UNIVERSITY OF FLORIDA
EXTENSION
Institute of Food and Agricultural Sciences

ENH5

St. Augustinegrass for Florida Lawns[1]

L.E. Trenholm, J.L. Cisar, and J. Bryan Unruh[2]

St. Augustinegrass (*Stenotaphrum secundatum* [Walt.] Kuntze.), is widely adapted to the warm, humid (subtropical) regions of the world. It is believed to be native to the coastal regions of both the Gulf of Mexico and the Mediterranean. In Florida, St. Augustinegrass is the most commonly planted turfgrass in the urban, coastal areas. It performs best in well-drained, fertile soils but can grow satisfactorily in a wide variety of soils. To produce an acceptable quality lawn, St. Augustinegrass requires irrigation and moderate fertility.

Figure 1. St. Augustinegrass.

Advantages

St. Augustinegrass produces a green to blue-green dense turf that is well adapted to most soils and climatic regions in Florida. It has relatively good salt tolerance and certain cultivars possess good shade tolerance. Establishment of St. Augustinegrass from sod is quick and easy. Several different cultivars of St. Augustinegrass sod and plugs are available from garden centers and custom sod installers throughout Florida.

Disadvantages

St. Augustinegrass, like most turfgrasses, has certain cultural and pest problems. It does not remain green during drought conditions without supplemental irrigation. It produces excessive thatch under moderate to high fertility and frequent irrigation. It has poor wear tolerance and some varieties are susceptible to cold damage. The coarse leaf texture is objectionable to some people. The major insect pest of St. Augustinegrass is the chinch bug, although resistance to chinch bugs varies somewhat among cultivars. For example, Floratam and Floralawn have traditionally been considered chinch resistant, but over time the insect has overcome this and are now considered a pest to these cultivars as well. St. Augustine Decline Virus (SADV) is a major disease problem in some parts of the United States but has not been identified as a problem in Florida. Some cultivars are also susceptible to gray leaf spot disease.

1. This document is Fact Sheet ENH5, a series of the Environmental Horticulture Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. First published: May 1991. Revised: October 2000. Please visit the EDIS website at http://edis.ifas.ufl.edu.
2. L.E. Trenholm, Assistant Professor, Turfgrass Specialist, Department of Environmental Horticulture, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611, J.L. Cisar, Professor, Turfgrass Specialist, Ft. Lauderdale Research and Education, Institute of Food and Agricultural Sciences, University of Florida, Ft. Lauderdale, FL 33314, J. Bryan Unruh, Assistant Professor, Turfgrass Specialist, West Florida Research and Education Center, Institute of Food and Agricultural Sciences, Jay, FL 32565.

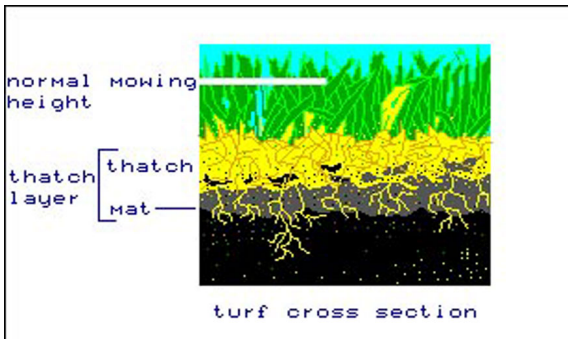

Figure 2. Thatch.

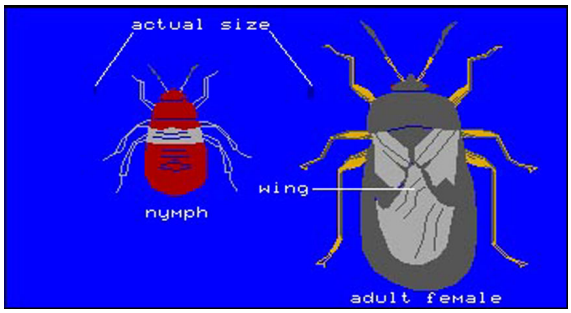

Figure 3. Chinch bug.

Cultivars

There are several cultivars of St. Augustinegrass available for lawn use in Florida. The different cultivars vary in their tolerances to environmental stresses or their susceptibility to pests, so it is advisable to check with your county Cooperative Extension Service office for the best grass for your location and needs. Table 1 lists some relative growth characteristics for currently available cultivars.

Common and Roselawn

These are pasture types of St. Augustinegrass that evolved in the 1800s. They produce a coarse, open turf that is susceptible to chinch bugs, herbicide damage, shade, and cold damage. They also have a light leaf color and do not respond well to fertilization. Avoid planting these cultivars if lawn appearance is important.

Bitterblue

This is an improved variety selected in the 1930s. Bitterblue has a finer, denser texture and darker blue-green color than common St. Augustinegrass. It has improved cold tolerance and good shade tolerance but is not resistant to chinch bugs or gray leaf spot disease. Its tolerance to atrazine is also lower than other varieties, making weed control more difficult. Bitterblue can produce a good lawn under proper management practices and pest control.

Figure 4. Bitterblue and Floratam Cultivars.

Floratine

This is an improved selection from Bitterblue that was released in 1962 by the Florida Agricultural Experiment Station. It has finer leaf texture and a denser and shorter growth habit that allows closer mowing than common St. Augustinegrass. It is not resistant to chinch bugs but tolerates light to moderate shade. Floratine's other characteristics are similar to Bitterblue's.

Floratam

Floratam is an improved St. Augustinegrass that was released jointly in 1973 by the University of Florida and Texas A & M. Floratam is the most widely produced and used St. Augustinegrass in Florida. It is a coarse-textured cultivar that has poor cold and shade tolerance. It will thin in direct relation to the amount of shade received. It grows vigorously in the warmer, but has a relatively long period of dormancy in north Florida and greens-up more slowly in the spring than some cultivars. It has some degree of chinch bug and SADV resistance, although new strains of chinch bugs that can damage Floratam have been identified. Floratam is tolerant of atrazine herbicides when temperatures are below 85°F.

Palmetto

Palmetto was a selection from a Florida sod grower in 1988. It was well received by sod growers

throughout the southeast, but, unfortunately, little university research has been done to date on this cultivar. It is often described as highly tolerant of shade, drought, and cold, but no impartial evidence of these claims exists at this time. It does exhibit a shorter growth habit, similar to Jade, Delmar, and Seville.

Raleigh

Raleigh is a cold-hardy cultivar released by North Carolina State University in 1980. It has a medium green color with a coarse texture. It is susceptible to chinch bugs, but can be planted in northern Florida due to its tolerance to lower temperatures. It is also susceptible to brown patch disease. During peak summertime heat, Raleigh has been noted to yellow and to not grow as aggressively as during cooler temperatures. Supplemental iron applications can reduce this yellowing tendency. Raleigh is best adapted to the heavier, organic, clayey soils with medium to low soil pH in central and north Florida.

Figure 5. Seville and Raleigh Cultivars.

Seville

Seville is a semi-dwarf, fine-leaved variety with a dark green color and a low growth habit. It is susceptible to chinch bug and webworm damage, but resistant to SADV. Due to its compact growth habit, Seville tends to be thatch-prone and shallow rooting. Seville performs well in shade and full sun, but is cold sensitive. Its cold tolerance is similar to Floratine's. Being a semi-dwarf variety, Seville's maintenance is different than taller growing varieties.

Figure 6. Chinch bug.

Figure 7. Webworm.

Floralawn

This cultivar was released in 1986 by the Florida Agricultural Experiment Station. It is resistant to SADV, chinch bugs, sod webworms and brown patch. Like Floratam, it has poor shade and cold tolerance. It is also coarse-textured. Floralawn should be grown in mild environments in full sun to moderate shade under low to moderate fertility.

Jade and Delmar

These two semi-dwarf releases are commercially available as sod or plugs. Jade and Delmar have improved shade tolerance, shorter internodes, a darker green color, and better cold tolerance than Seville. They should be mowed at 1 1/2-2 1/2 inches. Jade has a finer leaf blade texture and better shade tolerance than Delmar. Delmar has enhanced cold tolerance; therefore, it can be grown in cooler regions of Florida. Jade and Delmar are both susceptible to chinch bugs, sod webworms, and brown patch disease. These also have slow lateral runner growth, thus, require longer periods for grow-in from plugs or recovery from damage.

Other Varieties

Several other lesser known and available St. Augustinegrass varieties have been released. These include FX-33, Sunclipse, Mercedes, Gulf Star and others. Research performed on these varieties has been limited and generally they have not proven superior to older varieties that are currently available.

Maintenance of St. Augustinegrass

It is advisable to check with your local County Extension office for cultivars best adapted to your geographical area and uses. As emphasized throughout the Florida Lawn Handbook, proper lawn maintenance practices are the best means for avoiding pest problems and obtaining a high quality lawn.

Establishment

The best time to establish St. Augustinegrass is during the spring or early summer months. This enables the grass to grow in before cooler weather begins, when growth will be reduced. In south Florida, establish St. Augustinegrass during winter or spring. When establishing any grass, it is important to provide irrigation more frequently than normal recommendations call for. Frequent, short irrigations throughout the course of the day will help the root system to become established in the soil and become viable. Mowing should not be done until the roots have had a chance to peg down into the soil. For more information on preparing the site and establishment, see Chapter 2 "Establishing Your Florida Lawn."

St. Augustinegrass is established by vegetative propagation rather than by seeds. Vegetative propagation means that plant parts with growing points are used for planting rather than seeds. St. Augustinegrass has stolons (aboveground stems) that have areas of actively dividing cells at the nodes. These areas are capable of generating new shoot growth and are responsible for lateral growth of St. Augustinegrass along the ground.

Sodding

Sodding will produce an instant lawn, as you virtually cover the entire area to be planted with grass material. Sod should only be laid over bare moist soil with pieces laid in a staggered brick-like pattern and the edges fitted tightly together to avoid any open cracks. Rolling and watering thoroughly will insure good contact with the soil for fast rooting. Sodded areas should be watered at least twice per day with 1/4 inch of water until the sod is held fast (usually 2 to 3 weeks) to the soil by roots; then watering should be reduced to an as-needed basis.

Sprigging

Sprigging is less expensive than sodding, but does not produce an instant lawn as does sodding. It is a labor-intensive way to cover a large area. Sprigs contain nodes on stolons, which are planted end-to-end in furrows 6 to 12 inches apart. Stolons should be covered with soil, but leaf blades should be left exposed. The soil should be tamped and watered in thoroughly. Soil should be kept moist until new stolons appear.

Plugging

A number of St. Augustinegrass cultivars are available commercially as plugs. Sod also can be made into plugs by cutting it into small squares. Spacing of plugs varies from 6 to 24 inches. The closer spacing provides full coverage in 3-6 months and farther spacing covers in 6 to 12 months. Plugs are placed in holes of the same size or in open furrows and tamped into place. A thorough watering completes the installation. The turf should then be cared for like a sprigged lawn.

Fertility

Proper fertilization of any lawngrass is an important component of the best management practices of your home lawn. Fertilization and other cultural practices influence the overall health of your lawn, and can reduce or increase its vulnerability to numerous stresses, including weeds, insects, and disease.

It is advisable for homeowners to have soil tests done annually. Your local Cooperative Extension office has instructions and supplies for taking soil samples and submitting to the Extension Soil Testing Lab for analysis. In particular, phosphorous levels are best determined by soil testing. Since many Florida

soils are high in phosphorous, little or no phosphorous may be needed for satisfactory lawn growth.

Maintaining a good quality lawn requires a properly planned fertility program. An acceptable quality St. Augustinegrass lawn can be grown with a low to high level of fertility, depending on what the homeowner wants. First, decide how much time and effort can be spent on lawn maintenance. A lower fertility lawn is best for those with little time to spend on lawn care. A high fertility lawn may be better suited to those who desire a manicured appearance for their yard. This type of maintenance will require more time and money for lawn care.

In general, two weeks following spring regrowth, apply a complete fertilizer such as 16-4-8 at the rate of 1/2 (water-soluble) to 1 (slow-release) pound of nitrogen per 1000 square feet. The three numbers refer to percent nitrogen, phosphorous, and potassium, respectively, in the bag. For example, a 50-pound bag of 16-4-8 contains 16% nitrogen or 8 pounds total nitrogen. This bag will fertilize 8000 square feet at the rate of 1 pound of nitrogen per 1000 square feet at this rate. Higher fertilization rates will produce a faster buildup of thatch than lower rates. High rates of fertilizing can also encourage insect damage to the turf. Additionally, the necessary amount of mowing and watering increases with the amount of fertilizer.

University of Florida guidelines for lawngrass gertility show a range of fertilizer rates over which a particular species may be successfully grown for various areas of the state. These ranges are included to account for individual homeowner preferences for low-, medium-, or high-input grass. Additionally, localized microclimate effects can have a tremendous effect on turfgrass growth, and a range of rates provides more opportunity to allow for these environmental variations. An example of this would be a typical home lawn that is partially shaded and partially sunny. The grass growing in the shade should receive lower rates of fertilizer than that growing in full sun. The guidelines are also separated into three geographical locations statewide as indicated in Table 2 and Table 3 . All rates are in pounds of nitrogen per 1000 square feet. For questions on how to apply these amounts, refer to the section in this book entitled Florida Fertilization.

Fertilizer should be applied to St. Augustinegrass in 2 to 6 application from spring greenup through fall. Do not apply nitrogen too early in the growing season, particularly in north Florida, or subsequent frosts may damage the grass. Likewise, don't fertilize too late in the year, as this can slow regrowth the following spring. If applying water-soluble forms at the lower application rate, it will take more applications to apply the total amount of fertilizer needed for the year than if applying a slow-release form.

On high pH (>7.0) soils or where high pH water is applied, yellow appearance may be an indication of iron or manganese deficiency. For iron deficiency, spray ferrous sulfate (2 ounces in 3 to 5 gallons of water per 1000 square feet) or a chelated iron source (refer to the label for rates), to temporarily enhance color. Iron applications every 6 weeks will help maintain green color and, unlike nitrogen, will not promote excessive topgrowth. Lower the soil pH by applying 15 pounds of elemental sulfur per 1000 square feet prior to grass establishment. Once the grass is established, up to 5 pounds of elemental sulfur may be added per 1000 square feet, it if is immediately irrigated in to prevent burn. Using ammonium nitrate or sulfate as a fertilizer source will also help to temporarily reduce soil pH. Apply manganese as a fertilizer with micronutrients or as straight manganese sulfate ($MnSO_4$) bimonthly at 0.41 pounds per 1000 square feet (18 pounds per acre) to relieve deficiency symptoms if present.

Mowing

Proper mowing practices are necessary to keep any lawn healthy and attractive. Under high levels of management, St. Augustinegrass can be maintained at 2 inches if the lawn is mowed at least weekly during the growing season. Mowing at this height and frequency requires more fertilizer and water to maintain an attractive lawn. Also, low cutting heights and high maintenance levels can predispose the turf to many pest problems. Under moderate or low levels of management, St. Augustinegrass should be cut at a height of 3 to 4 inches. To obtain this height with most home rotary lawn mowers, the highest wheel

height setting should be used. This height will help the grass develop a deep root system and give a better appearance to the turf. Mowing frequency under moderate or low management should be adjusted to the amount of growth. No more than one-third of the leaf blades should be removed with any mowing. Low mowing heights can cause problems in turf quality. Repetitive low mowing reduces the density and vigor of St. Augustinegrass and can lead to weed problems. The mowing height should be increased to 4 inches during periods of moisture stress or if the grass is growing in shade. Newer semi-dwarf varieties have a lower growth habit, and should be mowed at 1 1/2 to 2 inches for optimum quality. Mowing too infrequently and watering improperly can cause a thatch buildup. The chapter entitled "Thatch and its Control in Florida Lawns" in this publication has more information on thatch.

Either a rotary or reel mower can be used on St. Augustinegrass. It is important to keep the blades sharp and well-adjusted to get a clean cut. Dull blades will give the lawn a brownish cast, because a ragged cut shreds the leaf blades rather than cutting them. During the growing season blades should be sharpened on a monthly basis.

Grass clippings can be left on a lawn that is mowed at the proper height and frequency. Under these conditions, clippings do not contribute to the thatch layer. Clippings should be left on lawns maintained with low to moderate fertility levels to help recycle nutrients. If clippings are excessive (e.g., clumping occurs), let them dry out and then disperse them.

Watering

The best way to irrigate an established lawn is on an as-needed basis. Grass blades will begin to wilt (e.g., fold, turn bluish-green in color and not recover from traffic or footprints) as the moisture begins to be depleted in the soil. If 30 to 50% of the lawn shows signs of slight wilting, it is time to irrigate with 3/4 - 1" of water. The turf will fully recover within 24 hours. The turf should not be watered again until it shows signs of wilting. This irrigation schedule works for any soil type and environmental condition. For further information on recommended watering practices see the chapter in this publication entitled "Watering Your Florida Lawn." Proper watering practices will help maintain a lawn that requires less mowing and has little thatch buildup. Proper watering will also help develop a deep root system and be less susceptible to damage by pest and environmental stresses. If the diseases brown patch or gray leaf spot are a continuous problem, excessive watering and nitrogen fertilization may be responsible. Certain weeds (like pennywort and nutsedge) also thrive in soils which are continuously wet. Regulate these management practices closely to reduce disease and weed severity.

Irrigation on an as-needed basis is an efficient way to water any grass, providing that the proper amount of water is applied when needed. Normally, fall through spring is the driest period of the year. Therefore, irrigation is required to replace water lost via evapotranspiration. Apply enough water to rewet the soil rootzone and then wait until the turf shows signs of drought (e.g., wilting) again before the next irrigation (usually every 7 to 14 days in winter, 3 to 4 days in April-May, depending on soil type and maintenance practices). For most Florida soils, no more than 3/4 inch of water is necessary to rewet the upper 8 to 12 inches of the soil profile, which is where the majority of the roots are. To determine rates from a sprinkler system, place several coffee cans throughout the irrigation zones to find out how long it takes to apply 3/4 inch of water. Irrigation is needed when leaf blades begin to fold up, to actually wilt, turn blue-gray in color, or when footprints remain visible on the grass. The length of the irrigation period to apply this 3/4 inch can stay constant year round; only the *frequency* between irrigations should change. Therefore, irrigation programs set by automatic timers do not need to operate on a daily schedule. They need only to operate after the turf begins to show signs of drought and then be programmed to apply an average of 3/4 inch of water. Overwatering encourages nutrient leaching, increased pest problems, shallow rooting, and, of course, water waste. For further information refer to the chapter on "How to Calibrate Your Sprinkler System" in this publication.

Pest Problems

Several pest problems can affect St. Augustinegrass. Diagnosis and recommendations for treatment of pest problems are available from your county Cooperative Extension Service.

Weeds

The best approach to weed control is a healthy, vigorous lawn. Weed problems in a lawn indicate that the turf has been weakened by improper management practices or damage from pests. Proper management practices can eliminate most weed problems. If weeds are a persistent problem, herbicides labelled specifically for St. Augustinegrass should be used. If an herbicide is needed, apply preemergence herbicides (i.e., pendimethalin, benefin, bensulide, atrazine, or others) to control crabgrass if it was present in previous years. Timing is critical for successful control. A general rule of thumb for application is Feb. 1 in south Florida, Feb. 15 in central Florida, and March 1 in north Florida. *Note: Preemergence herbicides will not control weeds which are actively growing.*

Apply postemergence herbicides (e.g., atrazine) in May as needed for control of summer annual and perennial broadleaf or grassy weeds. Do not apply these materials if the turf is under moisture stress or if air temperatures exceed 85°F. Check with your local County Cooperative Extension Office for positive weed identification and latest recommendations.

Many commercial weed and feed formulations will provide control, but they should not be used every time the lawn is fertilized. Read and follow any pesticide label before use. The chapter entitled "Weed Control Guide for Florida Lawns" gives specific weed control recommendations.

Insect

The major pest of St. Augustinegrass is chinch bugs. These are foliar feeding insects that suck plant juices through a needle-like beak, resulting in yellowish to brownish patches in turf. Injured areas are usually first noticed, as the weather begins to warm, along sidewalks adjacent to buildings and in other water stressed areas where the grass is in full sun. Check for chinch bugs by removing the ends of a coffee can, inserting one end through the soil at the margin of suspected damaged areas and fill with water. Chinch bugs will float to the water surface within 5 minutes. In areas where chinch bugs are a serious problem, a single thorough insecticide treatment may offer only temporary control. Therefore, repeat applications may be required. Large populations of this insect have become resistant to organophosphate insecticides. Alternative chemicals are available, but the best solution is to plant Floratam or Floralawn, since these cultivars are resistant to chinch bugs. Other insect pests, including webworms, armyworms, grass loopers, and mole crickets, can cause damage on St. Augustinegrass. Mole crickets damage turfgrass areas primarily by the tunnels or soft mounds they leave while searching for food. Additional damage may result from small animals digging through the soil profile in search of the mole crickets as food. Check for mole crickets by: 1) examining an area for the tunnels, or 2) applying 2 gallons of water with 1 1/2 ounces of detergent soap per 2 square feet in suspected damaged areas. Mole crickets will surface in several minutes. High levels of nitrogen fertilizer encourage insect problems. Refer to the chapters on specific insect pests for descriptions and information about their control.

Diseases

Brown patch and gray leaf spot are the two major disease problems of St. Augustinegrass. Brown patch occurs in warm, humid weather and is encouraged by excessive nitrogen. Brown patch is generally most noticeable during spring and fall months. Gray leaf spot occurs during the summer rainy season and is primarily a problem on new growth. Both diseases can be controlled with fungicides. Refer to the chapter on diseases for additional information.

Nematodes

Several types of nematodes infest St. Augustinegrass lawns. Population peaks of nematodes typically occur in late April to early May and again in late August to early September. Damage symptoms include thin stand density, less vigorous growth, a weakened root system, slow recovery following rain or irrigation application, and certain

weed invasion (e.g., prostrate spurge and Florida pusley). Soil nematode levels can only be positively identified through laboratory procedures. Inquire with your local county Cooperative Extension Service office on proper sample submission to the University of Florida Nematode Assay Laboratory. Encourage deep turfgrass rooting by raising the mowing height, irrigating less frequently but deeper, and providing ample soil potassium and phosphorus. For more information, refer to the chapter on nematodes in this book.

Other Problems

Many other factors can decrease the quality of a lawn. To ensure a good St. Augustinegrass lawn, refer to other sections of this publication for recommended management practices, and follow label directions when applying fertilizers and pesticides.

Thatch Removal

Thatch is the layer of undecomposed leaf blades, stolons, roots and crowns intermingled with soil. Contrary to popular belief, leaving mowing clippings on the lawn does not cause thatch. Excessive thatch develops when the grass is overfertilized, overwatered, and improperly mowed. It the thatch layer exceeds 1 inch, remove by vertical mowing in early-spring (e.g., April) south of Orlando and late-spring (e.g., May) north of Orlando. A 3-inch spacing between the dethatching blades is best. *Caution: Vertical mowing may result in damaged turf that will require a period of recuperation. Do not attempt vertical mowing unless the grass is actively growing (April to May). A professional landscaping maintenance service or the local county Cooperative Extension Service office should be consulted before attempting lawn renovation.* Remove debris by raking, sweeping, or vacuuming and follow with a conventional mowing to improve turf appearance. Immediately irrigate to prevent rootzone dehydration. One week following vertical mowing apply 1 pound nitrogen per 1000 square feet (e.g., 3 pounds ammonium nitrate or 5 pounds ammonium sulfate per 1000 square feet) to encourage recovery. This material must be watered in immediately following application to prevent burn. Periodic topdressing (adding a uniform layer of soil on top of the grass) with to 1/4 inch of soil similar to that underlying the turf is the best method to alleviate thatch accumulation; however, the physical labor required limits its practicality for most homeowners. If topdressing, use soil that is free of weed seeds and nematodes. Do not exceed recommended topdressing rates as this encourages brown patch disease.

Renovation

Replant large bare areas by broadcasting sprigs (1 bushel per 1000 square feet), planting 2-inch plugs every 12 inches, or by sodding. Keep these areas continuously moist with light, frequent irrigations several times daily until runners develop or when sod is well rooted. Over time, gradually reduce irrigation frequency, but increase irrigation duration to apply 3/4 inch in order to wet the top 8 to 12 inches of the rootzone. Refer to the chapter "Establishing Your Florida Lawn" for more information.

Table 1. Relative growth characteristics for St. Augustinegrass cultivars

Cultivars	Mowing Ht. (in)	Cold Tolerance	Shade Tolerance	Chinch Bug Resistance	Green Color	Texture	Density
Normal Growth Habit							
Common/ Roselawn	3-4	poor	poor	poor	light	coarse	poor
Bitterblue	3-4	good	very good	slight	dark	coarse	good
Floratine	2-3	fair	good	slight	dark	fine	good
Floratam	3-4	poor	fair	good*	dark	coarse	good
Floralawn	3-4	poor	poor	good*	dark	very coarse	good
FX-10	3-4	poor	poor	good	medium	coarse	good
Raleigh	3-4	very good	good	poor	medium	coarse	good
Semi-dwarf Growth Habit							
Delmar	1- 2	very good	good	poor	dark	fine	good
Jade	1- 2	good	good	poor	dark	very fine	good
Palmetto	3-4				dark	coarse	good
Seville	2-2	good	very good	slight	dark	fine	good

*Isolated evidence of a new chinch bug has been reported, which can feed on these cultivars.

Table 2. Recommended Fertility Rates for St. Augustinegrass throughout Florida

Location[1]	N Fertility Guideline
North Florida	2-4
Central Florida	2-5
South Florida	4-6

[1]North Florida in this example is considered to be anything north of Ocala. Central Florida is defined as anything south of Ocala to a line extending from Vero Beach to Tampa. South Florida includes the remaining southern portion of the state.

Table 3. Calendar Guide to Annual St. Augustinegrass Fertilization[2,3]

Maintenance Level	January	February	March	April	May	June	July	August	September	October	November
North Florida											
Basic			C			Fe			C		
Moderate			C		SRN		Fe		C		
High			C		SRN	Fe	SRN		C		
Central Florida											
Basic			C				Fe		C		
Moderate			C		SRN		Fe	SRN	C	C	
High		C		N	SRN		Fe	SRN		C	
South Florida											
Basic			C		SRN		SRN			C	
Moderate		C		N		SRN		SRN			C
High		C		N	SRN		SRN		SRN		C

[2]For initial spring application, particularly in North Florida, the recommended time to fertilize is after the last frost rather than on a specific calendar date.

[3]C=complete fertilizer application (NPK); N=nitrogen application only; SRN=nitrogen only in a slow-release from; Fe=iron application only.