



Bermudagrass

Bermudagrass (*Cynodon* species) is one of the most widely used turfgrasses in tropical and subtropical regions. Common bermudagrass (*Cynodon dactylon*), called *mānienie* in Hawaiian, was introduced to the warmer regions of the United States from Africa or India in the late 1700s. The first recorded introduction of common bermudagrass to Hawaii was in about 1835 by Dr. Gerritt Judd.

Bermudagrass is a very durable, drought-resistant, and salt-tolerant turf that spreads rapidly by above-ground stolons and underground rhizomes. It is so durable and aggressive that the U.S. military used it to stabilize airfield runways in North Africa and the South Pacific during WWII and in Southeast Asia during the Vietnam conflict.

Several species of bermudagrass have gained wide popularity in Hawaii for use in home lawns, sports fields, parks, and golf courses. There are two general types of bermudagrass: those that are fertile and produce viable seed, and the sterile hybrids, which must be propagated vegetatively. Common bermudagrass produces seed and was once the only type used in Hawaii. It is a very functional turf, but it possesses some undesirable traits. Numerous hybrids have been developed that possess various improved characteristics of growth pattern, color, tolerance, or resistance.

Hybrid bermudagrass selections

Early attempts to improve the quality of common bermudagrass involved crosses between *Cynodon dactylon* and *C. transvaalensis*. These crosses result in hybrids that do not produce viable seed and must be propagated by sprigs, stolons, or sodding. The first of these hybrids introduced to Hawaii was ‘**Sunturf**’ in 1962. It gained wide acceptance and quickly replaced common bermudagrass as the turf of choice in many situations (see CTAHR publication TM-2, ‘*Sunturf*’ bermudagrass). Since 1962, other new hybrids have been introduced and are replacing ‘Sunturf’. The advantages of the hybrids over common bermudagrass are substantial improvements in quality, turf density, tolerance of heat and drought, and col-

oration. Hybrids have an added advantage in that they produce very few unsightly seed heads.

The main disadvantage of hybrid bermudagrasses is the greater expense of time and money needed to establish a mature lawn because of the vegetative propagation methods that are required. Also, the hybrids have a slower rate of growth, tend to build thatch faster than the seeded varieties, and generally require a higher degree of maintenance. Despite these disadvantages, hybrid bermudagrass cultivars are an excellent choice for a high-quality turf in Hawaii. Some of the popular hybrids used in Hawaii include the following:

‘**Tifway**’ or ‘**419**’ is the foundation of the “Tif” series of bermudagrass hybrids developed at the USDA research station in Tifton, Ga. It is extremely wear tolerant, darker green than previous selections, highly disease resistant, and it requires less fertilizer and water. Tifway is an aggressive, fine textured turf that does best in full sun and at a mowing height of $\frac{1}{2}$ – $\frac{3}{4}$ inch. It is best utilized on golf fairways and tees and on well maintained athletic fields and lawns. A more recent selection, ‘**Tifway II**’, is denser and has a higher resistance to sting and root-knot nematodes.

‘**Tifgreen**’ is a medium green, fine textured, tough and durable hybrid bermudagrass. It is a low growing, resilient turfgrass that is highly tolerant of heat and heavy traffic. It does best in full sun and at a mowing height of $\frac{1}{4}$ – $\frac{3}{4}$ inch. ‘**Tifgreen 328**’ is a newer variety that can be mowed lower and has greater drought tolerance.

‘**Tifdwarf**’ is darker green and more compact than ‘Tifgreen’. It tolerates lower mowing height ($\frac{1}{8}$ inch) and is often used for putting greens. It is also a popular choice for a well manicured lawn.

‘**FloraDwarf**’ is one of the new “ultra-dwarf” selections developed specifically for putting greens. It is a very dense, low growing turf introduced to Hawaii in 1988.

‘**GN-1**’ is a dark green, medium textured hybrid that produces less thatch than other bermudagrass hybrids and requires less maintenance, making it an excellent choice for sports fields, golf fairways, and lawns. It prefers full sun and should be mowed at a height of $\frac{1}{2}$ –1 inch.

In 1996 the Mississippi Sod Growers Association released three new hybrids that are now available in Hawaii:

‘MS-Choice’ is a very dark green, compact, leafy, prostrate turf used for home lawns and sports fields. Its closed canopy of leaves is tightly packed near the soil surface and gives the turf a cushion feel when walked on. ‘MS-Choice’ is more shade tolerant than other hybrids, produces very few seed heads, and has little or no tendency to scalp under normal mowing conditions. Its main limitation is the tendency to build heavy thatch under high fertilizer levels.

‘MS-Express’ is a leafy, medium green, low growing turf for use on golf putting greens and tennis greens. Enhanced rhizome density and robust shoot growth give this hybrid a rapid rate of establishment and recovery.

‘MS-Pride’ is a dense, leafy, dark green turf for use on lawns and golf tees and fairways. It has very high sod strength and some resistance to leafspot and dollar spot diseases. Its main limitation is a slow rate of establishment compared to other bermudagrasses.

Seeded bermudagrass selections

In the late 1980s, researchers in Oklahoma and New Mexico developed genetically stable seeded bermudagrass selections possessing improved turf characteristics. The first selection developed exclusively for turf, certified as **‘NuMex Sahara’**, became commercially available in 1989. ‘Sahara’ is more drought tolerant while maintaining the rapid growth rate of common bermudagrass. It has shorter internodes, which greatly increases turf density. Its smaller, finer leaves give it a very uniform texture and deep green color. Here in Hawaii at elevations above 1000 feet, ‘Sahara’ often produces a very loose turf cover and is rapidly invaded by weeds.

In 1994, a new group of improved turf-type seeded bermudagrasses was released. These selections, such as **‘Sultan’** and **‘Yuma’**, feature significant improvements in turf density and quality. ‘Sultan’ has shorter, narrower leaves than ‘Sahara’ and produces a turf that is over 30 percent denser. Its growth rate is more moderate than ‘Sahara’ and common bermudagrass.

More than 15 cultivars of seeded bermudagrass are currently commercially available. These new, dense grasses (such as **‘Blue-muda’**), with finer, shorter leaves and uniform dark green color, are earning respect for their improved characteristics on golf courses, sports

fields, and lawns. They give homeowners and turf professionals the ease and economy of establishing a quality bermudagrass turf from seed, and they provide a range of options when choosing a seeded bermudagrass or bermudagrass blend.

Establishing a bermudagrass lawn

Kill all existing grass and weeds by applying a non-selective herbicide such as Roundup® or Finale®. Wait two weeks after the first application of herbicide, and spray again if necessary. It is often helpful to fertilize and water the area well before applying the herbicide in order to encourage lush growth of the unwanted vegetation. This ensures a better kill and minimizes future weed problems, especially if the lawn is to be seeded. When the area is free of weeds and old grass, till in a complete fertilizer, along with compost if desired. The site should then be leveled and raked before planting.

The amount of fertilizer and pH-neutralizing material (lime or sulfur) mixed into the soil should be determined by a soil analysis. The desirable soil pH range for bermudagrass is pH 6–7. All bermudagrasses have a high nitrogen requirement. After planting, apply 1 lb of nitrogen per 1000 square feet (ft²) every three to four weeks until the turf is established.

Vegetative propagation. Hybrid bermudagrasses are usually planted using sprigs or stolons. They may also be planted by plugging or sodding. After the site has been properly prepared, the sprigs or stolons should be harvested and protected from desiccation by wind and sun. They should be used as fresh as possible and not subjected to excessive heating such as may occur when moist planting material is tightly packed or covered for several days. Sprigs are distinguished from stolons in that sprigs consist of stolons with roots and rhizomes, while stolons consist of above-ground parts only. Sprigs are obtained by shredding harvested sod or with a sprig harvester. Stolons are generally harvested with a vertical mower. Sprigs tolerate more environmental stress during planting and generally establish faster.

Sprigs or stolons should be planted at 5–15 bushels per 1000 ft², depending on the rate of cover required. They should be broadcast and either pressed into moist soil with a roller or covered lightly with soil or mulch. Water frequently enough to keep the soil damp for at least three weeks to obtain good cover. Extended drying can cause death of the stolons. Complete coverage can

be obtained in about two months, depending on the amount of propagules used.

Plugs of sod 2–4 inches square may be planted at 6–12-inch intervals. Sprigs may also be planted in this manner, but they will require more time to become established.

One advantage of vegetative propagation over seeding is that weeds can be controlled during the establishment period by applying a preemergence herbicide after planting.

Propagation by seed. Planting a seeded bermudagrass is much cheaper than planting a hybrid that must be propagated by sod or sprigs, but this cost advantage should be considered only when the seeded cultivar truly matches the hybrid in providing the desired turf quality. If in doubt about which type is best for your situation, consult a landscape professional.

To produce a dense stand, seed at a rate of 1–2 lb of hulled seed per 1000 ft². To ensure uniform spread, use a mechanical broadcaster or spreader. Divide the seed in two equal portions, apply the first portion over the entire area, and apply the second at a right angle to the first. Rake the seed gently into the soil surface and top-dress very lightly with compost. The seeds are very small and must be within ¼–½ inch of the surface to germinate and grow. Keep the soil moist by watering for brief periods two to three times a day during the first two weeks. After the new turf is established, water less frequently but more deeply.

Under ideal conditions, germination may begin in seven to ten days, but allow two to three weeks for complete germination. Full coverage may be obtained in four to six weeks under optimum conditions.

It is possible to renovate a bermudagrass lawn by seeding over the existing turf. Use half as much seed as for a new planting, and follow the same procedure after sowing.

If weed problems arise during the establishment period, do not apply herbicides until the turf is well established. The best solution for weed problems is to make sure they are eliminated before sowing seed.

Regardless of the method of planting, allow the new lawn to become well established before the first mowing. Mow at about 1 ½ inches for the first few times before gradually going to the final shorter height desired. Mowing should remove only one third of the grass height at any one time.

Soil and environmental requirements

All bermudagrasses tolerate a wide range of soil types, but they do best in well drained soils with pH between 6 and 7. Soil pH above 7.5 can lead to micronutrient deficiencies. Bermudagrass requires full sun for best growth. Under the cool temperatures that occur at high elevations in Hawaii, bermudagrass may undergo dormancy, which can present problems in turf maintenance.

Fertilizer application

For a high-quality turf, all bermudagrasses need high levels of nitrogen (N), with the hybrids requiring the most. After the turf has become established, use 6–12 lb of N, 6 lb of phosphorus as phosphate (P₂O₅), and 9 lb of potassium as potash (K₂O) per 1000 ft² per year. Phosphorus and potassium can be applied in three or four equal applications during the year. Nitrogen should be applied monthly at ½–1 lb per 1000 ft² if a soluble N fertilizer is being used. Controlled-release fertilizers can be applied in greater amounts and less frequently than soluble fertilizers, but do not apply more than 2 lb of N per 1000 ft² in a single application. (For more information on fertilizer, see CTAHR Circ. 495, *Turfgrass fertilization in Hawaii*.)

Keep in mind that higher soil fertility leads to lush growth, frequent mowing, faster thatch buildup, and higher maintenance demands.

Watering

All bermudagrasses are drought tolerant and recover well from temporary wilt. However, drought tolerance in bermudagrass is based on its ability to become dormant during severe drought and then recover through the regrowth of stolons and rhizomes when moisture becomes available. Therefore, bermudagrass is not a desirable turf for severely dry conditions.

The best time to water is late at night or early in the morning when the wind is usually the lightest and water distribution will be the most even. The worst time to water is in the late afternoon or early evening, which is also the most popular time among homeowners. When grass is watered in the late afternoon, the water remains on the lawn until sunrise. This long period of moisture encourages the establishment and spread of turf diseases.

Lawns also suffer when watering is frequent and light, which results in shallow, weak root systems. Turf with a weak root system is susceptible to many environ-

mental stresses, especially drought, and is less able to compete with weeds.

An established bermudagrass turf develops a healthy, deep root system if it receives infrequent, deep watering given at the first sign of wilting.

Mowing

Mowing requirements depend on the cultivar, use, level of maintenance, and soil fertility. Medium textured bermudagrass selections produce a dense, wear-tolerant turf when mowed at heights between $\frac{1}{4}$ and 1 inch. The shorter heights are used for golf and sports turf, while the taller heights are more common in lawns. At heights above 1 inch, bermudagrass develops a turf with acceptable appearance but low wear tolerance. Fine textured bermudagrasses such as 'Tifway' should be mowed below 1 inch, preferably $\frac{1}{2}$ inch or less; taller mowing height with these grasses produces puffy, stemmy turf that is easily scalped during mowing.

A reel mower is required for most bermudagrasses that are cut below 1 inch. A rotary mower may be used for heights above 1 inch. Mowers—whether reel, rotary, or flail—should be sharp, and changes in height or frequency of cut should be gradual. Avoid following the same pattern each time you mow. Avoid removing more than a third of the grass height with any one mowing.

Thatch buildup

All bermudagrasses develop thatch after a few years, although some varieties produce more than others. Thatch build-up is more pronounced in intensely managed sites. If thatch is more than $\frac{3}{4}$ inch thick, it should be removed by vertical mowing. Vertical mowers are specialized turf-maintenance machines that can be rented for homeowner use, but their best effect may be obtained when operated by a landscape professional. Small areas can be treated by hand using a dethatching rake. Periodic application of a light top-dressing of fine compost aids thatch decomposition and makes the need for vertical mowing less frequent.

Insects and diseases

Bermudagrasses are susceptible, in varying degrees, to webworm, lawn armyworm, bermudagrass mite, and

nematodes. Some varieties of bermudagrass are more resistant than others. The insects can be controlled by applications of appropriate insecticides. Always read the pesticide label to be sure that it can be used for the particular situation, and follow all label directions.

Weed control

An established, well maintained bermudagrass turf will have very few weed problems, but there may be occasions where weed control measures become necessary. Many brands of herbicide can be used on bermudagrass turf, but certain precautions should be followed. Always read the label completely and follow its directions. Do not apply herbicide when the temperature is above 85°F or when the lawn is under moisture stress. Some herbicides should not be applied to a newly seeded or plugged lawn.

Preemergence herbicides can be used on a regular basis as a preventative measure to control weeds before they become a problem. If your lawn is in an area that is likely to be constantly subjected to weed infestation from outside (a nearby vacant lot or poorly maintained yard), then preventative herbicide applications may be appropriate. A wide variety of preemergence herbicides are labeled for home use in bermudagrass. It may be necessary to combine herbicides to control both grassy and broadleaf weeds—use only the mixtures allowed by the respective herbicide labels.

If weeds are only an occasional problem or if your lawn is already infested, then postemergence herbicides labeled for bermudagrass should be used. Check the label to be sure the herbicide is effective on the specific weeds to be controlled.

For more information on herbicides, refer to *Chemical weed control recommendations for turfgrasses in Hawaii*, CTAHR publication II-20.

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