Proactive transition Part II. Making it happen

Intervening in the natural process to force an early departure of perennial ryegrass produces a better-looking golf course and healthier bermudagrass.

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EDITOR'S note:

This is the second installment of a two-part series describing a more effective way of overseeding bermudagrass turf with perennial ryegrass.

As discussed in the first article in this series (*GCM,* February 2006, pp. 93-96), it is advantageous for superintendents to force an early — perhaps mid-May — transition from perennial ryegrass (*Lolium perenne*) to bermudagrass (*Cynodon* species). Though transition will almost always include an ugly period between the demise of the perennial ryegrass and the full recovery of the bermudagrass, being proactive produces a shorter and not quite so ugly transition period. It also allows the bermudagrass adequate time to mature and enter the next overseeding cycle fully recharged, which, in turn, results in a quicker transition the following summer.

Proactive transition is a two-phase process. Phase 1 begins in April during prime golf season, when perennial ryegrass is healthy and growing full speed. Unfortunately, this is also when bermudagrass is attempting to gain a foothold in the turf canopy and re-establish itself. During this relatively cool period, the bermudagrass does not grow aggressively and needs some cultural assistance from the superintendent to compete successfully. Phase 2 begins in mid-May when physically removing and/or chemically controlling the perennial ryegrass eliminates it from competition so that the bermudagrass can recover and grow unimpeded.

Photos courtesy of H. Howard

Figure 1. A power road broom removes ryegrass and plant debris, but causes minimal disturbance to bermudagrass.

Phase 1

As the bermudagrass attempts to re-emerge and capture light energy in April, it finds itself among a formidable foe, that is, perennial ryegrass that is growing aggressively under optimal temperature conditions. Without cultural assistance from the superintendent, much of the bermudagrass will lose the battle, weaken and possibly die. However, the need for excellent playing surfaces during that prime season precludes the superintendent from seriously damaging the perennial ryegrass. The resulting strategy is a balancing act, enabling the bermudagrass to emerge and capture light without disrupting the perennial ryegrass turf canopy. To achieve this, the superintendent must exploit cultural practices that shift the competitive advantage from the perennial ryegrass to the bermudagrass. However, this shift must not be so drastic as to visibly damage the perennial ryegrass or its playing surface. Superintendents may use several practices to ease transition. No single phase 1 procedure makes a landslide difference. However, in total, they give the bermudagrass a substantial jumpstart.

Reduced mowing height

Bermudagrass transitions more readily in shorter-cut turf. It is not uncommon to have excellent transition in a fairway and traumatic bermudagrass losses in the rough on the same hole, where the only cultural difference is the cutting height. To exploit this

phenomenon, beginning in April, the superintendent should progressively lower the cutting height of the fairway turf from 5/8 to 3/8 inch. In roughs, the height may be gradually reduced from 1½ inches to ¾ inch. Cutting heights should be reduced as much as possible without adversely affecting the quality of play.

Verticutting and/or core-aerifying

Superintendents should employ any cultural practice that is acceptable to players and improves light penetration to the bermudagrass crowns and rhizomes underneath the perennial ryegrass. Superintendents often do a core-aerification or light verticutting in April or early May to give the bermudagrass competition an extra boost. If cleanup is meticulous, the players are usually not disturbed.

Irrigation

Bermudagrass has much greater drought tolerance than perennial ryegrass, a difference that is easily exploited. In late spring, superintendents should manage irrigation so that, at the end of an afternoon, perennial ryegrass experiences visible, but not fatal, drought stress. At that moisture level, the bermudagrass is not affected as much as the perennial ryegrass and gains a competitive advantage. Irrigation should be managed so that by 4 p.m., the perennial ryegrass should be turning off-color and showing footprints. The irrigation at night allows the perennial ryegrass to rebound.

Irrigation management gives the bermudagrass an advantage in the spring when temperatures inherently favor the perennial ryegrass. However, around June 1, high temperatures favor the bermudagrass, and the superintendent should irrigate to allow the bermudagrass to achieve its maximum growth rate.

Nitrogen fertility

Superintendents should provide limited nitrogen fertility in March to prevent excessive clipping yield from perennial ryegrass growing at ideal temperatures. Beginning in early May, temperatures become progressively less favorable for perennial ryegrass, and adequate nitrogen fertility helps the bermudagrass in two ways. First, it allows the bermudagrass to grow at its maximum potential rate. Second, under high temperatures, nitrogen fertility adequate for bermudagrass subtly damages the perennial ryegrass. Nitrogen in soil solution moves into the perennial ryegrass along with water. The water is lost through transpiration, and the nitrogen remains in the plant. The plants are then forced to burn carbohydrates to transport the nitrogen to the leaf chloroplasts and convert it to ammonium. Toxic levels of ammonium form in the chloroplasts, and the plants must detoxify the ammonium by combining it with a carbohydrate derivative and exuding the material (the amino acid glutamine) out the cut ends of the leaves. In short, detoxifying excessive nitrogen weakens the perennial ryegrass by forcing it to expend carbohydrate. Weakening the perennial ryegrass favors the bermudagrass.

Figure 2. Ten days after the application of Monument herbicide, treated perennial ryegrass has been controlled. The recovering bermudagrass may then grow unimpeded.

Phase 2

Phase 2 begins in late May, when priorities shift from maintaining prime playing surfaces to all-out bermudagrass recovery. At this point, the perennial ryegrass must be eliminated either by physical removal or chemical control of the perennial ryegrass, or a combination of the two.

Physical removal

Bermudagrass survives the dormant months as rhizomes and crowns, which serve as the initial growing points as the bermudagrass attempts to re-establish itself. However, the growing points encounter two obstacles: living perennial ryegrass and dead plant debris that has accumulated during the past eight months of perennial ryegrass growth. Physical removal is an attempt to eliminate both obstacles at once.

Physical removal is quite similar to the fall overseeding preparation, when much of the bermudagrass thatch and living leaf tissue is mechanically removed with cultivation equipment. Mechanical removal is very equipment- and labor-intensive. Where the fall and spring processes differ is that physical removal is an attempt to almost surgically remove the living perennial ryegrass tissues as well as the dead debris without substantially disturbing the bermudagrass that has already recovered or is still buried.

The removal process begins with scalping the turf using a mower that is adjusted to its lowest possible cutting height. After multiple passes with the mower, the loose debris is vacuumed and removed. In the critical second step, the perennial ryegrass crowns and the layer of dead debris are removed. Verticutting would be destructive to the bermudagrass tissues and would be ill-advised. We have found that a motorized road broom will remove virtually all of the unwanted material

while barely disturbing the bermudagrass (Figure 1). After the broom has been used, the turf is vacuumed again and the collected material is discarded.

After physical removal of the perennial ryegrass, the bermudagrass rhizome nodes are largely exposed to light. Any bermudagrass that has already emerged and produced leaves contains so much fiber that it is undamaged by the broom. The bermudagrass is then able to grow and develop unimpeded. Some perennial ryegrass will remain, but it only adds a green tint to the surface and is no longer dense enough to significantly compete for light.

Although we and other superintendents have successfully employed physical removal for more than 10 years, some superintendents and researchers have been less enthusiastic about the results. However, in most cases, they stopped after scalping and failed to perform the brooming step. Although scalping is better than nothing, leaving the layer of dead and decaying debris on top of the bermudagrass fails to achieve the main benefits of the technique.

Physical removal is very effective in roughs, where the bermudagrass most needs help, but the technique is somewhat less useful in high-density fairways because the broom has difficulty lifting the debris through the canopy. On fairways, lightly scratching the turf with a spring harrow after scalping enhances the effectiveness of the broom.

With physical removal, superintendents may start the morning with superb perennial ryegrass and end the day with a course that has been decimated. Although this can be very exasperating for the novice, physically removing the perennial ryegrass produces the quickest bermudagrass recovery possible because virtually all perennial ryegrass impediments to bermudagrass recovery have been removed. Typically, after a few days, a small portion of the perennial ryegrass that has eluded the process produces visible leaves, which, along with the active bermudagrass, gives the surface a green tint. After about two weeks, a substantial density of bermudagrass plants is very apparent. The density continues to increase until about the fifth week, when the bermudagrass turf has completely recovered.

Chemical control of perennial ryegrass

In recent years, the introduction of sulfonylurea herbicides such as Monument, Revolver and TranXit means that chemically controlling perennial ryegrass without affecting the bermudagrass is no longer a challenge. Since the early 1990s, we have successfully used these herbicides in both research and real-life situations to initiate transition by removing perennial ryegrass overseed from bermudagrass turf.

Figure 3. A mix of two methods — the perennial ryegrass has been mechanically removed from the roughs, but the fairways have been treated with Monument herbicide and are awaiting the demise of the perennial ryegrass.

Depending on the temperature, perennial ryegrass begins turning off-color about five days after herbicide treatment, and it may be completely dead in about 14 days (Figure 2). However, within a day or two after treatment, the perennial ryegrass physiology is affected and growth ceases. At that point, the perennial ryegrass is no longer in active competition with the bermudagrass; however, whether living or dead, the perennial ryegrass is still occupying space, both as a vertical canopy and as a debris layer, and remains an impediment to bermudagrass regrowth.

Chemically initiating transition is easy and does not require closing the golf course. Only one pass over the property with a sprayer is required. Costs are reasonable; they include the cost of a sprayer and a spray technician for one day plus the price of the chemical, approximately $3,000 depending on the size of the treated area. Players do not seem to mind because the turf remains a good-quality playing surface for a couple of weeks. If not for the greener color of sprayer skips, many players would not even notice. After about two weeks, the perennial ryegrass stubble will begin degrading into a mat of slimy debris. The turf surface will be unattractive until the bermudagrass covers most of it a few weeks later.

We have attempted to use low herbicide rates to reduce perennial ryegrass competition without actually eliminating it and enduring an ugly bermudagrass recovery phase. Unfortunately, such attempts have been less than successful. A general consensus of superintendents experienced with these herbicides is that if you are going to treat the perennial ryegrass, then just eliminate it and be done with it. An excellent review of transition herbicides and rates was recently published in *GCM* (1).

Mix and match

Superintendents may desire the fast-recovery benefits of physical removal but not wish to pay for the labor and other costs. Conversely, they may desire the ease of chemical initiation but wish to have a quicker bermudagrass recovery than that method will yield.

The answer may be to use both methods in separate areas.

Superintendent Paul Ellwood analyzed his situation at the Gallery Golf Club near Tucson, Ariz. Unless he took a proactive approach, transition in his long-cut roughs would be poor, and the bermudagrass needed all the help it could get. The short-cut fairways, however, would transition well, but he wanted transition to occur earlier so that the bermudagrass growing season would be extended by several weeks. Ellwood's solution was to physically remove perennial ryegrass from the roughs and then use chemical transition in the fairways (Figure 3). According to Ellwood, the patrons of his two elite golf courses are not concerned by the process. In fact, after the process, his courses have the look of a property where the fairways are overseeded but the roughs are not. The color contrast between the fairways and roughs is actually quite appealing. From year to year, Ellwood's members recall (with some public relation reminders) that their courses are the pride of the area on July 10, just as their peers are entering two months of transition trauma.

Timing is everything

The dates recommended in this paper apply to the desert Southwest. Superintendents who are located in other areas may have to adjust the dates to correspond to their particular climates. However, when the calendar says that it is time to drop the hammer on the perennial ryegrass turf, one thing is guaranteed. A higher authority will ask the superintendent to "wait a little longer." If it wouldn't cost the superintendent his job, the best response would be to hang up the phone. As stated in the first article, it is imperative for transition to occur early. Every day of delay means more dead bermudagrass.

Historically, superintendents have passively allowed transition to follow nature's timetable. However, with the recent trends of earlier overseeding dates and more-persistent perennial ryegrass varieties, nature's timetable arrives too late in the summer to allow bermudagrass survival. A knowledge of bermudagrass physiology coupled with strategic employment of cultural and chemical techniques — and the understanding of the golfing public — finally permits superintendents to win the transition battle. Proactive transition is becoming an accepted mainstream practice.

THE RESEARCH says . . .

- **By forcing the** early demise of overseeded perennial ryegrass, superintendents promote bermudagrass health.
- **Proactive transition takes** place in two phases. The first phase involves cultural practices to assist the bermudagrass while the perennial ryegrass is actively growing: lower cutting heights, core-aerification or light verticutting, intentionally induced drought and strategically managed nitrogen fertility.
- **Phase 2 of** proactive transition is complete control of the perennial ryegrass accomplished by physical removal or chemical applications.
- **Physically removing the** perennial ryegrass and controlling it with chemicals both result in a transition period that is not very attractive.
- **Combining the two** methods — physical removal and chemical control — can result in a more attractive transition period.

References

1. Gelernter, W.D., and L.J. Stowell. 2005. Improved overseeding programs: Managing the spring transition. *Golf Course Management* 73(3):114-118.
2. Howard, H.F. 2006. Proactive vs. passive transition. Part I. Pay now or pay later. *Golf Course Management* 74(2):93-96.

Figure 4. By early July, the bermudagrass at the Gallery GC has nearly recovered, allowing the maintenance staff to turn their attention elsewhere.

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Leo Feser Award candidate

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