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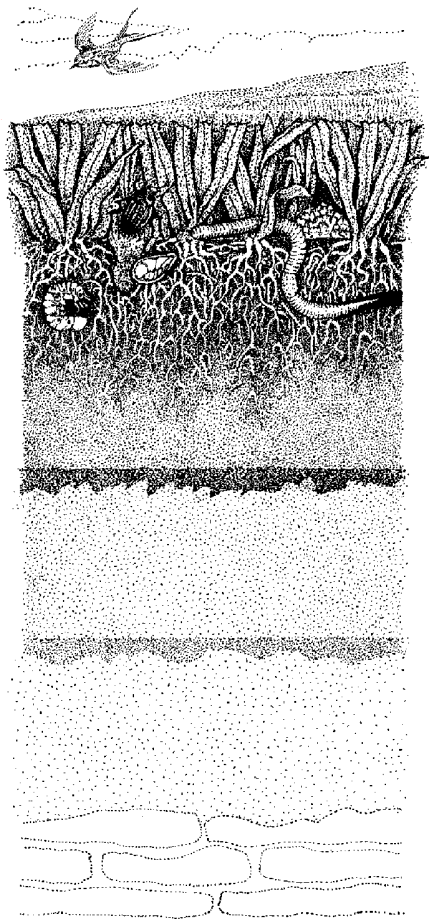


Does Bentgrass Overseeding Work?

Player expectations continue to increase for superior playing conditions. In particular, the putting green is the most scrutinized, managed area on the golf course. It follows then that golf course superintendents regularly strive to utilize all available technology to produce the highest quality product.

The golf course construction boom of the 1990's resulted in hundreds of new putting surfaces across the country, built with the aid of the latest technology in rootzone and plant materials. In addition, superintendents are becoming more aware of the advantages of using the "new generation" of bentgrass cultivars. This has occurred because golfers are playing on the new surfaces and pressuring superintendents (a phenomenon that has increased following the U.S. Open Championship at Pinehurst where the greens were converted to a new cultivar), or as a result of research on cultivar performance. In either case, there is significant appeal to providing acceptable quality at mowing heights below 0.125" with the ability to produce ball roll distances in the 11 to 13 feet range. ■

Most golf facilities are not in a position to reconstruct the putting greens, however, they would like the benefits of new technology, especially increased ball roll. As a result, golf course superintendents at established facilities have been interested in introducing the new cultivars into existing putting greens. This desire to alter the species composition of the putting green is not new. For years, superintendents have attempted to increase populations of bentgrass in mixed stands of annual bluegrass (*Poa annua*) and creeping bentgrass. The major obstacle to successful population shifts has been the obtrusiveness of the practices required to affect a noticeable change. Simply, it has been a challenge to shift populations in a way that is transparent to the golfer. Herein lies the ecological principles that govern shifts in populations of organisms.

continued on page 4

This Times

Bentgrass Overseeding

continued from front cover

Consequently, if high populations of annual bluegrass exist on surfaces where new bentgrass cultivars are to be introduced, techniques must consider altering the niche for the surface vegetation while taking into account contributions from the seedbank, likely to exploit a highly disrupted surface.

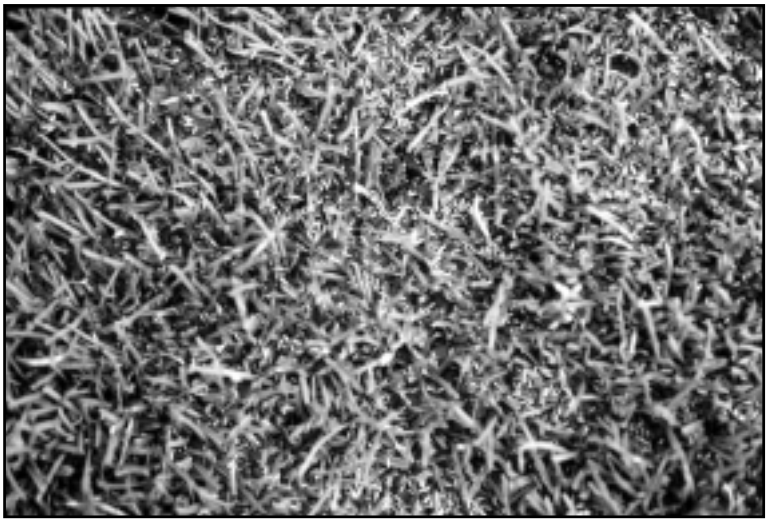
It was implied that the existing cultivar would always have the competitive advantage because it is established and already utilizing the resources that a new cultivar being introduced would also require.

Competition for Resources

In the early years of golf course management, it was common to manage weeds through the drastic manipulation of soil pH. For example, large amounts of elemental sulfur or lime would be applied to alter the pH so that the weeds could not be successful. This is a practical example of "altering a niche."

A niche is described as the range of conditions that are required for a species to survive and reproduce. In the example above, by drastically altering the pH, the niche is altered to the point that the resource needs of the weed are unable to be met. In addition, while severely weakened, the turf is still able to exploit the available resources so that it will successfully compete with the weeds and survive. The result is a population shift in favor of the turf.

Researchers have suggested that there are significant similarities among the resource requirements for bentgrass cultivars. It was implied that the existing cultivar would always have the competitive advantage because it is established and already utilizing the resources that a new cultivar being introduced would also require. Therefore, it appears that without substantial alteration of the niche, the conversion seems a formidable challenge.



Simply distributing the seed will limit success.

The conversion process is similar to previous work conducted to investigate techniques for population shifts of bentgrass/annual bluegrass surfaces. Research on the conversion from annual bluegrass has been primarily conducted on fairway height turf. While it might seem an easier task to convert from annual bluegrass to bentgrass, based on the previous assertion that different species may have different niches, annual bluegrass is well adapted to disturbed environments. Therefore, not only must practices address existing plants, but also must consider the contribution from the seedbank when the surface is disrupted.

Researchers have identified several important aspects of the species conversion process that involve cultural practices. These cultural practices, such as clipping removal, were suggested to result in altered soil fertility, potential allelopathic effects of clippings and reduced

Conversion Techniques
Annual Bluegrass Conversion

The process of conversion begins with recognizing the necessary requirements for altering the niche. This has been shown to include timing of procedures, chemical suppression of existing vegetation, mechanical surface disruption, introduction of the new cultivar, and post-plant care. Individually or collectively, these techniques are used to weaken the existing vegetation, establish a seedbed and implement practices that favor seedling growth.

Stock up on "new generation" bentgrasses?

Slit-seeding could improve soil-seed contact.

contribution to the seedbank. Furthermore, our research here at Cornell University indicates that annual bluegrass population shifts occur naturally in response to environmental factors and independent of conversion management procedures.

The types of cultural and environmental influences observed with annual bluegrass and bentgrass are not likely to exert a significant influence on existing bentgrass stands. In addition, the surface disruption on putting greens is more frequent and intense than what would occur on a fairway. Consequently, if high populations of annual bluegrass exist on surfaces where new bentgrass cultivars are to be introduced, techniques must consider altering the niche for the surface vegetation while taking into account contributions from the seedbank, likely to exploit a highly disrupted surface.

Should the process be transparent to the golfer?

Bentgrass Conversion

Without the competition from the seedbank, it appears that weakening the existing vegetation combined with mechanical surface disruption could lead to successful conversion. However, several issues remain to be resolved such as, will this be transparent to the golfers? What are effective post-plant procedures that do not weaken seedlings? And finally, how is cultivar conversion determined?

Research funded by the GCSAA and the USGA has involved conversion of existing Penncross greens to either Crenshaw, L-93, or Penn A-4. In each case, a significant amount of effort went into determining a precise method for distinguishing among cultivars, so that conversion could be quantified. The researchers developed genetic marking techniques that allows for separation of the cultivars. Unfortunately, in some cases the cultivars are so closely related genetically that it is difficult to find marker differences. Nevertheless, sufficient data were available to make some conclusions based on the conversion techniques that were investigated.

Dr. Richard White at Texas A & M University conducted experiments at the Extension Center and at the Dallas Country Club. Plots were interseeded in April 1995 and evaluated for up to 14 months. It was concluded that mechanical disruption did not substantially influence species conversion and that topdressing following seeding was all that might be needed. This is not surprising when the size of a bentgrass seed is considered. In addition, chemical suppression with glyphosate resulted in a 95% increase in Crenshaw population. However, it was observed that recovery of existing vegetation and the seedlings was not

continued on page 6

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Bentgrass Overseeding

continued from page 5

These practices, "put a priority on the post-plant watering and fertility of the seeding procedures, and not on everyday golf play." Therefore, it could be concluded that this is not transparent to the golfer, and why should it be?

A well articulated action plan that informs the golfers of the transition expected during the conversion process and the likelihood of long term success without significant short-term reductions in playability is required.

sufficient to be a practical option. Interestingly, at the Dallas Country Club, initial (4 week) evaluation indicated a significant conversion; by the 6 month evaluation Crenshaw made up less than 10% of the stand.

Drs. Sweeney and Danneberger at Ohio State University observed conversion of a Penncross green over a 4 year period. Mechanical disruption and seeding followed by alteration in mowing heights to possibly encourage the new cultivars that are more adapted to close mowing, resulted in little if any new cultivars being introduced. These researchers utilized the genetic marker methods similar to those employed in the Texas study.

Dr. Dan Bowman at North Carolina State utilized combinations of mechanical disruption, chemical suppression and seeding to convert Penncross greens to either L-93 or Penn A-4. Preliminary results are similar to previous reports, however, a one year 20% increase in Penn A-4 using a shallow surface cultivation procedure (Jobsavers) and low use rates of trinexepac-ethyl (Primo) was demonstrated. It was concluded that subsequent years will include more aggressive mechanical disruption procedures.

Altering the Niche

Mark Wilson, CGCS of Valhalla Golf Club in Louisville, KY has been attempting to convert 12 year old greens for the past several years and serves as a good example, both of the practical aspects of conversion and the principles of ecology (how plants respond to the environment), specifically altering the niche. Conversion begins by weakening the existing vegetation and allowing the greens to thin during the summer months by reducing fertility. Next, chemical suppression is utilized to further weaken existing vegetation, followed by aggressive mechanical disruption (2 or 3 passes with a core cultivator). Seed is applied then managed to favor seedling growth over existing vegetation by reducing mowing, topdressing and light, frequent watering. These practices, "put a priority on the post-plant watering and fertility of the seeding procedures, and not on everyday golf play." Therefore, it could be concluded that this is not transparent to the golfer, and why should it be? Success of these practices at Valhalla may not be as precisely determined as in the controlled research studies, however, Mark has indicated that there is improved quality of the surfaces, whether the new cultivars are present or not.

Summary

Altering a niche in a way that favors one species over another, such as annual bluegrass versus bentgrass, has been shown to present a formidable challenge. In addition, where there has been success reported, severe reduction in quality is followed by a significant alteration of management. Therefore, based on the latest information available, without severe suppression (or kill) of existing bentgrass surfaces, the overlap in resources required (similarity of niches) make successful conversion a formidable challenge. This will require a well articulated action plan that informs the golfers of the transition expected during the conversion process and the likelihood of long term success without significant short-term reductions in playability. In essence, bentgrass overseeding can work, but not without significantly altering the playing quality of the surface.

It was put best by Goethe, "One must obey nature's laws even while he denies them; he is forced to produce with her aid even when he imagines that he is able to work against her."

Frank S. Rossi
Cornell University Turfgrass Team

Favoring seeding success over playability is key.