



## Turfgrass Selection and Maintenance

**T**urfgrasses are narrow-leaved grass species that form a uniform, long-lived groundcover tolerant of traffic and low mowing heights. The correctly chosen and well maintained species is an integral element that enhances any landscape. Lawns increase the aesthetic and economic value of the landscape, provide recreational surfaces for outdoor activities, aid in erosion control, filter pollutants and provide oxygen to the environment. Because many of the grasses used in Florida vary widely in their maintenance and environmental requirements, careful consideration of these dynamics is essential when choosing turfgrass for a particular site.

### Turfgrass Selection

The basis for a good lawn is the correct selection of a turfgrass species appropriate for the site. Because lawns are intended to be a long-term investment, proper species and cultivar selection should be made dependent on the

- 1) Physical or environmental limitations at the planting site.
- 2) Level of maintenance required.
- 3) Type of lawn desired or expected.

### *Regional Adaptation*

Grasses are categorized as cool or warm season. **Cool season grasses** are best adapted to cooler climates with optimum growth at temperatures between 60° and 75°F; and **warm season grasses** are better adapted to warmer environments with optimum growth between 80° and 95°F. The transition zone between these two regions is the area where both cool and warm season grasses may be grown; but conditions usually are not ideal for either.

Warm season turfgrasses grow in Florida. As typical with landscape plants, certain turfgrasses grow better in some locations than in others because environmental and soil conditions vary widely throughout the state. There are several turfgrass species, and cultivars within those species, that can be planted statewide, while others perform best in the panhandle and northern Florida regions. Warm season grasses grown in Florida are maintained in a totally different way from cool season grasses grown in northern regions of the United States. Cool season grasses (such as ryegrass or bluegrass) may be grown in Florida, but only during the fall, winter and early spring months; they will not survive year-round.

## Site Considerations

Water quantity and quality, ease of mowing, soil type, pH, drainage and other characteristics are important selection criteria. The amount of shade a turf will receive can limit the selection of a suitable grass (Figure 14-1). In some situations, a grassed area may be shaded for most or all of the day, making it difficult for the grass to obtain either an adequate intensity or duration of light for growth. Under shaded conditions, turfgrasses have elongated leaf blades and stems as they attempt to obtain sunlight by outgrowing their neighbors. This reduces the overall health and vigor of the lawn. Coverage is also reduced, and the bare ground that results is conducive to weed growth. Consequently, it is generally not advisable to grow turfgrass in heavy shade; consider other groundcovers or mulch instead.

Several turfgrasses can grow in a wide range of soil conditions, including pH values of 5.0 to 8.5, and those that are mostly sand, clay, marl, or muck type soils. Obviously, some turfgrasses have more specific requirements. For example, centipedegrass and bahiagrass grow best in acid soils because iron chlorosis is a problem if these grasses are grown in high pH (alkaline) soils. Bahiagrass is more tolerant of drought and grows better in sandy soil.



photo by gale allbritton

Figure 14-1. Shade patterns and light intensity throughout the day influence turfgrass species selection.

## Maintenance Considerations

A lawn should be considered a long-term property investment, and the choice of a turfgrass should reflect the desired outcome and maintenance commitments. Since maintenance levels differ among the lawn grasses commonly used in Florida, it is important to select the correct grass for the type of yard desired (Figure 14-2). Most turfgrass will respond to a range of maintenance levels; however, there is an optimum level for each grass species.

It is important to realistically assess the level of maintenance a lawn will receive. For example, a bermudagrass or St. Augustinegrass lawn will not perform well in a site that does not provide supplemental irrigation during dry times. On the other hand, bahiagrass may be able to survive without supplemental irrigation, but it may never form a dense, lush, dark green lawn as some of the other turfgrass species will. Keep in mind that maintenance levels are closely related to cost and time; high maintenance turf costs more and requires more time invested in upkeep.



Figure 14-2. Consider use of space and commitment to maintenance when choosing a turfgrass.

## Environmental Tolerances

Florida lawns are subject to many environmental stresses. These can include nutrient deficiency, salinity, cold temperatures, prolonged exposure to shade, drought or traffic. Turfgrasses vary in their ability to withstand or tolerate certain environmental stresses.

In many coastal areas, turf can be subjected to salt stress from irrigation water, saltwater intrusion or salt spray from the ocean. St. Augustinegrass and bermudagrass generally have good **salinity tolerance** and are very suitable choices for coastal areas. Seashore paspalum is particularly well adapted to moist and salt-affected areas common in coastal regions.

Turfgrasses vary widely in their **shade tolerance**. In many landscape settings, grass receives a minimum amount of light for enough time during the day to maintain adequate growth, even if an area is shaded for other portions of the day by trees or buildings. For areas receiving moderate amounts of shade, certain species and cultivars are able to maintain appropriate growth. Both St. Augustinegrass and zoysiagrass have good shade tolerance compared to other warm season grasses.

**Wear tolerance** is a measure of how well a grass continues to grow after being walked or played upon, and can determine whether a grass will be able to survive in an area of moderate traffic. Seashore paspalum, zoysiagrass and bermudagrass all have good wear tolerance.

**Drought tolerance** is a measure of how well the turf will survive extended dry periods without irrigation or rainfall. Bahiagrass and centipedegrass have good drought tolerance, while St. Augustinegrass does not.

Environmental stress (such as drought, salt, shade, wear) can affect all grasses, and no environment is completely free from stress. It is important to reduce as many of these stresses as possible for healthy turfgrass growth, and to consider these limitations along with other site characteristics when selecting a grass species

or cultivar for any given region of the state (Figure 14-3).

## Aesthetics

A perfect green lawn will require higher levels of fertilization and irrigation, and much more mowing than an average lawn or one used as just a cover to lessen soil erosion. **Texture** is a relative measure of the leaf blade width and influences the visual perception of the lawn. Leaf textures may be coarse, medium or fine. Most southern lawn grasses are coarser in leaf texture than those grown further north. This is especially true of St. Augustinegrass, bahiagrass and centipedegrass, the three most commonly used lawn grasses in Florida.

The number of leaves or shoots per ground area is a measure of **turf density**. Species with a high density and finer leaf texture generally produce better quality lawns. Turfgrasses with lower density and coarser leaf texture often require a higher mowing height to produce an acceptable quality lawn. Higher density varieties include hybrid bermudagrasses and zoysiagrass. Bahiagrass has a low stand density while other warm season grasses have a medium density.

### Turfgrass Quick Reference

<b>Environmental Stress</b>	<b>Options (best choices listed first)</b>
salt tolerance	seashore paspalum St. Augustinegrass bermudagrass zoysiagrass
shade tolerance	St. Augustine zoysiagrass centipedegrass (fair)
wear tolerance	bermudagrass seashore paspalum zoysiagrass
drought tolerance	bahiagrass centipedegrass
reduced maintenance	centipedegrass bahiagrass St. Augustinegrass (fair)

Figure 14-3. General turfgrass selection guide.

## Planting a Florida Lawn

It is important to design the landscape before installing it; this includes turf beds as well as landscape beds. Many local ordinances regulate the amount of turfgrass that can be irrigated with high volume sprinkler irrigation (typically only 50% to 60%), the type of turfgrass considered drought tolerant (commonly bahiagrass), and the shape or size of turfgrass that can be efficiently irrigated (areas wider than 4 feet).

While local ordinances may regulate the amount or percentage of turfgrass, Florida Water Star<sup>SM</sup> recommends regulating the amount or percentage of high volume irrigation used on the property. For example, if permanent inground irrigation is used, no more than 60% of the landscape can be high water use plants and the remainder must be low water use plants maintained using low irrigation methods. To avoid loss or damage due to water application restrictions, it is necessary to become familiar with local ordinances and other statewide voluntary certifications before planting a lawn.

### Preparation

Proper soil preparation prior to grass planting is critical to ensure the establishment of a quality turf. Preparation will determine how quickly the lawn becomes established and its long-term maintenance requirements.



Figure 14-4. Final hand raking in preparation for sod laying.

This includes obtaining a soil test and applying soil amendments to improve the soil's physical, chemical and biological properties.

### Clean and Rough Grade

Remove all debris, large roots, rocks and weeds from the site. If the area needs extensive grading, remove the topsoil and stockpile it for replacement after the rough grade is established. Slope the ground away from the building at a 1% to 2% decline; in other words, the soil level should drop six inches to a foot for every 50 feet of distance. The rough grade should conform to the final grade after the topsoil is replaced.

Swales or mounds with steep slopes of more than 10% should be sodded and not seeded to avoid erosion problems. However, steep slopes and mounds should be avoided since it may be difficult to establish grass on them and mowing may be dangerous. If an area cannot be leveled, use groundcover plants other than turfgrass.

Control of perennial weeds, such as torpedograss, should be performed during site preparation. Several applications of a nonselective herbicide may be necessary for complete weed control before soil cultivation.

### Deep Tillage

Rototilling loosens compacted soil and improves the speed and depth of rooting. The soil should be tilled to a depth of six to eight inches if amendments have been added in the preceding steps. Care should be taken when tilling an area where tree roots are present. Remember, tree roots often extend beyond the canopy of the tree and shallow feeder roots can be damaged by tilling.

### Final Grading

Final grading completed just prior to planting provides a smooth planting bed. The site can be hand raked (Figure 14-4) or it can be smoothed with a hand pulled drag, such as a metal doormat. Large areas can be leveled by tractor-drawn equipment, such as a tiller rake or grading box, and then hand finished.

Compress loose soil with a water ballast roller to achieve a uniformly firm planting bed and to reduce erosion, but take care not to add too much weight and cause soil compaction. Driveways and walks should be level with, or slightly above, the final grade. A good job of grading will result in a more level site and a more attractive lawn that is easy to mow. Irrigate to settle the soil before planting. Hand rake to break up a crusty surface before seeding or vegetative planting.

## Establishment

Turfgrasses can be established from seed or vegetatively propagated using sod, sprigs, or plugs. Establishment methods depend on species, availability, and economics.

### Seeding

Seeding is usually the easiest and most cost-effective method of planting grasses, but not all warm season grasses can be established from seed. For example, St. Augustinegrass seed is not currently available, but bahiagrass and bermudagrass can be started from seed with little difficulty. Seed establishment also requires a longer period of time to have complete grass cover. Success depends on seed quality, proper seeding time, rate, and method of seeding.

Year-round planting is commonplace in most parts of Florida and good quality lawns can be produced. However, the best time to seed warm season grass is during the spring and summer months because this is the time the grass will grow most quickly and establish before cold weather. If irrigation is not available, avoid planting during dry months or times of drought.

Newly seeded areas should be kept moist, but not excessively wet, until seeds have germinated. If the surface of the soil is allowed to dry out at any time after the seeds have begun to swell and before roots have developed, many of the seedlings will die. As the seedlings mature and root systems develop, the frequency of irrigation is decreased, but the volume should increase so that the entire root zone is wetted, not just the soil surface.

### Vegetative Planting

Vegetative planting is simply transplanting large or small pieces of grass. Solid sodding covers the entire seedbed with vegetation. Plugging or sprigging refers to planting pieces of sod, or individual runners called **stolons** (above ground stems) or **rhizomes** (below ground stems).



Figure 14-5. Installing sod in a staggered brick pattern where the finish grade is slightly below the sidewalk.

## Sodding

Sodding can provide an “instant lawn” effect, though it is more expensive than sprigging or plugging. This method is recommended where immediate cover is desired for aesthetics or prevention of soil erosion.

Before buying sod, inspect it carefully to ensure the absence of visible weeds, insects, or stressed areas. Sod should be planted as quickly as possible after delivery, but if there are delays, store the sod in a cool, shady place until ready to plant. Sod life on pallets during the summer is typically less than 48 hours.

Lightly irrigate the soil before beginning sod installation, then lay each sod piece so it fits together as tightly as possible; however, the sod should not be stretched to fit an area. If cracks are evident between pieces, they should be filled with cut pieces of sod. Lay the sod in a staggered brick pattern, so the seams are offset between the sod pieces (Figure 14-5). Tamp or roll the sod to remove air pockets. Make sure the roots have good contact with the underlying soil to avoid drying out.

Keep the grass moist for the first seven days after planting with brief applications of water two to three times during the day to make sure the soil stays moist, but not overly wet. Once the sod is firmly rooted, watering frequency can be reduced. Wait three to four weeks before mowing, and 30 to 60 days before fertilizing.



Figure 14-6. Zoysia plugs grown in a tray develop a more extensive root system for better transplanting.

## Sprigging

Sprigging is the cheapest vegetative planting method. A **sprig** is an individual stem or piece of grass stem, with at least one node (joint) and no adhering soil, that has the potential to develop into a grass plant. Sprigs can be bought by the bushel, but more commonly sod is used and cut or pulled apart into sprigs.

The sprigging process is simply the planting of individual grass stems at spaced intervals. Where rapid cover is needed, sprigs are broadcast over the area like mulch. Sprigs are then cut into the soil with a light disc or covered with ½ inch of soil topdressing, rolled, and watered. Since the sprigs are planted at a shallow depth, they are very susceptible to drying out. Light, frequent irrigation is necessary until roots become well established.

## Plugging

Plugging is the planting of two to four inch circular or block shaped pieces of sod at regular intervals. Over time, the above ground stems grow new root and shoot systems to fill in bare spots. **Plugs** can be cut from sod pieces with a shovel, ax, or machete, but several turfgrass cultivars are currently available in trays (Figure 14-6). These commercial plugs usually have well-developed root systems.

Plugs should be planted on six to 12 inch centers (Figure 14-7). Plugs grow in more slowly than sprigs, but are less susceptible to desiccation. Mulching will help improve moisture retention and prevent soil erosion between the plugs.



Figure 14-7. Recently planted turfgrass plugs.

Keep plugs watered on a regular basis and do not mow until firmly rooted. This may take two weeks to a month or more in winter. Do not fertilize new plugs until the new stems have grown together.

### Turfgrass Renovation

The conversion of an existing turf is referred to as renovation. Many of the steps described for establishment are used for renovation, with minor exceptions. When converting from one cultivar to another within a single species stand, it is not necessary to eradicate the existing planting. However, when changing from one species to another and retaining a solid stand, it is essential to eradicate the existing turf with a nonselective herbicide.

## Turfgrass Types

There are several different types of turfgrass used in the Florida landscape. The type selected depends upon the grass best suited for the environmental conditions of the location. The suitability of a grass to the soil, pH, salt, traffic, shade and climate of an area will greatly affect the success of the grass. Attempting to grow bermudagrass under dense shade or to grow bahiagrass in alkaline soils is inviting failure. Regional problems must also be taken into consideration. For example, centipedegrass is an excellent low maintenance grass for acid soils, but ground pearls (an insect) are enough of a threat in some areas to preclude recommending it.

**Characteristics of Common Florida Warm Season Turfgrasses**

<b>Turfgrass / Characteristic</b>	<b>Bahiagrass</b>	<b>Bermudagrass</b>	<b>Centipedegrass</b>	<b>Seashore paspalum</b>	<b>St. Augustine</b>	<b>Zoysiagrass</b>
Area of state	statewide	statewide	north (acid soil)	statewide	statewide	statewide
Mowing height (in)	3 – 4	0.5 – 2.0	< 2.0	0.5 – 2.0	2 – 4	≤ – 2.0
Mowing frequency	7 – 14	3 – 7	7 – 10	3 – 7	5 – 7	5 - 10
Soil adaptation	acid, sandy	wide range	acid, infertile	wide range	wide range	wide range
Leaf texture	medium – coarse	fine - medium	medium	fine – medium	medium – coarse	medium
Drought tolerance	excellent	excellent	good	excellent	good	excellent
Salt tolerance	poor	good	poor	excellent	good	excellent
Shade tolerance	fair	poor	fair	fair	good - excellent	good - excellent
Wear tolerance	poor	excellent	fair	good - excellent	fair	excellent
Injury recovery	poor	excellent	fair	excellent	good	fair
Nematode tolerance	excellent	poor	poor	good	good	good
Disease potential	low	low – moderate	low – moderate	low	moderate – high	low – moderate
Maintenance	low	med – high	low	medium	medium	medium
Establishment	seed, sod	seed, sod, plugs, sprigs	seed, sod, plugs	sod, plugs, sprigs	sod, plugs	sod, plugs, seed

*Information adapted from A Comparison of Lawn Grass Species Available for Use throughout Florida by Trenholm, Unruh, Kenworthy, Kruse and Shaddox (June 2016), University of Florida, IFAS Extension.*

Figure 14-8. Summary of turfgrass species characteristics commonly used in Florida landscapes.

A choice of cultivar must be made after a species of grass has been selected. Cultivars exhibit varying qualities for insect or disease resistance, rate of growth, adaptation to harsh environments, etc. New cultivars are introduced frequently for some species, and not at all for others. Choices may be limited since not all cultivars are available in all parts of the state. Decisions about cultivar selection should be based on criteria similar to grass species selection. Cultivar choices are extensive and may change with new introductions; therefore, always consult resources published by the University of Florida, IFAS Extension to find recommended cultivars and descriptions of their characteristics.

Once selection criteria have been carefully examined for regional adaptability, site and maintenance considerations, and environmental stresses, the process of evaluating different turfgrass options can begin. The *Characteristics of Common Florida Warm Season Turfgrasses* table (Figure 14-8 on the previous page) can help in making decisions about the grass best suited to a particular customer, location and use. A more detailed summary of the characteristics, qualities and limitations of the six warm season grass species used for lawns in Florida follows.



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Figure 14-9. The clumping habit of coarse textured bahiagrass.

## Bahiagrass

Bahiagrass (*Paspalum notatum*) is a low maintenance lawn grass for infertile, droughty soils. Although bahiagrass does not produce a high quality, dense, dark green lawn like some other warm season lawn grasses, it does provide a good low maintenance lawn where slightly reduced visual quality is acceptable. The coarse leaf texture and clumping habit of growth provide less cushioning for recreational activities than other species (Figure 14-9).

### Advantages

Bahiagrass forms a very extensive and deep root system. It performs well in infertile, sandy soils and does not require high inputs of fertilizers. Bahiagrass can be grown from seed, which is abundant and relatively cheap, or it can be established from sod, sprigs, or plugs. This grass does not form excessive thatch, and has relatively few disease and insect problems.

### Disadvantages

Bahiagrass forms tall, V-shaped seedheads (Figure 14-10) throughout the spring, summer, and fall months, which necessitates mowing on a regular schedule. Because the seedhead stems are tough, it also makes it more difficult to mow than some other grass species. Bahiagrass does not perform well in high pH soils and is susceptible to mole crickets. It does



photo by forest and kim starr, creative commons

Figure 14-10. Tall and tough bahiagrass seedheads form frequently, making it necessary to mow more often to control.

### Bahiagrass Cultivar Characteristics

<b>Cultivar</b>	<b>Characteristics</b>	<b>Limitations</b>
Argentine	<ul style="list-style-type: none"> <li>▶ dark green color</li> <li>▶ relatively dense sod</li> <li>▶ wider leaf blades than 'Pensacola'</li> <li>▶ acceptable for lawn use</li> <li>▶ good insect and disease resistance</li> <li>▶ tolerates cold temperatures well</li> </ul>	<ul style="list-style-type: none"> <li>▶ somewhat open habit of growth</li> </ul>
Common	<ul style="list-style-type: none"> <li>▶ light colored</li> <li>▶ coarse-textured</li> <li>▶ open and sparse growth habit</li> </ul>	<ul style="list-style-type: none"> <li>▶ susceptible to cold temperatures</li> <li>▶ not normally recommended as a lawn grass</li> </ul>
Pensacola	<ul style="list-style-type: none"> <li>▶ extensive root system</li> <li>▶ excellent stress tolerance</li> <li>▶ tolerates hot and cold temperatures</li> </ul>	<ul style="list-style-type: none"> <li>▶ extensive seed head production</li> <li>▶ reduced desirability for a lawn grass</li> <li>▶ suitable for roadside plantings</li> </ul>

Figure 14-11. Relative growth characteristics of bahiagrass cultivars commonly used and available in Florida.

not have good tolerance of shade, traffic, or saltwater. Except for Pensacola bahiagrass, there is little tolerance for cold temperatures in this species (Figure 14-11). Leaves of bahiagrass tend to turn yellow as a result of iron deficiency. This deficiency can be alleviated by modification of soil pH or application of iron fertilizer.

The open growth habit of bahiagrass can allow encroachment of weeds into sparse areas. In addition, bahiagrass has a low tolerance for many herbicides, making chemical weed control difficult.

#### Establishment

Bahiagrass can be established from sod or seed. Bahiagrass seed is not expensive and seeding requires less labor than sodding. Scarified seed, which has been chemically treated to enable faster germination, should be used when available. Plugging or sprigging bahiagrass is not typically recommended since these methods leave open areas of soil that can be taken over by fast-growing weed species.

#### Mowing

During times of active growth, bahiagrass should be mowed every seven to 14 days at a height of three to four inches. Higher

mowing promotes a deeper, more extensive root system that makes the grass more stress tolerant. Mowing cycles are also often dictated by seedhead production. Because bahiagrass leaves and seedhead stems are very tough, the mower blade must be sharpened regularly to ensure a good, clean cut.

#### Watering

Bahiagrass is recognized as an acceptable drought tolerant turf choice. Nonetheless, it should be noted that during extended drought periods, bahiagrass will go into a drought-induced dormancy and turn brown until conditions become favorable for regrowth. Bahiagrass has the ability to generally recover from severe drought injury soon after receiving water from either rain or irrigation.

#### Pests Problems

Although bahiagrass is usually less troubled by insects, diseases and nematodes than other Florida lawn grasses, it is still not completely pest free. The most serious insect threat to bahiagrass is the mole cricket. These insects burrow through the soil and damage roots, causing rapid wilting of the grass. The only serious disease of bahiagrass is dollar spot, and the best method of weed control is to maintain a healthy, vigorous turf.

## Bermudagrass

Bermudagrasses (*Cynodon* spp.) are among the most widely used warm season grasses. Improved, fine textured bermudagrasses (Figure 14-12) are used throughout the south on golf courses, athletic fields, and in high profile residential and commercial landscapes where a fine textured, dense groundcover is desired. Bermudagrass is not frequently recommended for use as a home lawn grass due to high maintenance requirements. However, there are improved cultivars (Figure 14-13) of common bermudagrass to consider that have coarser leaves; they generally do not provide a high-quality carpeted appearance or require the high maintenance of fine textured improved types.

### Advantages

Bermudagrass produces a vigorous, medium green, dense turf that is well adapted to most soils and climates found in Florida. Bermudagrass has excellent wear, drought, and salt tolerance. It establishes rapidly and is able to outcompete most weed species.

### Disadvantages

Improved bermudagrass does require a high level of maintenance. It has a poor tolerance to many insect, disease, and nematode pests, which limits its use in home lawn sites. Bermudagrass grows very aggressively from stolons and rhizomes and can rapidly invade flower and landscape beds.

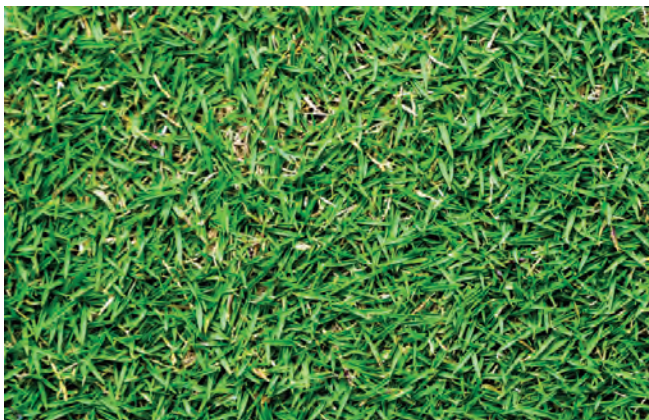


Figure 14-12. The dense, closely mown carpetlike appearance of bermudagrass requires high levels of maintenance.

This aggressive growth also fosters thatch buildup. Bermudagrasses generally have poor to medium cold tolerance and relatively poor shade tolerance.

### Establishment

Bermudagrass is readily available as sod or plugs, and some improved cultivars are available as seeded varieties. Each of these methods can be equally successful if the site is properly prepared before planting and if correct establishment practices are followed. The best time to plant bermudagrass is when the turf is actively growing, normally April through September. Other times may be suitable if sufficient care is given to prevent desiccation and cold damage in north or central Florida.

### Mowing

Under low to moderate levels of management, bermudagrass should be cut at a height of one (1) to two (2) inches, and may require mowing one to two times per week. Under higher levels of management, bermudagrass can be maintained at a height of 1/2 inch, but this height will require more frequent mowing during the growing season. Mowing at this height and frequency requires greater inputs of fertilizer and water to maintain an attractive and durable turf. It should be noted that low cutting heights and high maintenance levels predispose the turf to many weed and pest problems.

A reel mower is preferred for cutting fine textured bermudagrass cultivars that are mowed at heights below one inch. These mowers can be more accurately adjusted to low heights and cleaner cuts.

### Watering

An established bermudagrass turf should be watered as needed to maintain a green color. However, bermudagrass can persist during drought conditions, but it will turn brown and stop growing as it enters dormancy. The grass will revive and resume growth upon irrigation with sufficient amounts of water.

## Pests Problems

The most serious pests of bermudagrasses in Florida are nematodes. Nematodes cause yellowing and general thinning of older turf, especially during hot, dry periods. These pests cause extensive turf damage, particularly to turf grown on sandy soils or under high maintenance regimes. Although some cultivars tolerate nematodes better than others, no cultivar is resistant to nematode infestation.

Mole crickets are a major insect pest of bermudagrass. Other insects that cause damage in bermudagrass are sod webworms, armyworms, cutworms, grass loopers, and

bermudagrass mites. High levels of nitrogen fertilizer encourage insect problems.

Bermudagrass is also subject to several diseases, including dollar spot, brown patch, and *Helminthosporium* leaf spot. A sound cultural program can minimize most disease problems, and fungicides can be used to cure major disease outbreaks.

Weed problems in bermudagrass are a sign the turf has become weakened by improper management practices or damage from pests. If weeds become a persistent problem, herbicides labeled specifically for bermudagrass can be used for preemergence or postemergence weed control.

### Bermudagrass Cultivar Characteristics

Cultivar	Characteristics	Limitations
Celebration	<ul style="list-style-type: none"> <li>▶ dark blue-green; fine, leaf texture</li> <li>▶ low prostrate growth with tough runners, rhizomes, and deep roots</li> <li>▶ more shade tolerance</li> <li>▶ exceptional wear tolerance</li> <li>▶ extreme drought tolerance</li> <li>▶ requires less mowing</li> <li>▶ cold tolerant</li> <li>▶ can be mowed at 1 to 2 inches for lawn use with a rotary mower</li> </ul>	<ul style="list-style-type: none"> <li>▶ mowing at heights greater than 2 inches may result in an uneven appearance</li> </ul>
Latitude 36	<ul style="list-style-type: none"> <li>▶ dark green color with fine texture</li> <li>▶ high sod density</li> <li>▶ less aggressive growth</li> <li>▶ moderate shade tolerance</li> <li>▶ top-rated wear tolerance</li> <li>▶ exceptional cold tolerance</li> <li>▶ early spring greenup and good fall color retention</li> <li>▶ drought resistance</li> <li>▶ good salt tolerance</li> <li>▶ resistance to spring dead spot</li> </ul>	
TifGrand	<ul style="list-style-type: none"> <li>▶ naturally darker green</li> <li>▶ fine-textured, thin blades</li> <li>▶ semidwarf</li> <li>▶ vigorous growing, very dense, weed resistant turf</li> <li>▶ improved shade tolerance</li> <li>▶ holds up to heavy traffic</li> <li>▶ resistant to spring dead spot disease</li> <li>▶ exhibits resistance to mole crickets</li> <li>▶ can be overseeded with ryegrass</li> </ul>	<ul style="list-style-type: none"> <li>▶ may be best managed by professional lawn care companies</li> <li>▶ Tifway, TifGrand and TifSport are hybrid cultivars much more commonly used in golf and athletic fields than home lawns</li> </ul>

Figure 14-13. Relative growth characteristics of a few bermudagrass cultivars commonly used and available in Florida.

## Centipedegrass

Centipedegrass (*Eremochloa ophiuroides*) is well-adapted to the climate and soils of northern Florida and is the most common home lawn grass in the panhandle of Florida. Centipedegrass is a slow growing grass with creeping stolons. It is considered a low maintenance grass and has low fertility requirements. Centipedegrass grows close to the ground, is medium textured and is naturally pale green in color (Figure 14-14). Because of a relatively small region of use, few centipedegrass cultivars have been developed (Figure 14-15).

Overfertilizing to obtain an unnatural dark green color reduces its cold tolerance, increases long-term maintenance problems, and is believed to contribute to “centipedegrass decline” as well as increased insect pressure. Centipedegrass tolerates some partial shade.

### Advantages

Centipedegrass does very well in acidic and infertile soils. It has fair shade tolerance and somewhat good drought tolerance. Centipedegrass also has good cold tolerance, but browns off quickly after a frost. Maintenance and fertility requirements are low compared to other turfgrasses.

### Disadvantages

Centipedegrass has a naturally pale green color and is prone to iron chlorosis. It has poor salt, wear, and freezing tolerance. Stolons have a high lignin content and contribute to a heavy thatch layer, particularly under high fertility rates. Overly intensive management results in root dieback in the spring that then reduces shoot growth and results in the death of large patches of the lawn.

### Establishment

Centipedegrass can be established by seed, plugs, sprigs or sod and spreads by stolons. Seed of centipedegrass is expensive, but the seeding rate is low. This method of establishment is probably cheaper than vegetative planting if time and labor are considered.

Centipedegrass seed is naturally slow to germinate, and may take as long as two to three weeks. Soil washing due to heavy rain or excessive irrigations should be minimized by lightly mulching the planted area. Plugging or sprigging centipedegrass will leave open areas of soil that are subject to invasion by fast-growing, opportunistic weed species. Due to the slow growth habit of centipedegrass, diligent weed control measures will have to be used if this method of planting is used.



Figure 14-14. Centipedegrass with an example of a runner (stolon) placed on top of turf.

### Centipedegrass Cultivar Characteristics

Cultivar	Characteristics	Limitations
Common	<ul style="list-style-type: none"> <li>▶ light green color</li> <li>▶ medium texture</li> <li>▶ very prostrate</li> <li>▶ grows slowly</li> <li>▶ can be established by seed or vegetative means</li> <li>▶ readily available</li> </ul>	<ul style="list-style-type: none"> <li>▶ an undeveloped and unimproved variety</li> </ul>
Covington	<ul style="list-style-type: none"> <li>▶ uniformly emerald green color</li> <li>▶ moderately soft feel</li> <li>▶ good shade tolerance</li> <li>▶ good wear tolerance</li> <li>▶ very good injury recovery</li> <li>▶ very good spring greenup</li> <li>▶ very good fall color retention</li> <li>▶ good drought tolerance</li> <li>▶ very good disease resistance</li> </ul>	
TifBlair	<ul style="list-style-type: none"> <li>▶ low, dense growth habit</li> <li>▶ slightly faster rate of growth</li> <li>▶ tolerates full sun and shade</li> <li>▶ recovers quickly from wear or drought</li> <li>▶ excellent cold and freeze tolerance</li> <li>▶ good drought tolerance</li> <li>▶ can be propagated by seed or vegetative means</li> <li>▶ low maintenance and fertility requirements</li> </ul>	

Figure 14-15. Relative growth characteristics of centipedegrass cultivars commonly used and available in Florida.

#### Mowing

Centipedegrass that is actively growing should be mowed every seven to 14 days at a height of 1½ to 2½ inches. Mowing at this height promotes a deeper, more extensive root system that enables the grass to better withstand drought and nematode stress. A sharp blade and well-adjusted rotary mower should be used.

#### Watering

During prolonged drought, irrigation may be needed more often. However, centipedegrass has relatively good drought tolerance and usually recovers from severe drought injury soon after rain or irrigation. Do not overwater centipedegrass lawns as this weakens the turf and encourages weeds.

#### Pest Problems

Centipedegrass is highly susceptible to damage from nematodes, particularly ring nematodes. This damage limits the use of centipedegrass in south Florida's sandy soils. Both grassy and broadleaf weeds easily invade newly established or poorly maintained lawns.



Figure 14-16. Brown patch disease caused by *Rhizoctonia solani* in centipedegrass.

photo by scot nelson, creative commons license

Several insects may cause damage to centipedegrass, but the hardest to control are scale insects called ground pearls. At the present time, there are no effective chemicals to control these pests. Lawn caterpillars, grubs, mole crickets, spittlebugs and sod webworms also damage centipedegrass. The principal disease affecting centipedegrass is brown patch (Figure 14-16), but dollar spot can be a problem too. Both can be controlled with fungicides.

After a few years, an established centipedegrass lawn may develop yellowing (chlorosis) and/or dead spots as spring growth resumes. Numerous conditions may contribute to the problem, including high pH (greater than 6.5), excessive nitrogen fertilization the previous year, root stress from soil compaction, very low mowing heights or overirrigation, and nematodes and/or other disease organisms.

### Seashore Paspalum

Seashore paspalum (*Paspalum vaginatum*) is a warm season turfgrass that is particularly well adapted to moist and salt affected areas common in coastal regions. It tolerates sandy and infertile soils, high salt concentrations, and occasional inundation by seawater, as well as waterlogged conditions. The best growth of seashore paspalum occurs in response to warm temperatures and long day lengths.

Seashore paspalum produces both stolons and rhizomes, has an intermediate to fine leaf texture, an attractive bright green color, good density, and has good tolerance to low mowing (Figure 14-17). Seashore paspalum is considered to be the most salt tolerant warm season turfgrass species. One of its most unusual attributes is that salt may be used to kill weeds in this grass.

### Advantages

Seashore paspalum has excellent tolerance to saline or recycled water and excellent wear tolerance. Relatively low fertility inputs are needed to produce a dense, dark green lawn. Seashore paspalum has a dense growth habit that discourages weed competition, and produces a dense root system that provides good tolerance to most stresses. The grass tolerates a wide pH range and extended periods of lower light intensity, such as those experienced during prolonged cloudy or rainy periods.

### Disadvantages

Seashore paspalum does not have good shade tolerance, particularly when the shade is due to trees or vegetative canopies rather than to buildings. It can tolerate a few hours of shade daily, but would not be a good choice for a heavily treed area. Seashore paspalum tends to become thatchy, particularly when overfertilized and overirrigated. Seashore paspalum is also sensitive to many common herbicides and may be injured or killed by their use.



Figure 14-17. Closely mowed seashore paspalum turfgrass.

photo by forest and kim starr, creative commons license

## Establishment

Seashore paspalum does not produce viable seed and therefore must be established vegetatively by sod or sprigs. The best time for establishment is during periods of most active growth, when temperatures exceed 70°F. When planted, seashore paspalum does not show shoot growth for the first 10 to 14 days. This is typical because concentrated root establishment occurs initially. Once seashore paspalum has a root system capable of supporting it, growth is diverted to the shoot system, and then the grass will start to spread and fill in rapidly.

## Mowing

The seashore paspalum cultivars (Figure 14-18) currently available for use in home lawns should be mowed at one to two inches in height. Higher mowing heights will reduce turfgrass density and increase thatch problems. Strict attention must be paid to mowing frequency, particularly in the summer. If seashore paspalum is left unmowed for more than a week, it will typically be scalped when mowed, which will then provide an opportunity for fungal and insect problems.

## Watering

Although touted as being extremely drought tolerant, seashore paspalum still requires water on an as needed basis to remain green, just like any other turfgrass. Seashore paspalum will grow well where recycled or saline water is used.

## Pest Problems

Seashore paspalum has a few problems with insects, but chemical requirements for their control are minor. The grass is subject to occasional problems from mole crickets, sod webworms, spittlebugs, white grubs, billbugs, cutworms, and fall armyworms, but generally has no problems with chinch bugs.

Seashore paspalum has relatively few disease problems when maintained under recommended fertility levels and cultural practices. *Fusarium* blight may be found under hot, humid conditions, or when the grass is under drought stress. *Helminthosporium* disease may also occur under conditions of high humidity or soil compaction. There are also reports of take-all root rot in some locations in Florida. Proper cultural practices are the best defense against these problems.

**Seashore Paspalum Turfgrass Cultivar Characteristics**

Cultivar	Characteristics	Limitations
Salam	<ul style="list-style-type: none"> <li>▶ dark green</li> <li>▶ fine-textured</li> <li>▶ high shoot density</li> </ul>	<ul style="list-style-type: none"> <li>▶ has an increased susceptibility to dollar spot</li> </ul>
Sea Isle 1	<ul style="list-style-type: none"> <li>▶ dark green, fine-textured, dense growth habit</li> <li>▶ excellent salinity tolerance</li> <li>▶ good drought tolerance</li> <li>▶ good wear tolerance</li> <li>▶ performs well with relatively low fertility inputs</li> <li>▶ good winter color</li> <li>▶ vigorous growth under fresh or low salinity regimes</li> </ul>	<ul style="list-style-type: none"> <li>▶ not recommended for applications with mowing heights less than ½ inch</li> <li>▶ some susceptibility to <i>Helminthosporium</i> and <i>Fusarium</i> diseases</li> </ul>
Seaway	<ul style="list-style-type: none"> <li>▶ dark green in color</li> <li>▶ fine-textured</li> <li>▶ enhanced salinity tolerance</li> <li>▶ excellent at mow heights from ¼ to 1½ inches</li> </ul>	

Figure 14-18. Relative growth characteristics of seashore paspalum cultivars commonly used and available in Florida.

## St. Augustinegrass

St. Augustinegrass (*Stenotaphrum secundatum*), is the most commonly used lawn grass throughout Florida. It can grow satisfactorily in a wide variety of soils. Although it performs well in full sunlight, St. Augustinegrass is somewhat better than others for growth in partial shade.

### Advantages

St. Augustinegrass produces a green to blue-green, coarse-textured, dense turf (Figure 14-19) that is well adapted to most climatic regions in Florida. It has relatively good salt tolerance and certain cultivars possess good shade tolerance. There are several standard and dwarf cultivars (Figure 14-20) commercially available.

### Disadvantages

St. Augustinegrass, like most turfgrasses, has certain cultural and pest problems. It does not remain green during drought conditions without supplemental irrigation. St. Augustinegrass produces thatch under high fertilization and irrigation regimes. It has poor wear tolerance and will generally not stay green throughout the winter months in many parts of the state. The coarse leaf texture of most cultivars is objectionable to some people.

### Establishment

St. Augustinegrass is established by vegetative propagation such as sod, plugs, or sprigs. St. Augustinegrass has stolons (above-ground stems) that are capable of generating new shoot growth and are responsible for lateral growth of the turfgrass along the ground. While not common nor used for propagation, St. Augustinegrass occasionally produces flowers and seedheads (Figure 14-21). Although St. Augustinegrass can be planted year-round in warmer sections of Florida, the best time to plant is when environmental conditions allow for rapid establishment.



Figure 14-19. The coarse textured blades of St. Augustinegrass.

photo by stickpen, creative commons license

### Mowing

Most St. Augustinegrass cultivars should be maintained at a height of 3½ to 4 inches. Dwarf cultivars can be maintained between 2 to 2½ inches. Repeatedly mowing at lower heights increases stress on the lawn, discourages deep rooting, increases the chance for **scalping** (being cut too low and exposing grass stems) if a mowing event is missed or postponed due to weather, and may increase susceptibility to pest problems.

St. Augustinegrass typically requires weekly mowing during the growing season and less frequent mowing during the cooler months of the year. In north Florida, mowing may not be required during the winter months. A rotary mower can be used on St. Augustinegrass.

### Watering

Irrigating St. Augustinegrass two times per week is usually sufficient, yet local Water Management District guidelines or restrictions may apply. The correct approach is to water less frequently but more thoroughly. On average, St. Augustinegrass requires about ¾ inch of water twice per week (for a total of about 1½

**Standard St. Augustinegrass Cultivar Characteristics**

<b>Cultivar</b>	<b>Characteristics</b>	<b>Limitations</b>
Bitterblue	<ul style="list-style-type: none"> <li>▶ dark blue-green color</li> <li>▶ dense texture that grows more slowly</li> <li>▶ good cold tolerance and shade tolerance</li> <li>▶ well adapted throughout the state</li> </ul>	
Floritam	<ul style="list-style-type: none"> <li>▶ coarse-textured</li> <li>▶ grows vigorously in spring and summer</li> <li>▶ thrives in direct sun</li> <li>▶ poorer shade tolerance</li> <li>▶ poorer cold tolerance</li> </ul>	<ul style="list-style-type: none"> <li>▶ chinch bugs are a major pest</li> <li>▶ susceptible to gray leaf spot and other diseases</li> </ul>
Palmetto	<ul style="list-style-type: none"> <li>▶ lighter green color with a semidwarf growth habit</li> <li>▶ does well in full sun or partial shade, but not in dense shade</li> <li>▶ good cold tolerance</li> <li>▶ moderate drought tolerance</li> </ul>	<ul style="list-style-type: none"> <li>▶ not resistant to insects</li> <li>▶ some problems with disease</li> </ul>
Raleigh	<ul style="list-style-type: none"> <li>▶ medium green color</li> <li>▶ relatively cold hardy; good tolerance to lower temperatures</li> <li>▶ less tolerant of summer heat</li> <li>▶ best adapted to the heavier clay soils with medium to low soil pH of north and northwest Florida</li> <li>▶ supplemental iron applications reduce the summer yellowing tendency</li> </ul>	<ul style="list-style-type: none"> <li>▶ susceptible to chinch bugs and large patch disease</li> <li>▶ highly susceptible to gray leaf spot</li> <li>▶ yellows and grows less aggressively during peak summertime heat</li> </ul>

**Dwarf St. Augustinegrass Cultivar Characteristics**

<b>Cultivar</b>	<b>Characteristics</b>	<b>Limitations</b>
Delmar	<ul style="list-style-type: none"> <li>▶ dark green color</li> <li>▶ short internodes</li> <li>▶ good shade tolerance</li> <li>▶ performs well in full sun</li> <li>▶ good cold tolerance</li> </ul>	<ul style="list-style-type: none"> <li>▶ susceptible to chinch bugs, tropical sod webworms and large patch</li> <li>▶ heavy thatch</li> </ul>
Sapphire	<ul style="list-style-type: none"> <li>▶ deep blue-green leaves</li> <li>▶ purple, creeping stolons</li> <li>▶ long leaf blades that remain folded, giving the grass a fine leaf appearance</li> <li>▶ spreads rapidly</li> <li>▶ tolerates shade and drought conditions</li> <li>▶ salt tolerant; ideal for coastal regions</li> </ul>	<ul style="list-style-type: none"> <li>▶ susceptible to most major pests associated with St. Augustinegrass</li> </ul>
Seville	<ul style="list-style-type: none"> <li>▶ dark blue-green color that is well retained</li> <li>▶ fine-leaved</li> <li>▶ low growth habit</li> <li>▶ performs well in both shade and full sun</li> <li>▶ good tolerance of shade</li> <li>▶ good salt and drought tolerance</li> </ul>	<ul style="list-style-type: none"> <li>▶ susceptible to chinch bug and webworm damage</li> <li>▶ prone to thatch</li> <li>▶ cold sensitive</li> </ul>

Figure 14-20. Relative growth characteristics of St. Augustinegrass cultivars commonly used and available in Florida.



Figure 14-21. Flowers and seedheads on St. Augustinegrass.

inches of water per week). This need can be realized either from natural rainfall or from supplemental irrigation.

### Pests Problems

The major pest of St. Augustinegrass is the chinch bug, a foliage feeding insect that sucks plant juices through a needlelike beak, causing yellowish to brownish patches in the turf (Figure 14-22). Other insect pests, including webworms, armyworms, grass loopers, white grubs and mole crickets, can also damage St. Augustinegrass.

Brown patch and gray leaf spot are two major disease problems of St. Augustinegrass. Brown patch occurs in warm, humid weather and is encouraged by excessive nitrogen. Gray leaf spot occurs during the summer rainy season and is primarily a problem on new growth. Both diseases can be controlled with fungicides. Other St. Augustinegrass disease problems originate in the root system. Take-all root rot occurs under high moisture or stress conditions. When symptoms become noticeable aboveground, the disease is usually in an advanced state.

Several types of nematodes infest St. Augustinegrass lawns. Damage symptoms include thin stand density, less vigorous growth, a weakened root system, slow recovery following rain or irrigation application, and susceptibility to weed invasions.



Figure 14-22. Chinch bug damage to a St. Augustinegrass lawn.

## Zoysiagrass

Zoysiagrasses (*Zoysia japonica*, *Z. matrella* and *Z. tenuifolia*) are used for residential and commercial landscapes, athletic fields, and golf course tees, fairways, and roughs. An established, well-managed zoysiagrass provides a high quality turf, but zoysiagrasses generally require a high level of maintenance. Zoysiagrass is another good choice for partially shaded areas; similar to St. Augustinegrass, it also does well in full sunlight.

### Advantages

Zoysiagrasses (Figure 14-23) are adapted to a variety of soils and have good tolerance to shade, salt, and traffic. They provide an extremely dense sod that resists weed invasion. Once established, the slow growth of some zoysiagrass varieties is an advantage because mowing frequency is reduced. When properly



Figure 14-23. The fine textured, narrow leaf blades of zoysiagrass.

maintained, zoysiagrasses make excellent turf. One of the best attributes of zoysiagrass is its ability to resist weed invasion due to its thick, dense growth habit.

### Disadvantages

All zoysiagrasses form a heavy thatch that will require periodic renovation. Other disadvantages of older cultivars include slow recovery from damage, poor growth on compacted soils, high fertility requirements, and poor drought tolerance. Zoysiagrass also tends to form shallow roots and is weakened when grown in soils low in potassium.

### Establishment

Improved zoysiagrass species (Figure 14-24) must be propagated vegetatively by sod, plugs or sprigs and some are extremely slow to establish. For certain cultivars, two growing seasons may

be required for coverage when propagated by plugging or sprigging; others establish much more rapidly. *Zoysia japonica* is the only species for which seed is commercially available.

### Mowing

If fertilized as recommended, zoysiagrasses require frequent mowing during the summer to look their best. Medium to coarse textured zoysiagrasses should be mowed weekly, or when they reach a height of three to four inches. They should be maintained at a height of 2 to 2½ inches with a rotary mower.

Fine textured zoysiagrasses maintained at heights below one inch require more frequent mowing. Because of its leaf blade stiffness, zoysiagrass can be quite difficult to mow. A sharp, well-adjusted rotary or reel mower should be used. Due to the toughness of leaves and stems, a reel mower will provide the best cut.

**Zoysiagrass Cultivar Characteristics**

<b>Cultivar</b>	<b>Characteristics</b>	<b>Limitations</b>
El Toro (an improved <i>Zoysia japonica</i> )	<ul style="list-style-type: none"> <li>▶ dark blue-green color</li> <li>▶ dense texture that grows more slowly</li> <li>▶ good cold tolerance and shade tolerance</li> <li>▶ well adapted throughout the state</li> </ul>	
Emerald (a selected hybrid between <i>Zoysia japonica</i> and <i>Zoysia tenuifolia</i> )	<ul style="list-style-type: none"> <li>▶ light green, fine textured, dense growth habit</li> <li>▶ fast spreading</li> <li>▶ excellent cold tolerance</li> <li>▶ wide range of adaptation</li> <li>▶ highly recommended for top quality lawns where time and money allow for adequate maintenance</li> </ul>	<ul style="list-style-type: none"> <li>▶ produces an excessive thatch layer</li> <li>▶ susceptible to dollar and leaf spot</li> <li>▶ large (brown) patch disease can occur</li> </ul>
Empire Zoyia®	<ul style="list-style-type: none"> <li>▶ blue-green color, medium texture with a very dense growth habit</li> <li>▶ very good fall color retention</li> <li>▶ moderate rate of establishment, slower vertical growth</li> <li>▶ performs well in sandy and clay soil types</li> <li>▶ very good wear tolerance and injury recovery</li> <li>▶ very good drought tolerance</li> </ul>	<ul style="list-style-type: none"> <li>▶ does not do as well in shade</li> <li>▶ susceptible to large (brown) patch disease</li> </ul>
Toccoa Green™ ( <i>Zoysia matrella</i> cultivar)	<ul style="list-style-type: none"> <li>▶ dark green color, fine textured</li> <li>▶ extremely dense, very upright habit of growth</li> <li>▶ faster rate of growth</li> <li>▶ recovers more quickly from scalp damage</li> <li>▶ does not produce seed heads as prolifically</li> </ul>	<ul style="list-style-type: none"> <li>▶ recommended for use in high maintenance situations, including high-end home lawns</li> </ul>

Figure 14-24. Relative growth characteristics of zoysiagrass cultivars commonly used and available in Florida.

## Watering

Zoysiagrass responds to drought by turning brown and going dormant in a short period of time (within a week under typical drought conditions). In the absence of rain or irrigation, zoysiagrass stays dormant for extended periods of time. Once irrigation or rainfall resumes, zoysiagrass will regain its green color.

## Pest Problems

The most serious insect on zoysiagrass is the hunting billbug. Billbugs feed on roots, causing the turf to die in irregularly shaped patches. The damage most often occurs in the fall and spring when populations are high and when damage may be misdiagnosed as dormancy. Stems and rhizomes break easily, have irregular feeding marks, and the turf will not hold together if cut. Most damage occurs on infertile or dry soil.

Mole crickets and white grubs can also damage zoysiagrass. White grubs, like billbugs, feed on roots, causing the turf to turn yellow, wilt, and eventually die. Sod webworms can cause periodic cosmetic injury, but are not believed to severely damage the turf. Periodic control of one or more of these problems will be necessary to grow a high quality turf.

The most troubling disease for zoysiagrass is brown patch. This disease becomes active when soil temperatures are between 65° and 75°F each fall and can be a problem through the following spring. Although zoysiagrass is probably no more susceptible to this disease than St. Augustinegrass, recovery can be slow due to the prolonged dormant to semidormant condition of zoysiagrass.

Other diseases that impact zoysiagrass include dollar spot and rust. Dollar spot typically occurs when nitrogen is below optimal levels. This can easily be corrected with a light application of nitrogen. Rusts occur during mild, humid weather and appear as small yellow to orange to reddish-brown pustules on the leaves. Fungicides are effective, but most often, frequent mowing with clipping removal will keep this under control.

More information about turf insects and diseases is found in the *Pest Identification* chapter.

## Turfgrass Maintenance

Mowing and edging practices have a significant effect on the groomed appearance of a lawn and on the overall long term health of the grass. Sound mowing practices require quality equipment that is properly maintained. A sharp blade (Figure 14-25) and the proper length of cut are absolutely essential. Three injurious maintenance practices are mowing with a dull blade (Figure 14-26), mowing infrequently and mowing the grass too short.

The careful use of string trimmers and mowers in the landscape is imperative, and there is no reason to use them around trees. If trees and other obstacles are planted in the turf, replace the grass around the base of trees with mulch to provide a buffer zone. The larger mulched area results in less turf near the tree being stressed by shade, more room for the lawn mower to maneuver with ease, and less need for string trimmers to be used. Mulch also confers other benefits, such as reduced competition from weeds and water conservation.



Figure 14-25. Sharpening a mower blade for a precision cut.



Figure 14-26. A dull mower blade damages turf by tearing blades.

photo by gale allbritton

## Mowers

A variety of mowing options are available for different turfgrasses and different applications. Every type of mower has its optimum performance areas and limitations. For the greatest efficiency in fuel, equipment and labor costs, mowers should be selected that are maneuverable, adequately powered, easily adjusted and readily serviced. All grasses recommended for Florida lawns can be mowed with a rotary mower, but the finished precision, lower cuts required on improved bermudagrass, zoysiagrass and at times on seashore paspalum requires a reel mower.

### Rotary Mowers

**Rotary mowers** are extremely versatile and probably the mainstay of most landscape maintenance companies. Rotary mowers can be used for quality turf, for rough areas, to remove seed heads, and to pulverize fallen leaves. They are best suited to cutting grasses between one and five inches in height. Blades of a rotary mower travel at high speeds on a horizontal plane (Figure 14-27) and cut the leaf



Figure 14-27. The rotating blade of a rotary mower.

blade upon impact, like a scythe. This results in some tearing of the leaf, so the mower blade must be in good condition and be sharp for the cleanest cut. If the blade is properly sharpened, it will cut, rather than tear, the leaf tissue.

**Mulching mowers** are rotary mowers with multiple or special blades designed to cut and recut grass clippings into small pieces before dropping them onto the turf. These mowers cut the clippings more finely, but do not make them disappear completely. Instead, the smaller clippings decompose quickly and return valuable nutrients to the turf.

### Reel Mowers

**Reel mowers** are the preferred machine for quality turf situations, especially for grasses mowed at one inch or less. They are the standard mowers for greens, tees, and for high quality residential or commercial turf. Reel mowers cut with a scissors-type action of the reel against a bedknife (Figure 14-28). Reel mowers cut, not rip, the turf blade and require a relatively level surface for efficient operation. Reel mowers are preferred for turf such as improved bermudagrass and zoysiagrass.



Figure 14-28. The scissor action cut of a reel mower.

## Mowing

Mowing is one of the primary maintenance practices essential for a good quality lawn. A smooth, dense turf surface is attained from frequent and regular cutting of grass leaf blades at a constant height. Mowing alters the metabolism and appearance of grass immediately afterward by increasing plant respiration and temporarily ceasing root growth. Therefore, to ensure a healthy turf, it is important to manage both the cutting frequency and height of the grass based on species needs.

### Mowing Frequency

Turfgrass species, growth rate and level of management determine how often a lawn needs to be mowed. Weather conditions and species characteristics influence growth rate; yet, the frequency of mowing can be reduced somewhat by moderating the amounts of fertilizer and water applied.

The grass plant metabolism is stressed every time the lawn is mowed. This stress can be minimized by removing only one third of the leaf blade each time mowing occurs, thus leaving as much leaf surface as possible for photosynthesis to provide food for regrowth. For example, if the mowing height is two inches, the grass should be cut before it reaches

three inches. If the mowing height is three inches, then mow before the grass reaches four and one half inches. If mowing is done at four inches, it should occur again before the grass reaches six inches. The higher the initial mowing height, the more the grass can grow before it needs to be mowed again. The table below (Figure 14-29) illustrates the frequency of mowing rule.

### Mowing Height

Optimum cutting height is determined by the growth habit and leaf width of the turfgrass species. A grass that spreads horizontally can usually be mowed shorter than an upright-growing, bunch type grass. Grasses with narrow blades can generally be mowed closer than grasses with wider blades. This means bermudagrass is maintained between ½ and two inches because of its numerous, narrow leaf blades and low growth habit. Bahiagrass then needs to be maintained between three and four inches to produce a good quality lawn because of its open, upright growth habit.

Each grass has a lower and upper tolerance limit for mowing (Figure 14-30). Mowing at the correct height increases turf density and root health, plus suppresses weeds. A higher grass results in increased leaf surface for more photosynthesis, deeper root systems, better drought tolerance, and an overall healthier

**Mowing Frequency as Determined by the One-third Rule**

<b>Mowing Height (inches)</b>	<b>Height of Grass at Mowing (inches)</b>	<b>Amount of Grass Removed (inches)</b>	<b>Estimated Mowing Frequency (days)*</b>
0.5	0.75	0.25	1.3
1.0	1.5	0.5	2.5
1.5	2.25	0.75	3.8
2.0	3.0	1.0	5.0
2.5	3.75	1.25	6.3
3.0	4.5	1.5	7.5
3.5	5.25	1.75	8.8
4.0	6.0	2.0	10.0

\* Estimate based on a daily growth rate of 0.2 inches

Table adapted from *Mowing Your Lawn (FSA6023)* by University of Arkansas Cooperative Extension Service

Figure 14-29. Estimated mowing frequency based on height of grass at each cut.

### Recommended Mowing Practices

<b>Turfgrass Species</b>	<b>Optimal Height (inches)</b>	<b>Frequency (days)</b>	<b>Preferred Mower</b>
bahiagrass	3.0 – 4.0	7 – 17	rotary
bermudagrass	0.5 – 1.5	3 – 5	reel
centipedegrass	1.5 – 2.0	10 – 14	rotary
seashore paspalum	1.0 – 2.0	5 – 7	rotary/reel
St. Augustinegrass*	2.5 – 4.0	7 – 14	rotary
zoysiagrass	1.0 – 2.0	10 – 14	reel

\* only dwarf cultivars can be mowed at less than 3 inches

Figure 14-30. Ideal mowing range and suggested mower types for common turfgrass species.

turf. A dense turf impedes stormwater runoff. Taller grass also shades the soil surface; this keeps it cooler, and results in less water use, less weed competition (and thus less herbicide use), and less clipping volume. A healthy root system ensures that water and nutrients are absorbed and not wasted. Mowing turf below the recommended height can stress the grass and subject it to invasion by weeds, insects, and diseases.

### Mowing Pattern

In lawn care, mowing patterns are of concern solely for aesthetics and serve no functional purpose. Grass tends to lean or grow in the direction in which it is mowed. The horizontal orientation of grass foliage in one direction is called **grain** (Figure 14-31). On high performance and high value turf sites, it is advisable to vary the mowing pattern to reduce grain. Therefore, the grass should not be mowed in the same direction each time it is cut. In addition, turf wear and compaction from the mower wheels is accentuated by mowing repeatedly in the same pattern and direction.



Figure 14-31. Obvious grain in recently mowed turfgrass.

### Clipping Removal

Grass leaf clippings result from mowing. They contain nutrients and should be left in place to help return some fertilizer and organic matter to the soil. Clippings do not contribute to thatch or to disease and insect problems. When turf is mowed at the proper frequency, the volume of clippings is small and they decompose quickly; however, clippings should be removed if large amounts are left on top of the grass (Figure 14-32). If clumping occurs, distribute the clippings by removing or by lightly raking. A leaf blower can also be used to distribute clippings, but never blow them into bodies of water or onto impervious surfaces. The nutrients in clippings are pollutants only when they end up in stormwater systems and waterbodies.



Figure 14-32. Too many clippings remaining on grass surface.

photo by gale allbritton

Recycling lawn clippings can reduce the amount of fertilizer needed. Further, it is expensive, wasteful and irresponsible to add yard waste to decreasingly available landfill space. It also makes sense to recycle as much of a site's landscape waste as possible onsite, which eliminates the need to use energy and money to move it.

## Edging and Trimming

Edging and trimming provide crisp, neat areas that improve the appearance of the landscape. **Edging** is the vertical cutting of turfgrass along a sidewalk, curb, or planting bed to create a delineating edge (Figure 14-33). Edging should not expose a wide strip of soil that can be invaded by weeds.

**Trimming** is the horizontal cutting of grass around buildings, signs, fences or other obstacles in the lawn area. Maintenance technicians should be very careful when mowing and trimming around trees. String trimmers and lawn mowers can inflict serious



Figure 14-33. Mechanical edging to create a clean edge between turfgrass and the sidewalk.

injury to trees. A mechanical bark wound from equipment often seriously affects the vascular system (found just under the bark) and disrupts or prevents its normal function. Injury can also create an entry point for diseases and insects.

Recently planted trees with young and thin bark are much more susceptible to **mechanical injury** than are older, more corky barked specimens. Large shade and ornamental trees with smooth bark (such as crape myrtles, hollies, lacebark elms and maple) can also be easily damaged by mechanical injury. It is a best practice to keep the string trimmers and mowers well away from the trunks of trees and shrubs. Creating a safety zone of mulch that extends at least 18 inches from the trunk of each tree and the base of each shrub will help protect bark from mechanical injuries (Figure 14-34).

## Blowing

Blowing is typically the final task in landscape maintenance operations. It is used to remove unwanted clippings from walks, driveways and parking lots. Power blowers are indispensable equipment in the care of a landscape. However, some municipalities and neighborhood associations have limited or banned their use because of noise. Be aware of local requirements before using this equipment.



Figure 14-34. A mulched safety zone is created around trees to keep mowers and string trimmers well away from trunks.

## Thatch Removal

Thatch is the layer of dead and decomposing leaf blades, stems, and roots on top of the soil surface. Thatch development is greatest in grass that is overfertilized, overwatered and improperly mowed. An excessive thatch layer will reduce water penetration and can bind fertilizer or pesticides, making them less effective. In severe cases, roots may actually be seen growing above ground and rooting into the thatch layer. This is a very unhealthy condition and leaves a lawn vulnerable to many stresses.

Vertical mowing (or **verticutting**) is the most efficient remedy for excessive (thicker than an inch) thatch. This technique uses vertical knife-like blades (Figure 14-35) to thin out thatch by slicing into it and bringing dead material to the surface. While this process can alleviate buildup by removing thatch, it also removes portions of the grass and will cause temporary damage to the turf. It is important to perform this procedure only during times of active grass growth, and only on healthy, nonstressed grass when irrigation or regular rainfall is available.

Periodic **topdressing** (adding a uniform layer of soil on top of the grass) with  $\frac{1}{4}$  inch of soil similar to that underlying the turf is the best method to alleviate thatch accumulation. However, the physical labor required for topdressing usually limits the practicality of this method on most residential lawns.



Figure 14-35. A dethatcher with vertical blades designed to cut and loosen thatch for raking and removal.

## Overseeding

Lawns go dormant during late fall and early winter in many parts of Florida, resulting in brown lawns throughout the cold months. There is nothing wrong with brown grass in the winter; it is a natural process. For some clientele, overseeding lawns may be desirable in the colder parts of the state to maintain a green color during the longer winter months.

**Overseeding** involves seeding a temporary cool season grass over the permanent warm season lawn. The warm season grasses come out of dormancy the following spring, and the cool season grass dies out. The best choice for overseeding home lawns is annual, intermediate, or improved/perennial ryegrass (Figure 14-36). These grasses also grow fast, are adaptable, and can tolerate close, frequent mowing.

Overseeding of warm season turfgrasses is done in the fall, approximately one month before the grass goes off color or when daytime temperatures are consistently in the low to mid 70°F range. The two most important things to remember while overseeding lawns are proper seedbed preparation and proper watering.

Seedbed preparation involves thoroughly raking the permanent grass to remove all debris. Next, mow the lawn at a lower height than usual, but do not mow St. Augustine grass any lower than three inches. The clippings should be caught or raked after mowing, followed by a final raking to remove additional material and loosen the soil so that ryegrass seed can come into contact with it. Lawns with heavy thatch should be dethatched in spring or early summer in preparation for fall overseeding.

Use a broadcast spreader for the best coverage during seeding. Walk in one direction to sow half the seed, and then walk at a right angle to the first side to sow the other half. Ensure the seed reaches the grass and contacts the soil by raking the ground with a stiff broom after sowing.

Watering is the last step in winter lawn establishment, and it is the most important because the seeds will not germinate without

moisture. Lightly apply water for 10 to 20 minutes to the overseeded lawn once or twice a day until the seeds have germinated; this usually takes about seven to 10 days. Continue to water daily for two to three weeks until seedlings are established. Use care not to overwater, as it could wash seeds away and encourage disease development. Once the overseeded grass is well established, water only on an as needed basis.

Established winter lawns require the same maintenance as permanent lawns, so remember to mow, water, fertilize, and control pests. Start mowing overseeded grass once it is well rooted and tall enough.

### Transitioning Back to Permanent Grass

To encourage growth of permanent lawn grass in the spring, do not encourage the temporary grass cover to continue growing in the spring. Permanent lawn grass can be weakened by the highly competitive ryegrass during this overlapping season of growth. Ryegrass normally dies out in late spring, but if the weather is cool and the lawn is watered frequently, it can persist. To discourage the ryegrass, do not apply fertilizer after February in South Florida, or after March in North Florida. Water as infrequently as possible, while making sure the permanent lawn grass does not suffer from drought. Continue to mow the ryegrass as closely as possible each week. These practices tend to weaken the winter grass and facilitate a faster transition back to the permanent lawn grass. Once the permanent lawn grass has resumed growth, begin a regular lawn maintenance program.



Figure 14-36. Ryegrass is most commonly used for overseeding.

## Irrigation Management

Irrigation is one of the most important cultural practices in turfgrass management. Since water is a limited resource and is vital to the health of a lawn, it is very important that watering is done correctly.

### Frequency

Irrigation frequency varies based on grass species, rainfall amounts, soil type and amount of compaction, shade presence, geographical location in the state, and, most importantly, by season. Irrigation systems should be reset seasonally to reflect the differing water requirements of grasses based on time of year. Overwatering will harm the long-term health of turf because it greatly increases disease susceptibility, encourages thatch buildup and leads to a shorter root system, thus reducing overall stress tolerance and the ability to survive with less water. Additionally, overwatering promotes the growth of certain weed species such as dollarweed and sedges.

Ideally, irrigation should be applied on an “as needed” basis (Figure 14-37). This can be determined by observing the grass for signs of water stress, which indicate that water lost in transpiration is not being replaced and the plant’s needs for water are not being met. It is also important to be aware of any watering restrictions which might be established by the Water Management District or local government. Signs of drought stress include:



Figure 14-37. Water as needed at a sufficient rate to penetrate the depth of the root system, but without runoff.

- ▶ Leaf blades folded in half lengthwise, which is in an attempt to conserve water.
- ▶ Grass with a blue-gray tint rather than the normal green color.
- ▶ Footprints that remain visible on the grass long after they are made.

### Amount

The amount of water applied during each irrigation cycle should not vary seasonally, though the frequency will change by season. Efficient irrigation wets only the turfgrass root zone, does not saturate the soil, and does not allow water to run off. Light, frequent watering is inefficient and encourages shallow root systems. Excessive irrigation, which keeps the root system saturated with water, is also harmful to the lawn.

A simple watering schedule would apply  $\frac{1}{2}$  to  $\frac{3}{4}$  inch of water when the turfgrass begins to show drought stress symptoms. If it rains, suspend irrigation until visible drought stress symptoms appear.

### Timing

The best time for lawn irrigation is in the early morning hours. Watering during the heat of the day wastes water due to excessive evaporation. Watering in late afternoon or late morning may be detrimental if it extends the time the lawn is naturally wet from dew. This extended **dew period** can accelerate disease occurrence.

## Fertilization Management

The timing of fertilization is tied to the turfgrass species, maintenance level goal, season of the year, the location in the state where the turfgrass is being grown, and the fertilizer source being used. The fertility needs of recently established lawns also differ from those of mature lawns.

One of the most important principles of fertilization timing is avoiding application to dormant or nongrowing turfgrass. During dormancy, turfgrass takes up very small

quantities of nutrients, and applied nutrients are more likely to leach or run off site in the next thunderstorm. Slow-release sources also influence the timing of fertilization, in that fertilization is required less frequently. For the initial spring application, particularly in north Florida, the recommended time to fertilize is after the last frost rather than on a specific calendar date.

Depending on the geographical location (Figure 5-26), fertilizer should be applied in two to four applications from spring greenup through fall. Do not apply nitrogen too early in the growing season, particularly in north Florida, because late season frosts may damage the grass. Likewise, do not fertilize too late in the year after growth has subsided. In south Florida, nearly year-round fertilization is acceptable.

Fertilizer should not be applied when heavy rains are imminent. When applying fertilizer near any waterways, remember it is imperative to leave an untreated buffer zone to protect water quality. This **ring of responsibility** should be at least three feet from the edge of the water for liquid fertilizers or granular fertilizers applied with a fertilizer spreader equipped with a deflector shield (Figure 14-38). If fertilizer is applied without a deflector shield, the distance should extend at least 10 feet from the edge of the water.



photo by sally scalera

Figure 14-38. Follow best management practices and fertilization guidelines to ensure a healthy lawn and environment.

More specific information about turfgrass fertilization can be found in the *Fertilization Management* chapter.

## Weed Management in Lawns

The proper identification of weeds and some understanding of how and why weeds are present in a lawn are important in selecting the best control strategy. Knowledge of whether weeds were previously present in a particular area will also help in preparation for future control procedures. To be successful, weed control should be a carefully planned and coordinated program instead of a hit-or-miss operation.

The best method of weed control begins with proper management practices that encourage a dense, thriving turf. Healthy turf shades the soil so sunlight cannot reach weed seeds that are ready to germinate. A thick turf also minimizes the physical space available for weeds to become established, while thin turf does not (Figure 14-39). Proper fertilization, watering, mowing and control of other pests are required to produce the dense turf that will be necessary to prevent weed infestation.

Turf damaged by foot or vehicle traffic invites weeds. Turf growing in areas compacted by excess traffic, especially when the soil is water saturated, cannot extract oxygen as well as turf under noncompacted conditions. Turf damaged by pests such as insects or diseases does not always recuperate quickly enough to outcompete germinating weeds. For example, tunneling from mole crickets disrupts the soil surface and loosens the soil around the roots, causing damage and enabling weeds to germinate and become established. Other insects and diseases can severely damage turf, resulting in bare areas. These open areas are usually slow to recover, thus enabling weeds to become established. High nematode populations also thin the turf and make it less able to recuperate from environmental stresses. Weeds that often become established in nematode infested soil include spotted spurge and Florida pusley.

### Sanitation

It is extremely important to prevent the introduction of weeds into lawn areas. If one can prevent weed establishment, there will be no need for control practices. Areas adjacent to



Figure 14-39. Broadleaf weeds invading a thin centipede grass turf being grown in too much shade for the grass species.

fine turf that are hard to mow, such as fencerows or ditch banks, often serve as a source of weed seed that infests the nearby turf. These areas should receive weed management attention.

A good sanitation practice is to wash mowers and trimmers used in weed-infested areas before mowing or trimming in weed-free areas. Similarly, rototillers should be thoroughly cleaned before and after use to minimize dispersal of weed seeds found in the soil. Yard clippings that contain weeds should be properly disposed of or composted to reduce the possibility of unwanted contamination.

It is important to use weed-free soil during construction or renovation. To minimize weed invasion during planting, use only certified

seed or weed-free sod. It is not unreasonable to request a tour of the sod farm where the sod will be purchased in order to inspect the quality of the grass.

## Sustainable Lawns

The idea of a residential lawn is changing in today's society. Given concerns about impacts on water use and quality, urban ecology, biodiversity, etc., it is likely in the future that a monoculture lawn will evolve into a neatly mowed polyculture of different grass species (both nonnative and native) and forbs (herbaceous flowering plants) as the acceptable norm. There are still challenges to this concept; much research, product

### **BMPs for Sustainable Lawns**

- ▶ Improve the soil at establishment to reduce compaction and improve infiltration.
- ▶ Plant or replant the best adapted turfgrass species and cultivars.
- ▶ Regularly test lawn areas (every one to three years) to determine pH, salinity levels and nutrient levels.
- ▶ Implement a fertilizer program based on University of Florida, IFAS Extension recommendations. Follow the Urban Turf Fertilizer Rule adopted by the Florida Department of Agriculture and Consumer Services.
- ▶ Maintain correct mowing height. Use the highest acceptable mowing height for the grasses being grown. Follow the one-third rule.
- ▶ Mow only when the turf is dry. Mowing wet turf can promote disease, and clippings can clog the machine.
- ▶ Mow in a different direction every time the lawn is cut. This prevents wear patterns, decreases grain and reduces the possibility of scalping.
- ▶ Sharpen the mower blade frequently enough to prevent a ragged appearance to the turf.
- ▶ Do not direct clippings into bodies of water or onto impervious surfaces.
- ▶ Leave clippings on the lawn; remove any that reach impervious surfaces. If clumping occurs, distribute the clippings by removing, lightly raking or using a leaf blower.
- ▶ Compost any clippings that must be collected. Use the compost as a soil modifier or mulch.
- ▶ Mulch tree leaves into the lawn and clean up any that accumulate on impervious surfaces.
- ▶ Clean the mower after use to reduce rusting and weed seed movement.
- ▶ Avoid mechanical damage to trees and shrubs from string trimmers, mowers, and other equipment. Maintain a mulched safety zone around trees and shrubs.
- ▶ Irrigate only as needed or if severe drought persists and threatens to significantly reduce turf cover. Follow UF/IFAS Extension guidelines for frequency, amount and timing. Abide by any local or Water Management District restrictions in place.
- ▶ Use pesticides only when weed, insect or disease levels threaten to significantly thin the lawn; strictly follow label directions. Implement an IPM program.

development and consumer education will be required to validate this alternative strategy. Yet, discussions abound in this arena and a new paradigm is likely to emerge as an improvement over current practices. Until such time, the landscape industry should strive to produce and maintain sustainable lawns by following a set of research based best management practices (BMPs) that support the goal of maintaining lawns with minimized impacts on water quality and quantity.

## Summary

The effort and time spent selecting the right grass species and cultivars will be well worth the investment. Many potential problems related to turf use, appearance, environment, insect or disease pests, and cultural practices can be avoided by properly choosing a turfgrass that best fits the situation.

When planted in areas where it is not adapted, a turfgrass often deteriorates or fails. The result of planting a turfgrass where

it is not adapted is a poor quality turf that requires excessive pesticide applications, fertilization, and replanting to retain a desirable groundcover. A high quality turf may not be obtainable in this situation.

A good maintenance program is just as necessary to ensure turf of satisfactory quality. Different lawn grasses require different levels of maintenance. Consequently, a realistic assessment including how much time, money, and maintenance is important before establishment.

While a lawn can be an appealing element in the landscape (Figure 14-40) and provides important benefits, like reducing stormwater runoff and cleaning the air, it is important to use turf wisely. Turfgrasses are all considered to be Florida-Friendly™ when used appropriately. Selecting the right turfgrass for the site becomes even more critical during times of drought or water shortages for conservation of valuable resources, contributing to a better environment, and long term success.



Figure 14-40. Properly selected, well maintained turfgrass provides both environmental and personal rewards.

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