A stolon is an aboveground lateral stem, commonly referred to as a runner. A rhizome is a below-ground lateral stem.

Both these structures are likely to have nodes, which can produce a whole new plant. These lateral stems are organs that store carbohydrates for the plant's survival during periods of dormancy. Once favorable weather returns, the nodes produce new plants.

A tiller is a new plant produced at the base of the original plant. This is the slowest method of spreading. These grasses form clumps and are sometimes called bunch grasses.

Table 8.2. Types of lateral stems for various grasses.

Variety	Rhizome	Stolon	Tiller
Bermudagrass	X	X	
Buffalograss		X	
Centipede		X	
Fescues			X
Kentucky bluegrass	X		
Ryegrasses			X
St. Augustinegrass		X	
Texas bluegrass	X		
Zoysiagrass	X	X	

Very few of the 500 grass species that grow in Texas are suitable for use as turfgrasses in home lawns. Turfgrasses are distinguished from other grasses in that they can withstand frequent mowing. Because the growing points for turfgrasses—the crown tissue and nodes on stolons and rhizomes—are located at ground level or lower, turfgrasses are not killed when they are mowed regularly.

The choice of turfgrass depends on the geographic location, amount of water available for irrigation, amount of shade present, time and money to be spent for lawn establishment, and uses planned for the lawn.

Texas warm-season turfgrasses

The most practical, widely used, and recommended warm-season grasses for lawns are common bermudagrass and St. Augustinegrass.

Buffalograss is suggested for the Blackland areas of Texas and where irrigation is limited. Centipede grows on sandy soils in East Texas. Zoysia can be used statewide where its maintenance requirements are met.

Bermudagrass

The most widely used turfgrass in Texas is bermudagrass. It is a narrow-leaved, vigorous perennial that originated in Africa. A warm-season grass, it goes dormant in cool fall weather and "greens up" when warm spring weather returns.

Bermudagrasses are all fairly salt tolerant, but none can withstand any significant shade. They start growing in the spring when soil temperatures reach 60 degrees F. As a group, they are aggressive, spreading both by rhizomes and stolons. When a lawn is bermudagrass, there is an almost constant need to edge sidewalks and trim around trees, shrubs, fences, and buildings.

Bermudagrass used as turf:

- Does not grow well in light shade and is not adapted at all in medium to dense shade
- Turns brown after frost in the fall and with continued low temperatures does not become green until after the last spring freeze
- Is more of a nuisance in flower beds and gardens than are other turfgrasses because of its stolons and rhizomes
- Is subject to scalping when seldom mowed

Common bermudagrass: A fairly wide-bladed bermudagrass, common bermudagrass can be established from seed. It needs fairly little maintenance and can survive with little water and fertilizer. Although the best cutting height is 1½ inches, it can be maintained at slightly lower heights if cut often. It does not produce thatch.

Disadvantages to common bermudagrass include its production of unsightly seed heads, especially for people with allergies. Because it is so easy to start from seed, bermudagrass is not readily available as sod, which is a section of the grass surface that includes matted roots and some soil.

Common bermudagrass is used for many home lawns, athletic fields, and other moderate- to low-maintenance areas.

Bermudagrass established from seed

More than 20 "named" seeded varieties of bermudagrass are available. They tend to have a finer texture and provide a denser turf than does common bermudagrass, but not as fine as 'Tifway'. Because so many seeded bermudagrass varieties are available, nurseries usually do not carry them all. Each garden center carries only a few varieties unique to its suppliers.

Examples of seeded bermudagrasses include 'Arizona Common', 'Blackjack', 'Blue-muda', 'Contessa', 'Jackpot', 'LaPaloma', 'Majestic', 'Mohawk', 'NuMex Sahara', 'Panama Princess 77', 'Pyramid', 'Riviera', 'Savannah', 'Shanghai', 'Shangri-la', 'Southern Star', 'SR 9554', 'Sunbird', 'Sundevil II', 'Sunstar', 'Sydney', 'Transcontinental', 'Veracruz', and 'Yukon'.

Bermudagrasses established only vegetatively by sod sprigs or plugs

The hybrid, or vegetative bermudagrasses—those planted only as sod or sprigs (small grass plants) and not available as seed—are usually darker green, finer textured, and more aggressive than the common-type bermudagrass varieties.

The disadvantages of hybrid bermudagrasses are that they require more maintenance, mowing, and nitrogen than do the common bermudagrasses.

Examples of hybrid or vegetative bermudagrass available from Texas sod producers include 'Baby'; 'Celebration'; 'Common'; 'GN-1'; 'Tifgreen', sometimes referred to as '328'; 'TifSport'; 'Tifton 10'; and 'Tifway', sometimes referred to as '419'.

Hybrid bermudagrasses are better adapted for use on golf course fairways and sports fields than for home lawns.

Zoysiagrass

Zoysiagrass is native to Asia. Not as shade tolerant as St. Augustine, it is wear resistant and more cold tolerant than bermudagrass. Although it has a fairly low growth rate, zoysiagrass forms a strong, dense turf and spreads by both rhizomes and stolons.

Once established, this grass has low to moderate maintenance requirements because it does well with low to moderate amounts of nitrogen fertilizer annually. If maintained with more fertilizer applications, it may need to be mowed as often as a hybrid bermudagrass.

The disadvantages of zoysia are that is spreads more slowly to fill in damaged areas than do bermudagrass and St. Augustine, and it requires a longer grow-in period for sod or plugs, which are small clumps of sod, soil, and grass plants.

Zoysiagrass is used for home lawns and golf courses.

Differences between Zoysia japonica *and* Zoysia matrella

Two main types of zoysia grasses are used for turfgrasses in home lawns: *Zoysia japonica* and *Zoysia matrella*.

Compared to *Z. matrella*, varieties of *Z. japonica* generally have wider leaf blades, are lighter green, and have more cold tolerance but less shade tolerance. The *Z. matrellas* have finer blade than do the *Z. japonicas*, and they perform best at mowing heights near 1 inch or less.

'Emerald' is hybrid developed by crossing two zoysiagrass species. 'Emerald' is dark green and very fine textured with good shade tolerance.

Most of the improved zoysiagrass varieties are propagated vegetatively as sod because they do not produce viable seed. These can also be established by planting plugs on 12-inch centers that will eventually grow together.

Improved vegetative *Z. japonica* grasses available from Texas sod producers include 'Crowne', 'El Toro', 'Empire', 'GN-Z', 'Jamur', and 'Palisades'.

Improved vegetative *Z. matrella* grasses available from Texas sod producers include 'Cavalier', 'Royal,' 'Zeon', and 'Zorro'.

Only a few seeded-type zoysiagrasses are available, and they are likely difficult to locate. Seeded types require warm, well-prepared soils to germinate, and they establish lawns much more slowly than do seeded bermudagrasses. Two seeded types are 'Zenith' and 'Compadre'.

St. Augustinegrass

Native to the West Indies and the Texas Gulf Coast, St. Augustinegrass is widely grown in the warm, humid parts of the United States. Its best attribute is its outstanding shade tolerance. All St. Augustinegrass varieties have wider leaf blades than those of most other turfgrasses.

However, St. Augustinegrass does not tolerate wear well, which may make it undesirable for heavily trafficked lawn areas.

St. Augustinegrass is usually established by sod; plug establishment is uncommon. It spreads quickly by stolons. The major varieties of St. Augustinegrass are 'Common,' 'Floratam', 'Palmetto', 'Raleigh', and 'Seville'.

'Common': A coarse-textured grass, this variety is as cold tolerant as any other St. Augustinegrass, but it does not survive at temperatures as low as those bermudagrass tolerates.

Disadvantages of 'Common' St. Augustinegrass are that it is susceptible to chinch bug damage, St. Augustine decline (SAD), and fungal diseases such as large brown patch and gray leaf spot. Compared to bermudagrass, it needs more water and is more susceptible to iron chlorosis, or yellowing leaves.

'Floratam': This fast-growing, broadleaved variety was released by the University of Florida and Texas A&M University. 'Floratam' is thought to have the best drought tolerance of all St. Augustinegrass varieties. It resists SAD and has been resistant to chinch bug attacks, although some chinch bugs recently have been found feeding on 'Floratam' in some Texas locations.

Disadvantages of 'Floratam' are that it does not have the shade or cold tolerance of the 'Common' or 'Raleigh' varieties. It is recommended only for the Gulf Coast area.

'Palmetto': Palmetto is a relatively new St. Augustinegrass variety that is reported to have improved tolerance to shade, cold, and drought. Its resistance or susceptibility to SAD has not yet been established.

'Palmetto' is just as susceptible to brown patch and gray leaf spot as are the other St. Augustinegrass varieties.

'Raleigh': This North Carolina State University release has SAD resistance and greater cold tolerance than 'Floratam'. 'Raleigh' looks much like 'Common' St. Augustinegrass. However, 'Raleigh' appears to be more susceptible to brown patch and gray leaf spot diseases than are either 'Floratam' or 'Common' St. Augustinegrasses.

'Seville': This dwarf-type St. Augustinegrass should be used only in the southernmost parts of the South. It can resist SAD. 'Seville' does not have the cold tolerance of the 'Common' or 'Raleigh' varieties.

Other recently released or newly marketed St. Augustinegrass varieties include 'Amerishade', 'Delmar,' and 'Sapphire'.

New St. Augustinegrass varieties occasionally become available on the marketplace. To evaluate a new variety, consider the following, depending on your Texas location:

- Compared to the other varieties, does it better resist common pests such as SAD, chinch bug, brown patch, and take-all root rot?
- Is it more tolerant of cold, heat, drought, and shade?

Answers to these questions should help determine whether a new variety of St. Augustinegrass is better than the old ones in a particular area of the state.

Buffalograss

Buffalograss is native to the North American Great Plains from Texas to Canada. It is a warm-season turfgrass that spreads by stolons. Buffalograsses have fine leaf blades, and most varieties are bluish green.

The turf formed by buffalograss is less dense than that of bermudagrass, and if left unmowed, it does not reach more than about 6 inches tall. It can survive extreme drought but may turn brown during dry summers and green up gradually after rain returns.

Buffalograss can be used for parks, golf course roughs, or other low-maintenance areas. The "native" environment for buffalograss is in areas with annual precipitation of about 25 inches or less. If irrigated above that level, buffalograss loses its native competitive advantage, and the lawn usually gets weedy. Common bermuda can be a serious "weed" problem in buffalograss.

Buffalograss is established from seeds called "burrs," which are larger than other grass seeds. Few seeds are produced, making them expensive. Buffalograss is the only turfgrass that is dioecious, which means that there are male and female buffalograss plants. The male flower is produced on the end of a stalk, while the female flower is produced at the base of the plant.

Used as a mowed turf, buffalograss:

- Tolerates infrequent mowing
- Is not aggressive and is easily removed from flower beds and gardens
- Tolerates drought very well

Buffalograss grows best in heavy, well-drained clay soils with a slightly alkaline soil pH. It does not grow well in sandy or acidic soils. Its biggest enemies are overwatering and overfertilizing. Buffalograss does not persist in shade. Its shade tolerance is about the same as bermudagrass, which is poor.

Compared to the other more commonly used grasses, buffalograss is not as readily available as sod because it is produced by only a few growers.

Varieties: The more commonly available varieties produced as sod in Texas are 'Prairie', '609', and 'Density'. 'Tech Turf' is planted from plugs, not sod. Seeded buffalograss varieties include 'Common', 'Texoka', 'Commanche', 'Plains', and 'Topgun'.

Centipedegrass

Centipedegrass often is called the "lazy man's grass." Under low fertility, centipedegrass is easy to mow and tolerates irregular or infrequent mowing without significant scalping. It has a creeping growth habit. The leaf width and the color are intermediate between bermudagrass and St. Augustine.

Because it produces only surface stolons, centipede is easy to control in a landscape. In shade tolerance, it is better than bermudagrass and worse than St. Augustine. Although it requires fertilizer for an attractive appearance, centipede needs significantly less annual nitrogen than does bermudagrass or St. Augustine.

Centipede is adapted to the sandy, well-drained soils of East Texas. It often performs poorly in alkaline soils.

Varieties: Centipedegrass is available as seed and sod of the older 'Common' and the newer 'TifBlair' varieties.

Texas cool-season turfgrasses

Cool-season perennial grasses are used successfully as lawn grasses in North Texas and where irrigation is available in the state's higher altitudes. Cool-season grasses, typically the ryegrasses, are planted into established bermudagrass to function as a "winter overseeding" for year-round green.

Tall fescue

Tall fescue is a cool-season or northern turfgrass. If managed correctly, it is tough enough to tolerate southern summers in the Upper South and be used as a permanent lawn. Tall fescue is

one of the most heat- and drought-tolerant northern grasses. Because it is a bunch-type grass and spreads only by tillers, it requires little edging and does not invade flower or shrub beds.

Tall fescue's greatest advantages are its abilities to grow well in moderate shade and to easily survive winters in the South. Plus, it stays green all winter. Tall fescue grows best during spring and fall. Watering every 3 or 4 days during summer should be enough to keep it from going brown in the summer heat.

A disadvantage is that additional watering during the warmer times of the year increases the potential for fungal disease. To improve heat tolerance, mow at 3 inches or higher in the summer.

The old standard tall fescue variety, 'K-31', which originated as a forage grass, is still available. But many new varieties have much finer leaf texture than 'K-31' and are often referred to as "turf-type" tall fescues. These tall fescues are more heat and shade tolerant than are the older types.

About 70 varieties of turf-type tall fescues are available in the marketplace. For best results, use a blend of three or four tall fescues.

Ryegrasses (perennial, intermediate, and improved annual types)

Perennial and annual ryegrass can be grown as temporary cool-season turfgrasses throughout Texas. In the Texas Panhandle, perennial ryegrass can be used as a permanent turfgrass if it is irrigated.

The perennial ryegrasses are fine-leaved bunch grasses that spread by bunch-type tillers. They are best adapted to cool, moist environments that are not found in West Texas. They are well suited for the northeastern and northwestern United States.

Perennial ryegrass may also provide a permanent turfgrass in the transition zone between the northern and southern regions. But in humid areas it must be managed with fungicides to overcome summer fungal diseases.

Disease pressures are lower in semi-arid to arid climates. However, despite the name, perennial ryegrass acts as cool-season annuals and ***not*** as perennial turf in most parts of Texas.

Although perennial ryegrasses grow in a wide range of soil conditions, they favor moist, well-drained, fertile soils. Ryegrasses have little drought tolerance and must be irrigated during dry spells. To improve their persistence in southern climates during the summer, plant them where light to moderate shade reduces the extreme heat.

The types of ryegrass are perennial, intermediate, annual, and the turf-type improved annual ryegrasses. In Texas, all kinds of ryegrasses can be used for temporary grass cover during fall and winter.

Because they quickly establish from seed, ryegrasses are ideal protection against erosion on newly prepared sites in the fall. As an overseeded grass, they also provide temporary green color in winter when bermudagrass is dormant.

Ryegrasses have become very popular for overseeding athletic fields, golf courses, and lawns during winter. The improved turf-type perennial ryegrasses persist, resist diseases, and tolerate cold and wear better than do the annual types. The new varieties also have better turf characteristics—finer texture, greater density, darker color, and better mowing qualities.

However, they may persist too long into the spring and delay the recovery of bermudagrass. When used for overseeding, the planting date can be critical for success (see the section on overseeding).

In the High Plains of the Texas Panhandle, perennial ryegrass can be used as a permanent turfgrass on golf courses and athletic fields, and in mixtures with bluegrass on lawns.

Perennial ryegrasses: At least 75 improved ryegrass varieties are available commercially. Most of the modifications to perennial ryegrass have been to improve its density, texture, color, and stress tolerance.

Intermediate ryegrasses: These grasses have been developed to overseed bermudagrass for winter play and color. They have the turf quality and reduced winter mowing requirement of perennial ryegrasses but do not persist in spring to inhibit bermudagrass recovery. Several varieties are available to choose among.

Improved annual ryegrasses: Compared to normal annual types, improved annual ryegrasses need less mowing in the winter and have better texture, density, and color. Winter overseeded bermudagrass has a more predictable spring transition back to bermudagrass. There are only a few varieties, including 'Axcella,' 'Axcella II', and 'Panterra'.

Kentucky bluegrass

Kentucky bluegrass is a fine-leaved, rhizomatous perennial turfgrass widely used for lawns in the northern states. In Texas, it is used mainly in the Panhandle on irrigated sites.

In the more humid areas of Texas, bluegrass is thinned out by diseases. Kentucky bluegrass is particularly susceptible to fusarium, brown patch, powdery mildew, and leaf spot diseases. Its use as a general lawn grass is not recommended in the state's more humid areas.

Varieties: Many improved Kentucky bluegrass varieties are commercially available. For best results, use a blend of three or four varieties.

Texas bluegrass

Texas bluegrass hybrids are the result of crossbreeding between native Texas bluegrass and Kentucky bluegrass. The resulting cool-season grass does well in heat and sun.

If Texas bluegrass becomes more available, it will be a suitable alternative to turf-type tall fescue. Texas bluegrass can provide year-round green lawns for the upper south. Texas bluegrass hybrids appear suited to Upper Central Texas and southern Oklahoma.

Texas bluegrass hybrids reportedly need less water than do other cool-season grasses. Good drainage is a must: They do poorly when watered often.

'Reveille', a variety developed by Texas A&M University, has shown good adaptation in home lawns and commercial and industrial parks. 'Reveille' has a medium texture, an appealing green color, resistance to powdery mildew and fall armyworm, and moderate resistance to rust and white grub.

However, the availability of this grass has been questionable. Other Texas bluegrass varieties are likely to be developed.

Varieties available: The marketplace has not yet embraced Texas bluegrass as having significant value over tall fescue in northern Texas. So there has not been the incentive to produce as sod or market as seed.

Lawn establishment

Unlike for flower beds, the soil under a lawn is rarely modified. But the quality and depth of soil can greatly influence the amount of maintenance needed for a good, dense cover of turfgrass.

Much can be done during lawn establishment to make certain the lawn persists at an acceptable level of quality. Turfgrass needs a fine, firm soil and a good after-planting care and maintenance program. Avoid taking shortcuts.

Regardless of the establishment method—whether by seed, sod, or sprigs—the preparation of the bed is the same:

1. Select the proper type of grass and variety, and locate a provider of seed or sod such as a landscaper or sod producer.
2. Decide when to plant and calculate backward to allow enough time to complete the steps below.
3. Have the soil tested.
4. Control perennial grasses and broadleaf weeds.

5. Grade and till the soil.
6. Apply soil modification if needed.
7. Apply fertilizer and adjust the soil pH according to the soil test recommendations.
8. Make the final soil preparations before planting.
9. Plant the seed, sod, sprigs, and/or plugs.

Preparing the soil

The first step in preparing a new turf area is to remove all debris, such as stones, tree stumps, and construction debris.

In many instances, the character of the soil must be altered to make the long-term lawn care easier and better for the health and persistence of the lawn. The best soil for turf is a sandy loam soil high in organic matter.

If the original surface soil is heavy clay, it may be impractical to alter its nature, but organic matter can be added. This organic matter can be composted manure, well-decomposed hardwood sawdust, or a similar material. Thoroughly mix the organic matter in the top 4 to 6 inches of the seedbed. This mixing can be done by repeated cultivation operations such as roto-tilling.

Also, grade the area properly to provide surface drainage. Grade it so that the lawn slopes away from all buildings. This will prevent water from standing near foundations after excess rainfall.

Firm the soil surface with a walk-behind roller (available at equipment rental stores) and make sure the lawn has no low areas that can trap water from irrigation and rain. Areas that tend to hold water stay wet too long, making it difficult to maintain a quality stand of turfgrass.

After working the soil, irrigate it to encourage any settling before planting.

How much soil is needed to establish and maintain a lawn? The answer is "the deeper the better"... 12 inches or more is preferred. But even deep soil can be unable to grow plants. For example, it will be unusable if it has been compacted severely during home construction. Lawns are often planted without this problem being corrected. Compacted soil is commonly covered up with a small amount of surface tillage or a shallow layer of sand.

Before planting, break up the compacted soil by tilling it. Otherwise, rooting will be disrupted, which limits water and nutrient absorption and overall turf performance.

Seeding

The least expensive way to establish turf is by seed. Because the cool-season turfgrasses germinate best at temperatures from 60 to 75 degrees F, the best time to seed cool-season turfgrasses is in late summer to early fall as the soils cool.

The second-best but considerably less desirable time is in mid to late spring. However, new roots of cool-season grasses do not grow well in warm soil.

Warm-season turfgrasses are the opposite of the cool-season turfgrasses in their reaction to temperature. The best temperature range for seed germination of warm-season grasses is from 70 to 95 degrees F. Therefore, depending on the location, late spring to early summer is the best time to seed bermudagrass and other warm-season turfgrasses.

Not all turfgrasses produce viable seed; those that do may not produce enough to be profitable, or the seed may not "come true." This means that the plant produced from the seed will not necessarily look or act like its parent. Examples of turfgrasses that can be propagated only vegetatively are listed in this chapter under each grass type.

To evaluate seed quality, read the seed test information on the seed container. The seed test date should be within 1 year of purchase. Look for high germination and purity and a low weed and inert matter content. Buying certified seed ensures that the variety desired is indeed the variety bought. (Fig. 8.4)

SUN & SHADE MIX
GRASS SEED MIXTURE

Pure Seed	Variety/Kind	Germination	Origin
29.74%	Abbey Kentucky Bluegrass	87%	OR/WA
29.66%	Fenway Creeping Red Fescue	87%	OR
19.69%	Divine Perennial Ryegrass	90%	OR
19.69%	Enchanted Perennial Ryegrass	90%	OR

Other Ingredients

0.15%	Other Crop Seed
1.06%	Inert Matter
0.01%	Weed Seed

Noxious Weed Seeds: None Found
Net Weight 3 Lb (1.36 KG.)

Figure 8.4. Seed label.

Although hand-sowing can be satisfactory, it's better to use a small seed spreader. To improve distribution, divide the seed into two equal parts, one to broadcast as you walk back and forth in a given direction (such as lengthwise across the lawn), the second to sow as you walk back and forth at right angles to the first seeding.

Sodding

Any turfgrass that spreads by a rhizome or stolon can be grown and harvested as sod. Although sod initially costs more than seeding, it may cost no more than seeding when the long-term cost of "growing in" seedling turf is factored in. Compared to sod, seeding usually requires more irrigation, fertilization, weed control, turf, and time to establish successfully.

Sodding:

- Is the quickest way to establish a lawn or recreational surface
- Provides immediate soil erosion control
- Eliminates issues with dust and mud
- Can be used to reroot lawns
- Eliminates the need for weed control during establishment
- Can be planted nearly year-round
- Offers the best turfgrass varieties
- Can be used for total lawn installation or repair of smaller areas

The best time to sod is when the turfgrass is actively growing, which is when the sod will root or knit down as quickly as possible. As with seed, certified sod—if available—is the buyer's best assurance of getting the stated variety.

A problem associated with using sod is the potential effect of soil differences between the sod field and the new site. If the sod is grown on soil containing more clay and silt than at the new site, the sod could contain a thin layer of soil that differs greatly from the underlying soil. The difference between the two soils can interfere with water movement into the soil and affect drainage.

To sod a lawn:

1. Prepare the soil completely to a final grade before ordering the sod. To smooth the lawn, topdress it with a sandy loam topsoil that is free of debris. The surface should be smooth, firm, and free of footprints, stones, depressions, and mounds.
2. Lay the sod blocks or rolls in the same manner that bricks are placed. Butt each sod piece against the others as tightly as possible.
3. Roll or tamp it lightly.
4. Keep the soil moist until it is well rooted. If it dries soon after transplanting, it will tend to shrink and separate from adjoining pieces, leaving gaps that allow weeds to invade. However, do not overwater it.

Sprigging

Some turfgrasses that spread by stolons can be harvested as sprigs and used to establish new turf. Sprigging is used primarily for establishing hybrid bermudagrasses.

Sprigging costs more than seeding but less than sodding. Sprigs are sold by the bushel. A bushel of sprigs is equal to about 1 square yard of shredded sod.

Sprig in the spring and early summer to allow the lawn to become established as completely as possible before winter. Sprigs are perishable and must be planted soon after harvest. Keep