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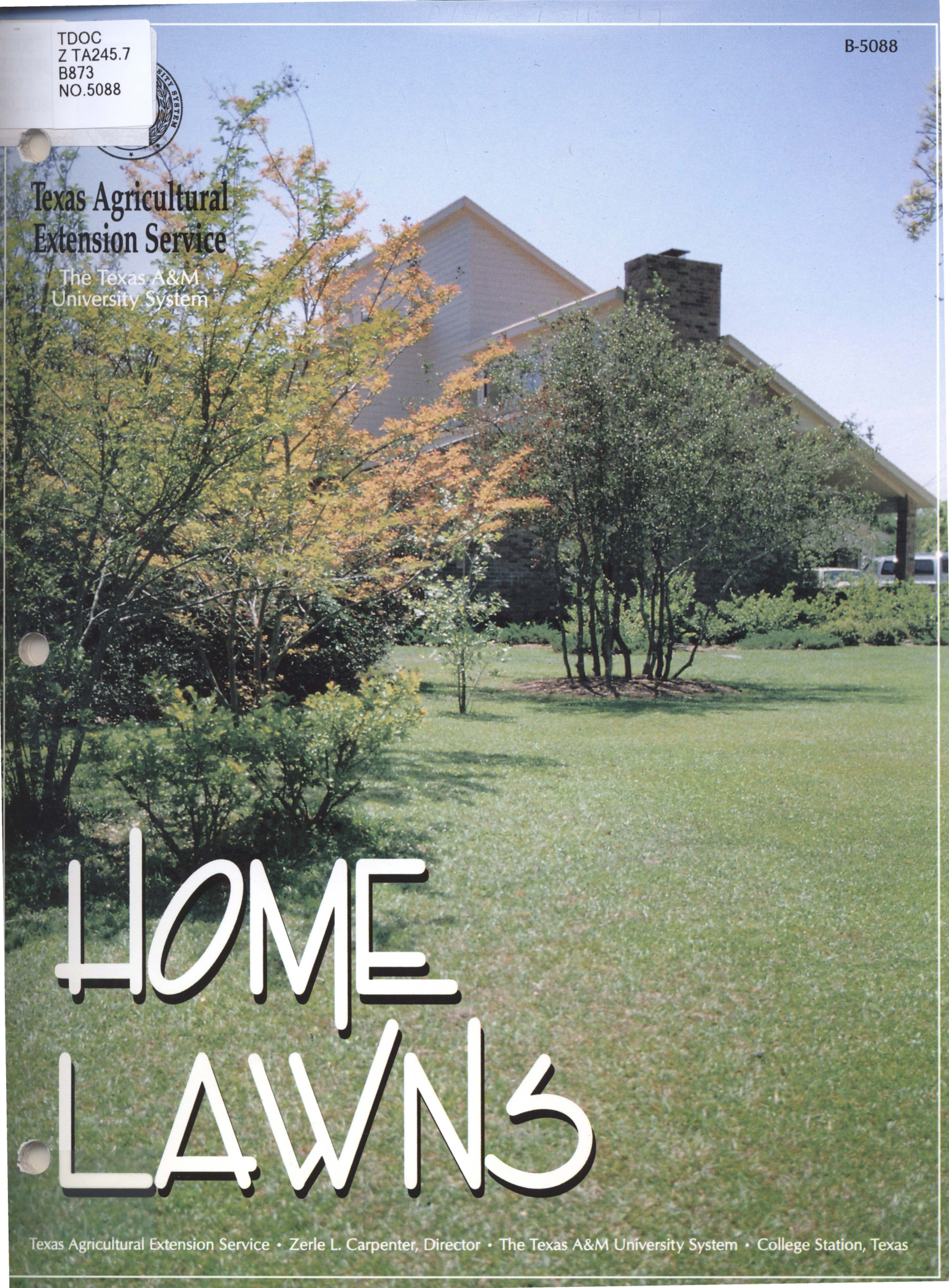


# HOME LAWNS

Texas Agricultural Extension Service • Zerle L. Carpenter, Director • The Texas A&M University System • College Station, Texas

*The sight of a turf, whether*
*of short grass carpeting the earth*
*or tall grass waving in the wind,*
*restores my soul.*
*A valley of green grass is beautiful*
*in the way that mountains, seas, and stars*
*are beautiful.*

J. Frank Dobie

# HOME LAWNS

*Richard L. Duble*
*and*
*William E. Knoop**

The lawn is the single most important feature in a well-landscaped home area, and it is the first improvement that the homeowner plans as soon as the house is completed. Although the lawn provides a setting for the entire landscape, including trees, shrubs, flowers, and buildings, its main purpose is functional rather than aesthetic.

A lawn eliminates soil erosion, reduces runoff, lowers surface temperatures, muffles noise, reduces glare, and filters harmful pollutants from the air. Lawn grasses, like other living plants, consume carbon dioxide and release oxygen into the surrounding environment. In addition, lawns provide recreational areas that are inexpensive and nonabrasive and have the capacity to recover from injury and environmental stress.

A green, well-kept lawn also gives a warm welcome. In spite of the hard work it requires, an attractive lawn is the most enjoyable part of the home landscape.

The results of a statewide survey indicate that, every year, more than 1 billion dollars is spent in Texas on the maintenance of home lawns. The major expenditures are for water, equipment, and labor. In the western regions of Texas, over 60 percent of the maintenance cost is for water, while water accounts for less than 10 percent of the maintenance cost in the Gulf Coast region. The average annual maintenance cost per lawn in Texas is estimated at $230.00. However, this average includes many homeowners and renters who spend very little money on lawn maintenance. Thus, the cost of a well-maintained lawn is greater than this average.

**Professors and Turfgrass Specialists, Texas Agricultural Extension Service, Texas A&M University, College Station and Dallas, Texas, respectively.*

# TURFGRASSES FOR TEXAS

Very few of the 500 species of grass that grow in Texas are suitable for turf. Unlike other types of grasses, turfgrasses are not permitted to mature normally and produce seed. Instead, the leaves of turfgrasses, which manufacture the food materials needed for growth, are frequently removed by mowing. Few grasses tolerate the close, frequent mowing required to maintain a turf.

Your choice of a turfgrass depends on your geographic location, the amount of water available for irrigation, the amount of shade present, the time and money you are willing to spend for lawn establishment, and the kind of use you expect.

Turfgrasses are classified as warm-season (growing in late spring, summer, and early fall) and cool-season (growing in late fall, winter, and early spring) grasses.

## Warm-Season Turfgrasses

Common bermudagrass and St. Augustine grass are the most practical, widely used, and recommended warm-season grasses for lawns. Buffalograss is suggested for use in the blackland areas of Texas and where irrigation is limited. Centipede is suggested for lawns on sandy soils in East Texas, and zoysia can be used statewide where its maintenance requirements are met.

### Bermudagrass

Bermudagrass (*Cynodon dactylon*) is the turfgrass most widely used in Texas. It is a narrow-leaved, vigorous perennial, with both above-ground (runners) and below-ground (rhizomes) creeping stems. It is drought-tolerant, spreads rapidly, and tolerates traffic better than most grasses.

Bermudagrass makes a dense turf when mowed weekly at a height of 1 to $1^1/_2$ inches. Bermudagrass must be fertilized to produce good turf. During extended drought, water is needed to keep the grass green. In drier regions of west Texas, water is needed for the survival of bermudagrass.

Bermudagrass used as turf:

- does not grow in medium to dense shade.
- turns brown after frost in the fall and, with continued low temperatures, does not become green until after the last spring freeze.
- is more of a nuisance than other turfgrasses in flower beds and gardens because of the runners and rhizomes.
- is subject to scalping when mowed infrequently.

Although the leaves of bermudagrass turn brown after frost, the grass tolerates low temperatures because the stolons and rhizomes produce new shoots and leaves when growing conditions become favorable.

Seeded bermudagrasses are the most practical for the homeowner because seed is readily available and inexpensive. 'Sahara', 'Sonesta', 'Sun Devil', and 'Cheyenne' are seeded-type bermudagrasses that have improved turf characteristics over Common bermudagrass.

Many hybrid bermudagrasses have been developed for general and special purposes, but because seed is not available these grasses must be established from sprigs or sod. When these hybrid bermudagrasses are used for home lawns, the costs of the planting material and the labor for planting make turf establishment more expensive. Hybrid bermudagrasses, including Texturf-10, U-3, Santa Ana, Tifway, and Floratex, may be used for lawn turf.

**Texturf-10** bermudagrass was developed by the Texas Agricultural Experiment Station and is a medium-textured, dark green variety that is more wear-resistant than Common bermudagrass. Texturf-10 recovers rapidly in the spring, produces few seedheads, and is widely used for athletic fields. It is best adapted to the semi-arid region of West Texas. In humid climates it is highly susceptible to leaf spot diseases.

**U-3** is a strain of Common bermudagrass selected in Savannah, Georgia. U-3 has finer stems and leaves than Common bermudagrass. The strain is more cold-tolerant than other varieties and is recommended for use in the Texas Panhandle.

**Table 1. Types Of Planting Material, Methods, Rates, And Times Of Planting.**

| Grass Species | Established from | Method of Planting | Quantity per 1,000 sq. ft. | Best Planting Season |
|---|---|---|---|---|
| Bermudagrass | Seed | Broadcast | 1/2 to 1 lb. | Late spring and early summer |
| | Sprigs | Sprig 6 inches apart in 12-inch rows or broadcast | 5 to 10 bushels | |
| | Sod | Solid-lay as bricks | Same as area to be sodded | |
| St. Augustinegrass | Sod | Solid-lay as bricks | Same as area to be sodded | Spring, early summer, and fall |
| | 4-inch sod blocks | 4-inch blocks on 12-inch centers | 100 sq. ft. of nursery sod | |
| Buffalograss | Treated seed | Broadcast | 1/2 to 3/4 lb. | Spring |
| | 4-inch sod blocks | On 1- to 2-foot centers | 25 to 100 sq. ft. of nursery sod | Spring and early fall |
| | Sod | Solid-lay as bricks | Same as area to be sodded | |
| Centipede | Seed | Broadcast | 1/3 to 1/2 lb. | Spring |
| | 2-inch sod blocks | 2-inch blocks on 12-inch centers | 25 sq. ft. of nursery sod | Spring and early fall |
| | Sod | Solid-lay as bricks | Same as area to be sodded | |
| Zoysia | 2-inch sod blocks | 2-inch sod blocks on 6-inch centers | 100 sq. ft. of nursery sod | Spring, early summer, and fall |
| | Sod | Solid-lay as bricks | Same as area | |
| Ryegrass | Seed | Broadcast | 6 to 8 lb. | Sept. to Nov. |
| Tall Fescue | Seed | Broadcast | 6 to 8 lb. | Sept. to Nov. |
| Kentucky bluegrass | Seed | Broadcast | 1 1/2 to 2 lb. | Sept. to Nov. |

**Santa Ana** bermudagrass was selected by the California Agricultural Experiment Station in 1956 for its desirable turf characteristics and its salt tolerance. Santa Ana performs well in West Texas in high-pH soils and where irrigation water is relatively high in salt.

**Tifway** bermudagrass was selected by the Georgia Agricultural Experiment Station for its fine texture, dark color, and stiff leaves. It is perhaps the best of the hybrid bermudagrasses for lawn use.

**Floratex** is a medium-textured variety of bermudagrass released jointly by the Florida and Texas Agricultural Experiment Stations in 1993. Planting material will be available to the public in 1994. Floratex was developed as a low-maintenance grass that provides acceptable color and density with relatively low inputs of fertilizer, water, and pesticides.

Table 1 (page 5) lists methods that may be used to establish bermudagrasses.

## St. Augustine

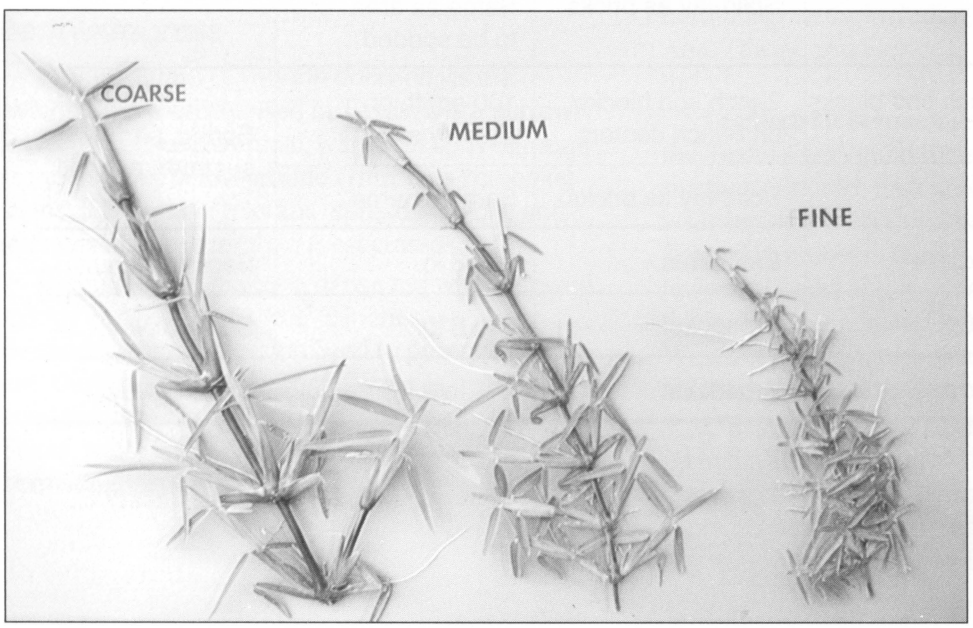
St. Augustine grass (*Stenotaphrum secundatum*) is a warm-season perennial with above-ground runners. It is not as cold-hardy as bermudagrass and is best adapted to East and South Texas. However, it grows satisfactorily east of a line from Vernon to Brady to Del Rio. St. Augustine grass grows in moderate shade or in open areas when adequate moisture and nutrients are available. St. Augustine remains green longer after frosts than bermudagrass.

St. Augustine grass forms a dense, thick turf and usually crowds out all other grasses and most weeds if growing conditions are favorable. It should be cut at a height of 2 to 3 inches. It grows best in fertile, well-drained soils adequately supplied with organic matter. Because the plant spreads from surface runners only, it is easily controlled in flower beds and gardens. Since St. Augustine grass has good shade tolerance, it is less prone to "scalping" than bermudagrass.

Common St. Augustine grass used as turf:

- is susceptible to lawn diseases, notably large brown patch, St. Augustine Decline (SAD), and leaf spot.
- is more susceptible to iron chlorosis than bermudagrass.
- is attacked by insects (chinch bugs and white grubs).
- needs more water for survival than bermudagrass.
- will not survive at temperatures as low as those bermudagrass will tolerate.
- is a coarse-textured grass.

St. Augustine grass must be established by planting sod or runners of other St. Augustine plants, as seed is not generally available. See Table 1 for methods of establishing St. Augustine grass.




*Floratam, Raleigh, and Seville represent the coarse-, medium-, and fine-textured varieties of St. Augustine grass.*

**Floratam**. St. Augustine grass is a variety selected in a cooperative program of the Texas and Florida Agricultural Experiment Stations. Floratam is a fast-growing, vigorous, broadleaved St. Augustine grass that is resistant to SAD. Floratam also was found to be resistant to the lawn chinch bug. However, Floratam is not as shade- or cold-tolerant as Texas Common St. Augustine and is recommended only along the Gulf Coast and in South Texas.

**Raleigh.** St. Augustine grass is a SAD-resistant variety with greater cold tolerance than Floratam. However, Raleigh appears more susceptible to brownpatch and grey leaf spot diseases than either Floratam or Common St. Augustine grasses.

St. Augustine is often confused with carpetgrass (*Axonopus affinis*). The two grasses can be distinguished by examining the seedheads. Seedheads of St. Augustine are single, flat, thick, corky stems (spikes). The seeds are embedded in one side of this stem. Carpetgrass seedheads are long, slender, drooping stems that fork at the end into two and occasionally three branches (racemes), somewhat like crabgrass. Some evidence of these stems is always present either growing or lying on the ground.

Vegetatively, the two grasses may be distinguished by the growth habit of the leaves. The leaf blades of St. Augustine arise from the collar at a 90-degree angle with the leaf sheath, while those of carpetgrass arise from the collar at an angle of about 60 degrees.

## Buffalograss

Buffalograss (*Buchloe dactyloides*)is a low-growing, perennial, warm-season grass native to South Central Texas and areas northward to Canada. Buffalograss is one of the few grass species having separate male and female plants. Buffalograss is cold-, drought-, and heat-tolerant. It is recommended for the blackland areas of Central Texas and other areas where water is limited or not available for irrigation. Surface growth may appear dry during extended drought, but the stems (runners) produce new growth after moisture is restored. Buffalograss tolerates infrequent mowing much better than bermudagrass, but buffalograss lawns that are mowed, fertilized lightly, and watered are more attractive. Because the plant spreads from surface runners, it is easily controlled in flower beds and gardens.

Buffalograss will not persist in shade. It performs best on fertile, well-drained, heavy soils in full sunlight.

Table 1 (page 5) gives methods of establishment. Buffalograss used as a turf:

- tolerates infrequent mowing.
- is not aggressive and is easily removed from flower beds and gardens.
- is very drought-tolerant.

'Prairie' and '609' buffalograss are selections of female plants with a darker green color and more dense growth habit than common buffalograss. Both 'Prairie' and '609' buffalograss must be established from sod or sod plugs. Seeded varieties of buffalo-grass include Common, Texoka, Commanche, Plains, and Topgun.

## Zoysiagrass

Zoysiagrasses are excellent for turf when they are properly established and properly managed. A zoysia lawn is attractive and wear-resistant, is not invaded by weeds, and is more cold-tolerant than bermudagrass. Zoysia will form a dense turf in partial shade, but it will thin out in moderate shade. It is less drought-tolerant than Common bermudagrass. Zoysia is slower to spread than bermudagrass and St. Augustine and requires longer to establish a complete cover. However, it requires mowing as often as bermudagrass if a uniform, attractive appearance is desired.

Zoysiagrasses can be established with seed, plugs, or sod. A clean seedbed is necessary for rapid establishment of a zoysia cover. Because of competition from other grasses during establishment, several years may be required to obtain a complete zoysia turf. Sod plugs 2 inches in diameter planted on 12-inch centers often take 2 years to provide the cover that bermudagrass or St. Augustine would give in 3 months. Zoysia plugged in a clean seedbed at the rate suggested in Table 1 (page 5) should provide a cover in one growing season if other grasses and weeds are kept out.

**Japanese lawngrass** (*Zoysia japonica*) was introduced from North Korea in 1930. The leaves are similar in size to those of St. Augustine. It can be established from seed, but provides a more open turf than other zoysiagrasses.

**Meyer** zoysia is a medium-textured selection of Japanese lawngrass. It forms a dense turf when completely established and has a desirable dark green color. The grass is more cold-tolerant than bermudagrass and will survive Texas winters, but it turns brown after the first frost in the fall.

**Emerald** zoysia is a hybrid of Japanese and Mascarenegrass (*Zoysia tenuifolia*). It was developed at the Georgia Coastal Plain Experiment Station. Emerald is fine-leaved, dense-growing, and dark green. Emerald zoysia requires frequent mowing with a reel-type mower for best results.

Zoysia as a turfgrass:

- is slow to give a complete cover.
- is less drought-tolerant than Common bermudagrass.
- tolerates partial to moderate shade.
- requires regular mowing to prevent scalping.

### Centipedegrass

Centipedegrass (*Eremochloa ophiuroides*) is often called "Chinese lawngrass" or "lazy man's grass." Under low fertility, centipede-grass is easy to mow and tolerates irregular or infrequent mowing without being subject to scalping. It has a creeping growth habit and medium-width leaves. Only surface runners are produced, so it is easy to control in a landscape.

Centipede is more shade-tolerant than bermudagrass and less shade-tolerant than St. Augustine. The leaf width and the color are also intermediate between bermudagrass and St. Augustine. Centipede requires fertilizer for an attractive appearance, but less than either bermudagrass or St. Augustine.

Centipede is adapted to sandy, well-drained soils in East, South, and Central Texas.

## Cool-Season Turfgrasses

Cool-season perennial grasses are used successfully as lawn grasses in North Texas and in the higher altitudes of Texas where irrigation is available. Cool-season grasses are also used in combination with established bermudagrass to provide year-round green lawns.

### Ryegrasses

Perennial ryegrass (*Lolium perenne*) and annual ryegrass (*Lolium multiflorum*) are suited for temporary cool-season turfgrasses throughout Texas. In the Texas Panhandle, perennial ryegrass may be used as a permanent turfgrass where irrigation is used.

The ryegrasses are fine-leaved bunch grasses that spread by above-ground tillers. They are best adapted to cool, moist environments which are not found in West Texas. In the United States, the northeastern and northwestern states are well suited to ryegrass. In the transition zone, perennial ryegrass may provide a permanent turfgrass. But in Texas, both species serve as cool-season annuals.

Ryegrasses are adapted to a wide range of soil conditions, but favor moist, well-drained, fertile soils. The ryegrasses possess little drought tolerance and must be irrigated during dry periods to ensure survival. Shade tolerance of the ryegrasses is good in southern climates where shade conditions reduce the extreme heat during summer. Perennial ryegrass often survives the hot, dry summers of the South in moderately shaded sites.

Both species of ryegrass are used for temporary grass cover during the fall and winter months in Texas. Their quick establishment from seed (rapid germination and rapid seedling growth) makes them ideal for protection against erosion on newly prepared sites in the fall. They are also used to provide temporary green color during winter months when bermudagrass is dormant.

The ryegrasses have become very popular for overseeding athletic fields, golf courses, and lawns during winter months. The improved turf-type perennial ryegrasses have greater cold tolerance, wear tolerance, disease resistance, and persistence than the annual types. New varieties also have better turf characteristics—finer texture, greater density, darker color, and better mowing qualities.

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

At least 50 improved ryegrass varieties have been developed over the past 20 years. Most improvements have been in perennial ryegrass, although intermediate crosses have been made with annual ryegrass. Improvements in turf quality have been in:

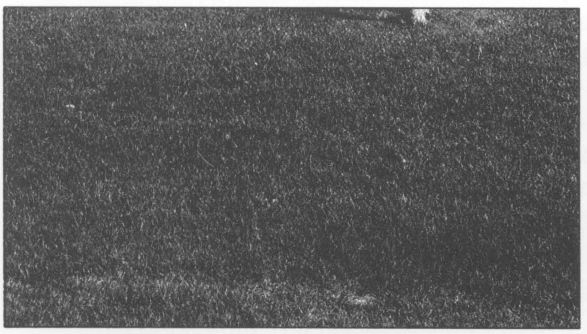
- Density, texture, and color (Pennfine, Manhattan, and Derby).
- Mowing quality (Palmer, Manhattan II, Delray, and Loretta).
- Heat tolerance (Derby, Birdie, Palmer, Citation, and Dasher).
- Cold tolerance (Elton, Goalie, NK-200, and Norlea).
- Disease resistance (Manhattan II, Palmer, Prelude, and Delray).
- Insect resistance (Repell).
- Drought tolerance (Palmer and Prelude).

## Tall Fescue

Tall fescue (*Festuca elatior,* var. *arundinaceae*) is a medium-textured perennial bunch grass. When seeded heavily and clipped short and regularly, it forms a dark green, dense, medium-textured turf. It has a wide range of adaptation to soil conditions, but grows best on fertile, well-drained soils. Tall fescue is moderately shade–tolerant. In North and West Texas where irrigation is available, it provides green turf throughout the year. In other areas of Texas, tall fescue is recommended only for shaded sites. Varieties of tall fescue include Rebel, Olympic, Hounddog, Avanti, and others. Table 1 (page 5) gives recommended seeding dates and rates.

## Kentucky Bluegrass

Kentucky bluegrass (*Poa pratensis*) is a fine-leaved, rhizomatous perennial turfgrass widely used for lawns in the northern states. In Texas, it is used mainly in the Panhandle region on irrigated sites. In more humid areas of Texas, bluegrass is thinned out by diseases. Kentucky bluegrass is particularly susceptible to fusarium, brownpatch, powdery mildew, and leaf spot diseases. Its use as a general lawngrass is not recommended in the more humid areas of Texas.



*Tifdwarf bermudagrass.*

*Centipedegrass.*

*St. Augustinegrass.*

*Emerald zoysiagrass.*

# ESTABLISHING A NEW LAWN

Three distinct steps are necessary in the establishment of a lawn. The first is preparation of the soil. This involves grading, providing drainage, incorporating organic matter and other amendments, and supplying adequate plant food. The second step is the establishment of the grass, which involves seeding, sprigging, or sodding. The third step is the care and maintenance of the young grass during the first 2 to 3 months after planting.

## Preparing the Soil

Soil is the foundation of the lawn. As with any structure, the end product is no better than the foundation upon which it is built. The first step in preparing a new turf area is to remove all debris, such as stones, tree stumps, and construction debris.

In many instances, the character of the soil must be altered considerably. A sandy loam soil high in organic matter is considered most satisfactory for turf. If the original surface soil is a heavy clay, it may be impractical to alter the nature of the soil; but organic matter can be added. This organic matter can be peat, composted rice hulls, well-decomposed sawdust (hardwood), or similar material. Organic matter must be thoroughly mixed in the top 4 to 6 inches of the seedbed. This mixing can be done by repeated cultivation operations such as rototilling.

The area should be graded properly to provide surface drainage. The soil should slope gradually away from the house, walks, and driveways. A fall of 1 foot for every 50 to 100 surface feet is adequate for drainage, provided no pockets or depressions exist. In some cases, subsurface drainage systems may be needed to remove excess water from poorly drained sites.

If a considerable part of the lawn area must be filled, such as a depression or ditch, use a sandy loam soil.

Avoid terraces, if possible, because it is difficult to establish and maintain turf on terraces. If your lot slopes steeply, build retaining walls, rather than terraces. When trees are to remain in the lawn area, the soil should be graded gradually away from the tree. If more than 2 or 3 inches of fill are required, build a retaining wall with drainage to prevent covering the tree roots too deeply. Construct the wall at least 4 to 6 feet from the trunk.

*A tall fescue lawn in early spring.*

## Adding Fertilizer

Many Texas soils are deficient in the major nutrients required for turf. East Texas soils normally are deficient in nitrogen, phosphorus, potassium, and lime. Most Texas soils are deficient in nitrogen. Potassium in the soil may become deficient for turf growth when high amounts of nitrogen are used in areas not normally deficient in potassium.

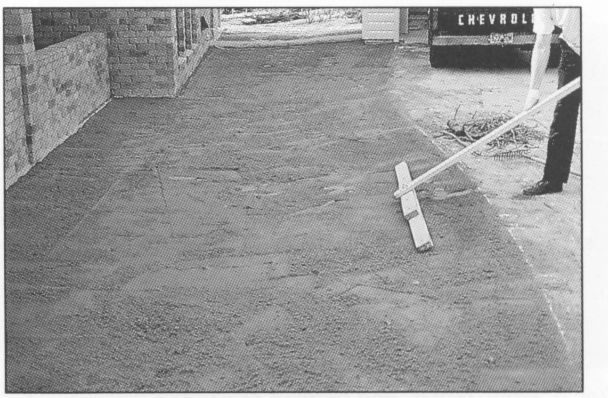
Soil testing is the only accurate means of determining your soil's needs for lime and fertilizer nutrients. A simple soil test will tell you if you need to adjust soil acidity with lime; if you need to add nitrogen, phosphorous, or potassium; and if you need micronutrients such as iron or zinc. Without a soil test, you are only guessing at your soil's needs, and you may be applying nutrients that are not only unneeded but which can also cause deficiencies of other nutrients. Contact your county Extension office to receive instructions for collecting soil samples, containers for mailing, and information on submitting your samples to one of the two soil test laboratories operated by the Texas Agricultural Extension Service and Texas A&M University.

Your choice of fertilizer and the rate at which you apply the fertilizer should be based on the results of soil tests. A complete fertilizer should be applied to the seedbed to supply the plant nutrients needed for turfgrass establishment. A complete fertilizer contains some of each of the elements nitrogen, phosphorus, and potassium. The relative amounts of these elements are expressed in the fertilizer "analysis," such as 8-8-8. The first number indicates the percent nitrogen, the second number the percent phosphorus, and the third number the percent potassium. A fertilizer of 1-2-1 (10-20-10, 6-12-6) or 1-1-1 (8-8-8) ratio should be applied at a rate that will supply 2 pounds of phosphorus per 1,000 square feet of lawn (see Table 2, page 14). A fertilizer containing only nitrogen and phosphorus (the third number in the analysis is zero) could be used on soils naturally high in potassium. See Table 2 (page 14) for fertilizer equivalents and rates.

In much of East Texas and on other acid soils, crushed agricultural limestone should be added at the rate of 50 to 100 pounds per 1,000 square feet. When undecomposed organic matter such as rice hulls, sawdust, or ground bark is added to the soil, 3 pounds of ammonium nitrate or 5 pounds of ammonium sulfate should be added per 1,000 square feet to aid in decomposing the organic material.

*Step 1. Remove rocks and construction debris from the site.*

*Step 2. Add top soil where needed to fill and provide surface drainage.*



*Step 3. Final grading and smoothing.*

Fertilizer, lime, and organic amendments should be incorporated by light tilling. A small garden rototiller may be used on small areas, but a tractor-mounted rototiller is required for large areas.

*Step 4. Have sod delivered to site.*

*Step 5. Lay sod like bricks on smooth, firm seedbed.*

*Step 6. Mow, water, and fertilize as needed.*

### Final Grading

The last step in preparing the soil is the final grading. Thorough watering will help to melt clods and firm the seedbed. Small lawns can be fine-graded by hand raking. Large areas can be smoothed, leveled, and contoured with a tractor-mounted box scraper or blade. The area should be raked free of large clods and stones which may have worked to the surface. Depressions which show up as a result of firming or settling of the soil should be filled, or high places worked down. Walks and driveways should be slightly above the final soil surface. The area is now ready for seeding, sprigging, or sodding.

## Establishing the Grass

Whether the lawn should be seeded, sprigged, or sodded will depend on the type of grass you use and the speed of cover you need. A sloping site may require sodding to prevent erosion. Table 1 shows the type of material to be used, the methods of planting, quantities needed, and the best seasons to plant.

### Seeding

Grass seed for lawns should be of high quality, with a high percent germination and purity. This information is required by state law on all seed sold in lots over 10 pounds.

Low-priced seed often are the most costly because they may have a low germination and purity. Purchase and plant your seed on the basis of percent "Pure Live Seed," which is the product of the percent purity and the percent germination. For example, Common bermudagrass seed which has a 90 percent purity and an 80 percent germination contains 72 percent pure live seed. In contrast, Common bermudagrass with only 70 percent purity and 85 percent germination contains only 59.5 percent live seed.

Although hand sowing can be satisfactory, the use of a small seed distributor is recommended. The seed should be divided into two equal parts, one broadcast as you walk back and forth in a given direction, the second sown as you walk back and forth at right angles to the first seeding. This method gives better distribution of seed.

After seeding, water the area lightly and keep the surface moist (not wet) until individual plants are well established. The time required will vary from 14 to 21 days, depending on climatic conditions and the grass variety.

### Sprigging or Plugging

Sprigging is the setting of plants, runners, rhizomes, or small sod blocks (2 to 4 inches square) in rows or furrows, or broadcasting the sprigs on the soil surface. Plants, runners, or rhizomes set in rows will give a quicker and more uniform cover than sod blocks or plugs. However, broadcasting sprigs usually provides the fastest cover for bermudagrass or zoysia.

Lawns should be sprigged in the spring and early summer, though they may be plugged at any time during the growing season when adequate moisture is available. Sprigging is used primarily for establishing hybrid bermudagrasses.

The proper distance between sod blocks or sprigs depends on the rate of growth and on how soon a cover is desired. St. Augustine grass plugs 2 to 4 inches in diameter planted on 2-foot centers should cover within 3 months if adequately watered and fertilized. Bermudagrass sprigged at 3 to 5 bushels per 1,000 square feet should cover within 2 months; zoysia may require an entire growing season. After sprigging bermudagrass and zoysia, the sprigs may be covered with a thin layer of topsoil or mulch. Press the sod blocks or sprigs firmly into the soil, and roll the soil to give a smooth surface for mowing.

### Solid Sodding

The term "sodding" means laying blocks of sod end to end. The advantages of solid sodding include an instant lawn, reduced erosion, fewer weed problems, and less watering. The only problem with solid sodding is the higher initial cost.

When sodding a lawn, lay the sod blocks or rolls like bricks on a smooth surface that has been firmed. The surface should be free of footprints, stones, depressions, and mounds. After the sod is laid, roll or tamp lightly and keep it moist until it is well rooted. Do not overwater! Topdressing with a sandy loam topsoil that is free of weeds, stones, and other debris will help smooth the lawn.

## Care After Establishment

How you care for your lawn after planting the grass is of critical importance. The young plants and new roots can be easily damaged by mismanagement or neglect.

### Watering

Water newly planted turf areas regularly. Watering should be light and frequent to keep the surface from drying. As the young seedlings develop, or as the sprigs or sod begin to take root and grow, reduce the frequency of watering and increase the amount applied per watering. This permits the development of a deep root system and ultimately reduces the amount of water needed.

### Mowing

The time to mow will depend on the species planted. Mow newly planted areas as soon as the grass is 2 to 3 inches high. Lawns should be clipped frequently enough to prevent removing more than half of the growth at any one mowing.

### Fertilizing

Fertilize newly planted turfgrass once a month with a complete fertilizer, at a rate equivalent to 1 pound of nitrogen per 1,000 square feet (see Table 2, page 14). Follow soil test recommendations, but if you haven't had your soil tested use a 1-1-1 or 1-2-1 ratio fertilizer for the first several months (see Table 2, page 14). On sandy-textured soils, supplement the initial fertilizer application with an additional pound of nitrogen after 2 weeks. Ammonium nitrate, ammonium sulfate, or urea may be used for the nitrogen source. Water the lawn after each application of fertilizer.

### Weed Control

Newly established lawns are likely to become weedy before the area is covered with grass. Weeds can be controlled by frequent mowing, adequate fertilization, and judicious use of water. Where weed eradication is necessary, the safest method is hand weeding. Do not use preemergence herbicides on newly planted lawns.

**Table 2. Percent Nutrients In Various Commercial Fertilizers And Recommended Rates Per Application On Turf.**

| Fertilizer Grade[1] | Ratio of plant food nutrients | Fertilizer Analysis (Percent[2]) | | | Amount of apply to get 1 lb. nitrogen per 1,000 sq. ft.[3] |
|---|---|---|---|---|---|
| | | Elemental nitrogen | $P_2O_5$ | $K_2O$ | |
| 8-8-8 | 1-1-1 | 8 | 8 | 8 | 12.5 |
| 6-12-6 | 1-2-1 | 6 | 12 | 6 | 16 |
| 10-20-10 | 1-2-1 | 10 | 20 | 10 | 10 |
| 12-6-6 | 2-1-1 | 12 | 6 | 6 | 8 |
| 6-10-4 | 3-5-2 | 6 | 10 | 4 | 16 |
| 12-9-6 | 4-3-2 | 12 | 9 | 6 | 8 |
| 15-5-10 | 3-1-2 | 15 | 5 | 10 | 6.5 |
| 16-20-0 | 4-5-0 | 16 | 20 | 0 | 6 |

[1]Other fertilizer materials are available and can be used. The amount needed to supply 1 pound of nitrogen per 1,000 square feet from any fertilizer can be calculated in the following manner: the nitrogen content of the fertilizer divided into 100 gives the amount of fertilizer needed to supply 1 pound of nitrogen. For example: in the case of 8-8-8, 8 into 100 equals 12:5; thus 12.5 pounds of 8-8-8 are required to supply 1 pound of nitrogen; 25 pounds of 8-8-8 are required to supply 2 pounds of nitrogen per 1,000 square feet.

[2]Or pounds of nutrients per 100 pounds of fertilizer.

[3]Length times width of lawn equals square feet. For example, an area 50 feet long and 20 feet wide contains 1,000 square feet.

# MANAGING ESTABLISHED LAWNS

After the lawn has been established properly, its appearance depends entirely on a sound management program. Regular care and attention are necessary to maintain an attractive turf. Four major practices–feeding, watering, mowing, and cultivation–are involved in maintaining turf.

Although these practices are discussed separately, they are interrelated and cannot be separated. No one practice is more important than another; proper attention to each is necessary to maintain the best possible lawn.

## Fertilization

Develop a lawn fertilization program based on turfgrass requirements, soil tests, other maintenance practices, and your desired results. Turfgrasses differ in their requirements for plant nutrients, principally nitrogen. Bermudagrasses have a greater nitrogen requirement than St. Augustine grass. While 2 to 3 pounds of nitrogen per 1,000 square feet per year may be adequate for St. Augustine, bermudagrass requires 4 to 6 pounds. Consequently, bermudagrass also utilizes greater quantities of phosphorus and potassium. If you don't know your soil's content of phosphorus and potassium, it is difficult to plan fertilizer needs. For example, if your soil is naturally high in phosphorus, using a high-phosphorus fertilizer (a 1-2-1 ratio) may result in a deficiency of other essential nutrients such as iron. Also, if your soil is deficient in potassium, the application of a straight nitrogen fertilizer may aggravate potassium deficiency in the grass. Soil testing helps you develop a sound fertilizer program for your lawn.

Your maintenance program also has a significant effect on your lawn's fertilizer needs. If you remove grass clippings instead of returning them to the soil, the amount of fertilizer required may be doubled. Table 3 indicates the nutrients contained in clippings from a fertilized lawn. If rainfall or irrigation is heavy on a sandy soil, fertilization must be increased to replace nutrients lost through leaching.

Finally, your desired results determine the required fertilization. A high-quality, dark green lawn will require more nitrogen than a lower-quality turf. Likewise, a lawn that is subject to heavy foot traffic will require more nitrogen than a lawn that receives little use.

**Table 3. Nutrient Content Of Grass Clippings From A Fertilized Lawn.**

| Grass Species | Percent of Dry Weight[1] | | |
|---|---|---|---|
| | N | P | K |
| St. Augustine | 2.5 | 0.30 | 1.3 |
| Bermudagrass | 3.5 | 0.50 | 1.8 |

[1]Approximately 100 pounds of dry grass clippings is produced per 1,000 square feet per year on fertilized lawns.

*Frequent watering and fertilization permit rapid establishment of newly sprigged turgrasses.*

## Why Feeding Is Necessary

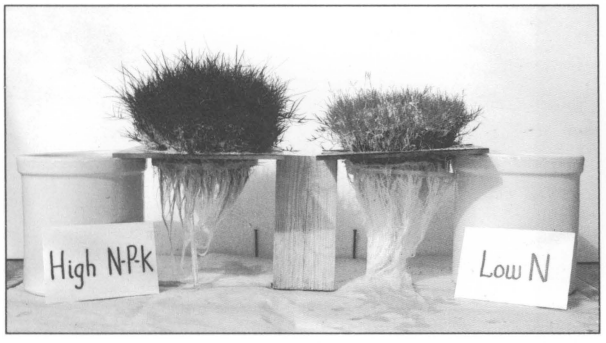
Grass plants require nitrogen, phosphorus, and potassium in larger amounts than other nutrients, but these must be applied in the right proportion to give satisfactory results. Nitrogen is the key element in turf production. Nitrogen promotes vegetative growth and gives the plant a dark green color. Phosphorus stimulates development of a good root system, and potassium affects many physiological processes of the plant. These three elements are necessary parts of all living plant tissue.

Other elements, such as iron, play important roles in the nutrition of plants. When nitrogen, phosphorus, and potassium are balanced properly, other elements necessary for plant growth are usually present in sufficient amounts to produce good turf.

Deficiencies of specific nutrients produce characteristic symptoms in plants. Nitrogen deficiency causes stunted growth and lack of green color in the leaves, which deteriorates to a complete yellowing and loss of the lower leaves. Increased seed-head production is also symptomatic of a nitrogen deficiency. Nitrogen deficiency can be confused with lack of moisture, but moisture deficiency is indicated by wilting of the plants or curling of the leaves in addition to yellowing of leaves.

Phosphorus deficiency causes slow growth of the entire plant. The leaves are an unhealthy dark green, and purplish brown patches may develop. Excessive levels of phosphorus can also cause stunting and chlorosis.

Potassium deficiency can cause stunted growth, and the leaf margins may appear dull green or yellow. Older leaves are affected first.




*Balanced nutrition promotes healthy root systems in turfgrasses.*

Narrow leaves and distinctive turf thinning are characteristic of potassium deficiency.

Iron deficiency causes pale, bleached stripes between the parallel veins of leaf blades. This bleaching or yellowing is called "chlorosis" and occurs on soils high in calcium. Using a high-phosphorus fertilizer such as a 1-2-1 ratio may aggravate this problem. When this condition is serious, it ruins the appearance of the lawn.

When lawns receive the proper kind and amount of plant food, they are healthy and green. Weeds are not a serious problem in properly managed lawns.

## Time And Rate Of Fertilization

Knowing when to feed your lawn is just as important as knowing what to feed it. Generally, spring and fall fertilization with a complete fertilizer is recommended on St. Augustine, centipede, and zoysia grasses, with supplemental applications of nitrogen during the summer if maintenance of a dark green color is desired. Bermudagrasses usually require 3 to 5 applications of fertilizer each year to maintain a vigorous, dark green turf.

Soil type, rainfall or irrigation patterns, and fertilizer sources also determine the rate and frequency of fertilization. Sandy soils in a high-rainfall area require light, frequent applications of fertilizer; clay loam soils in the dry sections of the state should be fertilized less frequently.

The type of nitrogen source used also determines the rate and frequency of fertilization. Inorganic fertilizers should be applied at lighter and more frequent rates than organic and slow-release fertilizers. These different fertilizers will be discussed in more detail in the following section.

The spring application on warm-season grasses should be made after the first or second mowing. Fall applications of complete fertilizer should be made about 6 weeks before the average first frost date. Tall fescue and bluegrass lawns should have these applications about September 15 and April 15. Generally, a fertilizer with a 3-1-2 or similar ratio should be used and applied at a rate of 1 pound actual nitrogen per 1,000 square feet. See Table 2 (page 14) for grades, ratios, and rates of fertilizer application.

Bermudagrass lawns need about 1 pound of actual nitrogen per 1,000 square feet every 45 to 60 days during the growing season. These applications of nitrogen, made between the spring and fall applications of complete fertilizer, will keep the lawn green and vigorous. See Table 4 (page 17) for rates and frequency of application for nitrogen fertilizers. Cool-season grasses do not require applications of nitrogen during the summer months.

Iron chlorosis can be corrected by applying iron sulfate or an iron chelate. But before you apply these iron-bearing materials, make sure the pale color of the grass is not due to nitrogen deficiency. The most effective way to apply the iron is as a foliar spray. Iron sulfate (copperas) can be applied at the rate of 4 to 8 ounces in 5 gallons of water per 1,000 square feet. Add 1 ounce of a household detergent to ensure good leaf coverage. Repeat applications will probably be necessary at 4- to 6-week intervals. Chelated iron compounds may be applied in a spray according to the manufacturer's directions. Clean the sprayer thoroughly after applying iron, because the iron-bearing materials are corrosive. Iron products will also stain sidewalks and driveways if not removed immediately.

## Types of Fertilizer

Plant food for turf should carry a high percentage of nitrogen, with enough phosphorus and potassium to meet soil test recommendations. Grasses require large amounts of nitrogen, so more nitrogen than phosphorus and potassium must be supplied on a yearly basis.

Since the root system develops primarily during the fall and early spring, you can promote deep and extensive root growth by applying adequate nitrogen, phosphorus, and potassium during those seasons. Nitrogen applied separately during the summer is used mainly for color enhancement and leaf growth and does not encourage the growth of the root system.

Your choice of the type and grade of fertilizer material to use depends on the grass species, the soil conditions, and the environment. Table 2 (page 14) shows some grades, ratios, and recommended rates of application for various fertilizers.

Use a complete fertilizer in accordance with soil test results for the spring and fall applications. Additional nitrogen needed between the fall and spring applications of complete fertilizer can be supplied from one of several sources, as shown in Table 4.

**Table 4. Percent Nitrogen And Other Nutrients In Various Nitrogen Sources, And Recommended Rates Of Application For Lawns After A Spring Application Of A Complete Fertilizer.**

| Source | Percent[1] | | | Pounds to apply per 1,000 sq. ft. per application | Frequency of application |
|---|---|---|---|---|---|
| | N | $P_2O_5$ | $K_2O$ | | |
| Cottonseed meal | 6 | 2 | 0 | 15 | 60 days |
| Activated sewage sludge | 6 | 3 | 0 | 15 | 60 days |
| Ammonium nitrate | 33 | 0 | 0 | 3 | 60 days |
| Ammonium sulfate | 21 | 0 | 0 | 5 | 60 days |
| Ammonium phosphate | 16 | 20 | 0 | 6 | 60 days |
| Urea | 45 | 0 | 0 | 2 | 60 days |
| Urea-formaldehyde | 38 | 0 | 0 | 4-6 | 90 days |
| IBDU | 31 | 0 | 0 | 6-8 | 90 days |
| Coated ureas | 30-36 | 0 | 0 | 5-6 | 90 days |

[1]Pounds of nitrogen in 100 pounds of fertilizer

Slowly available and organic sources of nitrogen, such as sulfur-coated urea, sewage sludge, or cottonseed meal, are more desirable than readily available or soluble (inorganic) sources, such as ammonium nitrate and ammonium sulfate. Slow-release and organic fertilizers usually cost more, but they are available to the plant over a longer period of time and help avoid the excessive growth produced by soluble nitrogen fertilizers. Inorganic or soluble nitrogen should be applied in smaller amounts and more frequently than slow-release and organic types.

Slow-release nitrogen sources have been developed specifically for turf use. Urea-formaldehyde, IBDU, and coated fertilizer granules are examples of slow-release nitrogen sources. When applied at a rate of 2 pounds of nitrogen per 1,000 square feet, these materials provide nitrogen to the turf for about 3 months.

Table 4 (page 17) shows the amount of nutrients contained in various sources of nitrogen. In every fertilizer analysis (such as 12-4-8) the first number represents the percent nitrogen (N), the second number represents the percent phosphorus ($P_2O_5$), and the third number represents the percent potassium ($K_2O$).

### Applying Fertilizer

Fertilizer can be distributed with a cyclone- or drop-type fertilizer spreader. Distribute the fertilizer evenly without skipping or overlapping. Even distribution will prevent light and dark streaks across the lawn. To ensure even distribution, divide the fertilizer into two equal lots. Apply one lot lengthwise and the other crosswise, as described under seeding.

Do not apply soluble fertilizers when grass is wet because of the danger of burning the grass. After applying the fertilizer, apply about $^1/_2$ inch of water to move the nutrients into the soil.

## Watering

Watering is the maintenance practice most often done incorrectly. Lawns should be watered when the grass shows a definite need. Grass suffering from lack of moisture develops a dark color and the leaves wilt in midday. When this occurs, soak the lawn thoroughly to a depth of 4 to 6 inches or more. Soaking the lawn until topsoil and subsoil moisture meet would be ideal. Apply water only as fast as the soil can absorb it.

Deep watering encourages the development of an extensive root system. A well-developed root system can use the nutrients and water in the soil more efficiently than shallow root systems.

Light, frequent sprinklings produce shallow, weak root systems which encourage weed invasion. Shallow rooting does not allow efficient utilization of plant food or moisture in the soil.

Lawns should also be watered during excessively dry periods in winter to prevent desiccation. On sloping sites or on slowly permeable soils, water intermittently for short periods to reduce runoff.

**Table 5. Recommended Mowing Practices For Lawn Grasses.**

| Grass Variety | Mowing Height (inches) | Mowing Interval (days) |
|---|---|---|
| Common bermudagrass | 1-1.5 | 5-7 |
| Hybrid bermudagrass | 0.5-1 | 3-5 |
| St. Augustine grass | 2-3 | 5-7 |
| Zoysia grass | 1-2 | 5 |
| Centipedegrass | 1-2 | 7 |
| Buffalograss | 2-3 | 7-14 |
| Tall fescue | 2.5-3 | 5 |
| Bluegrass | 3 | 7 |

Overall, these sites require as much water as the rest of the lawn, but the water must be applied over a longer period of time to allow water penetration.

If you plant a grass that is adapted to your local environment, watering is not required for the grass to survive. In Central Texas, for example, bermudagrass will survive without watering. However, it will go dormant and off-color during extended dry periods.

## Mowing

Improper mowing is responsible for the deterioration of many lawns. Mowing too close and too infrequently causes scalping of the turf and shallow rooting, which lowers the turf's resistance to drought, diseases, and weed invasion. Mowing too close at infrequent intervals also allows excessive soil drying and baking, as well as heat damage to grass during the summer. Frequent mowing at recommended heights is the most desirable practice (Table 5, page 18).

Leaves not only produce the desired green color, but they are also necessary for the manufacture of food required by the entire plant. When too much of the leaf is removed in one mowing, the entire plant suffers. Removing one-half or more of the leaf growth at one mowing is a severe shock to turfgrass. Mow the lawn often enough so that not more than one-third of the leaf is removed at any one time.

Creeping-type grasses can withstand closer mowing than bunch types. Bermudagrass and zoysia can be mowed at a height of 1/2 to 1 1/2 inches, but tall fescue should be mowed at a height of 2 to 3 inches. Many homeowners want a dense mat of turf on their lawns, but such a buildup of stems and leaves (called "thatch") eventually leads to trouble. This is especially true with St. Augustine and the hybrid strains of bermudagrass. Fertilizing excessively and mowing these grasses too high for a long period results in thatch buildup.

Proper mowing requires a sharp, well-adjusted lawn mower. Keep the mower sharp enough to cut the tip of the leaves without bruising or crushing them. Time spent picking up stones and sticks before mowing is well spent; this kind of debris can dull and damage the mower's cutting surfaces. On reel-type mowers, both the cutting edge of the bedknife and the reel should be sharp. Check the adjustments of the reel and bedknife regularly. The reel should be set so that it is close to, but not touching, the bedknife. Determine the height of the bedknife by placing the mower on a flat surface and adjusting the set screws so that each end of the bedknife is exactly the desired height. The distance from the surface to the bedknife is the cutting height. Sharpen and replace the blades of rotary mowers as needed to give a clean cut without fraying the leaf tips.

## Cultivation

Cultivation of turfgrass includes aeration, topdressing, and vertical mowing. These practices:

- Improve the aeration of the soil and the infiltration of water.
- Promote the growth of the root system.
- Reduce the compaction of the soil surface and the accumulation of thatch.

All of these benefits are essential to producing a vigorous, healthy lawn.

### Aeration

Aeration, the most effective method of alleviating surface compaction without damaging the desirable characteristics of the lawn, increases the movement of air and water into the soil and promotes deeper, more extensive rooting of turfgrasses. Aeration also reduces the amount of runoff from irrigation or rainfall. Other benefits of aeration include improved resiliency of compacted soils and stimulation of thatch decomposition. Aeration is not a routine cultural practice on lawns, but it is needed to correct soil compaction and the associated problems. Lawns that receive little traffic may not require aeration to maintain desirable surface characteristics.

Aeration is best accomplished during periods of active turf growth and when the soil is moist enough to permit deep penetration by the aeration tines or spoons.

Several types of aerators have been developed for lawn maintenance. The most effective type uses hollow spoons to extract soil cores 3 to 4 inches deep and 3/4 to 1 inch in diameter. The cores removed from the turf may be shredded with a mower.

## Topdressing

Another cultural practice in lawn management is the use of topdressing to smooth the surface, to aid in the decomposition of thatch, and to reduce surface compaction. Topdressing involves applying a thin layer of topsoil, or a mixture of soil, organic matter, and other soil amendments, to an established turfgrass area. Topdressing is often used in association with sprigging or seeding a new lawn. The topdressing contains nutrients and microorganisms which stimulate the growth of turfgrasses and promote the decomposition of thatch.

Topdressing rates may range from $^1/_2$ to 2 cubic yards of material per 1,000 square feet of lawn area, depending on the intended purpose of the operation. The topdressing is usually worked into the turf after application by dragging with a steel doormat, raking, or brushing.

It is important that the topdressing material be similar in texture and composition to the underlying soil. Layers of different-textured soils will create poor air and water relationships between the topsoil and the underlying soil. Sandy loam topsoil usually works best as a topdressing material.

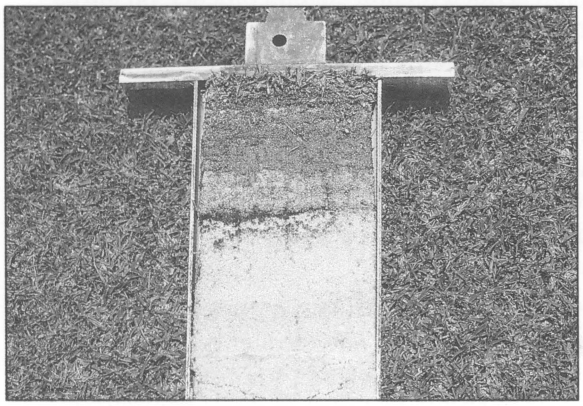
Vertical mowing (dethatching) helps remove dead vegetation from the thatch layer and promotes tillering. The dead material is lifted to the surface and must be raked or otherwise removed and disposed of immediately after vertical mowing. The thatchy material can be used in the landscape as a mulch or compost. Applying water and fertilizer after vertical mowing encourages tillering and rapid recovery of the turf. Vertical mowing and dethatching equipment is available from several manufacturers and can be rented.

Bermudagrasses and bluegrasses respond favorably to vertical mowing, but care should be taken with non-rhizomatous turfgrass such as St. Augustine. If the St. Augustine grass is not vigorous and well-rooted, serious thinning can occur as a result of vertical mowing. Equipment blades should be spaced 2 to 3 inches apart and should not penetrate too deeply into St. Augustine grass turf.

Vertical mowing is best done in early spring, just prior to the initiation of new growth. Fall vertical mowing of bermudagrass may cause an increase in clover, annual bluegrass, and other winter weeds. Likewise, early summer dethatching of Kentucky bluegrass may increase the infestation of crabgrass.

## After Cultivation

Fertilization after cultivation operations stimulates rapid recovery of turfgrasses and promotes healthy, vigorous turf. After lawn cultivation, the application of 1 pound of nitrogen per 1,000 square feet is desirable.



*Thatch accumulates under intensive management, even when clippings are routinely picked up.*

# OCCASIONAL LAWN PROBLEMS

Even with good management, problems occasionally arise as a result of thatch accumulation, weeds, insects, diseases, or excess shade.

## Thatch Accumulation

The spongy turf which results from accumulated organic residues between the soil and the green leaves is referred to as "thatch." A certain amount of thatch is desirable, as it adds resilience to the turf, reduces compaction of the soil surface, and prevents soil erosion. However, excess thatch reduces water infiltration, creates shallow-rooted turf, encourages insect and disease infestations, and makes mowing difficult.

Management practices such as thorough and infrequent watering, close and frequent mowing, proper fertilization, and occasional cultivation (aeration, vertical mowing, and topdressing) will prevent excess thatch accumulation. If lawns are mowed frequently, grass clippings will not promote thatch accumulation, and it is beneficial to leave them on the lawn. However, if a lawn is mowed so infrequently that the turf is covered with clippings, then the clippings should be removed. Excess tree leaves should also be removed rather than shredded with a mower. Scalping the lawn by close mowing in several directions at the first sign of spring green-up will aid in thatch prevention. Grass clippings and tree leaves collected after scalping can be disposed of through composting and used in flower and shrub beds or gardens.

Excess fertilization with nitrogen leads to thatch accumulation. Lawns should be fertilized in early spring and fall when the grass is not growing vigorously. During the summer months, keep fertilization to a minimum and do not exceed 1 pound of nitrogen per 1,000 square feet every 45 days.

If thatch accumulation becomes a problem, lawns should be dethatched in early spring by vertical mowing in two or more directions. For bermudagrass or bluegrass lawns, the vertical blades may be spaced only 1/2 to 1 inch apart, but for St. Augustine or centipedegrass lawns the blades should be 2 to 3 inches apart. After dethatching, rake or sweep the lawn to remove the organic debris brought to the surface. Aeration should follow the vertical mowing operation. Run a hollow spoon aerator over the lawn two to three times when the soil is moist so that the spoons penetrate 3 to 4 inches into the soil. After aeration, fertilize the lawn to encourage recovery of the grass.

Such a renovation may never be necessary, or it may be needed every 2 to 3 years, depending on the turfgrass species and your maintenance program.

## Shade

Shade from tree canopies creates several problems for turfgrasses, including reduced light and competition for water and nutrients. The result is usually shallow-rooted turf that is more susceptible to drought stress, winterkill, wear, and disease infestations. Of the turfgrasses, St. Augustine and tall fescue are the most shade-tolerant, zoysia and centipede grasses are intermediate in shade tolerance, and bermudagrass and buffalograss are the least shade-tolerant. However, even St. Augustine grass requires some sunlight to produce an acceptable lawn in shade.

Increase the mowing height for turf growing in heavy shade (St. Augustine grass and tall fescue should be mowed at 3 inches). Also, reduce nitrogen fertilization of turfgrasses in dense shade to prevent succulent growth that is more susceptible to diseases.

*A dull mower blade will fray leaf tips and damage the lawn.*

If tree canopies are dense and structures or low-growing shrubs screen the lawn, it may be necessary to selectively prune tree limbs to increase light penetration. Root pruning of shallow-rooted trees also will improve conditions for turfgrasses in shade. If dense, low-growing trees and shrubs are an essential part of your landscape plan, a shade-tolerant ground cover such as English ivy (*Hedera helix*) or Asiatic jasmine (*Trachelosperum asiaticum*) can be used in place of turfgrasses.

## Weeds

Because of their variation in texture, growth habit, and color, weeds create an unsightly appearance in lawns. Proper management is the best means of controlling weeds. Thorough and infrequent watering, judicious fertilization, and proper mowing are important steps to weed control. However, lawns damaged by insects or disease, wear (compaction), or other problems are highly susceptible to weed invasions.

Crabgrass, goosegrass, sandbur, and dallisgrass are the major grassy weeds which cause problems in lawns during the summer. The first three are annuals that emerge from seed each spring. Dallisgrass is a perennial grass that recovers from rhizomes in the spring, but also produces seed that spread throughout the lawn. With the exception of dallisgrass, these weeds can be controlled with preemergence herbicides applied in early spring. Dallisgrass can be controlled by spot-treating the plants with a contact herbicide. Cool-season weedy grasses, such as rescuegrass, annual bluegrass, and ryegrass, can be controlled by preemergence herbicides applied in early fall, or by contact herbicides applied when the permanent turfgrass is dormant.

Broadleaved weeds such as dandelion, chickweed, henbit, clover, dock, and mustards can be controlled with selective postemergence herbicides. Only materials recommended for St. Augustine grass should be used on St. Augustine lawns, as the turf might be damaged by some materials that are safe for bermudagrass.

Nutgrass (*Cyperus* spp.) creates special problems in lawns because it grows very rapidly and spreads to ornamental beds and gardens. St Augustine grass effectively competes with nutgrass and crowds it out; however, when the grass is damaged by insects or disease, nutgrass can become a problem.

For complete weed control recommendations, contact your county Extension office.

**Caution**: Follow label recommendations for all herbicides and use them only on the grasses specified on the label.

## Insects

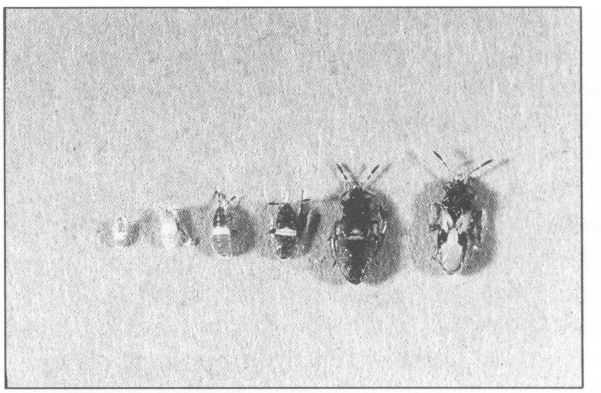
St. Augustine grass is susceptible to several insects, such as chinch bugs and white grubs, which cause extensive damage to lawns. Chinch bugs are particularly damaging along the Gulf Coast and in South Texas where three or more generations may develop each year. The second and third generations build up tremendous populations that cause extensive damage.

Chinch bug damage appears as irregular patches in open, sunny areas of the lawn, usually along a sidewalk, driveway, or house foundation. The grass turns yellow and, if untreated, eventually dies and turns brown. To detect the insects, twist a metal can with both ends removed into the turf and fill it with water and a small amount of detergent. Chinch bugs will float to the surface in 3 to 5 minutes.

The adult chinch bug (about $^1/_8$ inch long, black with white wings folded over the back) overwinters in the lawn or in plant debris around the house. Adults breed in the spring, and the first generation begins to feed. In hot, dry summers, chinch bugs develop large populations by the second and third generations. Wet summers inhibit the development of large populations. Control of the chinch bug should begin in early summer. For chemical control for chinch bugs and other lawn insect pests, request current recommendations from your county Extension office.

White grubs, larvae of the May or June beetles, also cause extensive damage to Texas lawns. The grubs feed on roots of lawns 1 to 2 inches below the surface. If the infestation is heavy, grubs consume the entire root system and the sod can easily be lifted or rolled up. To check for the presence of grubs, dig 1-square-foot sections of sod at several locations in the lawn and examine the roots and soil to a depth of 4 inches. (After examination, the

*White grubs and larvae of the June bug or masked chafer.*



*Chinch bugs — nymphs (left) to adults.*

*Grub damage to a bermudagrass lawn.*

*Chinch bug damage to a St. Augustine lawn.*

soil and sod can be put back in place.) Treatment is justified when more than four grubs per square foot are found. In the northern part of Texas (Dallas to Lubbock), treatment should be made during the last 2 weeks of July and the first 2 weeks of August. In South Texas, treatment should be made during July.

Other insects such as ants, ticks, chiggers, and earwigs commonly infest lawns but cause little damage to turf. For complete insect control recommendations, contact your county Extension office.

## Diseases

Properly managed lawns may be attacked by diseases, but they recover much faster than poorly managed lawns. St. Augustine grass is particularly susceptible to injury from lawn diseases and recovers more slowly than bermudagrass.

Identification of the disease attacking a lawn is essential to successful control. Some turf diseases have characteristic symptoms that can be readily identified by homeowners.

**Brownpatch** is a fungus disease that damages St. Augustine grass in spring and early fall. Brownpatch is characterized by circular patches of yellow or brown grass that may vary from less than 1 foot to several feet in diameter. The outside of the circle has a "smoke ring" appearance caused by the actively spreading fungus. In this area, the leaves of the grass may be easily pulled from the stem because of the deterioration caused by the fungus. The grass in the center of the circular patch may recover within weeks, giving the diseased area a doughnut-shaped appearance.

The fungus is most active when humidity is high and the air temperature is between 75 and 85 degrees; fungus activity stops when the air temperature reaches 90 degrees. Preventative fungi-

cides should be applied in early fall. Request Texas Agricultural Extension Service publication L-732,"Control Diseases in the Home Lawn," from your county Extension office for specific fungicide recommendations.

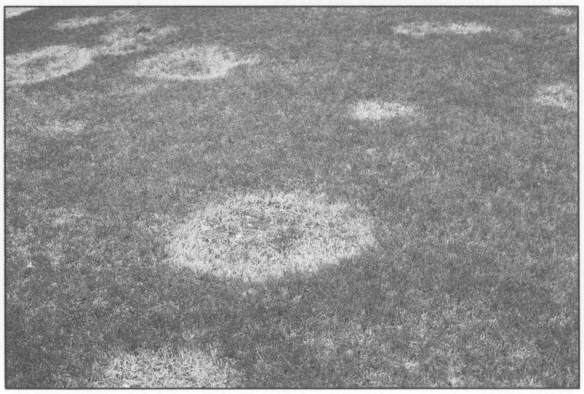
**St. Augustine Decline (SAD)**, a virus disease, causes chlorotic mottling of the leaf blade and a general decline in lawn vigor. Bermudagrass and weeds generally invade a St. Augustine turf attacked by SAD. Since the disease is caused by a virus, there are no chemical methods for control. However, good maintenance practices, if continued, will prolong the survival of the lawn. Floratam and Raleigh St. Augustine grasses are resistant to SAD and may be plugged into an infected area of the lawn, where the new variety will eventually replace the weakened turf.

**Leaf spot diseases** cause considerable damage to St. Augustine grass, as well as to bermudagrass lawns. These diseases may first appear as isolated dark or light spots on leaf blades, which enlarge or coalesce to form dark blotches on leaves and stems. Infected leaves may die and turn brown. In areas of heavy disease development, the grass may have a burned or scorched appearance resulting from an accumulation of dead leaves. Effective chemical controls are available for leaf spot diseases (refer to Texas Agricultural Extension Service publication L-732, "Control Diseases in the Home Lawn.").

*Helminthosporium leaf spot on bermudagrass.*

*Brownpatch on a St. Augustinegrass lawn.*

*St. Augustine decline (S.A.D.).*



*Spring dead spot.*

A green, well-kept lawn requires dedication and hard work, but the rewards are many. Not only will the lawn provide an attractive foundation for the other elements of your home landscape; it also helps to improve the environment around your home by reducing noise, air pollution, glare, heat, erosion, and runoff. And a lush, green lawn warmly invites guests into your home and provides a comfortable surface for relaxation and recreation.

## GLOSSARY

**chlorosis:** yellowing between the veins of leaves. Chlorosis can be caused by many factors.

**compaction:** a condition in which soil particles are pressed together so that the soil becomes firm. Compaction can be caused intentionally, to firm the soil after planting. It can also result from traffic across the lawn, and, if severe, can make it difficult for root systems to grow and function properly.

**complete fertilizer:** a fertilizer containing some of each of the elements nitrogen, phosphorus, and potassium.

**fertilizer analysis:** a numerical expression of the relative amounts of nitrogen, phosphorus, and potassium in a fertilizer. The first number indicates the percent nitrogen, the second number the percent phosphorus, and the third number the percent potassium.

**postemergence herbicide:** a herbicide that is meant to be applied after the weeds emerge from the soil.

**preemergence herbicide:** a herbicide that is meant to be applied before the weed seeds germinate.

**rhizomes:** horizontal stems that grow partly or entirely beneath the surface of the soil. They usually produce roots below the ground and send up above-ground shoots.

**runners:** horizontal, above-ground shoots.

**stolons:** stems that, when they grow, bend over with their weight so that the tips touch the soil, often continuing to grow along the soil surface. Roots may be produced at nodes where the stems touch the soil.

**thatch:** an accumulated organic layer just above the soil, usually consisting of decaying leaf, stem, and root tissue plus living grass stems and roots.

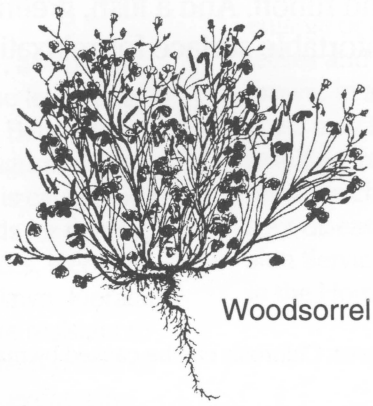
**topdressing:** applying soil or fertilizer to the surface of the soil or turf without working the material into the soil.

**vertical mowing:** mechanical raking of the turf to cut stems and runners and to bring dead tissue to the surface where it can be removed.

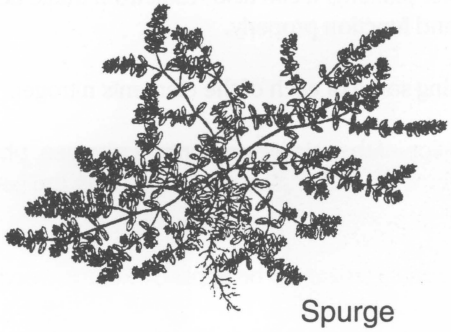
# BROADLEAF WEEDS

## Annuals

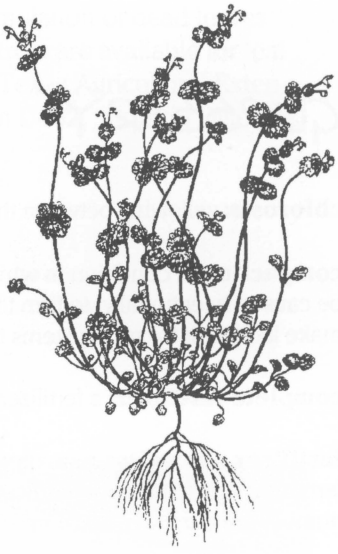
Chickweed



Woodsorrel

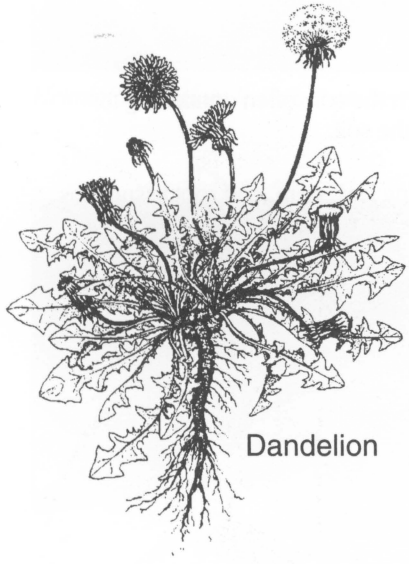


Spurge

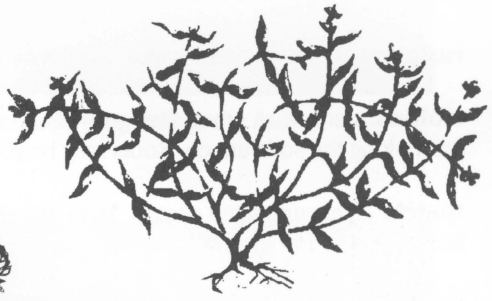


Henbit

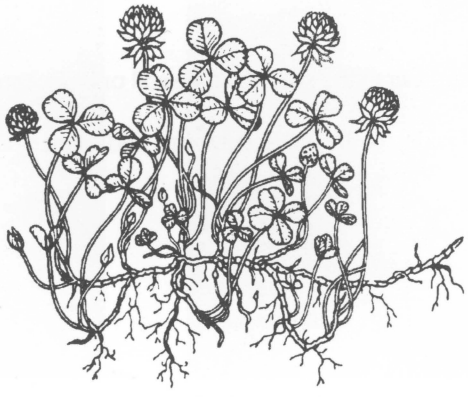
## Perennials



Dandelion



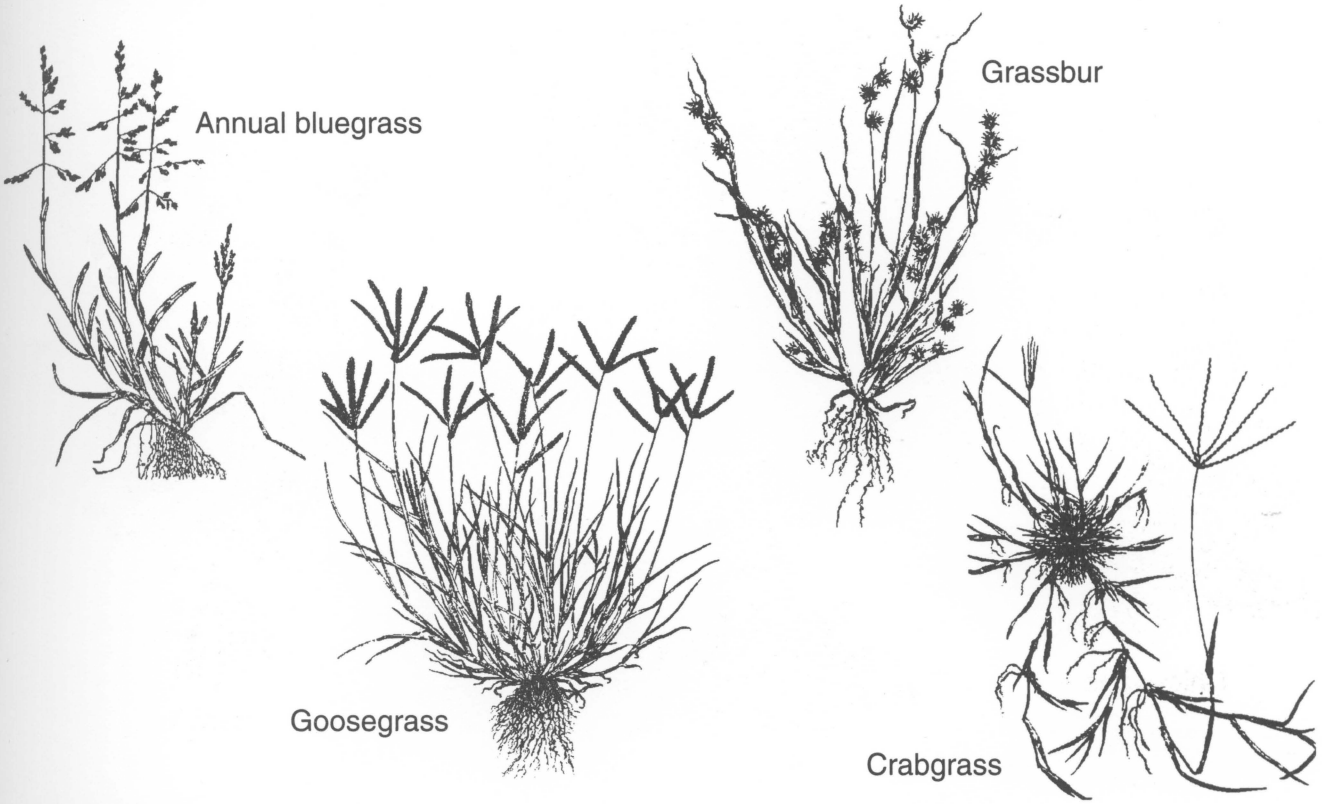
Virginia buttonweed



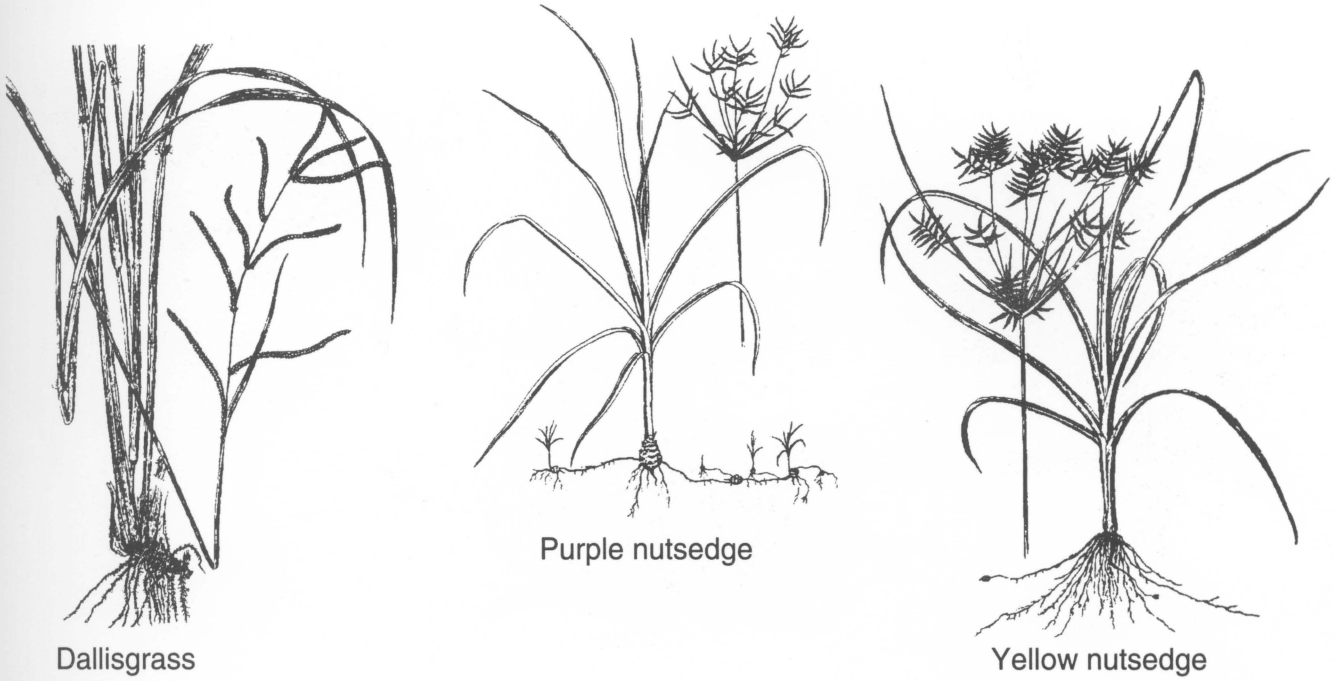
Clover

# GRASSY WEEDS

## Annuals




## Perennials



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Editor: Elizabeth Gregory, Assistant Professor and Extension Communications Specialist
Designer: Roxy Pike, Commercial Artist



Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Zerle L. Carpenter, Director, Texas Agricultural Extension Service, The Texas A&M University System.

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