

Bermudagrass Fairway Management

A review of practices for maintaining desirable playing conditions.

BY JOHN H. FOY

Bermudagrass (*Cynodon spp.*) is well adapted to warm climates and possesses good overall turf characteristics. It is the most widely used warm-season turfgrass for golf courses. Since its introduction in the early 1960s, the hybrid cultivar Tifway (also known as 419) has been the industry standard, and there is no argument that it provides excellent fairway playing conditions. However, in the past decade several new bermudagrass cultivars with improved performance and stress-tolerance characteristics have been introduced. New bermudagrass cultivars such as Yukon, Riviera, Latitude 36, Patriot and Northbridge exhibit improved cold tolerance and often require fewer management inputs than cool-season turfgrass species, resulting in their increased use throughout the transition zone of the United States.

The article [Working Bermudagrass Fairways](#) reviews management practices used by golf courses in Florida to produce premium-quality Tifway fairways. While many of the basic principles are still applicable today, some of the practices have been fine-tuned and additional tools have been developed to facilitate bermudagrass fairway management. The following is a review of current bermudagrass fairway management practices.

GROWING GRASS

With adequate fertilization and irrigation combined with close and regular mowing, hybrid bermudagrasses can produce dense, quality fairway turf. The standard recommendation for nitrogen is to apply 0.5 to 1 pound of actual nitrogen per 1,000 square feet per month when the bermudagrass is actively growing. Despite recommendations, more nitrogen than is necessary to maintain dense, healthy turf is often applied to accommodate golfer demands for lush, dark-green turf



Properly managed bermudagrass fairways provide an excellent playing surface for golfers of all skill levels.



While never popular amongst golfers, core aeration of fairways is necessary. Along with relieving soil compaction, this critical cultural practice aids in controlling thatch through dilution and increased microbial decomposition.



Broadcast spraying fairways with plant growth regulators (PGRs) and supplemental spoon feedings of nitrogen and micronutrients are being performed at many golf facilities with bermudagrass fairways. Also, the use of turf colorants or paints continues to gain popularity for "liquid overseeding" during the winter.

cover. However, excessive nitrogen fertilization results in rapid thatch and organic matter accumulation due to the stoloniferous and rhizomatous growth habit of bermudagrass.

One positive consequence of golf facilities having to reduce operating costs in recent years is the realization that acceptable fairway turf quality can be maintained with less nitrogen. However, bermudagrass does need adequate nitrogen to support sustained growth, especially during mid-spring and early summer, but nitrogen fertilization can be drastically reduced or even stopped for two to three months at many courses in Florida and the Desert Southwest once a dense cover of turf exists. Fertilizing bermudagrass fairways and roughs should be resumed in late summer or early fall to support sustained, balanced growth and prepare the bermudagrass for winter by promoting the production and storage of carbohydrates.

SPOON FEEDING

Chemical soil tests should be used to determine requirements for primary nutrients like phosphorus, potassium, calcium, and magnesium. Bulk broadcast applications of complete, granular fertilizer formulations two to six times per year are often used as a base for maintaining sufficient levels of available nutrients to support bermudagrass

growth. While nitrogen is often included in granular formulations, supplemental spoon feeding with nitrogen is common practice in the management of bermudagrass fairways. Fertigation and injecting materials into irrigation systems are common spoon-feeding strategies used by golf facilities in Florida. While fertigation makes it possible to regularly supply nutrients without any disruption and inconvenience to golfers, uniform irrigation distribution is essential for it to be effective.

Spoon feeding bermudagrass fairways by making broadcast spray applications is gaining popularity at an increasing number of golf facilities. Along with allowing for more precise or targeted application of materials to fairways, spoon feeding with broadcast spray applications eliminates the need for running an irrigation cycle when adequate soil moisture exists. Premixing all of the products with a material proportioner and storage tank the day before a scheduled application greatly improves efficiency and reduces the time required for a fairway broadcast spray application. Furthermore, a material proportioner and premix storage tank facilitate the use of less expensive agricultural-grade fertilizer materials such as ammonium sulfate, urea, potassium nitrate, iron, and manganese sulfate. Broadcast spray-

ing and spoon feeding fairways are also compatible with plant growth regulators in summer and green pigments, or "liquid overseeding" programs, during late fall, winter, and early spring.

PLANT GROWTH REGULATORS

Plant growth regulator programs for bermudagrass fairways started being employed in the mid-1990s and continue to remain a standard practice at many courses across the Sun Belt. The use of plant growth regulators remains popular because, even with judicious nitrogen fertilization and irrigation, rapid bermudagrass shoot growth occurs when average daily temperatures reach 75° F or higher. Actively growing bermudagrass typically requires a minimum mowing frequency of three times per week, although daily mowing is often considered to be ideal. Frequent mowing consumes a large amount of fuel and labor hours, and it shortens the life expectancy of mowing equipment. Also, even with frequent mowing, large quantities of grass clippings and mower-scalping damage can still occur during summer. The growth regulator trinexapac-ethyl (alone or in combination with flurprimidol) suppresses vertical shoot growth, which in turn reduces mowing requirements, the amount of grass clippings generated, and potential for scalping.

The benefits of a growth regulator program are most pronounced in regions where frequent summertime thunderstorms cause surges in turf growth and make it difficult to mow on a regular basis. Growth regulator programs also increase turf density, which improves ball lies with a mowing frequency of two to three times per week. Some additional but less obvious benefits of a plant growth regulator program include lower evapotranspiration (ET) rates and reduced water stress.

of the superior quality of cut they produce. However, compared to most other turfgrass varieties, bermudagrasses are tougher plants and not a candidate for true lightweight mowing. Equipment manufacturers are aware of this fact and have heavy-duty models available in their product lines that are better suited for mowing bermudagrass fairways. Also, a number of improvements have been made to reel-cutting units, and there are a variety of front and rear rollers, brushes, groomers, and verticut reel accessories available

turf grain. Cross, diagonal, or circle cutting fairways may take more time but should be done at least once a week during the growing season. While bermudagrass does not maintain mower-stripping patterns similar to other turf varieties, some courses have burned in stripes by repeatedly mowing in the exact same pattern. This practice is strongly discouraged because it creates severe grain patterns that are extremely difficult to eliminate.

Height of cut also plays an important role in fairway management. Hybrid bermudagrass fairways are typically maintained at a height of cut between 0.35 and 0.65 inch. For daily play and when growth is occurring, maintaining Tifway bermudagrass at a 0.5-inch height of cut has been the longtime standard. At some golf facilities, lower heights of cut are maintained during summer and the resulting tighter ball lies are generally preferred by low-handicap and professional golfers. With some of the newer cultivars of bermudagrass, such as Celebration, it has been found that maintaining a lower height of cut (around 0.4 inch) provides excellent fairway lies for golfers of all skill levels.

The growth rate of bermudagrass begins to slow in early to mid fall in response to cooler temperatures and shorter day length. Increasing the height of cut by 0.1 to 0.2 inch allows for increased carbohydrate production and storage prior to bermudagrass entering winter dormancy. This also helps increase the wear tolerance of bermudagrass at courses where regular play is hosted throughout the winter and early spring months.

BELOW THE SURFACE

Thatch is defined as an intermingled organic layer of dead and living shoots, stems, and roots of grass that develops between the turf canopy of green vegetation and the soil surface (Beard, 2002). A thatch layer of approximately 0.5 inch is considered desirable for fairways because it helps cushion traffic and provides some degree of moisture and nutrient retention. Again, due to the stoloniferous and rhizomatous growth habit of bermudagrass, thatch accumulation can occur rapidly



Vertical mowing of bermudagrass fairways is needed to control organic matter accumulation and maintain a dense, upright turf growth habit. Deep verticutting can be performed once annually, or light and frequent verticutting throughout the growing season also works well.

SURFACE MANAGEMENT

A general rule for mowing bermudagrass turf is to remove only the upper one-third of the total turf canopy. When a greater amount of tissue is removed, the resulting mechanical stress and damage negatively impact both plant health and surface quality. Quality bermudagrass fairway surfaces can be maintained with regular mowing and a plant growth regulator program; however, more frequent, i.e., daily, mowing or double cutting fairways is needed to produce the best possible surface quality for championships, tournaments, and special events.

The use of lightweight five-plex fairway mowers has been the industry standard for nearly 20 years because

to further improve the precision and quality of cut. Due to the lateral growth habit of bermudagrass, the use of brush or groomer attachments is often necessary. These attachments help maintain the best possible surface quality and ball lie by promoting upright shoot growth and a dense turf canopy.

The inherent lateral growth habit of bermudagrass also greatly increases the potential for surface grain to develop. As is the case with putting greens, ball roll is reduced when playing into the grain, but grain can also negatively impact the play of approach and chip shots. In addition to grooming and verticutting, regularly changing the direction in which fairways are mowed is extremely important for minimizing

on bermudagrass fairways. This is especially true when over-fertilization and irrigation are used to maintain lush, green aesthetics in fairways. Winter overseeding of bermudagrass fairways is another practice that can contribute to additional thatch accumulation and the development of an organic mat layer that can be several inches deep.

Excessive organic matter accumulation essentially acts as a sponge that absorbs and retains moisture and, in turn, contributes to the persistence of wet, soft surface conditions. Excessive thatch can also result in poor-quality mowing and increased scalping damage. Furthermore, thatch layers can cause shallow rooting, reduce drought tolerance, harbor various insect and disease pests, and tie up pesticides (thereby reducing their effectiveness). Increased incidence of hydrophobic localized dry spots is also observed when excessive thatch layers dry out. Management and control of thatch is a critically important and an ongoing concern.

Cultural management practices such as core aeration and verticutting are the primary means of physically controlling thatch and organic matter accumulation. Due to the disruption associated

with aeration and verticutting, these practices are never popular with golfers, but they are absolutely necessary.

Fortunately, over the past few decades, improvements in fairway aeration equipment have been made. The advancements in aeration technology allow a greater number of holes per square foot to be produced at increased depths, significantly improving the effectiveness of aeration. Aeration equipment that brings more soil material to the turf surface improves the dilution of organic matter and increases the rate of natural microbial degradation. Nevertheless, even with the improved effectiveness of new equipment, two to three core aeration procedures on bermudagrass fairways annually are still recommended. In most cases, harvesting or removing the material generated by core aeration is considered impractical and cost prohibitive. Typically, aeration cores are allowed to dry out for several hours before being mechanically broken up and worked back into the turf.

Deep vertical mowing, or verticutting, bermudagrass fairways on an annual basis is also strongly recommended. Verticutting brings a large quantity of organic debris to the surface that can be removed with sweeping or

vacuuming operations. It also aids in maintaining a very dense turf canopy by cutting stolons and shallow rhizomes, which results in the formation of new shoots. Additional benefits of vertical mowing are grain control and improved surface smoothness. The best result and fastest recovery occur when verticutting is conducted in early to mid summer. Oftentimes, verticutting is performed in conjunction with core aeration of fairways. However, deep verticutting of fairways is not recommended during late summer and early fall. Even though bermudagrass growth is still occurring, the recovery rate of bermudagrass is reduced at this time of year. Furthermore, verticutting in late summer and early fall will interrupt the production and storage of carbohydrates before the bermudagrass enters into a partial or fully dormant overwintering state. In addition to standard, tractor-mounted fairway verticutting equipment, flail mowers set up with straight blades offer another verticutting option that has been used at some golf facilities.

A third option that continues to gain popularity is the use of fairway mowers set up with vertical mowing reels. This equipment setup is not suited for deep verticutting; however, by conducting



At a growing number of golf facilities in Florida and the Desert Southwest where core aeration and verticutting aren't enough to control thatch, fairway topdressing programs have also been adopted.

lighter treatments on a monthly basis throughout the growing season, very similar results can be achieved. Reduced course disruption and fewer complaints about air quality from golfers and adjacent homeowners are added benefits of conducting lighter, but more frequent, fairway verticutting. Light verticutting also generates less material compared to the amount of material produced by one or two deep verticuttings, and it can be used in areas of the country where green-waste disposal is a growing concern.

Based on experiences over the years, both core aeration and verticutting are necessary practices to prevent excessive thatch and organic matter accumulation with bermudagrass fairways. However, in some regions of the country, such as Florida and the Desert Southwest, it can be very difficult to keep up with the annual rate of organic matter accumulation. In the early 1900s, fairway topdressing with sand was being performed at courses in the Pacific Northwest to combat the problem of heavy soils and a unique environment so that firmer, drier playing conditions could be provided throughout the year (see [Dressing Up for the 1990s](#)).

There was skepticism about whether the benefits provided would justify the cost of topdressing bermudagrass fairways, especially for golf courses with sandy soils and 30 to 40 acres of fairway turf. However, at courses where fairway topdressing programs have been implemented, the benefits have justified the cost. With increased dilution of organic matter accumulation, a drier, firmer, and smoother surface condition is achieved. On several older courses where 6 inches or more of organic matter has accumulated over the years and earthworm casting is a problem,

a marked reduction in earthworm casting has been achieved with topdressing. Also, complaints about “muddy” golf balls are common at courses in Florida during the winter. The mud is actually organic matter accumulation, and diluting the organic matter with topdressing will greatly reduce complaints about muddy golf balls.



While bermudagrass has many great turfgrass characteristics, organic matter buildup is a concern. Thatch and organic matter accumulation must be controlled if a firm, dry playing surface is to be achieved.

While benefits have been noted after only one or two topdressing treatments, for truly marked and permanent results, topdressing should be a multi-year program. The goal of a topdressing program should be to develop at least a 4- to 6-inch homogeneous layer of sand and organic matter accumulation. Lighter, more frequent applications of sand in the range of 8 to 10 tons per acre per application throughout the growing season are preferable to one or two heavy appli-

cations of sand in summer. Based on university research and field experiences, the particle size of fairway topdressing sands is not as critical as the particle size of sand used for topdressing putting greens. Thus, less expensive materials will still produce the desired results when used to topdress fairways. Even so, topdressing large areas of fairway can be

expensive. Thus, at some golf facilities, topdressing of just the primary landing zones and approaches to the putting greens is conducted as a cost-control measure.

CONCLUSION

Bermudagrass has been and most likely will continue to be the dominant warm-season turfgrass species used on fairways. It can provide excellent fairway turf conditions and is well suited to being maintained as a firm, dry playing surface. With bermudagrass fairways being maintained over a wide range of climatic zones across the United States, all aspects and details of its management could not be discussed in this article. The intent is to provide a review of the basic practices being employed for providing consistent, quality bermudagrass fairway conditions. For more specific information on best management practices for a particular location, do not

hesitate to contact a USGA Green Section regional agronomist.

LITERATURE CITED

Beard, James B. 2002. *Turf Management For Golf Courses. Second Ed.* Chelsea, MI: Ann Arbor Press. 793 pp.

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