

The Transition From Perennial Ryegrass to Creeping Bentgrass Fairways for the Mid-Atlantic Region

A history of the conversion process.

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THE INTRODUCTION of new grass species is a normal aspect in the evolution of enhancing the game of golf. Although seldom noticed by the casual golfer, superintendents almost annually overseed fairways, tees, and greens with improved cultivars. When the time comes, however, to change the species and not just introduce new cultivars, the transition often is costly in terms of time that areas are out of play, not to mention the cost of seed, chemicals, fertilizers, and labor. When greens are fumigated in late summer, the golf course normally closes until the following spring or else temporary greens are used. In either case, club revenues fall precipitously. The transition process for a fairway conversion program, however, is not as difficult as it is for greens.

In the Mid-Atlantic region, many golf courses grow perennial ryegrass as the primary species for fairways. Furthermore, most rough areas, tees, collars, and green surrounds also are composed primarily of perennial ryegrass. The emergence of perennial ryegrass as an important golf course species began in the mid to late 1970s. Basically, perennial ryegrass replaced annual bluegrass and Kentucky bluegrass on fairways. Kentucky bluegrass cultivars had improved dramatically in the 1970s, but as fairways were reduced to a height lower than 0.75 inches, even improved Kentucky bluegrass cultivars could no longer compete with weeds and diseases. Summer patch disease and annual bluegrass invasion were major factors in the demise of Kentucky bluegrass fairways and tees.

Summer patch, formerly known as *Fusarium* blight, was first observed on golf courses near Washington, D.C., in the mid-1950s, not long after Merion Kentucky bluegrass was released. When common-type bluegrasses were grown on fairways mowed at 1.5 inches, they would persist even without a good fungicide program, but density was poor and weeds were abundant. Improved Kentucky bluegrasses, which have better density and color than common types, were still susceptible to summer patch. As mowing height continued to be lowered, even the so-called *resistant* bluegrasses lost their resistance to summer patch.

By 1980, summer patch was the most important disease of bluegrass fairway turf, and no fungicides were available to effectively control the



A very effective but disruptive renovation method involves complete turf removal, followed by seeding or sodding.

malady. The advent of Bayleton® and Banner® in the early 1980s enabled us to control summer patch in annual bluegrass on greens, but high rates and multiple applications were required and this was prohibitively expensive for 25 or more acres of fairway turf.

By the early 1980s, improved perennial ryegrasses such as Manhattan and Citation became available. These new cultivars could be mown cleanly, without ripping vascular bundles, a characteristic that had given the older ryegrass cultivars a grayish appearance. Perennial ryegrass has several important characteristics that led to its widespread acceptance: 1. it is resistant, if not immune, to summer patch; 2. it is compatible with Kentucky bluegrass from the standpoint of appearance and growth habit, so it could easily be overseeded into fairways without having to use a non-selective herbicide such as Roundup; 3. ryegrass germinates and establishes quickly; 4. it does not produce thatch; 5. it can be mowed very low, and a golf ball sits up nicely; 6. it has fewer insect pest problems than Kentucky bluegrass; and 7. it has excellent tolerance to most herbicides, including Prograss®, which effectively controls annual bluegrass.

At the time perennial ryegrass was widely introduced, several of its weaknesses were unknown. Rust disease was an early disease problem of the older ryegrasses, but this problem was overcome by breeding resistant cultivars. The breeders, however, have been unable to overcome other significant diseases of perennial ryegrass, including brown patch and *Pythium* blight. The discovery of the ryegrass endophyte, however, led to an intensive breeding effort to produce high endophyte-containing cultivars. The endophyte, which is the fungus *Neotyphodium lolii* (formerly *Acremonium loliae*), is seed-borne and grows systemically through sheath and leaf tissue. This beneficial fungus produces a substance that deters the activity of surface-feeding insect pests.

Hence, most new-generation perennial ryegrass cultivars were resistant to rust, contained a beneficial endophyte, and were easier to mow. By 1983, the final and perhaps most appealing aspect of having perennial ryegrass fairways was that the herbicide Prograss became available. This herbicide effectively controls the *annual* type of annual bluegrass. Although high herbicide rates and multiple applications are required in most years, perennial ryegrass



A less disruptive technique includes severe verticutting and interseeding.

grass is remarkably tolerant of the herbicide. Furthermore, ryegrass seed and seedlings also are tolerant of Prograss. Hence, in fairways with high annual bluegrass populations, perennial ryegrass could be disk-seeded either just prior to or just after Prograss was applied.

Prograss only works consistently well when fall applied, and although it may take all winter, more than 90% *Poa* control can be achieved. As the *Poa* dies, the overseeded ryegrass tillers and fills in rapidly so that by early May, perennial ryegrass fairways could be presented at 100% density with little or no *Poa*. Over time, however, resistant perennial-type annual bluegrass biotypes begin to appear on golf course fairways with an eight- or ten-year history of Prograss usage.

Hence, perennial ryegrass became the preferred species for fairways in most of the Mid-Atlantic region. Perennial ryegrass is even used as a lawn and fairway turf in many northern regions of the U.S. and is extensively used to overseed winter dormant bermudagrass in the southeastern and southwestern U.S. During the 1980s, more revolutionary products and equipment were developed to enhance golf turf quality. Among these advances were lightweight triplex fairway mowers, improved cultivation equipment, and very sophisticated irrigation systems. With these and other innovations and improved products, the standards for playing surfaces became higher and higher. Superintendents found they

needed ever-increasing budgets to buy expensive fertilizers, pesticides, and the latest equipment to maintain the high standards that were established. As long as budgets were able to grow, the standards of quality increased.

Two natural events in 1994 and 1995 brought to the forefront a weakness of perennial ryegrass which became prohibitively expensive to overcome. During the 1993-94 winter, a series of storms coated golf courses in the Mid-Atlantic region with thick ice layers. The ice persisted for many weeks, and when it was finally removed mechanically from greens or by the spring melt, superintendents were presented with acres of dead turf. Wherever ice had lain for an extended period, virtually all of the annual bluegrass, bermudagrass, and perennial ryegrass was dead. Superintendents were forced to purchase large quantities of bentgrass to reseed greens and perennial ryegrass to reseed fairways, tees, green surrounds, and roughs. Because of the great vigor of perennial ryegrass, fairways were made playable in four to six weeks, but at considerable expense.

The summer of 1995 also brought a record extreme in high-temperature stress and long periods without rain. In the midst of the 1995 heat wave, a disease ravaged perennial ryegrass fairways from southern New Jersey to Kentucky. The disease was gray leaf spot and it ultimately killed more perennial ryegrass than the ice storms in early 1994. Once diagnosed, the

disease was checked by applying high rates of Daconil® or Dyrene® on five- to seven-day intervals during the heat wave. Some superintendents chose not to spray fungicides, but instead purchased more perennial ryegrass seed. Unfortunately, gray leaf spot attacked the seedlings and remained active up to the first week of November. Hence, fungicides had to be applied to keep seedlings alive. The cost of seed and fungicides in 1995 was enormous.

The two catastrophes in back-to-back years initiated the debate of whether perennial ryegrass fairways should be converted to another species. The three alternative species for the Mid-Atlantic region are zoysiagrass, bermudagrass, and creeping bentgrass. From an overall cost/benefit perspective, zoysiagrass may be the best species for the region. There are, however, some formidable negatives associated with zoysiagrass. In reality, it must be sodded, and sod is very expensive (cost is about \$475,000 to \$500,000 for 23 to 25 acres). Zoysiagrass also becomes dormant and turns brown between mid-October and late April, during which time cart traffic must be restricted from the fairways. Zoysiagrass also can be damaged or killed by ice; hence, good surface drainage across zoysiagrass fairways is essential. Despite these drawbacks, the installation costs for zoysiagrass are recoverable in a seven- to eight-year period by virtue

of the savings from its lower requirements for water, fertilizer, and pesticides. Furthermore, zoysiagrass provides an outstanding surface because golf balls invariably are nicely elevated (i.e., sit up) on both green and dormant zoysiagrass.

Bermudagrass makes an excellent, low-maintenance fairway turf for golf courses south of Baltimore, Maryland. Bermudagrass is less expensive to establish and can be sprigged into existing perennial ryegrass fairways. Conversely, zoysiagrass sprigs or plugs cannot compete in an existing cool-season turf. By restricting fungicide use and water after sprigs have rooted, properly managed bermudagrass can dominate the stand within two years. Use of a selective herbicide such as LESCO TFC® in spring of the second or third year after sprigging eliminates the remaining ryegrass. Bermudagrass has excellent drought tolerance, few pest problems, and requires only a modest supply of fertilizer between spring green-up and mid-August. Like zoysiagrass, however, bermudagrass enters a similar brown winter dormant period. During winter the ball does not sit up as well on dormant bermudagrass. Bermudagrass is more prone to winter injury than zoysiagrass, and it is likely to winter-kill every seven to ten years. Regardless, the potential savings in management inputs over a seven- to ten-year period make bermudagrass a

cost-effective fairway turf for transition zone areas.

For several of the reasons outlined above, most Mid-Atlantic courses are considering conversion to creeping bentgrass. Because it can be seeded, creeping bentgrass is less expensive to establish compared to bermudagrass or zoysiagrass. Creeping bentgrass has superior winter hardiness compared to all other alternatives. Hence, creeping bentgrass is considered to be a more reliable fairway turf. Creeping bentgrass is susceptible to a myriad of diseases; however, they generally are not as chronically severe as ryegrass diseases. The major bentgrass diseases in the Mid-Atlantic region include: take-all patch (primarily on new golf courses), dollar spot, *Fusarium* patch or pink snow mold, anthracnose, brown patch, and *Pythium* blight. Brown patch and *Pythium* blight tend to be chronically severe only in low-lying and shaded bentgrass. A good scouting program and spot spraying can effectively address most of these potential disease problems. Hence, creeping bentgrass fairways can be managed with fewer fungicide inputs compared to perennial ryegrass grown in a humid transition zone or northern regions.

There are, however, other management considerations regarding creeping bentgrass grown on fairways. Fairways must be mowed with lightweight triplex mowers and the clippings must be removed. Creeping bentgrass is more sensitive to herbicides and, as such, weed management is a greater challenge in bentgrass fairways. Unlike ryegrass, creeping bentgrass develops thatch. Thatch control is essential in retaining high-quality bentgrass, particularly during summer months. Bentgrass fairways generally require two core cultivations annually. The fall cultivation should be performed by late August to avoid the first flush of annual bluegrass seed germination, which begins in mid-September. Core cultivation after mid-September encourages annual bluegrass, which is not as easily removed from bentgrass as perennial ryegrass, zoysiagrass, or bermudagrass.

Creeping bentgrass fairways develop dry spots, which can be alleviated only by wetting agents, careful irrigation, or water injection cultivation during summer months. Syringing can be effectively performed only by hand. Hence, a double-row irrigation system with conveniently spaced snap couplers is required before creeping bentgrass conversion can be considered.



It takes time for the desirable grass to fill in and mature.

Large divots also will be a significant problem. Even the most dedicated golfers are not able to keep up with proper divot management. Divot repair crews, therefore, are needed weekly during high-play periods to minimize their impact. Furthermore, during hot or excessively wet periods, carts need to be restricted to roughs and paths.

There are two approaches to converting from perennial ryegrass to creeping bentgrass fairways. One involves using a plant growth regulator and the second the non-selective herbicide Roundup Pro®. The latter approach is the most likely to succeed in the shortest period of time. Roundup should be applied in early August and the site vigorously core cultivated after the ryegrass shows signs of dying. Careful overlapping of the herbicide is required to avoid ribbons or islands of surviving perennial ryegrass. These skips or misses should be sprayed as soon as they are discerned. During humid or overcast periods, Roundup can take up to 48 hours to dry totally or be inactivated. Walking or driving carts across Roundup-treated areas may result in tracking the herbicide onto greens or other non-treated areas. It therefore is important to wait two or more days before allowing golfers to re-enter Roundup-treated areas. The new Roundup Pro formulation dries more rapidly and is considered rain safe within a few hours of application on sunny days. While the fairways may be dying, they can remain in play after the two-day post-Roundup application waiting period.

Once it is determined that all of the ryegrass is dying or dead, fairways are core cultivated and the bentgrass is disk-seeded in two or more directions and seed broadcast into aerifier holes. The fairways are dragged with a heavy steel mat to break up soil cores, and dead organic matter is blown off. Because it is difficult to get uniform fertilizer distribution during the dragging process, the starter fertilizer normally is applied after dragging. For best results, the seeding should be completed on or before September 1.

With light and frequent syringing and warm temperatures, the bentgrass should germinate in five to seven days. Assuming there are no serious washes or other problems, the bentgrass fairways can be put fully into play within a six- to eight-week period after seedling emergence. Cart traffic, however, will have to be restricted until the following spring. Once the fairways have

been mowed two to three times in the spring, and assuming it is not excessively wet, carts can be allowed on fairways.

Using plant growth regulators (PGR) is a slower approach to bentgrass conversion; however, fairways can remain open for play. There is little research, unfortunately, to allow us to predict the level of success to expect from a PGR program. The most commonly used PGRs for fairway conversion are Embark® and Primo®. These are the preferred materials because they have no soil activity and, as such, germinating bentgrass seedlings would be unaffected by these PGRs.



The final product — great fairway turf!

About one week prior to seeding, the highest label rate of the PGR is applied. Embark causes much more discoloration and injury and its use may slow perennial ryegrass recovery, thereby giving bentgrass seedlings an additional competitive edge. Primo does not discolor perennial ryegrass as severely, and this may be a preferred feature for some golfers. It takes five to ten days for PGRs to show growth suppression. Regardless, a few days after a PGR is applied, the mowing height is lowered and the ryegrass is severely scalped. Fairways are core cultivated and dragged, and bentgrass seed is disk-seeded and broadcast. Like the Roundup program, the bentgrass should be seeded by September 1. Given warm and moist conditions, the bentgrass seedlings will begin to appear in five to seven days. By the following spring a successful overseeding will result in 30 to 50 percent bentgrass cover. Lower mowing heights and spoon

feeding in summer should enable bentgrass to compete with the ryegrass. By the fall of the second growing season, or when more than 90% bentgrass cover is achieved, an application of the herbicide LESCO TFC will eliminate the remaining perennial ryegrass.

Regardless of which program is chosen, there are a few key factors to success. It is imperative that no pre-emergence herbicides be applied in the spring prior to an August overseeding. The herbicide Acclaim® can be used to control annual grassy weeds at very low rates without producing a soil residual problem. Secondly, a higher-than-normal seeding rate of two to four pounds

of bentgrass seed per 1,000 square feet is suggested. The earlier a dense bentgrass stand is achieved, the better the competitive edge it will have against annual bluegrass or perennial ryegrass. Because of the first flush of annual bluegrass seed germination during the second or third week of September, it is very important to have bentgrass seedlings emerging on or before September 1.

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