to encourage establishment. Nitrogen and other nutrients should be applied sufficiently but not abundantly. High rates of fertilizer can injure the plants and/or restrict root and shoot growth. Apply 0.5 to 0.75 pounds N/1,000 square feet in a soluble form every other week for 6 to 8 weeks and follow general fertilization guidelines thereafter. All other nutrients, such as phosphorous, potassium, magnesium, calcium and iron, should be applied according to soil test results. Although most of these nutrients usually are abundant in New Mexican soils, a soil test can reveal the lack of certain minerals and prevent nutrient deficiencies.

Table 5. Seeding time and rate and sod availability for warm- and cool-season grasses in New Mexico.

Grasses	Seeding Time		Seeding Rate (pounds/1,000 square feet)	Sod Availability
	North	South		
Warm-season				
Bermudagrass	May 15-Aug 1	May 1-Sep 1	0.75-1.5	√
Blue Grama	May 15-Aug 1	May 1-Sep 1	1-2	N/A
Buffalograss	May 15-Aug 1	May 1-Sep 1	0.5-2	√
St. Augustinegrass	Not recommended	May 1-Sep 1	N/A	√
Zoysiagrass	May 15-Aug 1	May 1-Sep 1	1-2	√
Cool-season				
Bentgrass	Aug 15-Sep 15	Sep 1-Oct 15	0.5-1	√
Fine Fescue	Aug 15-Sep 15	Sep 1-Oct 15	3-4	√
Kentucky Bluegrass	Aug 15-Sep 15	Not recommended	1-2	√
Perennial Ryegrass	Aug 15-Sep 15	Sep 1-Oct 15	4-8	N/A
Tall Fescue	Aug 15-Sep 15	Sep 1-Oct 15	5-8	√

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