Lawns in Georgia

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An attractive lawn makes an ideal setting for a home and adds beauty to an area. In addition, a lawn reduces dust, glare and heat, muffles noise, helps prevent erosion and surface runoff and provides a good play area. It can also increase the value of your property.

Establishing and maintaining an attractive lawn requires time, effort and money. This publication provides you with the information needed to obtain an attractive lawn.

Selecting the Right Grass

Perhaps the most important factor in developing and maintaining an attractive and problem-free lawn is to choose a grass that is adapted to your area and has the qualities you desire. Georgia has widely differing geographical areas and local climates. A grass that will do well in the southern part of the state may not survive winter in the mountain area. Conversely, cool-season species are not suited to the hot, humid summer of the Coastal Plain area. First, let's distinguish between cool-season and warm-season species.

Cool Season Grasses

Cool-season grasses grow well during the cool months (60 degrees-75 degrees F) of the year. They may become dormant or injured during the hot months of summer.

Tall Fescue *(Festuca arundinacea*). Perhaps the most popular grass in the mountain and upper piedmont areas of Georgia is tall fescue. This is a perennial bunch-type grass that grows rapidly and requires frequent mowing in the spring and fall. Tall fescue needs more water than the warm-season grasses to stay green during the summer. It is quickly established from seed and grows well in full sun as well as moderate shade. Tall fescue will tolerate a wide range of soil conditions, but like most turfgrasses grows best with a soil pH between 5.5 and 6.5. Lawns planted in tall fescue tend to thin out and become "clumpy" thus requiring reseeding every three or more years.

Kentucky-31 (K-31) is the old, common cultivar or variety of tall fescue grown in Georgia. Most of the new cultivars referred to as "turf-type" tall fescues have slightly narrower leaf blades, slower vertical growth rates, greater density and shade tolerance than K-31. As a result, if properly managed, most turf-types will produce a better turf than K-31. More information can be obtained from Cooperative Extension Service Leaflet No. 354, *Tall Fescue Lawn Management*.

Kentucky Bluegrass *(Poa pratensis*). Kentucky bluegrass has a medium leaf texture and a bright, pleasing color. There are many varieties which grow well in and north of the

upper piedmont areas of Georgia. Kentucky bluegrass can become semi-dormant during hot weather, and grows best in a fertile soil with a pH of 6 to 7. While it does best in partial shade, it will grow in open sun if adequate moisture is present.

Ryegrasses. Perennial ryegrass (*Lolium perenne*) and **annual ryegrass *(Lolium multiflorum)*** are suited for temporary cool-season turfgrasses throughout Georgia. They can be used as a temporary winter cove on new lawns that have not been permanently established. Ryegrasses are also used for overseeding, that is, to provide a green cover on a warm-season grass during the winter. However, overseeding may damage the warm-season grass unless managed correctly in the spring because the ryegrass competes for moisture, sunlight and nutrients.

There are many varieties of perennial ryegrass, and depending upon the environmental conditions, they may behave as an annual or perennial. As its name suggests, annual ryegrass dies as summer approaches. It is also known as common, winter, domestic, Oregon, and Italian ryegrass.

Warm Season Grasses

Warm-season grasses grow best during the warm months (80 degrees-95 degrees F) of spring, summer and early fall. They grow vigorously during this time and become brown and dormant in winter.

Bermudagrasses (*Cynodon Spp*). All bermudas thrive in hot weather but perform poorly in shade. Bermudas spread so rapidly by both above-and-below-ground runners that they are difficult to control around flower beds, walks and borders. If fertilized adequately, they require frequent mowing. The bermudagrasses are adapted to the entire state and tolerate a wide soil pH.

Common Bermudagrass *(Cynodon dactylon*). Common bermudagrass is drought resistant, grows on many soils, and it makes a good turf if fertilized and mowed right. Common bermudagrass produces many unsightly seedheads, but in spite of this fault, it is frequently used on home lawns due to the ease and economy of establishment. Common bermuda may be planted from either seed or sprigs and with intensive management will provide a high quality turf. However, the newer hybrid bermudas are generally far superior.

Hybrid Bermudagrasses. Compared with common bermuda, these grasses have more disease resistance, greater turf density, better weed resistance, fewer seedheads, finer and softer texture and more favorable color. They also produce no viable seed and must be planted by vegetative means.

The hybrids also require more intensive maintenance for best appearance. Frequent fertilization and close mowing, edging, and dethatching are needed to keep them attractive.

All of the improved bermudas described here have been developed and released cooperatively by the University of Georgia Coastal Plain Experiment Station and U.S.

Department of Agriculture. They are products of the grass breeding program of Dr. Glenn W. Burton, Principal Geneticist.

Tifway (Tifton 419) Bermudagrass. Tifway has several outstanding features that make it an ideal turf for lawns and golf fairways and tees. It has a dark green color and stiffer leaves than Tifgreen. Tifway is more frost resistant than other bermudagrasses. Therefore, it will usually remain growing and green longer in the fall and will develop color earlier in the spring. This trait, along with its ruggedness, has led to its use on football fields.

Tifway II Bermudagrass is an improved mutant of Tifway. Tifway II looks like Tifway and has the same desirable characteristics, but makes a denser turf, is more frost tolerant, often greens up earlier in the spring and provides slightly better turf quality.

Tifgreen (Tifton 328) Bermudagrass. Tifgreen is a low-growing rapidly spreading grass. It is relatively disease resistant and makes a dense, weed-resistant turf when properly managed. Its fine texture and soft, green leaves are largely responsible for its excellence as a putting green on golf courses.

Tifdwarf Bermudagrass. This hybrid is thought to be a vegetative mutant from the original Tifgreen nursery at Tifton. Tifdwarf, as the name implies, is a very short grass with tiny leaves that hug the ground very closely. It has softer leaves and fewer seedheads than Tifgreen. These characteristics contribute to its use on golf greens and make it less desirable than the other hybrids for lawn use.

Carpetgrass (*Axonopus affinis*). Carpetgrass is a perennial, coarse-leaved, creeping grass which grows in the central and southern regions of the state. It grows better on low, wet soils than do other grasses. It will grow well in either sun or shade but is less shade tolerant than St. Augustine and centipedegrass which it resembles. Carpetgrass may be planted by seed or sprigs. It is not winter hardy and should not be planted north of middle Georgia.

Carpetgrass is recommended only for lawns on wet, low fertility, acid, (pH 4.5-5.5) sandy soils where ease of establishment and care is more important than quality. Its chief disadvantage is rapid seedhead production.

Centipedegrass *(Eremochloa ophiuroides*). This is a low, medium textured, slow growing but aggressive grass that can produce a dense, attractive, weed-free turf. It is more shade tolerant than bermudagrass but less shade tolerant than St. Augustine and zoysiagrass. Since centipede produces only surface runners, it is easily controlled around borders of flower beds and walks. It is well adapted as far north as Atlanta and Athens.

Centipede is the ideal grass for the homeowner who wants a fairly attractive lawn that needs little care. Centipede does not require much fertilizer or mowing, and compared to other lawn grasses, is generally resistant to most insects and diseases. It will, however, respond to good management and provide a very attractive turf. Centipede can be established from either seeds or sprigs. Since it is slow growing, it takes longer than bermuda and St. Augustine to completely cover.

Centipede is subject to "decline" problems that can be prevented by proper management. This includes care not to overfertilize, prevention of thatch accumulation, irrigation during drought stress, particularly in the fall, and maintaining a mowing height of 1-1 1/2 inches. Centipede is well adapted to soils of low fertility with a pH of 5.0 to 6.0 but grows best -- like most grasses -- at a soil pH of 6.0 to 6.5. For additional information see Cooperative Extension Service Leaflets No. 313, *Centipede Lawns,* and No. 177, *Prevent Centipede Decline.*

Zoysiagrasses *(Zoysia Spp*). Several species and/or cultivars of zoysiagrasses are available in Georgia. Most are adapted to the entire state and form an excellent turf when properly established and managed. For the best appearance, most zoysias require cutting with a reel mower, periodic dethatching, and more frequent irrigation than other warm season turfgrasses. The zoysias form a dense, attractive turf in full sun and partial shade, but may thin out in dense shade. Most zoysias grow very slowly when compared to other grasses. They usually are established by sodding, plugging, or sprigging. Two-inch diameter plugs planted on 6-inch centers, will cover completely in 12 months if irrigated and fertilized properly.

Zoysia japonica is sometimes called Japanese or Korean lawngrass or common zoysia. It has a coarse leaf texture and excellent cold tolerance like Bermudas and it can be seeded.

Meyer zoysia, also called "Z-52," is an improved selection of Zoysia japonica. It has medium leaf texture, good cold tolerance, and spreads more rapidly than the other zoysiagrasses.

This is the zoysia often advertised as the "super" grass in newspapers and magazines. These advertising claims are true in part, but do not tell the entire story.

Zoysia matrella, also named Manilagrass, is less cold tolerant than Zoysia japonica or Meyer but more so than Emerald. It also has a finer leaf texture than Zoysia japonica and Meyer, but is coarser than Emerald.

Emerald zoysia is a hybrid between *Zoysia japonica* and *Zoysia tenuifolia* that was developed in Tifton, Georgia. It has a dark green color, a very fine leaf texture, good shade tolerance, high shoot density, and a low growth habit. Emerald will develop excess thatch rather quickly if over fertilized and its cold tolerance makes it more susceptible to winter injury from the Atlanta area and north.

After this grass has been mowed, new growth originates largely from the base of the plant, rather than from the branches, thereby leaving very few exposed brown stems. Emerald zoysia is moderately winter-hardy and fairly shade tolerant, but it grows more slowly when planted in a shady yard. Because of its thick growth, it is difficult to overseed.

El Toro is a relatively new zoysia that was developed in California and looks like Meyer. El Toro is the fastest growing zoysia, tolerates mowing with a rotary mower, and

produces less thatch than Meyer, The winter hardiness of this zoysia is not yet well established.

The zoysiagrasses are (1) slow to cover completely, thus more costly to establish; (2) less drought-tolerant than Common bermudagrass; and (3) recommended for lawn use only when the homeowner is willing to provide the required maintenance. For more information see Cooperative Extension Service Leaflet No. 395, *Zoysiagrass Lawns.*

St. Augustinegrass (*Stenotaphrum secundatum*). Compared to finer textured grasses like the bermudas, St. Augustine has large flat stems and broad coarse leaves. It has an attractive blue-green color and forms a deep, fairly dense turf. It spreads by long above-ground runners or stolons. While it is aggressive, it is easily controlled around borders. It produces only a few viable seed and is commonly planted by vegetative means.

St. Augustine is the most shade tolerant warm-season grass in Georgia. It is very susceptible to winter injury and should only be planted with caution as far north as Atlanta and Athens. Perhaps the greatest disadvantage of this grass is its sensitivity to the chinch bug. While insecticides can control this insect, frequent applications are required.

The more common St. Augustinegrass varieties are Bitter Blue, Floratine and Floratam. Bitter Blue has the best shade tolerance but is sensitive to chinch bugs and St. Augustine Decline Virus (SADV). Floratine has the finest leaf texture but is also susceptible to chinch bugs and SADV. Floratam has the coarsest leaf texture, is resistant to chinch bug and SADV, but is not as shade tolerant as the others.

Establishment

There are three distinct aspects of turfgrass establishment. The first, soil preparation, is probably the most important. The second, planting, may involve seeding, sprigging or sodding. The final step is the care and maintenance for two to four weeks after planting.

Soil Preparation

The key to successful establishment of a home lawn is proper soil preparation. Without this, most lawns will eventually fail. Soil should be prepared the same whether you are planting by seed, sprigs, stolons, or sod. Outlined below are the steps necessary for proper soil preparation.

Take Soil Samples - Base fertilizer and lime applications on the result of soil tests. Contact your county agent for information on how to collect samples.

Clean Planting Site - Remove all the debris from the area to be planted. This includes rocks, bottles, and large roots. Remove all old tree stumps. These will eventually decay and leave depressions in the lawn.

Rough Grading - If extensive grading is being done, remove the topsoil and replace it after the rough grade is set. The rough grading should conform to the final grade after the topsoil is added. A 1-2 percent slope (1-2 foot of the fall per 100 feet) away from all buildings generally gives the best results.

If internal drainage or sub-irrigation systems are to be installed, this is the best time to do it. Remember, good drainage is a must if a nice lawn is desired.

The subgrade may become compacted during rough grading, especially if the ground is wet. This compacted layer must be broken up by some means. A spring tooth harrow works well on soils compacted lightly, while a small rotovator might be needed for more heavily compacted sites.

Replace Topsoil - Once the subgrade is established, respread the topsoil. Allow for at least 6- 8 inches of depth after the soil has settled. This means placing about 8-10 inches topsoil over the subgrade. Steep slopes or rock outcrops need at least 12 inches of topsoil for proper maintenance. If the existing topsoil is poor, improve it if you cannot purchase new topsoil.

If organic matter is needed, add 1-3 cubic yards per 1000 square feet of lawn area. Materials such as peat moss, shredded pine bark, rotted sawdust (6-8 years) or leaf mold serve well as organic materials. On heavy soils, add 8-10 cubic yards of sand per 1000 square feet of lawn. Mix all of these materials in thoroughly with the native soil to a depth of 6-8 inches.

Add Fertilizer and Lime - Once the topsoil is spread and graded, add fertilizer and lime as indicated by the soil test. Mix the lime thoroughly with the top 3-5 inches of topsoil. The fertilizer should be mixed with the top 1-3 inches of soil or simply applied to the surface. Water the fertilizer lightly prior to planting.

A general recommendation for a starter fertilizer is 20-30 pounds of a commercial grade fertilizer, such as 5-10-15, 6-12-12, 5-10-10, or 7-14-21 per 1000 square feet of lawn. If a soluble source of nitrogen is used, do not apply more than 1 pounds of nitrogen per 1000 square feet. If an insoluble source of nitrogen is used, such as unreaformaldehyde, you can apply 3-5 pounds of nitrogen per 1000 square feet prior to planting.

Final Grading - Final grading and mixing of the fertilizer should be delayed until right before planting time. If this is done too far in advance, some fertilizer may be leached out and the soil may become crusted. On light soils (high sand content), the seedbed should be firmed. This will help prevent drying out of the soil. Once the soil is properly prepared, it is time to plant.

Take care not to destroy the existing trees in the lawn. The cutting of a large percentage of a tree's roots during soil tillage can severely damage if not kill it. Trees can also be suffocated by deeply covering the roots with soil. If soil is necessary at a tree base, a tree well should be constructed.

Planting

Cool Season Grasses - In Georgia, most cool-season lawns are established by seeding. For the proper seeding rate and time see Table 1.

Always purchase quality seed, that is, one with a high percent germination and purity. This information should be given on the tag. Inexpensive seed often ends up being quite expensive because of low germination and purity. Reputable seed dealers are always willing to help customers select quality seed.

The best way to apply seed is with a mechanical seeder that will distribute the seed uniformly. There are four basic types of mechanical seeders available: (a) drill, (b) gravity, (c) broadcaster, and (d) hydroseeder. For small areas, such as home lawns, the gravity flow or broadcaster (Figure 2) work best.

When seeding, divide the seed in two equal parts and then seed in two directions at right angles to each other (Figure 3). Fertilizers and pesticides should also be applied in this manner to insure a more uniform distribution. For some small seed, it may be helpful to mix the seed with a carrier such as dry sand to distribute the seed evenly. If this is done, frequently mix to prevent separation of the seed and sand.

Once the seeds are planted, rake lightly into the soil. On small areas a hand rake works fine. This increases the contact of the seed with the soil, thus increasing the chance of the seed surviving. After raking, roll the seed lightly to firm the soil. Then place a mulch over the soil. A mulch serves two purposes: (1) it helps prevent soil erosion and (2) it helps retain moisture necessary for the seed to germinate. If straw is used, find a source that is free of weed seed. One bale of straw (60-80 pounds) will cover approximately 1000 square feet.

The straw can be left on the lawn to decompose if it is not spread too thick. Peat moss or aged sawdust does not make a good mulch for seeded lawns. These materials compete with the seed for water and resist decomposition. Water the lawn as soon as possible after seeding.

Warm-Season Grasses - With the exception of common bermudagrass and centipedegrass, most warm-season grasses in Georgia are established by planting vegetative plant parts. For proper planting rates see Table 2. The seeding procedure is the same for warm- and cool-season grasses. However, the time of planting differs (Table 1).

Table 1: Seeding Rates for Lawn Grasses in Georgia

Grass	Seeding Rate (lbs/1000 sq.ft.)	When to Plant	Area of Adaptation
Tall Fescue	5-8	September, October (preferably), or early spring	North of fall line
Kentucky Bluegrass	1-2	Same as above	North, mountain area

Annual Ryegrass	5-10	September- November	All*
Common Bermuda	1-2 (hulled)	May-June	All
Common Bermuda	3-5 (unhulled)	Fall	All
Centipede	1/4 -1/2	May-June	Central south
Carpetgrass	1-3	May-June	Central south

** Annual Ryegrass is used as an overseeding to produce green color on home lawns in winter.*

Table 2: Vegetable Planting Rates for Warm Season Grasses

Grass	Planting Rate* (bu/1000 sq. ft.)	When to Plant	Rate of Establishment
Bermudagrass	2-4	May-July	2-3 months
Zoysias	2-4	May-July	1 year
Centipede	2-4	May-June	4-6 months
St. Augustine	2-4	May-June	3-4 months*

** One square yard of sod approximates: 9 sq. ft; about 1 bu. of sprigs; 2000 Bermuda or Zoysia sprigs; 500 St. Augustine or Centipede sprigs; 324, 2-inch plugs; 84, 4-inch plugs.*

Sprigging is the placing of grass plants, runners, rhizomes, stolons, or small sod pieces (2-4 inch plugs) in small holes or furrows on the soil surface. Stolonizing is the broadcasting of vegetative plant parts on the soil surface and covering by topdressing or slicing.

To plant sprigs, dig furrows every 8-12 inches and place the sprigs at a 1-2 inch depth every 4-6 inches in the furrows (Figure 4). The closer together the sprigs are, the quicker the grass will cover. After placing the sprigs in the furrow, cover part of the sprig with soil and firm. This can be done with a roller or by stepping on the soil around the sprig. Water as soon as possible after planting.

Broadcasting requires more planting material but will produce a quicker cover. Stolons are broadcast by hand or a mechanical spreader over the prepared seedbed. The stolons are then topdressed lightly with 0.15-0.25 inches of soil or sliced into the soil. Machines with vertical blades for slicing the stolons into the soil are available for this purpose (Figure 5, Figure 6). After topdressing or slicing, roll the lawn to firm the soil around the stolons. Apply water immediately.

Sodding is becoming more and more popular. Quality sod that is free of weeds, diseases and insects should be used. Be sure the soil grade is correct before laying the sod. As soon as the sod is in place, roll, mow if necessary and water.

Relatively new methods of planting are hydroplanting and hydroseeding. Sprigs or seed are mixed with water in a large tank and then sprayed under high pressure over the area being planted. The advantage of this method is that the equipment does not have to go over the lawn. This helps prevent compaction, especially in wet weather.

Many zoysia lawns in the south are plugged. While more grass tends to survive when plugged, the rate of establishment is much slower than that or sprigging or stolonizing. Zoysia plugs (2 to 4 inch diameter) should be placed on 6-12 inch centers. The closer the plugs, the faster the cover. Most lawns plugged with zoysia take two years to achieve full cover.

Care after Planting

Water newly-planted turf areas regularly. The waterings should be light and often enough to prevent the surface from drying. This usually means daily waterings for the first 2-3 weeks. As the seedlings develop, or as the sprigs or sod begin to take root and grow, decrease the frequency of watering and increase the amount applied each time.

The grass should be mowed when it reaches 1.5 times its recommended mowing height (Table 3). Do not mow young grass when it is wet. More information concerning mowing will be presented later.

Newly-planted turfgrasses should be fertilized according to soil test recommendations. In the absence of these recommendations, and in order to obtain rapid cover, monthly apply a complete fertilizer (contains N, P and K) at the rate of one to two pounds of nitrogen per 1000 square feet. Proper fertilizer application is also important and is discussed later in this bulletin.

Newly-planted areas are likely to become weed infested. Weeds should be controlled by frequent mowing and proper fertilization and watering. If chemical weed control is necessary, consult the *Weed Control in Lawns* bulletin.

Table 3 - Mowing Height for Lawn Grasses in Georgia

Grass	Cutting Height (inches)
Tall Fescue	2-3
Bluegrass	2-3
Common Bermudagrass	1-2
Hybrid Bermudagrass	0.5-1.5
Zoysia	0.5-1.5
Centipedegrass	1-1.5
Carpetgrass	1-2
St. Augustine	2-3
Ryegrass	1-2

Maintenance

After a lawn has been established, its appearance depends on a sound maintenance program. Constant care is usually necessary to maintain an attractive turf. An effective maintenance program involves fertilization, watering, mowing, and cultivation. No one practice is more important than another because these practices are interrelated and necessary to obtain an attractive, healthy turf.

Fertilization

Grass, like all other plants, requires nutrients for growth. Unfortunately, most soils in Georgia are naturally not rich in all these nutrients. Therefore, apply fertilizers to supply those elements not present in the native soil.

The three macronutrients are: nitrogen (N), phosphorus (P) and potassium (K). Of these, nitrogen is required in largest quantities, potassium second and phosphorus third. Most home lawn fertilizers sold in Georgia contain these three macronutrients in the largest amounts.

Fertilization programs should be based on turfgrass requirements, soil tests, maintenance practices, and desired appearance. For example, the bermudagrasses have a larger nitrogen requirement than most turfgrasses. A soil test is needed to determine the supply of phosphorus and potassium in the soil. When grass clippings are removed, the amount of fertilizer needed may be doubled. Increased irrigation on sandy soils will also increase fertilizer requirements. Finally, a higher quality, dark green lawn will require more nitrogen, as well as more clipping and watering.

Some considerations for determining what fertilizer material to use are ease of handling, price and availability. Since nitrogen is the key nutrient for lawn grasses, it is important to understand the differences in the nitrogen sources. There are three types of nitrogen carriers: (1) synthetic inorganic, (2) organic, and (3) synthetic organic.

Synthetic Inorganic Nitrogen Carriers - Ammonium nitrate and ammonium sulfate are examples of synthetic inorganic nitrogen carriers. Some advantages are: (a) rapid initial plant response, (b) minimum temperature dependence, and (c) lower cost per unit of nitrogen. Disadvantages are: (a) subject to loss by leaching in the nitrate form, (b) high foliar burn potential, and (c) a rapid surge in growth.

Natural Organic Nitrogen Carriers- This is nitrogen bound in complex organic compounds such as decayed living matter, sewage sludge, manures, and bone meal. Nitrogen released from these compounds is dependent upon microorganisms to break down organic matter. Advantages are (a) low foliar burn potential, (b) longer lasting, (c) very little leaching and (d) more even growth of grass. Some disadvantages are: (a) low analysis, thus requiring a great deal of bulk, (b) slow response and (c) at low temperatures, very little nitrogen is released through microorganisms activity.

Synthetic Organic Nitrogen Carriers- These nitrogen carriers are synthesized in the laboratory and can be divided into two groups: (1) primarily water soluble compounds

and (2) primarily water insoluble compounds. The water soluble compounds, such as urea, resemble the synthetic inorganic carriers in their activity, while the water insoluble compounds, such as ureaformaldehyde, resemble the natural organic carriers in their activity.

Most mixed fertilizers contain more than one source of nitrogen. The following is one example of a mixed fertilizer containing several different sources of nitrogen.

Lawn Fertilizer 12-4-8 Guaranteed Analysis	
Total Nitrogen	12%
6.50% Ammoniacal Nitrogen 1.00% Nitrate Nitrogen 0.90% Other Water Soluble Nitrogen 3.60% Water Insoluble Nitrogen	
Available Phosphate Acid (P205)	4%
Soluble Potash (K_20)	8%
Total Available Plant Food, Not Less than	**24%**

Fertilizer Programs

Applying fertilizer at the right time is as important as knowing what fertilizer to apply. Generally, spring and fall fertilization with a complete fertilizer (contains N, P and K) is recommended for the warm-season grasses. The spring application should be made about the time the grass begins to green-up and grow. The fall application should be made about 6 weeks before the average first frost date. Normally, the first frost date ranges from the latter part of October in the piedmont area to the end of November on the coast.

In the absence of soil test recommendations, the complete fertilizer used can range from 16-4-8 to 10-10-10 and 5-10-15, etc. Most of the warm-season grasses require 3 to 7 pounds of nitrogen per 1000 square feet per year to remain hardy and attractive. This fertilizer is usually applied in 3 to 5 applications during the growing season. A typical example would be 10 pounds of 12-4-8 per 1000 square feet in early spring when green-up begins, 10 more pounds in mid-summer, and 6-8 weeks before the average first frost date. This gives a total of 3.6 pounds of nitrogen.

Proper fertilization of centipedegrass is very important to its survival. Most people tend to over-fertilize centipede. One pound of nitrogen per 1000 square feet per year is ample nitrogen on most centipede lawns. On sandy soils in high rainfall areas, 2 pounds per 1000 square feet per year may be needed. Apply 5 pounds of 12-4-8 per 1000 square feet in early spring. If a second application is needed, apply 5 pounds of 12-4-8 per 1000 square feet in early August. Never apply lime to a centipede lawn unless soil tests show that the pH is extremely low. If the grass shows signs of iron chlorosis, which is observed

by the yellowing of leaves, apply ferrous sulfate at the rate of one tablespoon per 3 gallons of water to each 1000 square feet of grass.

The cool-season grasses, such as tall fescue and Kentucky bluegrass, normally should receive the majority of their fertilizer requirements in the fall. An example of cool-season grass fertilization would be 10-15 pounds of 16-4-8 per 1000 square feet in early September and April. Additional nitrogen or complete fertilizer may be applied in November if desired.

Fertilizer Application - Listed below are some key points to remember when applying fertilizer.

- Don't apply fertilizer when the grass leaves are wet. This can increase the potential of leaf burn.
- Use a mechanical spreader to distribute the fertilizer. Don't apply it by hand. Use the two direction application procedure as described for seeding.
- If possible, water all fertilizer applications thoroughly.

Soil Acidity - Another important factor in plant growth is the soil acidity level. This is measured in terms of a pH scale which is graduated from 0 to 14 with 7 being neutral. Any number below 7.0 is considered acid with 5.0 being more acid than 6.0. Any number above 7.0 is considered basic with 9.0 being more basic than 8.0. Most turfgrasses, with the exception of centipedegrass and carpetgrass, grow best at a pH of 6.0-6.5. Centipedegrass and carpetgrass grown best at a pH of 4.5- 5.5. A pH either too low to too high will reduce the availability of plant nutrients. Therefore, it is very important that a proper pH be maintained.

Lime - If the soil becomes too acid, correct this by applying lime. Use a good agriculture grade of limestone. In most cases, a dolomitic source of limestone should be used. Base all lime applications on soil test results.

More detailed information concerning fertilization can be obtained in the *Fertilization for Lawns,* Bulletin No. 710.

Water Management

Many factors influence the amount and frequency of water needed for a home lawn. Soil type, type of grass, management level, frequency of rain, temperatures, wind and humidity all affect the amount of water needed. High level maintenance and hot, windy days tend to increase the demand for water, while low level maintenance and cool, cloudy days tend to decrease the demand for water.

The best time to apply water is just before wilt occurs. Most grasses appear a dull bluish green, the leaf blades begin to fold or roll, and footprints remain after walking over the area when the grass is under water stress. If dry conditions continue, the grass wilts. Begin irrigation on that portion of the lawn which first exhibits these signs.

Apply enough water to soak the soil to a depth of 6 to 8 inches. This is usually equivalent to about one inch of rainfall. For most sprinklers, this means leaving the sprinkler in one spot for 2 to 3 hours. Do not apply until runoff occurs. If water is being applied faster than the soil can absorb it, either move the sprinkler to a new location or turn it off and allow the existing moisture to soak into the soil. To test your sprinkler output, place seven open-top tin cans under the sprinkler.

Prior to sunrise is considered the best time to water because of less wind and lower temperature. Research indicates water losses at night through irrigation are 50 percent less than during midday irrigation. Studies also indicate that irrigating after dew develops on a turf will not increase disease problems. However, irrigating prior to dew formation or after the dew has dried from the morning sun and/or wind extends the period of free surface moisture and may enhance disease development.

Irrigation is one maintenance practice often done wrong. Light, frequent waterings produce shallow, weak root systems. The shallow root system prevents efficient use of plant nutrients and soil moisture. Roots grow only where the soil is moist (Figure 7); they do not seek out water.

The key to success in irrigating home lawns is to condition the grass to get by on as little extra water as possible. The best way to do this is to develop a deep rooted grass. Listed below are several simple rules which will help develop a deep rooted turfgrass which is more able to withstand drought conditions.

- Select a grass which is well adapted to your locations.
- Water as infrequently as possible. At the first sign of wilt, irrigate, not before.
- Apply enough moisture to drench the soil 6 to 8 inches deep.
- If the soil becomes compacted or crusted, loosen it so that water can penetrate to the proper depth.
- Raise the height of cut during stress periods, and mow more frequently.
- Use a sprinkler that gives a good even distribution of water at about 1/4 to 1/3 inch per hour.
- Fertilize lightly in the summer months.

For more information refer to Cooperative Extension Service Leaflet No. 399, *Turfgrass Water Management.*

Mowing

Proper mowing will have tremendous effect on the appearance of a lawn. Height of cut, frequency of cut and type of mower used are all important factors to consider when mowing a lawn. For the best appearance, a grass should be kept at its best height for growth (Table 3).

Reel mowers (Figure 8) are best suited for the hybrid bermudas and zoysiagrass. The other grasses can satisfactorily be cut with a rotary mower (Figure 9). Dull mower blades

tear leaves instead of cutting them, thus producing a poor appearance and increasing the possibility of disease problems.

As a general rule, a grass should be mowed often enough so that you never remove more than 1/4-1/3 of the plant material. *Example:* If a bluegrass lawn is cut at a height of 2 inches, the grass should be cut when it reaches 3 inches. Removal of too much plant material can shock the grass.

The most damaging mowing practice is a sudden reduction in mowing height. This upsets the balance between the grass leaves and roots. It also gives a scalped appearance and usually injures the grass. If the grass becomes too tall between mowings, gradually reduce the cutting height until the recommended height is reached.

During stress periods, such as summer heat, it is a good idea to raise the height of cut slightly. This is especially helpful to the cool-season grasses because it reduces the stress on the grass. After the stress is gone, lower the height of cut gradually. Grasses in shaded areas should be cut higher than normally suggested for better growth. Raising the mowing height of warm-season grasses as fall approaches will help the grass survive the winter months.

If lawns are properly fertilized and mowed, grass clippings will not promote thatch accumulation. In fact returning the clippings to the soil will recycle plant nutrients and reduce fertilizer requirements. However, on high level maintenance lawns, such as hybrid bermuda and zoysiagrass lawns, clipping removal is advised, otherwise thatch will accumulate. This "thatch layer" (Figure 10) is an accumulation of dead plant material at the soil surface. It prevents penetration of water into the soil, harbors insects and disease organisms and leads to a shallow root grass which is heat, cold and drought susceptible. Many people like a dense soft mat of turf on their lawns, but this is usually a sign of excessive thatch and generally leads to problems.

Scalping or lowering the lawn mower cutting height and mowing the lawn in several directions just prior to spring "green-up" will help prevent thatch accumulation. The removal of this dead plant material will also encourage early spring growth. Centipede and St. Augustinegrass are spread by above ground runners or stolons, thus they should not be scalped as low as the other grasses or they may not recover. For more information on thatch refer to Cooperative Extension Service Leaflet No. 394, *Thatch Control in Turf.*

Cultivation

Cultivation of turfgrasses includes vertical mowing, core aeration and topdressing. These operations reduce surface compaction and thatch accumulation, improve soil aeration and water infiltration, and promote root growth. All these benefits are essential to producing vigorous, healthy turf.

Vertical mowing or dethatching helps keep turfgrasses healthy by removing the dead vegetation from the thatch layer. This dead vegetation is lifted to the surface by the

blades of the vertical mower (Figure 11). Vertical mowing can be done in early spring just before green-up occurs or when the grass is growing rapidly, yet not so hot that water requirements are high. Take care not to remove too much of St. Augustine and centipedegrass lawns because they do not have underground runners.

Core aeration relieves soil compaction and increases air and water movement into the soil. It also stimulates thatch decomposition. Proper aeration is best accomplished by a power aerator (Figure 12), which has hollow tines or spoons so that it removes a soil core 2 to 3 inches deep and 1/2 to 3/4 inch in diameter. Aeration is best accomplished during period of active plant growth and when the soil is moist enough to allow deep penetration. Aeration, which is also called *coring,* should only be used to correct soil problems and not as a routine practice.

Topdressing is a management practice used to aid in the decomposition of thatch, to reduce surface compaction, and to smooth the surface. Topdressing involves spreading a thin layer of topsoil or other soil mix on the soil surface. It is often used to cover the planted material in planting operations. The topdressing material should be of similar texture and composition as the underlying soil. Topdressing rates may range from ½ to 2 cubic yards of material per 1000 square feet. This will produce a layer from 1/8 to 5/8 inch thick. However, it is important that distinct layers are not formed. The topdressing is usually worked into the turf by dragging, raking or brushing.

Fertilization after cultivation operations stimulates rapid turfgrass recovery and promotes a healthy, vigorous turf. These operations can be done at the same time if needed. However, neither dethatching nor aeration should be done during a period of heavy weed germination or appropriate weed control measures will be necessary.

Renovation

Occasionally a lawn will become thin and spotty and, in some cases, large dead areas may appear. These areas are eventually filled in by undesirable plant species (weeds). At this point, the homeowner must decide: (1) if the lawn can be brought back to desired appearance through normal maintenance, (2) if the lawn requires renovation, or (3) if the lawn has to be completely re-established.

First, the cause of the problem must be determined and corrected. Normal decline causes are: (a) improper maintenance practices, (b) use of a grass not adapted to the area, (c) excessive thatch accumulation, (d) severely compacted soil, or (e) disease or insect problems. Your county extension agent can help solve this problem. Once this is resolved, one of the above procedures can be used to improve the lawn. In most cases, renovation is the answer.

Following are the necessary steps in renovation of a home lawn. Lawns with cool-season grasses should be renovated in early fall (August-September), while lawns with warm-season grasses should be renovated in early spring.

Step 1. Eliminate all undesirable weeds and/or excessive thatch. Weeds can be removed by either chemical or mechanical means, while thatch will require some mechanical means of removal.

Step 2. Cultivate the soil by aerifying, coring, slicing and/or spiking.

Step 3. Correct the soil pH and/or salinity (salt accumulation) problem if one exists. If the pH is not suitable for plant growth, it must be changed. Soil test should be taken to determine the pH and fertility level of the soil.

Step 4. Apply fertilizer as recommended to the area and water. Use a starter fertilizer such as 6-12-12 or 5-10-15 unless soil test shows otherwise. Apply about 20 pounds per 1000 square feet.

Step 5. If the lawn is overseeded drag, rake or brush the seed down to contact the soil. If the area is planted with vegetative material, place the sprigs in a furrow and lightly topdress.

Step 6. Whether the lawn is reseeded or planted with vegetative stock, water as soon as possible after planting. Do not allow the newly planted material to become dry. At 3 to 4 weeks after planting, apply 2 to 3 pounds of ammonium nitrate per 1000 square feet to enhance the growth of the new grass. Continue normal mowing practices once the grass reaches 1.5 times its normal mowing height. For more information refer to Cooperative Extension Service Leaflet 263, *Renovation of Home Lawns.*

Weed Control

The appearance of your lawn depends greatly upon the practice of preventing or controlling weeds. Good lawn management which includes proper fertilization, mowing and watering will produce a healthy dense turf which is difficult for weeds to invade.

Ask your county extension agent to identify problem weeds or to submit a plant specimen to the state weed specialists for identification. Submit plant specimens (whole specimens with roots, flowers and seed if possible) in a plastic bag with sender's name and address. Include the type of lawn grass and other important information. Refer to the Georgia Extension Bulletin No. 978, *Weed Control in Home Lawns,* for more detailed information on weeds and specific control recommendations.

Disease and Insect Control

Proper management will also produce a healthy, vigorous lawn which is less susceptible to disease and insect problems. If these pests do become troublesome, contact your local county Extension office for consultation and publications.

Calculation____Calibration____Application

Failure to apply a material uniformly over an area will produce an irregular response. This can range from a lack of response to a pesticide to leaf burn from over-fertilization. This reduces the effectiveness of the material, may be hazardous to individuals and the environment, and can be quite costly. Proper application is important whether planting, fertilizing or applying a pesticide.

First determine the size of the area. Multiplying the length by the width in feet will give the square feet involved. Be sure to follow the correct application procedures for the particular material. Finally, proper distribution can be insured by dividing the material in two equal parts and applying in two direction at right angles to each other.

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