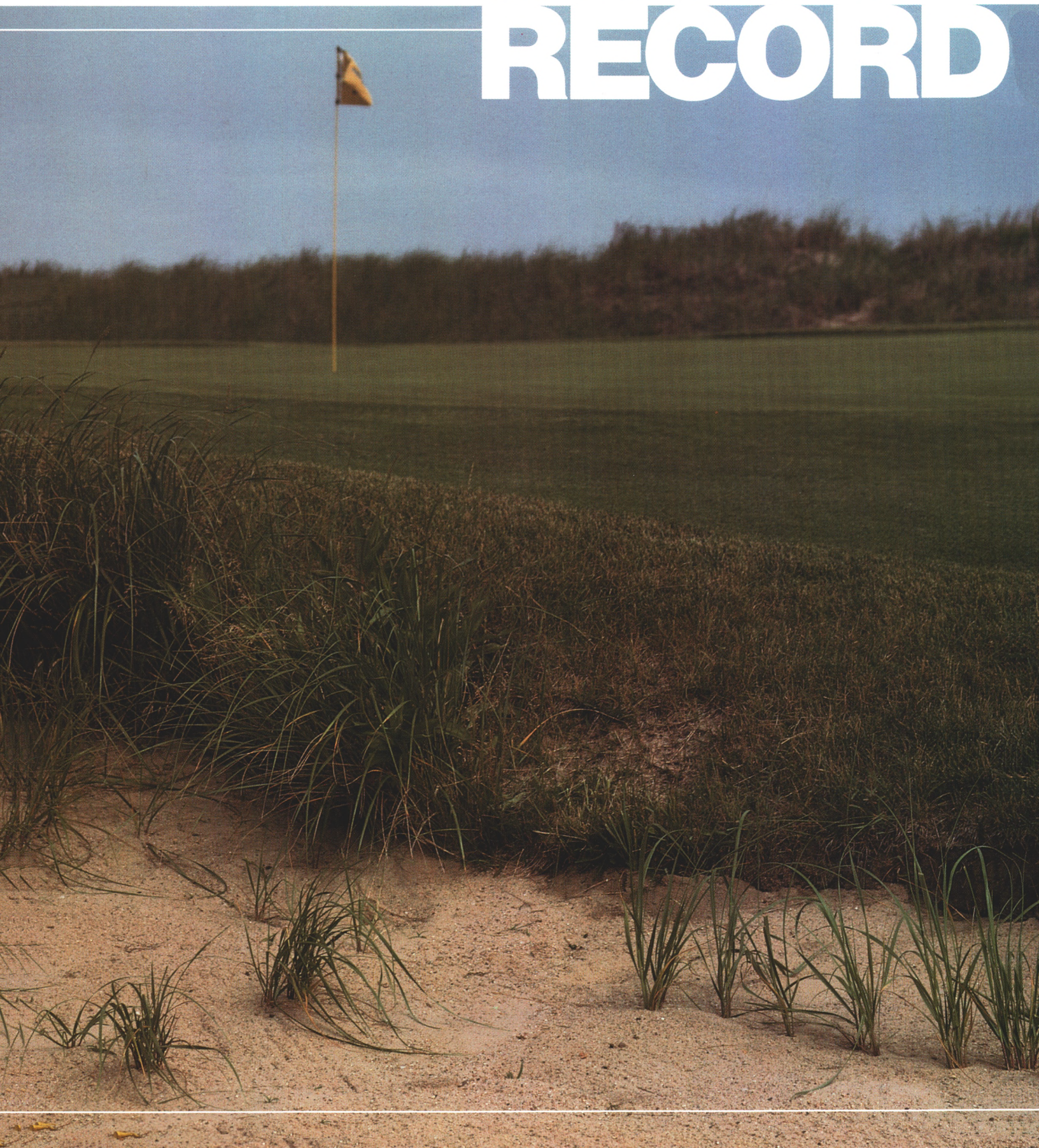


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*Whether it's too hard or too soft,
bunker sand quality is an issue
at many golf courses.*

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Putting an End to Those Fried-Egg Lies

by JAMES T. SNOW

Director, Northeastern Region, USGA Green Section

THE SAND IS TOO SOFT! This is a common response to the playability of sand bunkers where old, contaminated sand has recently been replaced with several inches of fresh material. Sometimes the criticism is justified; sometimes it is not. Consider the following scenario:

After many years of putting off the inevitable, Tired Trap Country Club finally decides to renovate its bunkers. The old sand, which has gradually become contaminated with soil and organic debris, has lost its original color

and consistency and has become too hard. Because of its poor color and hardness, some golfers insist that there is no sand at all in some of the bunkers. In the process of renovation, the old material is replaced with 4 to 6 inches of fresh, new sand, as recommended by the USGA. Before the first day is done, golfers begin complaining that the new sand is much too soft and is unsuitable for their course.

More often than not, the sand that has been added to bunkers in such instances is perfectly good. The reaction

of the golfers, though, is predictable and understandable. Having played from firm, contaminated sand for many years, playing from the new, unsettled sand is a striking change. The fresh sand would indeed seem soft by comparison.

Golfers should be advised that when this type of renovation work occurs, the new sand takes time to settle and will very likely seem soft for several months. During this time, the sand will develop a greater firmness and the golfers will become accustomed to playing from a softer base. Generally, the number of

Wetting the sand and packing it with a utility vehicle is one good way to firm newly installed material.







*(Opposite page, top) One way to test different sands prior to a sand bunker renovation program.
 (Opposite page, bottom) A cement finisher can be used to quickly firm soft sand.
 (Above) Hand raking smoothes the surface without loosening the sand.*

complaints diminishes once the new sand has been in place for several weeks.

Another complicating factor is golfers' preferences for different types of bunker sands. Some prefer firm sands, while others like softer sands.

On the other hand, it is possible that the new sand is indeed too soft. Under these circumstances it could take years of contamination with soil and organic debris before a good firmness develops, during which time golfers would be subjected to poor playing conditions and fried-egg lies.

The difference between a good-quality sand that is temporarily soft after installation and a sand that will be too soft for months or years to come is

not easy to detect, especially from a visual standpoint. The best way to avoid a sand that is too soft is to do your homework. Contact clubs in your area for recommendations, and talk to their golf course superintendents, golf professionals, and other club members for comments. Play their courses if you can, especially if their sand has recently been installed.

If locally used sands are unsuitable for play or from a budget standpoint, then a search must be made of local quarries for a satisfactory sand. Contact the regional office of the USGA Green Section in your area for guidelines in selecting bunker sands, and use the particle size range, particle shape, and chemical composition parameters from

the guidelines to help sort out the potentially useful sands.

IF THERE is any doubt about your choice, send samples of the best-looking sands to a soils laboratory that is experienced in evaluating sands for bunker use. The lab should be able to provide a description of the playability of each sand and discuss any potential problems, allowing the choice to be narrowed down to one or several selections.

If doubts remain, install different sands in a limited number of bunkers on the course or in several test bunkers for further evaluation. After a few months or a season of use, the best sand should be apparent.

Having to take all of these steps to find a suitable, affordable bunker sand

is not common, but many courses pay a high price for not taking the time to fully investigate and test the sand they are placing in their bunkers. Many a course has gone through the disruption and expense of replacing old bunker sand, only to go through the whole process again within a year or two because the members were unhappy with the material.

When a sand already has been installed in a bunker and is found to be too soft, there are a number of different steps that can be taken to correct the problem. If the sand is extremely soft and fried-egg lies are common, send a sample to a good soil-testing laboratory for evaluation. If the lab suggests that the sand will be a problem for some time to come, it might recommend a different sand, with a distinctly different particle size range, be mixed with the existing sand to give it greater stability. For best results, the existing materials should be removed from the bunker and mixed off-site with the new sand. This procedure would be feasible with only a bunker or two involved, but on-site mixing would be the only practical alternative if the sand in all or many of the bunkers had to be modified.

Before an expensive sand replacement or modification procedure is instituted, though, there are a number of relatively simple practices for firming soft sand that should be tried. For example, if the depth of the sand in the bunker is 6 inches or more, then reduce it to about 4 inches in the flat areas and 2 to 3 inches on the faces. Since the degree of fluffiness of the sand is directly related to its depth, removing some of the excess sand should minimize the potential for fried-egg lies. When sand depth is at a 4-inch level, though, it is often difficult to use a mechanical rake without digging into the soil in the base of the bunker. This method of firming sand, then, requires careful use of the mechanical rake, modifications to the rake to reduce its cultivating activity, or more hand raking.

Another good approach to firming soft sand is to try to pack the particles closer together. Some sands pack more tightly than others. Sometimes, irrigating the sand is all that is necessary to adequately reduce its fluffiness. A better method is to wet the sand thoroughly and run back and forth many times across the surface with a tractor, a riding mechanical rake with

the cultivator bar removed, or a utility vehicle of some type.

An excellent compaction technique for firming sands involves the use of a cement finisher (a steel plate mounted to a gasoline-powered engine that produces a compacting effect by vibrating horizontally). After the sand has been thoroughly watered, the machine is used to compact the sand to the desired firmness. The compactor can be rented by the day from most rental outlets, or it can be purchased for less than \$1,500 if a large-scale sand-replacement program is anticipated. For more information, see "A Technique For Dealing With Soft Sand" in the March/April 1989 issue of the GREEN SECTION RECORD.

As noted earlier, irrigation is a good method for temporarily firming a soft sand. Ironically, sands that are raked when they are wet tend to be especially fluffy as they dry out. Because of the surface tension of water, wet sand particles tend to bridge more readily when they are cultivated and therefore develop a looser texture. As drying occurs, the structure of the sand remains intact until it is subjected to traffic. This is quite a common effect, since irrigation is often done during the night, and sand bunkers are usually raked during the early morning hours.

Removing the cultivation bar and adding lead weights to the smoothing apparatus is one way to modify the mechanical rake for accommodating soft sand.



TO PARTIALLY overcome the soft-sand problem that occurs when wet sand particles are raked, many courses regularly use wetting agents in their bunkers. Since the wetting agent reduces the surface tension of water, the bridging effect is reduced and the sand is better able to retain its firmness after cultivation. To be effective, the wetting agent must be used regularly, as often as once per week during periods of frequent irrigation or rainfall and regular cultivation. Only light rates of wetting agents need be applied, and nearly any product is satisfactory for this use as long as it is non-phytotoxic. This practice is most likely feasible when just a few bunkers are involved. Other means of firming sands should be considered when dealing with a large number of bunkers.

In trying to develop greater firmness in a naturally soft sand, two general strategies must be adopted. The first involves filling more of the pore space between the sand particles by way of compaction techniques or by adding sand particles of a different size. This has been the theme of the practices mentioned in the discussion thus far.

The second strategy consists of subjecting the sand to as little cultivation as possible. This makes sense, because cultivation is a loosening process that would only make a soft sand softer. Unfortunately, raking is an integral part of sand bunker maintenance, serving to keep the surface smooth and to keep weeds in check. A compromise must be reached, then, to serve these opposing needs.

A typical sand-raking program at many courses involves the use of a riding mechanical sand rake as little as once or twice per week to as often as once per day. The rake usually is equipped with teeth or a bar that cultivates to a depth of several inches. What's more, the operator usually makes numerous passes around a bunker to do a thorough job of smoothing and cultivating every square inch of sand.

Given the frequency and depth to which bunker sand is raked, it is not surprising that there are so many complaints about fried-egg lies in newly installed sands. If the objective is to maintain greater sand firmness, then it is clear that cultivation depth and frequency should be reduced. Therefore, instead of raking the bunkers six or seven days per week, reduce it to once or twice per week, if possible. On days when the mechanical rake is not used, touch up footprints and other irregularities with hand rakes.

ANOTHER OPTION is to modify the mechanical rake so that it smooths the surface without doing much cultivation or loosening of the sand. Cultivating teeth can be shortened, or the cultivating bar can be raised or removed, for example. Golf course superintendents have come up with all kinds of homemade accessories for the mechanical rake which work very well for smoothing sand while doing a minimal amount of cultivation. From time to time the cultivating bar can be temporarily reinstalled on the machine to control developing weeds in the bunkers.

Regular use of the mechanical rake causes other sand softness problems as well. When used frequently and at fast speeds, the rake can redistribute the sand throughout the bunker and cause a wide variation in sand depth. It is not uncommon to find 8 to 10 inches of sand in some areas and only 2 to 3 inches in other locations. Naturally, softness problems are more prevalent in areas where the sand is deeper. Sand depth,



Moving sand from where it is too deep to where it is too shallow.

therefore, should be closely monitored in bunkers where the mechanical rake is often used.

As noted before, many courses are reducing their use of the mechanical rake and relying more and more on hand raking. The misuse of the mechanical rake is a key factor with respect to keeping soft sands soft, hastening the contamination of good sands with soil and other debris, and causing the deterioration of bunker edges and lips. Indeed, hand raking is an excellent means of keeping soft sand firmer while keeping the surface of the sand smooth and playable. Many styles of rakes are for sale, and some are very well suited for this purpose. Some have short, stubby, cultivating teeth, while others have none at all. Hand raking programs require more labor time, but many courses find that the improvement in playability and the reduced rate of sand and bunker edge deterioration are important compensating factors.

Most of the options for dealing with fluffy bunker sands are temporary measures. They are usually quite adequate, though, because all bunker sands are subject to soil and organic matter contamination that makes them firmer over a period of time. Silt and clay particles from the base of the bunker

and from its edges eventually become intermixed with the sand to fill pore spaces and bind the sand. Soil, dust, and organic debris also find their way to the bunkers by way of wind, mowing and edging practices, or other means. As time goes by, then, the problems encountered with soft sands and fried-egg lies gradually disappear.

Whether or not to use geotextile liners in sand bunkers is an arguable point. It is a factor, though, in a bunker renovation program where a soft sand is being used. Because a liner can, with luck, remain in place for a number of years and greatly reduce the rate of soil contamination from important sources (i.e., the base and edges of the bunker), it can substantially increase the amount of time it takes for a very soft sand to become firmer. Where the use of liners is being considered, therefore, it is even more important to test the sand that will be used to be sure that it is not too soft.

Sand bunkers are important and expensive features on many golf courses, and they are a source of criticism for many golf course superintendents and club officials. Complaints about soft sand and fried-egg lies, however, need not occur if reasonable caution is taken in selecting, installing, and managing bunker sands.

A Selective Annual Bluegrass Control — Finally!

by **B. E. BRANHAM**
Michigan State University

ANNUAL BLUEGRASS (*Poa annua*) is considered by many golf course superintendents to be the worst weed they have to deal with. It is so invasive that in many northern areas of the United States it is the dominant species on most golf courses. For the average homeowner, it would be comparable to having a lawn of 75 percent to 90 percent perennial crabgrass! Dr. Don White, at the University of Minnesota, has begun a breeding program to develop improved varieties of annual bluegrass, indicating just how successful this species is — if you can't beat it, breed it.

At last, there appear to be several methods of halting the spread of this species on golf courses. Practices such as clipping removal, reduced levels of nitrogen fertilizer, and plant growth regulators all have been shown to be effective in reducing annual bluegrass populations. In my opinion, though, the most effective means of eliminating annual

bluegrass is with the herbicide called ethofumesate (trade name Prograss). It has been around for a number of years, but we are just beginning to understand how to use it on fine turf.

I have observed results with this product in Michigan. This discussion concentrates on three uses — established greens, established fairways, and in fairway renovation to prevent re-establishment of annual bluegrass.

Before discussing the various uses of Prograss, let me describe how it works. There is so much more to learn about this product, and the potential is tremendous. Prograss is primarily a pre-emergence herbicide (it controls most weeds by killing germinating seeds and thus must be in the soil prior to weed seed germination). But it also has excellent postemergence (applied directly to the established weed) activity on annual bluegrass. Preemergence control is achieved from a single application, while postemergence activity requires

from 2 to 4 sequential applications that can be made 20 to 30 days apart.

Interestingly, Prograss is only effective when applied in the fall. Applications in the spring or summer showed little effect. The need for, and the spacing of, the sequential applications is also curious. Applications made one week apart were not very effective, but when the spacing between applications was increased to 20 to 30 days, much better annual bluegrass control was seen. Also, the first application was much less important in controlling annual bluegrass than the second or third application. Thus, an application of 0.5 lb. AI/A followed by 1.0 lb. AI/A will give much better control than an application of 1.0 lb. AI/A followed by 0.5 lb. AI/A, even though the same total amount of herbicide was applied.

This information suggests that the first application of Prograss sets up the annual bluegrass plant for injury from the subsequent applications. If the

Figure 1: A bentgrass/annual bluegrass fairway in mid-May after Prograss applications the previous fall. A high percentage of bentgrass or ryegrass must be present if Prograss is to be used in this manner.





Figure 2 (left): Seedling bentgrass experienced injury from fall application of Prograss (mid-April photo), but plot completely filled in with bentgrass by mid-June in Figure 3 (right).

spacing of the applications is too close (e.g., one week), little control will be observed. Lower rates can be used initially because all you're doing is setting up the plants for the additional applications. Since only fall applications give good control, perhaps the Prograss makes the annual bluegrass susceptible to winter injury.

The use of Prograss on established fairways is probably the worst fit I see for this product. The reasoning is simple: If the Prograss works as intended on fairways that contain more than 20 percent annual bluegrass, then the fairways will be very unsightly while the golf course superintendent waits for the creeping bentgrass to fill in. The picture in Figure 1 shows the results of using Prograss on a typical bentgrass/annual bluegrass fairway. This photo was taken in mid-May, after the superintendent had been overseeding and pushing the existing turf to get it to fill in as quickly as possible. Imagine how the fairway looked in mid-April.

In these situations the Prograss works so well that the fairways are left with large dead patches. Some progress is made, but the creeping bentgrass cannot fill in quickly enough and the annual bluegrass reestablishes itself from late May to early June. This is not to say that Prograss does not have a use on fairways, but it is essential that fairways consist predominately of bentgrass or ryegrass before using this herbicide.

Prograss is a very good preemergence annual bluegrass herbicide, and could be used effectively in such a manner on ryegrass fairways. Because some discoloration is occasionally observed on bentgrass from even a single application of Prograss, the best way to control annual bluegrass in a recently established bentgrass fairway is to wait until annual bluegrass invasion is observed in significant amounts (1 to 5 percent). Then, in the fall, treat with 2 or 3 applications of Prograss to eliminate what is there, while providing preemergence control for the fall and the following spring.

If a superintendent is converting his fairways to creeping bentgrass by using PGRs or cultural practices, Prograss could be used to eliminate the last 10 to 15 percent of the annual bluegrass. When a fairway contains 85 to 90 percent bentgrass, thin areas left when the annual bluegrass dies out are quickly filled. As already noted, using Prograss on fairways with less than 80 percent bentgrass usually results in large dead patches each spring and an unacceptable appearance.

Another use for Prograss is in a fairway conversion program. This is occasionally done in the northern United States to convert annual bluegrass fairways to creeping bentgrass. The procedure typically followed is to kill the existing fairways with Roundup in the late summer period (during August), and reseed with a quality creeping bentgrass. The problem with this approach is that the soil carries a quantity of

annual bluegrass seed which will germinate along with the creeping bentgrass, resulting in a substantial degree of reinfestation. My observations in Michigan indicate that best results are obtained when the bentgrass seeding is done in late August, prior to the optimum annual bluegrass germination period (mid-September).

Fortunately, Prograss can be used to kill annual bluegrass seedlings without killing the creeping bentgrass seedlings. If done properly, an essentially pure stand of bentgrass will exist by late spring following the fall applications. Our initial research work called for Prograss at 1.0 lb. AI/A approximately 4 weeks after seeding, followed by another 1.0 lb. AI/A application 8 weeks after seeding. While these rates were too high and applied a little too early, the result was dramatic. Figure 2 shows a treated plot in mid-April. The bentgrass was severely injured, but no annual bluegrass was present. By mid-June (Figure 3) the turf had recovered completely and the stand was solid bentgrass.

WE ARE presently testing a variety of rates and application dates for this procedure. My current recommendation is to apply $\frac{3}{8}$ lb. AI/A at 4 weeks after germination (WAG) (roughly 5 weeks after seeding), followed by a $\frac{3}{4}$ lb. AI/A application at 8 WAG. The longer you wait after seeding to make the first application, the less control you will have over annual bluegrass. However, by waiting longer there will be less

injury to the creeping bentgrass. In my experience, the 4 and 8 WAG spacing gives the best results, but we are currently testing this procedure more thoroughly and will have better information in 1990.

The final use for Prograss is probably the most controversial. Prograss is not labeled for greens and probably never will be because of liability concerns. To many golf course superintendents, however, annual bluegrass in bentgrass greens is one of their most serious problems because of the potential for summer and winter decline. We have been testing Prograss on greens for a number of years, with some excellent results. Figure 4 shows a plot treated with Prograss at 1.0 plus 0.5 lbs. AI/A in the fall of 1986. The photo was taken in May of 1987; note the difference between the treated plot and the surrounding four check plots.

Our research indicates best results with a 0.25 lb. AI/A application in mid-

September, followed by a 0.75 lb. AI/A application in mid-October. These applications produce minimal discoloration to the bentgrass, yet provide good annual bluegrass control.

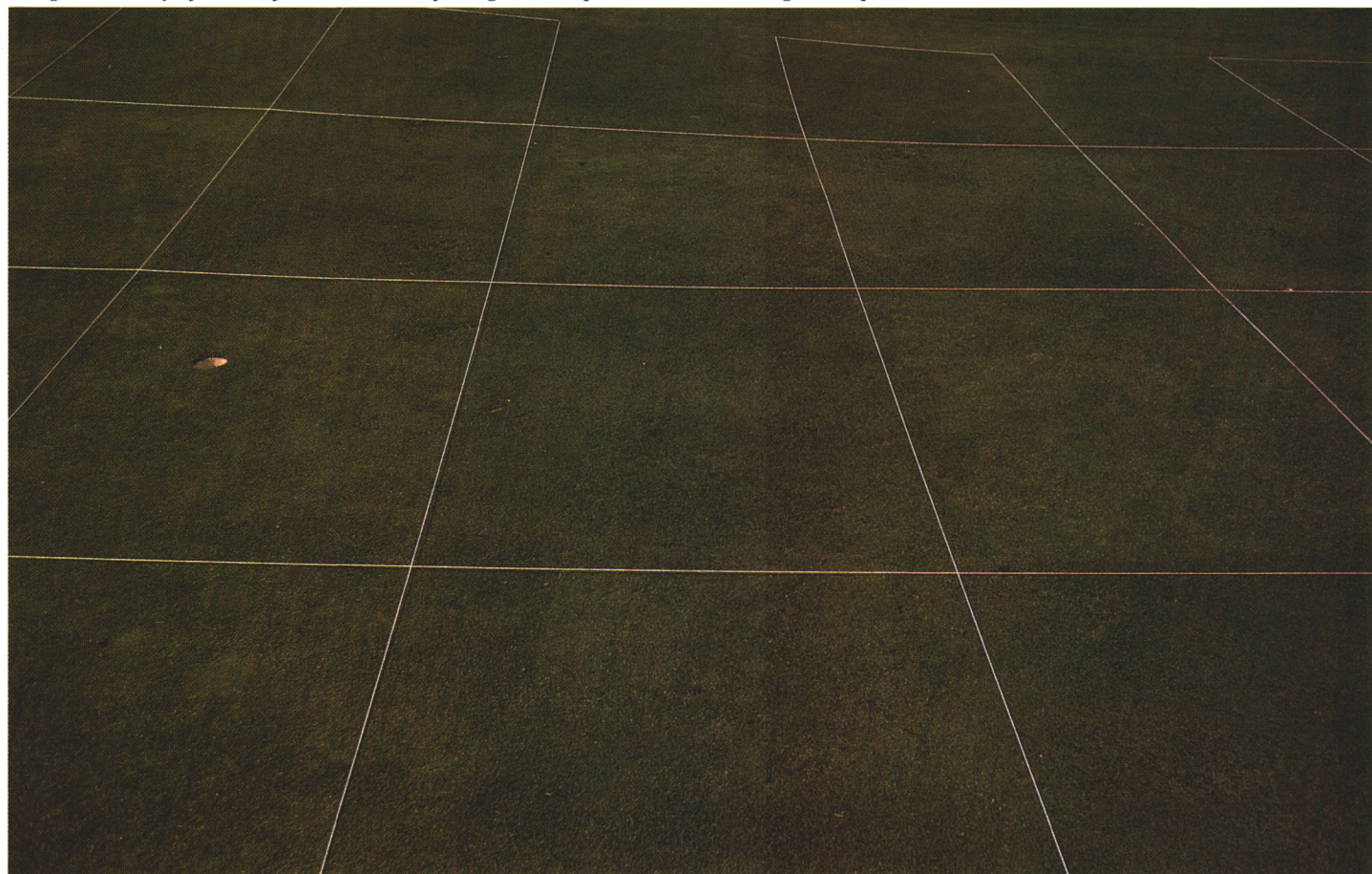
Some words of caution are in order. The only cases where I've observed the outright kill of creeping bentgrass were in areas which were poorly drained or where water collected. Don't use Prograss treatments on wet areas. Another point to keep in mind is that the removal of annual bluegrass should be approached as a 3- to 5-year program. It will not be accomplished in one year. Therefore, I suggest a cautious, experimental approach to using Prograss. If you want to try it on greens, do not treat all 18 greens at 0.25 plus 0.75 lb. AI/A. First, try it on a 200- to 300-square-foot section of the practice putting green. Evaluate the results and decide how to proceed in subsequent years. If you have a larger percentage of annual bluegrass, you may want to reduce the

rates of Prograss to 0.25 plus 0.5 lb. AI/A to try to make a more gradual transition to bentgrass. These rates will cause injury to the annual bluegrass but will not cause much kill. As the bentgrass begins to predominate, rates can slowly be increased to achieve complete conversion.

All of my research has been in Michigan. There is clearly an important environmental component to the action of Prograss, so I do not recommend using this product in other states without first consulting your state cooperative extension service or turfgrass specialist to find out what works best in your region.

Prograss holds the promise of being an important tool in maintaining quality turf in the 1990s. More in-depth research will eventually unlock the potential of this product for giving us consistent, reliable annual bluegrass control.

Figure 4: Center plot on this bentgrass/annual bluegrass green contains much less annual bluegrass in May after two fall treatments of Prograss compared to surrounding check plots.





Larger topdressing equipment is a necessity!

Dressing Up For The 1990s!

by **LARRY GILHULY**

Director, Western Region, USGA Green Section

IN MAY OF 1980, Mt. St. Helens decided to come back to life. With a monumental eruption, this perfectly symmetrical mound of rock produced one of the largest topdressings ever seen in the history of mankind.

While fairway topdressing may not take on such epic proportions for most courses, it does provide a method for improving problem fairway areas. With this in mind, let's look at agronomy, field experience, and course playing conditions in light of the recent increase in fairway topdressing programs.

Agronomic Considerations

For years, superintendents have known the importance of topdressing

greens following aerification, and over time this standard program has been adopted on teeing surfaces and other small areas. Increased play brought about the use of high sand content and straight sand topdressing materials to minimize compaction effects, and topdressing programs eventually evolved into light, frequent applications for the sake of playability as well as agronomics. Topdressing at 3- to 5-week intervals at a rate of about $\frac{1}{3}$ cubic yard of topdressing material per 5,000 square feet helps minimize thatch and compaction problems while improving surface drainage, green speed, and surface smoothness. There can be no question that the topdressing of greens has produced positive results on our nation's golf courses.

In the Pacific Northwest, where the combination of clay soil and heavy rainfall makes playability and turf maintenance difficult, golf course superintendents have successfully adapted greens topdressing programs for use on their fairways. While subsurface drainage installation remains the most important means of removing excess moisture, the use of sand for topdressing fairways has had a positive impact.

Considering Some Important Questions

Instituting a large-scale program like the topdressing of fairways should be given some careful advance consideration. Many questions should be brought up and answered, and club

officials and maintenance staff alike should be appraised of the potential benefits, pitfalls, and costs. What follows are some of the important questions that should be asked, along with some comments which should help you make up your mind.

1. How important is the fairway problem and how much money are you willing to spend?

The application of one inch of sand per year to one acre of ground using sand that costs \$10 per cubic yard would cost about \$1,350, not including labor and equipment. Courses that have followed through with the program, though, have found the effort to be worth every cent.

Is it worth it to you? Answer the following questions to find out.

Are embedded balls a consistent problem? After a hard rain, is the course closed, or are golf carts restricted for an extended period of time? Are there problems with mower track marks on the fairways? Is the course being used just six months per year in spite of good golfing weather during March, April, October, and November? If the answer is yes to one or more of these questions, consider yourself a good candidate for fairway topdressing. How much it costs will depend on the acreage involved and the cost of materials and labor, but if money is a big issue, perhaps a trial area of 10,000 to 20,000 square feet might be the best approach to demonstrate the value of this program.

2. What are the rates and intervals of application and how many years will topdressing be required?

Judging from the experiences of many courses, good results are obtained by applying $\frac{1}{4}$ inch of sand every 3 to 6 weeks throughout the growing season. During periods of heavy rainfall during the spring and fall, it could be difficult to keep up this schedule because of wet soil conditions. Also, golf courses located in very warm regions should be careful with their summer applications. Try to apply about 1 to $1\frac{1}{2}$ inches of sand per year for 3 to 4 years, for a total of 3 to 6 inches of sand over that period of time. In many circumstances, topdressing can then be greatly reduced or terminated.

3. What type of sand should be used?

Compared to the topdressing of greens, this program has an advantage in that a wide variety of sands can be used for good results. Use a sand devoid of excess coarse and fine material if possible, but coarser plaster sands that are less expensive also have been successful.

In some cases, golf courses that are changing or cleaning bunker sands have found the old sand to be an excellent fairway topdressing. Even though they might contain some fine or coarse particles, they still outperform the clays and silts that exist on the fairways.

4. What type of equipment is needed?

That depends on how much of an area you wish to treat. Existing topdressing equipment might be adequate for small areas, but topdressing larger areas generally requires a topdressing unit with a capacity of 1 to 4 cubic yards.

5. What are the problems associated with fairway topdressing?

Aside from the costs involved, the most consistent complaint has been the scratching of club surfaces while the course is topdressed. To avoid this problem, some clubs have used a temporary rule on the day of topdressing: Players are allowed to place their ball on a tee if the sand has not been thoroughly matted into the turf. As you might expect, complaints are few with this type of advantage. An alternative is to allow preferred lies during or immediately after a heavy sand topdressing application.

Turf problems can occur if the sand is applied during wet and hot weather. Avoiding the two extremes is critical. But as the areas begin to respond to the topdressing applications, the problem of topdressing during weather extremes will diminish.

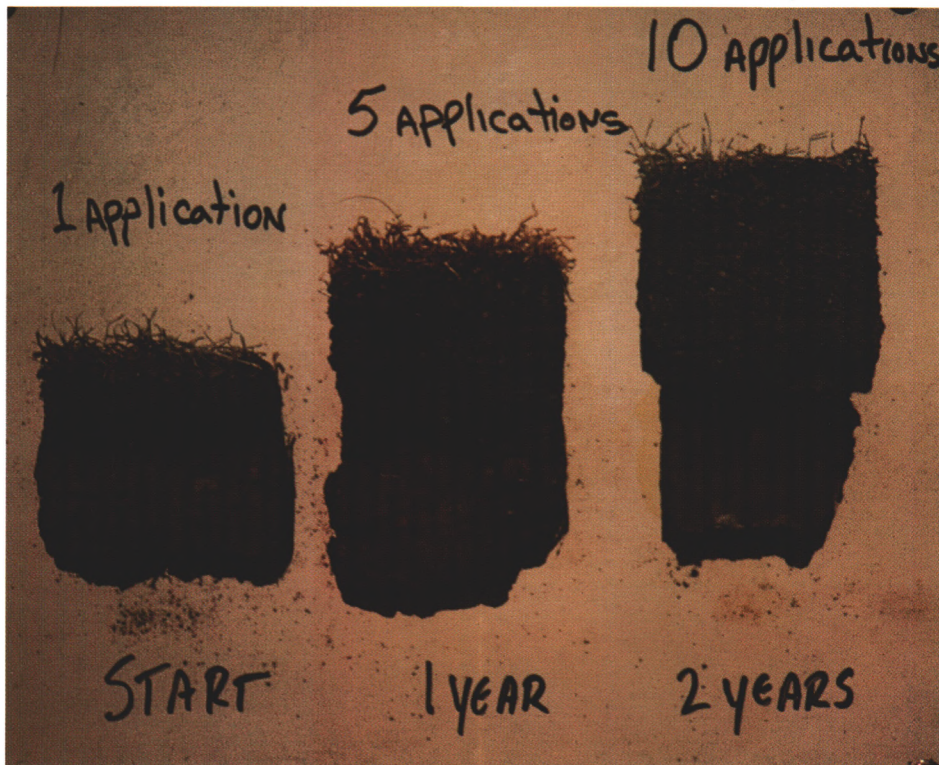
Finally, applications of large amounts of sand will dull fairway mowing units. It is important to have an additional set of "rock crushers" available for mowing fairways after each topdressing application until the sand has been moved off the surface of the turf.

Learning from Experience

Applying large amounts of topdressing sand to fairways is a viable method for counteracting problems with poor soils and poor drainage in the Pacific Northwest. It is natural to be apprehensive about a program with which you are not familiar and which is costly if large areas are involved, but consider the following success stories.

Longview, Washington — The Mint Valley Golf Course has had to cope with a problem of monumental proportions for many years. During most of the year, the water table is very near the play-

Fairway topdressing yields deeper roots, less compaction, and a healthier turf.



ing surface. Superintendent Dave MacDonald decided in 1985 to address this issue with a fairway topdressing program. Since then, approximately 2 inches of sand has been applied on one fairway, and lesser amounts on several other fairways. Remarkable improvements have been noted. Areas which had been completely unplayable during the winter are back to playability. The fairways are now much drier and firmer than the roughs, and tire marking has been reduced. Although small areas of standing water still occur, these are being systematically eliminated with subsurface drain lines. Budget considerations do not allow for the expansion of this program, but the Mint Valley Golf Course is well on its way to providing the local citizenry extended and improved play.

Victoria, British Columbia — Victoria Golf Club is one of the oldest courses in the West. For years, several low-lying fairways were virtually unplayable during the winter. Beginning in 1984, superintendent Alex Kazai started topdressing a 10,000-square-foot landing zone on one fairway. By putting down ¼ inch per application, a total of

1½ inches of accumulated material in this area resulted in improved smoothness and better turf growth. After this success, a far more extensive program was started a year later. From April through September, weekly applications of slightly less than ¼ inch of topdressing material were made. Approximately 2 inches of sand was applied per year, and the program was completed in 1988. This 6-inch layer of topdressing has turned three wet and often unplayable fairways into year-round quality fairways. Subsurface drainage is still needed in some areas, but the membership is pleased. These same results could have been achieved through reconstruction, but the cost would have been 8 to 10 times higher, and construction would have taken these holes out of play for a period of time.

Medina, Washington — The Overlake Country Club justifiably carried the nickname "Underlake Country Club" for many years. Miles of drainage tile had been installed, yet the golf course suffered from consistently wet conditions in the fall, winter, and spring. Superintendent Gary Sayre had a plan to topdress all of the par-4 and par-5

fairways over a 3-year period. Applications were begun in 1987 at a rate of about ¼ inch per application, and as of the end of 1989, 4 to 5 inches of topdressing has been applied. Improvements noted were better mowing under wet conditions, greater turf density, more consistent utilization of irrigation water, fewer weeds, and improved winter playing conditions. In short, another success story!

Summary

Is fairway topdressing right for your golf course? In many cases, the answer is probably yes! If your membership has the patience required to undergo three or four years of sand applications, the results will be worth the inconvenience. Consider, too, that fairway topdressing is being successfully used on many fairways that don't necessarily suffer from the extreme problems described.

One point is certain. Fairway topdressing is a program that is rapidly gaining acceptance. As you contemplate improvements to your course, consider dressing up your fairways for the 1990s.

Basic subsurface drainage tile installation is still the most important means of removing excess moisture.



The topdressing sand disperses quickly into the turf canopy after two days.





Blazing star in Indian grass field.

Using Native Plants in the Golf Course Landscape

by JOHN WESTON

Golf Course Superintendent,
Forest Hills Country Club, St. Louis, Missouri

IF A WEED is defined as a plant out of place, then a native plant should be defined as one in its place. Historically, native plants often have been ignored in favor of exotic species in landscape situations, but this philosophy is gradually changing. Public gardens using native species are being built throughout the country, books are being written on the subject, and a number of landscape architects are emphasizing the use of native plants for many landscapes. There is no doubt that native vegetation will play an important role in our environmental policy of the 21st century. The following is a case history of native plant establishment on a golf course in the

Missouri area, but it could be adapted to fit any region.

Missouri represents a crossroads of vegetation for America. From the dry-land loess vegetation of the Northwest, to the Gulf Coast vegetation of the Southeast, to the Ozark Mountain region of the South, to the tallgrass prairie of the North, each part of the state contributes to a remarkably diverse plant community. With the flowering trees in spring, native flowers in summer, fall foliage in autumn, and the dormant hues of grasses in winter, it is possible to have a 12-month splash of texture, contrast, and color.

At Forest Hills Country Club, in St. Louis, we are in the last year of a 3-

year landscape program honoring our native vegetation. Each hole is named after and features a species native to Missouri. The species were selected to fit habitat considerations and provide seasonal interest.

Four criteria must be met when setting out on such a program. The first, and most important, is education. With half of our timber cleared, and less than one percent of our prairie left, many people are not familiar with plants that are actually native. The second criterion is communication. It is difficult to sell such a project to people unless you can convince them of its importance. The third criterion is implementation, which requires decisions on the proper loca-

tions and methods of establishment. The final step is management with patience. It takes 10 to 15 years for most trees to make an impact in the landscape, and two or three years for grasses and forbs (wild flowers) to make a show.

Getting Educated

I began working in my family's nursery business at the age of 12, have a graduate degree from the College of Agriculture at the University of Missouri, and have been working in the golf maintenance business for 12 years. Yet, even with my education and experience, I had a pitiful knowledge of native plants. And little wonder. Most landscaping work is centered around making an area look like someplace else. My education involved the use of introduced plant material, and it seems that most of our golf courses have that wall-to-wall "maintained" look.

Discovering what vegetation is native to a region is a time-consuming, yet rewarding task. My brother, who is still active in the nursery business, helped me find local nurseries that carry native woody materials. The grass and forb species were considerably more difficult to locate. Fortunately, the Missouri Botanical Garden had been reestablishing prairie since 1980 at their Shaw Arboretum, just southwest of St. Louis. The staff at the arboretum has been an endless source of information, providing me with tours, plant materials, and slides. Mervin Wallace, who operates the state's only wild flower nursery, has sold us several thousand grass and forb plants. Rather than selling a generic regional mix, Mr. Wallace collects all of his seed in Missouri, so I know we are getting the real thing. Steve Clubine, Chief Grasslands Biologist with the Department of Conservation, helped with slides and a bibliography that covered prairie restoration and maintenance. Many phone calls and trips were made to obtain information from these individuals over the last couple of years. This education process was enjoyable and provided me with enormous pride in our region.

Communicating with the Membership

Your membership needs to be informed of the many benefits of a native vegetation program. If carried out properly, it produces a more diverse botanical ecosystem, creates an improved habitat for wildlife, and increases natural beauty. An appeal should be made to the pocketbook, too.

There is a lower establishment cost per acre for the introduction of native warm-season grasses compared to cool-season turf species, and a reduction in maintenance costs as well. This means fewer herbicide, fungicide, insecticide, irrigation, and fertilizer applications. Equipment costs are lower, too.

It is not difficult to sell a tree-planting program to your membership. But to tell them that you want to establish native vegetation in some areas and leave these areas unmowed, however, invokes fears of snakes, hay fever, and weeds. That is where communication plays a role. After preliminary discussions with our grounds committee, I took my grounds chairman on a tour of the Shaw Arboretum. He was as impressed as I had been the first time I saw it. He brought along his camera and took some of the photographs which accompany this article. Another member of the grounds committee went with me when I took pictures of dormant foliage. Together, we sent to the entire membership a hole-by-hole description of our plans for native plantings, along with a description of each species. Because of these efforts, our plans were accepted.

Implementing the Plan

The first step in implementing a native vegetation plan is to do a detailed site analysis of your area. Among the factors that must be considered when

selecting which native species to use are: whether the site is tree covered or open ground, the particular soil type you are working with, whether the site is normally wet or dry, whether the site is typically in sunlight or shade, and the direction of its exposure.

After you have determined which plants are suitable for a particular area, find a source for the materials. Your local Department of Conservation is the ideal place to begin. The people there should be able to provide you with a list of distributors who supply seed, plants, and trees.

As mentioned earlier, Missouri is an intermingling of prairie and forest. At Forest Hills Country Club, we are using representatives of both groups for our plantings. The tree species selected include native dogwoods and redbuds in their understory environment, bald cypress and sycamores in lowlands, red cedar on dry slopes, and oaks, hawthorns, ash, and prairie crabapples in their natural habitat. We have also done a planting of *Rhododendron roseym*, which is the only azalea native to this part of the country.

Establishing prairie plants, including many forbs and grasses, has been a much more challenging and rewarding experience. Bear in mind that all prairie plants are warm-season species.

At Forest Hills, we used both seeds and plants in establishing our forbs. Most native forbs are perennials which

Sumac grove in glade environment.



do not flower until at least their second year of growth. If you want a quick flower show, then purchase one- or two-year-old plants from someone who grows them, or start some from seed and put them out the second year. We have done both.

A small hoop house was purchased for approximately \$400, shelves were built, and seed was planted around the middle of March. This process yielded approximately 15,000 plants that were ready to be transplanted by Memorial Day. We put some in pots for future use, but most of the material was transplanted in designated areas. The transplanting work involved the use of a generator, an electric drill with an auger, and lots of elbow grease.

For smaller landscape beds, we purchased one- and two-year-old plants from the Missouri Wildflowers Nursery, which collects all of its seed locally. They made an on-site inspection and helped us determine which species to use where. Over 2,000 asters, blazing stars, sunflowers, blackeyed susans, butterfly weeds, coneflowers, and many other species were planted. They made a marvelous show this season. One species of blazing star was recommended for an unsightly rock gravel bank. Three hundred bulbs were put in the area with no soil amendment, and they looked great in August. All forbs were watered for two weeks after planting, then left unirrigated for the rest of the year. We are planning to put in several thousand more plants next year.

We pursued grass establishment in the same manner as forb establishment, using both seeds and plants. The growth of native grasses is similar to that of forbs in that there is not much to see until the second year. A one-acre Indian grass stand from seed was established in the following manner. The area was disked in August and planted with rye for a winter cover crop. In May, the rye was mowed, disked, and gone over with a Gill Pulverizer to smooth and pack the seedbed. We then spread 15 pounds per acre of debarbed Indian grass seed with a Vicon spreader and dragged it in lightly with a chain link fence, being careful not to get the seed deeper than 1/4 of an inch. Timely rains helped produce good germination.

Bluestem, Indian grass, sideoats grama, prairie dropseed, sand lovegrass, and silver beardgrass were used in mass and as specimens. Little bluestem belies its name because some of the foliage in summer was the color of Aqua Velva after-shave. In the fall it takes on



Sand lovegrass accenting lake spillway.

hues of red and pink and stays that color through the winter. It seems that all of these grasses are at their showiest in dormancy, with shades of orange, red, pink, yellow, tan, and brown giving a glorious display.

Prairie dropseed resembles weeping lovegrass in nature with its arching leaf canopy, and is sold widely as an ornamental specimen plant. It gives off a spectacular gold color in dormancy when planted in mass. Sand lovegrass has foliage that resembles a clump of fescue, but gives a showy reddish-purple seedhead in autumn. One species, silver beardgrass, puts out a seedhead that resembles a mass of angel hair. Also, buffalograss, a native of the loess prairie, was seeded in unirrigated roughs with excellent results. We then took plugs and put them in steep, western-facing bunker banks. There is an out-of-play area next to one of our tees that has periodic standing water. Instead of draining it, prairie cordgrass (sloughgrass) is now thriving in its natural habitat. As with the forbs, all species were irrigated during establish-

ment for a period of two weeks and then left unirrigated.

Managing the Landscape

The management of a native landscape bed is like a normal landscape bed, except less fertilizer and water are used. One pound of a 1-1-1 ratio fertilizer is more than enough for established plants. A newly seeded area is more difficult, however. Spring weeds germinate earlier and grow faster than natives. Therefore, nitrogen should not be used on first-year seeded natives. This action would only encourage weed growth. Mow often enough to keep the area at a 6-inch height. We did this with our Indian grass planting and had a good survival. Next year, the area will be mowed around the first of June and then allowed to go on its own. This perennial grass eventually will crowd out the smaller annual weeds. Native plants spend their first year's growth establishing roots (some get to a depth of 12 feet at maturity), so be patient.

What about chemical weed control? Research is very thin on this subject.



*(Top) Native forbs and grasses alongside tee area.
(Above) Silver beardgrass on tee bank.*

Most people who have been reestablishing natives up to this point are preservationists who do not believe in chemical control. I respect their opinion. But when a planting is done in a public area and not somewhere out of sight in a preserve, there are always lots of doubters and second guessers in the first year when weeds begin to appear. We spot treated several areas with various chemicals and found some interesting results. Some chemicals will not harm certain native grasses, but they will torch others. A randomized complete block research design will be carried out by us to produce scientifically accurate results that should benefit us in the future. Once you get through the first two years of weed-control work, the game is over. It should not be necessary to treat it chemically again.

Thatch control is needed for native prairie grasses, just as it is for turf-grasses. If left unattended for several years, the grasses begin to choke themselves out. For millennia, nature took care of prairie thatch and tree invasion

with fire started by lightning. Prairie fires would rage so intensely that settlers, when trapped by these fires, would have to disembowel their horses and climb inside their carcasses to survive. Fortunately, we do not have to resort to those means. Your conservation department will gladly show you how to burn safely in your area if it is permissible. I am going to control thatch in many areas by mowing and picking up the residue with a sweeper.

What is the future for native vegetation? A recent edition of *Landscape Management* magazine discusses how to deal with widespread water shortages in the 21st century. Only an ostrich would believe it is not going to happen. What will my priorities be when I am told to limit water usage? Obviously, greens, tees, and fairways will take priority. But will there be enough water for landscape beds and out-of-play areas? The recent San Francisco earthquake was a terrible tragedy, but it could have been unthinkable worse without construction codes developed

to limit damage. We need to establish the same long-term strategy for our vegetation in order for it to survive the worst crises that mother nature offers in the future.

Native vegetation is a long-term landscaping investment. Once established, it works. Our glaciated prairie of northern Missouri was in existence for roughly 10,000 years. The unglaciated prairie of western Missouri, as well as the Ozark region and southeast lowlands, have been evolving for millions of years. The drought of 1988 was brutal, but native vegetation has been through it thousands of times without a hitch.

Many articles have been written about prairies and native vegetation that have a poetic, Zen-like connotation to them. I would not go quite that far, but for me, it was still an extraordinary experience the first time I saw a true prairie. I now am convinced that our area takes a back seat to none in terms of natural beauty. You will feel the same way about your area when you discover your natives.

ALL THINGS CONSIDERED

Superintendent and Pro: Build a Constructive Relationship

by TIM MORAGHAN

Agronomist for Championships, USGA Green Section

ONE OF THE unfortunate realities in golf is that many golf course superintendents and golf professionals are not always the best of friends, and do not always see eye to eye with regard to the maintenance of their golf course. "Their golf course" may be the operative words here. I thought it was the members' course. After all, the members are the ones who should be setting the policies for the course and facilities. The superintendent and pro are two of the professionals hired by the club to carry out these policies; they shouldn't be involved in a war of words that disrupts the smooth operation of the course at the expense of the members' enjoyment.

Can this situation be avoided? It most definitely can. The key words in unlock-

ing the doors to cooperation between the superintendent and pro are basic ones: professionalism and communication.

Professionalism is defined quite simply as the conduct or qualities that mark a professional. If a superintendent and pro claim to be professionals, as most do, then it ought to be clear that infighting should be replaced with a spirit of cooperation and understanding.

Now, can it be so difficult to conduct oneself in such a manner? I don't believe so. To begin with, each professional should make a concerted effort to understand the trials and tribulations of the other, and to recognize the importance of the other's position to the club. This is best achieved, as you might

guess, through effective communication. Take the time to meet regularly and to learn the names of the employees on the other's staff. Have a weekly meeting, perhaps for lunch, to discuss the next aerification or 7:00 A.M. shotgun. Use the phone, send memos or play a round of golf as means of communicating your respective activities. Do whatever it takes! Those who have done so can testify to the many benefits that can be realized.

The course superintendent and the golf professional are employed by the club to produce a properly conditioned course and a pleasant atmosphere for the members to enjoy. When a free exchange of ideas and opinions can be shared on an equal level, everyone gains.

USGA Green Section Educational Conference

in conjunction with the 61st

GCSAA International Conference and Show

Orlando, Florida — February 26, 1990



CPR in Golf Course Management — Conservation - Preservation - Regulation

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|---------------|--|
| 8:00 - 8:20 | Welcome & Introduction of New Research Projects Undertaken by the USGA
The USGA has established a special fund to identify the specific research needs to protect our golf courses <i>and</i> the environment.
F. Morgan Taylor, Jr., Chairman, Green Section Committee,
and Member, USGA Executive Committee. |
| 8:20 - 8:35 | Turf Tips from the Green Section Staff
Twelve Green Section Agronomists have consulted with over 1500 golf courses and their superintendents this past year. They have found these Best Turf Tips of 1989.
John Foy, Agronomist, Southeastern Region.
James Connolly, Agronomist, Northeastern Region.
Stanley Zontek, Director, Mid-Atlantic Region. |
| 8:35 - 8:55 | 40 Megabytes of Donald Ross
The use of computer terrain models in greens renovation. The Preservation of Pinehurst No. 2.
Ed Connors, President, Golf Forms, Inc., Casselberry, Florida. |
| 8:55 - 9:25 | It's a Matter of Opinion — Personal Comments on Golf Course Management Issues
Backing into Professionalization
Our profession is becoming more important because of government regulations.
Stanley Metsker, CGCS, Country Club of Colorado, Colorado Springs, Colorado
Misdirected Good Intentions Can Spell Trouble
Are you chemically dependent?
James F. Moore, Mid-Continent Director, USGA Green Section, Waco, Texas
Using Environmental Regulations to Your Advantage
Utilizing a local water management district's criteria to help beautify and naturalize a golf course along with a community.
Kevin Downing, CGCS, Willoughby Golf Club, Stuart, Florida |
| 9:25 - 9:45 | Audubon Cooperative Sanctuaries for Golf Course Management
A description of how golf courses can provide the habitat needed by wildlife for coexistence in metropolitan and rural settings.
Ronald G. Dodson, President, The Audubon Society of New York State |
| 9:45 - 10:00 | Break |
| 10:00 - 10:15 | More Turf Tips from the Green Section Staff
James Latham, Director, Great Lakes Region
James Snow, Director, Northeastern Region
Paul Vermeulen, Agronomist, Western Region |
| 10:15 - 10:35 | Can We Cope with Mother Nature <i>and</i> Governmental Regulation?
"Protecting the Public Rights and Interests" by a state agency can have disastrous effects on golf operations. This is the story of one club's comeback.
Mark Kienert, CGCS, Bull's Eye Country Club, Wisconsin Rapids, Wisconsin |
| 10:35 - 10:50 | The USGA Today
An update on the activities of the United States Golf Association; what the USGA is doing for the game of golf and today's golfer.
B. P. Russell, Chairman, Public Golf Committee; Member, USGA Executive Committee; and
President, USGA Foundation |
| 10:50 - 11:05 | It's The Little Things That Count
A Golf Course Superintendent's perspective and introspective look at golf course maintenance and life.
Dennis Lyon, CGCS, Golf Division, City of Aurora, Colorado, and President, Golf Course
Superintendents Association of America |
| 11:05 - 11:20 | Speaker to be announced |
| 11:20 - 11:40 | Still More Turf Tips from the Green Section Staff
David Oatis, Agronomist, Mid-Atlantic Region
Tim Moraghan, Agronomist for Championships
Patrick O'Brien, Director, Southeastern Region
Larry Gilhuly, Director, Western Region |
| 11:40 | Closing Comments and Adjournment
Mr. Taylor |

TURF TWISTERS

PATCHING *POA ANNUA* POSES PROBLEMS

Question: We have *Poa annua* greens that occasionally require sodding work due to hydraulic leaks and other problems. Our nursery, however, is comprised of 100 percent bentgrass, and it takes years for sodded areas to blend in well with the *Poa annua*. Any ideas for dealing with this dilemma? (Oregon)

Answer: Remove a strip of *Poa annua* sod from the edge of your practice green or the back edge of one of your regular greens to sod areas damaged by hydraulic leaks or vandalism. Then use the sod from your bentgrass nursery to replace the sod taken from the edge of the regular green. The *Poa annua* sod should blend well with the turf adjacent to the damaged area, while the bentgrass sod will have a minimal effect on the appearance of the edge of the green.

SO PREPARE PROPERLY

Question: Upon assuming the duties of golf course superintendent at a club in Pennsylvania, I learned that they have been subscribers to the Green Section's Turf Advisory Service for many years. In anticipation of the visit during the upcoming year, what should I do to get the most out of it for myself and the club? (Pennsylvania)

Answer: Spending some time in advance to prepare for the visit is the best way to make the most of the Turf Advisory Service. This might include: 1) reviewing the list of topics listed at the bottom of your visit notice for possible discussion subjects; 2) reading the copies of past TAS reports and noting any questions you may have (if past reports cannot be found, simply contact your regional Green Section office for copies); 3) making a list of questions as they arise in the weeks prior to the visit; 4) contacting your club officials, the golf professional, and even your assistant for any questions they might have; 5) encouraging your green chairman and other interested parties to attend the visit if they can. In most cases, a better informed chairman is a more effective advocate for the maintenance program.

WHEN pH LEVELS ARE PERTURBING

Question: The pH of our new high-sand-content green is 8.2. Can this be reduced by making periodic applications of sulfur? (North Dakota)

Answer: Probably not. Many of the sands in your part of the country and in many other areas contain a great deal of free calcium carbonate which must be neutralized before any permanent pH reduction can occur. Minor element deficiencies (usually iron) that occur because of the high pH can usually be effectively treated with foliar applications of micro-nutrients (e.g., ferrous sulfate).