

Turfgrass Establishment for Texas

Ecological Turf Tips

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Turfgrass is often planted without much thought as to what it needs to grow well and remain healthy. Turfgrass gets off to the best start when proper attention is given to:

- preparing the site and soil,
- understanding correct planting techniques for the material being used (seed, sod, sprigs or plugs), and
- caring for the grass properly after planting.

This publication explains the steps involved in successful turfgrass establishment on any site, whether it is a lawn or sports turf that will be well watered and mowed often or a low-maintenance area. These steps are also important when renovating turf areas or repairing isolated spots.

The successful establishment of turfgrass also depends on:

- selecting a grass type that is adapted to your part of Texas,
- making sure your site is appropriate for the grass type you select (soil type, soil depth, amount of shade, etc.), and
- giving the grass the level of care that matches its intended use.

Options for Planting

The grass species and variety you select also influences your planting options, as well as the site preparation you will need to do and the time

Table 1. An overview of turfgrass establishment methods suited for different grass species available in Texas.

Grass species	Seed	Sod*	Plug	Sprig
Bermudagrass	Yes**	Yes	Yes	Yes
Buffalograss	Yes**	Yes	Yes	NR
Centipedegrass	Yes	Yes	NR	NR
St. Augustinegrass	NA	Yes	NR	NR
Zoysiagrass	Yes**	Yes	Yes	NR
Tall fescue	Yes	Yes	NA	NA
Kentucky bluegrass	Yes	NA	NA	NA
Texas bluegrass	NA	Yes	NA	NA

*Many improved grasses do not produce viable seed and are only available as sod, plugs or sprigs.

**Seeded types are typically not commercially available as sod. NR = not recommended because successful large scale establishment is difficult

NA = not available in Texas or not an appropriate method

it takes for the grass to establish. Table 1 shows the grass species suitable for Texas and the ways each can be planted. Table 2 has more detail on planting methods, quantity of planting material needed, and best planting season by method. If planting is contracted out, be certain to check the contract for the extent of services it specifies.

Seed. Seeding costs less than other planting methods. Warm-season grass seed germinates best when the temperature is 70 degrees F to 95 degrees F, so late spring to early summer is the

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Table 2. Types of planting material, methods, rates, and recommended season for planting.

Grass species	Established from	Method of planting	Quantity per 1000 sq ft	Best planting season
Bermudagrass	Seed	Broadcast	½ to 1 pound	Seed and sprigs: spring and early summer Sod: any time of year – best during spring, late summer and fall
	Sprigs	Broadcast or sprig 6 inches apart in 12-inch rows	5 to 10 bushels of sprigs	
	Sod	Solid planting staggered in a brick-like pattern	Same amount in square feet as area to be sodded	
St. Augustinegrass	Sod	Solid planting staggered in a brick-like pattern	Same amount in square feet as area to be sodded	Sod: same as above Plugs: spring and early summer
	2-inch plugs cut from sod or stolons	2-inch sod plugs on 12-inch centers; stolons on 12-inch centers	Cut sod pieces from 30 square feet of sod, stolons from 3 to 6 square feet of sod	
Centipedegrass	Seed	Broadcast	½ to 1 pound	Seed: spring and late summer to early fall Sod: same as above
	Sod	Solid planting staggered in a brick-like pattern	Same amount in square feet as area to be sodded	
Zoysiagrass	Seed	Broadcast	1 pound	Seed: spring and early summer Sod: same as above
	Sod	Solid planting staggered in a brick-like pattern	Same amount in square feet as area to be sodded	
Buffalograss	Seed	Broadcast	2 to 3 pounds	Seed: spring Plugs: spring and early summer Sod: same as above
	Plugs	2-inch sod plugs on 12-inch centers	Cut sod pieces from 30 square feet of sod	
	Sod	Solid planting staggered in a brick-like pattern	Same amount in square feet as area to be sodded	
Tall fescue	Seed	Broadcast	6 to 8 pounds	Sept. – Nov.
	Sod	Solid planting staggered in a brick-like pattern	Same amount in square feet as area to be sodded	Sept. – Apr.
Kentucky bluegrass	Seed	Broadcast	1.5 to 2 pounds	Sept. – Nov.
	Sod	Solid planting staggered in a brick-like pattern	Same amount in square feet as area to be sodded	Sept. – Apr.
Ryegrass	Seed	Broadcast	6 to 8 pounds	Sept. – Nov.

best time to seed bermudagrass and other warm-season turfgrasses. This will allow them to become well established before the growing season ends. Unlike bermudagrass, few types of seeded zoysiagrass and centipedegrass are readily available and these species grow much more slowly from seed than does bermudagrass. Seeded types of warm-season grasses are typically not available as sod, although there are a few exceptions. Many improved types of bermudagrass, buffalograss, zoysiagrass and St. Augustinegrass varieties do not produce viable seed and are available only as sod, plugs or sprigs. Cool-season grasses (Kentucky bluegrass, tall fescue, Texas bluegrass), where they are adapted, are best planted in the fall.

Information on the seed label is important. You can evaluate seed quality by reading the information on the label (see Fig. 1). The label gives the seed test date (which should be within 1 year of purchase) and the percent germination and purity. Both percent germination and purity should be as high as possible, with little weed seed and inert matter contained in the package. Buying “certified seed” ensures that the variety stated to be in the package is indeed the variety in the package. Low-priced seed is often the most costly because it may have a low percent germination and purity. Professional landscapers evaluate seed on the basis of the percent “pure live seed” (not on the label). This number is the product of the percent purity and the percent germination. For example, bermudagrass seed with 85 percent germination and 98 percent purity contains 83 percent “pure live seed” ($0.85 \times 0.98 = 0.83$). In contrast, bermudagrass with only 80 percent germination and 85 percent purity contains only 68 percent “pure live seed.” Make sure that the date of purchase is within 1 year of the seed test date. Seed should be stored in a cool, dry place to maintain viability.

Lot # BR549-98-0254 Very Good Grass Blend		
Kind	% purity	% germination
Golly Bermudagrass	49	85
BeGood Bermudagrass	24.5	85
Forever Bermudagrass	24.5	85
% Crop Seed	0.8	
% Inert matter	1.1	
% Weed seed	0.1	no noxious weeds
"Origin: AZ tested 4/10 sell by 4/10 John Doe Seed Company, Somewhere USA"		

Figure 1. A sample of information on a grass seed label.

Sod. Turfgrasses that spread by rhizomes and/or stolons can be grown and harvested as sod. Although sod costs more than seed, sodding may not cost more than seeding when the long-term cost of “growing in” seeded turf is considered. Seed usually requires more irrigation, fertilization, weed control and time than sod to become established.

Advantages of Sodding over Seeding

- The quickest way to establish turfgrass
- Gives immediate soil erosion control
- Eliminates problems with dust and mud
- Minimizes the need for weed control after planting
- Can be planted nearly year-round
- Can be used sooner than other methods
- Sod is available for some of the best turfgrass varieties
- Can be used for a total turf installation or the repair of smaller areas

The best time to sod is when the turfgrass is actively growing so the sod will root or “knit” down as quickly as possible. As with seed, buying certified sod, if available, is the best way to be sure you are getting the stated variety.

Before ordering or purchasing sod, be sure you are prepared to install it and can irrigate it adequately. Sod is perishable, so plant it right away; it should not remain on the pallet or stack longer than 36 hours (less in hot weather).

Sod has traditionally been sold by the square yard, though the trend now is to sell it by the square foot. To determine the amount of sod you will need, measure the square feet of the area to be planted, then divide the total square feet by 9 (the number of square feet in a square yard) to calculate square yards. There are 111 square yards per 1,000 square



Figure 2. Sod pieces stacked on a pallet awaiting installation.

feet. Sod is usually delivered on pallets that contain 50 square yards (450 square feet). There is some waste in installation because of odd shapes and irregular pieces, so order a bit more than you will need, based on the recommendation of the sod producer or landscaper.

Sprigs. Sprigs are harvested from turfgrasses that spread by stolons. Sprigs may come in bags for small jobs or in bulk for large jobs. They are planted by uniformly distributing them over the site and then setting them into the ground with specialized equipment. Sprigging is used primarily to establish hybrid bermudagrasses. Sprigging costs more than seeding but less than sodding. Sprigs are sold by the bushel. A bushel of sprigs is approximately equal to 1 square yard of shredded sod. Sprigs should be planted in the spring or early summer so the grass will get established quickly.

Sprigs are perishable and must be planted as soon as possible after harvest. Sprigging requires a good irrigation system because sprigs must be watered diligently to keep them from drying out as the grass is growing in. Bermudagrass sprigged at 5 bushels per 1,000 square feet should cover in 2 months or so with good growing conditions; zoysiagrass may require an entire growing season and, for that reason, is rarely sprigged. After planting, the sprigs may be covered with a thin layer of topsoil to help them get established. Since the sprigging is initially sparse, weed control will likely be necessary once the grass is mature enough to tolerate herbicides labeled for this use.

Plugs. Relatively small areas can be established or repaired with plugs of grasses that spread by stolons, such as bermudagrass, centipedegrass, St. Augustinegrass or zoysiagrass. Plugging can be done at any time during the growing season when adequate moisture is available. The proper distance between plugs depends on the rate of growth and on how soon you want the grass to reach 100 percent ground cover. St. Augustinegrass plugs 4 inches in diameter planted 2 feet apart should completely cover within 3 months if adequately watered and fertilized. Plugs must be firmly pressed into the soil and then rolled to give a smooth surface for mowing. Plugs can be obtained by cutting up sod pieces or by taking plugs from healthy turf areas and then backfilling those areas with topsoil. Most sod producers do not market plugs.

Steps to Follow before Planting

1) **Select a grass.** The availability of sod, sprigs and plugs of particular grass species or varieties varies by region. Seed of specific grass varieties may be hard to locate, since garden

centers usually carry only a few seed varieties of each species. Refer to Extension publication L-, "Turfgrass Selection," (available from <http://agriflifebookstore.org>) to select grasses best suited for your area.

- 2) **Target the date of planting and work backward to schedule the preparation that must be done before planting.** Turfgrasses should be planted when temperature and moisture are most favorable. This will be different for cool-season and warm-season grasses. See Table 2 for the approximate best planting dates for various grass species and planting methods.
- 3) **Measure the lawn area.** Measure to determine the total square feet to be planted and, thus, the amount of material or seed to purchase. You will also use the total square feet of the planted area to purchase fertilizer. Fertilizer recommendations are based on the number of pounds of nutrients needed per 1,000 square feet or per acre.
- 4) **Test the soil.** Texas soils are often deficient in the major nutrients required for turf. East Texas soils normally are deficient in nitrogen, phosphorus and potassium, and require lime to adjust the acidity of the soil. Soil testing will determine whether the soil pH and nutrient levels are in a range favorable for turf growth. The soil test report will tell you how much fertilizer needs to be applied before planting. Fertilizer should be tilled into the upper 4 to 6 inches of the soil. Soil sample boxes and soil analyses are available through your county office of the Texas AgriLife Extension Service. You may also send soil samples directly to Extension's Soil, Water and Forage Testing Laboratory (<http://soiltesting.tamu.edu/>). Allow 2 to 4 weeks to get the results from the soil testing lab.
- 5) **Control perennial weeds.** Perennial grassy weeds (e.g., bermudagrass, dallisgrass) detract from the appearance of new turf, compete with newly planted grass, and are difficult to selectively control with herbicides after the turf is established. Control grassy and broad-leaf weeds before planting by applying a non-selective, systemic herbicide (such as glyphosate). Two applications 4 to 8 weeks apart may be necessary to control perennial grassy weeds. Glyphosate has no soil residual and planting can be done 7 days after its application. However, weeds are best controlled when they are actively growing, which may not be until late spring. Controlling them may delay the planting of grass.

- 6) Prepare the soil and grade the site.** Turfgrasses are healthier, need less water, and tolerate environmental stress better if they are grown in a deep, non-compacted soil. A soil depth of 10 to 12 inches is preferred. If topsoil depth is not an issue, grade the seedbed so the surface will drain away from the house, walks and driveways. A fall of 6 inches for every 40 to 50 surface feet is adequate for drainage. Make sure there are no pockets or depressions in the surface. Take care not to direct excessive water onto neighboring properties. Subsurface drainage systems are sometimes needed to remove excess water from poorly drained sites.

In many parts of Texas good topsoil is a scarce commodity. If significant grading is required, stockpile the topsoil to the side of the property while grading the subsoil; then redistribute topsoil evenly over the area. If the topsoil is not deep enough, bring in good topsoil (a loam or sandy loam soil is best) to build up the native soil. Construct the site to avoid steep grassed slopes, as they are difficult to maintain. Do not indiscriminately add soil over tree roots without first seeking advice from a professional horticulturist. You may need to build a retaining wall a good distance from the tree trunk to avoid harming the tree. Be sure to remove all debris such as stones, tree stumps and construction debris. Then you are ready to till the soil.

Compacted soils are usually not tilled before planting, even though they should be. Proper tillage requires the right equipment to do well and the soil settling process afterward takes time, so this important step is often skipped. Instead, compacted soils are often buried beneath a small amount of surface tillage or a shallow layer of topsoil or sand. If your soil is compacted, make every effort to till it deeply (scarify, chisel plow or rototill) so it does not become a permanent barrier to water flow, soil aeration and rooting. Do not till the soil when wet, as this will further compact it. After tilling, wet the soil to settle it; then let it dry. Repeat the wetting and drying cycle several times until the loosened soil has settled and you can determine whether further surface grading is necessary.

It may or may not be necessary, or practical, to till in soil amendments (organic matter) to improve the soil before planting. If organic matter is needed, till it in before the final grading of the topsoil. Organic matter (composts, well-decomposed hardwood sawdust, or similar

material) should be thoroughly mixed into the top 4 to 6 inches of the seedbed. Rotary tilling is a good way to accomplish this.

Intensively used sports fields (football, soccer, baseball) may need special preparation so the soil will resist compaction and drain well. Sports fields are often built with soil mixes that contain a high percentage of sand and that have been laboratory tested by qualified soil scientists.

- 7) Install the irrigation system.** If you will have an in-ground irrigation system, install it before the final grading. Soil disturbed by trenching will then have time to settle with repeated irrigation. Be certain to use qualified and licensed irrigation designers and installers. Irrigation heads should be at the same level as the final grade if you are seeding, and $\frac{1}{2}$ to $\frac{3}{4}$ inch above the final grade if you are sodding.

- 8) Add pre-plant fertilizer and amend soil pH.** The soil test report (from step 3) will suggest the types and rates of fertilizers for the new turf. Most turfgrasses prefer a soil pH near neutral, in the range of 6.0 to 7.0. The soils in East Texas have a tendency to be acidic and may need liming to adjust the pH. Only a soil test can determine the need for lime. In much of Texas, the soil pH is above 7. While sulfur can be used to lower pH, the amount of sulfur needed and the effort required make it impractical to do so on such a large scale.

Starter-type fertilizers typically have more phosphorus than nitrogen and potassium and their N, P₂O₅, K₂O nutrient ratios are about 1:2:1. If the soil test shows that a site is deficient in phosphorus, adding a starter-type fertilizer at planting might be beneficial. If no soil test was done, apply 1 pound of nitrogen, 1½ pounds of phosphate, and 1 pound of potash per 1,000 square feet. This should be mixed into the top 4 to 6 inches of soil.

- 9) Irrigate to settle the soil.** If the site was tilled again to amend the soil, irrigate it several times, allowing the soil to settle. This will identify low spots that may need to be re-graded before planting.

- 10) Do the final soil preparation.** Walks and driveways should be flush with the final soil grade before planting. If planting with seed, sod or plugs, the soil should be rolled to firm the soil surface and then lightly raked to leave a corrugated surface. A well settled and firmed soil helps prevent ruts from mower tires and foot traffic while grass is growing in. If the site is

to be sprigged, firm the soil but leave the soil surface slightly loosened in the upper 1 to 2 inches. This allows the sprigs to be set into the soil and helps them take root. Make certain the final soil preparation is done in time to receive delivery of sod, sprigs or plugs.

Planting Tips by Method

Seeding. Seed can be sown by hand but it is better to use seeders or spreaders. Divide the seed required for a specific area into two equal parts, one to be broadcast as you walk back and forth in one direction, the second to be sown as you walk

at right angles to the first seeding. This will make the seed distribution uniform. After seeding, roll the area with a weighted roller so the seed will have good contact with the soil. Landscape professionals may offer hydro-seeding as

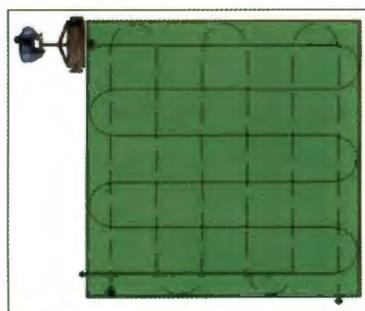


Figure 3. Pattern for seed distribution.

an alternative. Hydro-seeding equipment mixes seed, fertilizer and mulch in a water tank to form a slurry that is then uniformly sprayed on the area prepared for seeding.

Sprigging. When sprigs are broadcast over an area the grass covers more quickly and is more uniform than when sprigs are set in rows. Do not cover sprigs too deeply with soil because you must leave part of the sprig (or stolon) above the soil to produce new shoots and roots. In repairing smaller areas, or where sprigs do not get set into the soil, sprigs can be covered with a thin layer of topsoil to enhance rooting. Sprigging can take place at any time during the growing season when there is adequate moisture from irrigation.

Plugging. The proper spacing between sod plugs depends on the grass species and how soon a 100 percent ground cover is desired. St. Augustine-grass plugs (4-inch diameter or square) planted on 2-foot centers will grow together within 3 months if adequately watered and fertilized.

Sodding. The firm soil surface should be free of footprints, stones, depressions and mounds. Sod is perishable and should be installed within 36 hours of harvest. If you see mildew or yellow grass leaves as you pull the pieces off the pallet, it is evidence of "sod heating" injury, which happens when sod is left on the pallet too long. Do not plant such sod.



Figure 4. Sod installation.

To reduce the need for short pieces when installing sod, it is generally best to establish a straight line lengthwise through the lawn area. Lay the sod on either side of the line with the ends staggered in a brick-laying pattern. If the terrain slopes significantly, place the sod strips perpendicular to (across) the slope. On severe slopes the sod may need to be staked until it roots to prevent it from slipping during heavy rains.

A sharpened concrete trowel is very handy for cutting sod pieces, forcing the pieces tightly together, and leveling small depressions in the soil. Make certain to butt each sod piece up against the others as tightly as possible when laying the sod. Immediately after planting the sod, roll it with a weighted roller.

Keep the sod moist until it is well-rooted into the soil. If the sod dries soon after transplanting, it will tend to shrink and separate from adjoining pieces, leaving gaps where weeds can grow.

Care after Planting

Mulching. Mulching is a common practice on cool-season grasses but not on seeded warm-season grasses such as bermudagrass or buffalograss, since heavy mulch blocks out sunlight needed for warm-season grass seed to germinate. However, hydro-seeding may include a layer of hydro-mulch to stabilize the soil surface and aid germination.

Watering. Newly seeded or sprigged turf should be watered frequently. The first few weeks are especially critical as the plants begin to send out new roots and shoots. If young plants are allowed to dry out, they may die. Keep the seed or sprigs and the soil moist, not saturated, during this initial grow-in period. This may be difficult to monitor in large landscapes, since it will take awhile for an irrigation system to cycle through all irrigation zones. It may be necessary to water four or five times for short periods on hot, windy days. After about 2 weeks, seedlings should be growing (germination time varies with species) and sprig roots should be developing. Watering amounts and frequency can be adjusted as seed and sprigs mature.

After planting sod, water enough to ensure that the soil under the sod is wet to a depth of 2 or 3 inches. Roots develop fairly rapidly under good growing conditions and with good watering practices. Avoid overwatering, as roots do not grow as quickly in saturated, oxygen-deficient soil. Water newly sodded areas as you would established turf, except more frequently. Each time the sod begins to dry out, water to a depth just beyond the depth of the root system. After 2 weeks or so, begin to increase the amount of time between waterings.

Mowing. Allow the turf grass to grow one-third to one-half higher than the desired mowing height before beginning to mow. Sodded sites will be ready for mowing sooner than others. Seeded or sprigged sites should not be mowed until they can tolerate the mowing without damage and have covered well enough that the mower wheels will not create ruts. The recommended turf mowing heights will determine how frequently to mow. Keep mower blades sharp. Dull mowers can dislodge or damage young seedlings.

Fertilizing. If fertilizer was applied before planting and the area was planted during the active growing season, then apply nitrogen fertilizer at a rate of $\frac{3}{4}$ to 1 pound of nitrogen per 1,000 square feet when new growth from seedlings or sprigs reaches a height of 1 $\frac{1}{2}$ to 2 inches. Thirty days after this application, begin to follow a maintenance fertilization program. Refer to Extension publication E-437, "Lawn Fertilization for Texas Warm-Season Grasses," (available at <http://agrillifebookstore.org/>) for fertilizer rates and application timing for established warm-season lawns.

Controlling weeds. Newly seeded, sprigged or plugged areas may become weedy before they are completely covered with grass, as weeds are opportunistic, quick to germinate, and grow in the absence of turf competition. While grass is growing in, the safest way to control weeds is hand weeding. Help the grass compete against weeds by giving it adequate fertilization and irrigation and by mowing frequently. Regular mowing can help keep summer annual grassy weeds in check until grass plantings mature enough to tolerate post-emergence herbicides. Different types of grasses tolerate selective herbicides differently. It is best not to apply an herbicide until after the second or third mowing, when grass should be mature enough to tolerate it better. Always select an herbicide labeled for use on your grass species and read and follow the label guidelines.

Sodded areas have few if any weed problems after planting if good quality weed-free sod is used.

Fully Established Turf

A turf is well established when the grass can express the true characteristics of the species. It is often assumed that a lawn is "established" when it covers the ground completely. However, grass planted from seed or sprigs can reach total ground cover, under good care, in 60 days but still be more at risk from drought or heavy traffic than more mature grass stands. For seed, sprigs and plugs it takes about a year from the date of planting to consider the lawn truly established. Planting sod significantly speeds up the establishment process.

Overseeding Warm-Season Grasses for Winter

Overseeding bermudagrass turf for winter color is another type of turf establishment used on sports turf, golf courses, and commercial lawns. However, it is not necessary. Overseeding should be done only on fully established turf. Overseeding is typically done in the fall about 5 to 8 weeks before the expected first frost date. The turfgrasses most commonly used for overseeding are varieties of perennial ryegrass, intermediate ryegrass, and improved turf-type annual ryegrass. Perennial ryegrass is generally the preferred choice for winter quality. The rate for ryegrass overseeding ranges from 5 to 10 pounds of seed per 1,000 square feet, depending on the type of turf. The most important issue associated with overseeding is the time known as "spring transition," when the turf is changing from the actively growing overseeded grass back to pure bermudagrass. Ideally, the overseeded grass will die out gradually as temperatures begin to warm and bermudagrass begins to green up. As the overseeded grass thins, bermudagrass takes its place. But in many years temperatures do not warm soon enough for the overseeded grass to thin out, so it delays the spring recovery of bermudagrass. When this happens, it is not uncommon for the overseeded grass to die quickly in mid- to late spring, leaving behind a thin and weak bermudagrass turf. This is a concern more with the perennial ryegrasses than with improved turf-type annual ryegrasses.

