Opportunity Knocks with the Ultradwarfs

Success with an ultradwarf might be easier than you think.

by CHRIS HARTWIGER

CHANGE is exciting. Change can be intimidating. Change may be frustrating. The introduction of a new generation of bermudagrass varieties for putting greens, commonly referred to as the ultradwarfs, has evoked some or all of these emotions at golf courses that have tried them. Golfers at many courses with ultradwarf bermudagrass putting greens are enjoying green speed, smoothness, and firmness that are at an all-time best. An astonishing number of golf courses have eradicated their Tifdwarf greens and have converted to an ultradwarf. With these impressive credentials, one might assume that ultradwarf varieties would be universally accepted as *the* choice for bermudagrass greens. That assumption would be dead wrong.

Currently, the phrase "the ultradwarfs are not for everyone" is making the rounds from turfgrass conferences to magazine articles to green committee meetings. This comment and the underlying tone of negativity is scaring people. The phrase might be accurate, but it is devoid of any tangible information and only serves to frighten and intimidate. It evokes a fear of the unknown.

Given the success of ultradwarfs experienced by hundreds of courses, it is clear that they deserve strong consideration when establishing a bermudagrass putting green. This article is intended for those involved in selecting a new bermudagrass for their golf course, and it aims to replace fear with facts. The reader should have a clear understanding of what an ultradwarf is, the performance of the ultradwarfs in the field, and the tools necessary to make an ultradwarf a success.

What is an Ultradwarf?

No one knows who coined the term *ultradwarf*, but it is a term that has become widely accepted in the turfgrass industry. Champion, Floradwarf, Mini-Verde, MS-Supreme, and TifEagle are the ultradwarf varieties commercially available today. The industry definition of an ultradwarf today is any variety that can withstand a mowing height of 0.125 inch (⅛ inch) or lower over an extended period of time.

Using side-by-side replicated field trials is a great way to compare the differences between the various ultradwarf bermudagrass varieties before making the final selection for your golf course.

Numerous turfgrass scientists have studied the ultradwarfs and have offered a more formal definition. Guertal and White described these varieties as having shorter leaves than are found on Tifdwarf and Tifgreen and being tolerant of lower mowing heights (Guertal and White, 1998). Gray and White have separated the ultradwarfs into vertical or horizontal dwarf categories based on vertical and horizontal growth rates (Gray and White, 1999). The morphological differences between the ultradwarfs and Tifdwarf have been reviewed, too (White, 1999; Beard and Sifers, 1996). Table 1 provides information about the physical characteristics and genetic origin of several ultradwarfs. Please note that although these varieties are all considered ultradwarfs, they do vary substantially in their physical characteristics.

The Ultradwarfs Find a Home

The past few years have seen a major change in attitude toward bermudagrass putting greens. In the traditional bermudagrass zone of Florida, the deep South, and the Southwest, courses regrassing or rebuilding putting greens have selected an ultradwarf variety an overwhelming majority of the time, hoping to take advantage of the potential for better putting surfaces. The ultradwarfs are having a big impact in the southern portion of the transition zone, where bentgrass has always been difficult to grow, too. In the past, many courses have felt that mediocre or poor-quality bentgrass produced a better putting surface than Tifdwarf.

The ultradwarfs are pushing the bentgrass line farther north, with successful ultradwarf putting greens established in North Carolina, Tennessee, Arkansas, and throughout the Southwest. Clubs are finding that the management program associated with the ultradwarfs is easier and less expensive than trying

Table 1
Physical characteristics and genetic origins of selected ultradwarf varieties.

Variety	Genetic Origin (Beard and Sifers, 1996)	Vertical Growth Rate vs. Tifdwarf (Gray and White, 1999)	Lateral Growth Rate (Gray and White)	Multiple of Thatch Accumulation vs. Tifdwarf (Gray and White)	Percent More Shoots per unit area vs. Tifdwarf (Gray and White)
Champion	Selection from Tifdwarf green	Slower	Faster	11.7X	100%
Floradwarf	Selection from Tifgreen	Slower	Similar	7.5X	50%
Mini-Verde	Selection from Tifdwarf	Slower	Faster	5X	100%
MS-Supreme	Selection from Tifgreen green	Slower	Faster	?	?
TifEagle	Gamma-induced mutant of Tifway II	Slower	Similar	7.7X	50%

to maintain bentgrass putting greens throughout the summer. Fungicide budgets are down, fans are not needed, and labor requirements have been reduced at the clubs that converted from bentgrass to an ultradwarf.

Are the Ultradwarfs Measuring Up?

To answer this question, it is necessary to examine performance on the golf course as well as in research trials. The expectations of the ultradwarf varieties have been high, success stories have been abundant, and failures have been publicized widely. To date, an overwhelming majority of golf courses with an ultradwarf are pleased with their selection and have no regrets for not selecting Tifdwarf. For the first time ever, reports from South Florida have golfers complaining about the putting greens being too fast! This is amazing, considering the unbelievably high expectations in this region and the frustration with Tifdwarf over the years.

In isolated instances, disease, scalping, shade, excess thatch, cold temperatures, and management errors have injured some of the ultradwarf varieties. Putting quality has been compromised at these courses and changes in putting green management have been necessary to resolve the problems.

A review of research trials yields some interesting observations as well. There are numerous sites throughout the country where the ultradwarfs and Tifdwarf were planted in replicated trials. Results have been positive, with a few notable exceptions. At Texas A&M, the ultradwarfs have been plagued with a myriad of problems (White, 2000). More than one visitor has left these trials thinking, "Why on earth would someone plant an ultradwarf?" At other locations, such as Auburn University and the USGA/GCSAA/NTEP putting green trials, the ultradwarfs have been as steady as a rock. A wealth of information on these trials is available free of charge at www.ntep.org, and in practically every variable measured, Tifdwarf finishes at the bottom of the rankings (NTEP, 2000).

With a diversity of results in the field and in research trials, what conclusions can be made regarding the performance of the ultradwarfs? First, it is obvious that the ultradwarfs are neither perfect nor foolproof. They require appropriate management and good growing conditions. Remember that Tifdwarf is haunted by numerous weaknesses, too. After more than 30 years of research and experience in the field, it is not too difficult on any given day to locate a Tifdwarf putting green in poor condition. Second, it is clear that we do not understand completely what stress or combination of stress factors leads to poor performance. Third, putting quality on an ultradwarf green with good management is significantly better than Tifdwarf or poor-quality bentgrass.

Ultradwarf Management Issues

The management of the ultradwarf varieties has been described as requiring more labor and expense. However, this description paints the maintenance requirements with too broad a brush because it does not differentiate managing for plant health versus managing for playability. Each of these management components will be reviewed.

Managing for Plant Health

The management protocol for maintaining healthy, viable ultradwarf greens has been changing over the last few years in response to turfgrass research and trial and error on the golf course. There are several areas that appear to be critical to managing the health of an ultradwarf. This section is not a "how to" primer on ultradwarf management, but it does focus on the areas most critical for managing plant health.

Biomass Management: The rapid buildup of organic biomass in the upper portion of the profile of ultradwarf turf is well documented (Guertal and White, 1998; Gray and White, 1999; White, 1999; Beard and Sifers, 1996). This biomass is primarily a layer of stolons that should be maintained at a depth of ¼ inch to avoid potential problems. Initially researchers hoped this layer could be managed through the traditional Tifdwarf program of light, frequent vertical mowing, core aeration, and topdressing, while still providing an excellent putting surface.

However, results in the field and in some research trials have indicated that the physical injury caused by the vertical mowing component of the program may increase the chance for decline problems (White, 2000).

Many superintendents have proven it is possible to maintain the biomass layer at ¼ inch in an ultradwarf putting green with brushing instead of vertical mowing. It requires a different method of management, but not at an extra cost. Because many of the ultradwarfs have very low vertical growth but have an increased lateral growth rate, low-growing stolons can escape the bedknife and grow to undesirably long lengths. This contributes to the proliferation of the stolon or biomass layer. Vertical mowing severs long stolons once they have developed, but brushing successfully stands up shorter, more juvenile stolons and clips them off before they become too long. Brushing every five to seven days is much less injurious to the plant than vertical mowing every seven to 14 days. Brushes are available that fit into the front roller bracket and can be set even with the bedknife. The beauty of this approach is the ability to mow and brush at the same time without any extra labor.

Core aeration followed by filling the holes with sand topdressing continues to be the most effective means to physically remove the accumulation of organic matter in the upper portion of the profile. The general school of thought is that no additional core aeration beyond what is appropriate for a sound Tifdwarf program is needed.

Light sand topdressing is essential for managing biomass. Light dustings of sand every seven to 14 days on average help dilute the accumulation of organic matter, improve air-filled porosity, and produce a firm surface without inconveniencing golfers. The rate is so light that only an irrigation cycle is needed to incorporate the sand into the canopy.

Some areas have reported difficulty finding sand topdressing that is easily incorporated into the canopy. Sand particle sizes between 0.25 mm and .75 mm are generally advised for this material. Coarse sand particles above .75 mm that remain on the surface can damage mowing reels and can interfere with putting quality. Many sand companies have the ability to screen out particles above .75 mm in topdressing sand if they are advised of this problem.

The long-term impact of using topdressing sand lacking coarse particles has been debated. Some feel that it may contribute to black layer formation (Unruh and Davis, 2001). Because black layer requires anaerobic conditions, it is hard to imagine that a well-managed profile, even with a finer topdressing sand, will consistently favor the development of black layer. After all, light and frequent topdressing with any kind of sand is a relatively new phenomenon. There are thousands of bermudagrass putting greens that were topdressed once or twice per year that exhibit no signs of black layer. Theoretically, the alternating layers of sand and organic matter in these greens should be havens for black layer development. In reality, it has not happened.

Moisture Management: The ultradwarfs have outperformed Tifdwarf in areas where water restrictions have necessitated reduced watering. The only moisture management issue that has arisen is the occasional sealing of the surface during periods of rapid growth. The surface canopies become so tight and dense that water runs off instead of soaking into the canopy. Localized dry spots and hydrophobic soil are common when the surface seals.

A sealed surface is best dealt with by taking a proactive approach. The first requirement is an irrigation system that provides good coverage. Next, hand watering should be practiced on areas prone to drying out or exhibiting poor water penetration. Also, superintendents can use wetting agents, solid-tine cultivation, and water injection to minimize dry spot problems. When managed proactively, moisture management should not be too difficult.

Disease: Reports of diseases such as bermudagrass decline (*Gaeumannomyces graminis var. graminis*), curvularia (*Curvularia* species), and spring dead spot (*Ophiosphaerella herpotricha*) have appeared in several articles (Unruh, 2001; White, 2000). However, in the broader view, disease outbreaks appear to be isolated, according to USGA Green Section agronomists traveling throughout the bermudagrass zone and southern transition zone. Virtually all courses use a curative program, and some courses with ultradwarf putting greens have never experienced a disease.

The presence of mechanical or environmental stress factors may help explain the large variation in disease incidence from location to location. In many cases where disease is a problem, there is an existing stress factor that induces or exacerbates disease injury. Light, frequent vertical mowing, poor water quality, mower scalping, shade, and prolonged cloudy or rainy weather are stress factors to watch out for.

Fertility: This is one of the least-understood aspects of ultradwarf management. There is no clear consensus among researchers regarding optimum levels of N, P, and K fertility for each of the varieties. To further complicate the issue, it is possible that the different ultradwarf varieties may require different fertility programs, particularly nitro-

Failure to cover ultradwarf greens when winter conditions warrant can result in an unnecessary level of winter injury.

gen rates (White, 2000b). There have been examples of poor performance at both high and low rates of nitrogen. Reducing the typical annual nitrogen program for Tifdwarf greens by 25% appears to be working reasonably well. Additionally, these clubs are finding that making scheduled applications may not be the best method. Instead, better success has been reported using observational techniques such as clipping production, color, and the density of the stand to schedule fertilizer applications. Spoon-feeding with liquid fertilizer has been widely used with excellent results, too.

Growing Conditions: Excellent site and soil conditions are a prerequisite for success with every turfgrass variety. Shade levels, rootzone quality, putting green size, irrigation coverage, and water quality all affect the health of an ultradwarf. Many feel that ultradwarfs are even less shade tolerant than Tifdwarf. While providing good growing conditions may seem like common sense, it is shocking how many golf courses compromise plant health by failing to address these factors. A minimum of eight to 10 hours of full sunlight daily is recommended, or poor performance will result. Providing the best growing environment is every bit as important as selecting the right variety.

Winter Hardiness: As ultradwarfs replace bentgrass putting greens in the southern portion of the transition zone, protection against winter injury becomes more important. The relative cold hardiness of the ultradwarfs versus Tifdwarf is not completely understood at this time, although it seems there is little difference from observations in the field. Winter injury has been documented on ultradwarfs during the cold winter of 2000-2001 when temperatures reached as low as 0 to 10 degrees and covers were not adequately used. The use of covers during the winter when temperatures drop below 25 degrees F dramatically reduces the risk of winter injury.

Overseeding: Early in their development, there was concern that the ultradwarfs were too dense to overseed. This thinking has changed with the successfull establishment of *Poa trivialis* overseeding on all the ultradwarfs. Transition problems do not appear to be more or less severe than with Tifdwarf.

The percentage of golf courses that overseed their ultradwarfs is declining, however. One reason why courses choose not to overseed is the ability to set up the entire management program around the requirements of the ultradwarf. This results in even better putting green performance during the warmer months. The fact that several of the ultradwarf varieties maintain green color during the fall is another reason why many courses are not overseeding ultradwarf putting greens.

Putting on dormant or semi-dormant ultradwarfs has been widely accepted by golfers during the colder months. High green speeds, firmer surface conditions, and some wear are the primary liabilities on putting quality during the winter. Raising the mowing height to 5/32 or 3/16 inch prior to dormancy is necessary to avoid excessive winter green speeds and to improve wear tolerance.

Encroachment: The encroachment of surrounding fairway type bermudagrass varieties from the collars into the putting greens has not been an issue with the ultradwarfs. It appears the high turf density of these new varieties and the lower mowing heights employed discourages encroachment into the putting greens.

Off-Types or Mutations: No one is certain whether off-types or mutations will appear in ultradwarf putting greens, but the track record to date is spotless, with no off-types reported. This may be the result of superior genetic stability or stricter management of ultradwarf growers. This is quite a change from Tifdwarf greens, where off-types could be expected to appear after five or six years and regrassing was expected after 15 years.

The management protocol for maintaining a healthy ultradwarf is a departure from traditional Tifdwarf management, but it is not considerably more expensive or time-consuming if all the proper equipment is in place. This is a critical point to remember because it suggests that even mid- to low-budget golf courses can commit the resources to having healthy ultradwarf putting greens. The Aiken Golf Club, Aiken, S.C., and the Country Club of Lexington, Lexington, S.C., are successfully managing TifEagle on budgets of less than $300,000.

Managing for Playability

With a healthy turfgrass base, managing an ultradwarf for optimum playability can be fun. Historically, superintendents were required to manage Tifdwarf putting greens on the edge of failure to achieve the best playability. All this has changed with the ultradwarfs. Superior putting conditions can be provided on an ultradwarf without unduly sacrificing plant health. The level of quality achieved is a function of the effort expended, and this is where costs can vary widely.

The golf courses with the best ultradwarf greens commit the most resources and time to the putting greens. Quality has a price. The questions for a golf course considering an ultradwarf include, "Is that price within our reach?" For many golf courses, the answer is a resounding "yes," and here is why. Sixty percent of the game of golf involves the putting greens, but on average only 15% of the budget is spent on putting green maintenance. If the budget cannot be raised, some portion of the 85% of the budget spent on other parts of the course is available to be reallocated. Examples of reallocation include naturalizing pond and creek banks, eliminating unnecessary landscaping on the course, or reducing the intensity of bunker maintenance or other labor-intensive hand work. There is nowhere else on the golf course where such a small increase in costs can have such a dramatic impact on playability.

The extent to which a course with an ultradwarf can elevate putting quality is a function of available equipment and the staff to carry out a predetermined schedule. Outlined below are the areas that most influence ultradwarf performance. The list is not all-inclusive, but it provides the essential elements for an ultradwarf management program. Utilization and frequency can vary based on the geographic location where the ultradwarf is being grown and on the desired level of quality.

Mowing Equipment: Mowing has the largest influence on the quality of any putting green. The ability to mow lower on a regular basis results in approximately one to one-and-a-half extra feet of ball roll compared to Tifdwarf. Generally, walking mowers produce the highest quality of cut and are recommended, but triplex mowing can produce excellent ultradwarf putting surfaces, too. Mowing heights seen in the field on ultradwarfs have ranged from .090 to .150 inch.

Many courses find that it is beneficial to have two fleets of mowers. The primary fleet is used for daily mowing, while the secondary fleet, comprised of secondhand mowers, is used after sand topdressing.

Mowing frequency has a tremendous influence on putting quality, too. Double mowing is performed regularly

Tifdwarf bermudagrass is plagued with contamination and off-types, which disrupt uniformity. To date, this has not been a problem with the ultradwarf varieties.

at some courses to further improve green speed and smoothness. Critics claim frequent double mowing is taking management to an extreme. Supporters argue that the extra speed and smoothness achieved with double mowing are well worth the extra cost.

Specialty equipment for the mowers rounds out a high-quality management program. Groomers and brushes all have a place in the program.

Equipment Maintenance: The best agronomic program can be written on paper, but unless the equipment is maintained to a high level, the desired degree of quality will never be reached. The mechanic at a golf course with an ultradwarf can make or break the success of the program. As mowing heights move lower and lower, the amount of time necessary to set up and maintain the mowers increases dramatically. Daily backlapping is a given today, and bedknives are replaced as frequently as every two to three weeks. Golf courses with the highest standards find it is necessary to have at least one additional employee dedicated to working with the mechanic each day.

Rolling Equipment: The practice of rolling putting greens is an excellent way to temporarily increase green speeds by as much as 10% (Hartwiger, 1996). One or two rollers are recommended for courses that desire to further enhance putting quality. Many courses are finding the need for rolling is reduced because of better speeds created through lower mowing and more frequent topdressing.

Topdressing Equipment: Topdressing machines that have the ability to apply light and heavy amounts of sand are essential. The now rotary spinner topdressers have the ability to deliver light dustings of sand to improve smoothness and dilute the accumulation of organic matter. A traditional topdresser is recommended to fill aeration holes with sand.

Aeration Equipment: Two or three aerifiers are recommended to complete scheduled aerations on a timely basis. Some courses are obtaining water injection machines such as the Toro Hydroject or using ¼ quadratines on their regular aerifier to use in the summer to avoid surface sealing.

Making an Ultradwarf Work

Magic is not required to make an ultradwarf a success at a golf course. Plant health can be maintained with a reasonable amount of effort, and playability is a function of staff expertise, equipment, and labor. The final piece of any successful ultradwarf management program involves the human element.

Attitude of the Golf Course Owners: The putting greens must be the focal point of every golf course that wishes to succeed with an ultradwarf variety. Shortcuts in the equipment fleet and the frequency of routine maintenance are a formula for disappointment. The most successful clubs focus on the putting greens, provide the equipment and staff recommended in this article, and commit to carrying out the program. They also are open to change in the management program, as the turfgrass manager learns through experience and research.

Skill and Attitude of the Superintendent: The ultradwarfs are still in their infancy. Management programs are evolving as more information becomes available. Individuals uncomfortable with change will not be the best managers for ultradwarf putting surfaces. The most successful managers welcome the chance to elevate putting conditions and enjoy the challenge of discovering the best maintenance practices for that specific location.

Conclusion

We are experiencing the best bermudagrass putting conditions ever in the history of the game. The ultradwarf varieties are nothing to be afraid of, and with the right commitment and resources, they should be embraced. As research is conducted on and off the golf course, the potential for the ultradwarfs will be fully realized. Take the time to understand what it takes to make an ultradwarf a success, because the next time you hear the comment "the ultradwarfs are not for everybody," you will know exactly what they mean.

References

Beard, J. B., and S. I. Sifers. 1996. New cultivars for Southern putting greens. *Golf Course Management.* 64(12):58-62.

Gray, J. L., and R. H. White. 1999. Maintaining the new dwarf greens-type bermudagrasses. *Golf Course Management.* 67(3):52-55.

Guertal, B., and R. H. White. 1988. Dwarf bermudagrasses demand unique care. *Golf Course Management.* 66(7):58-60.

Hartwiger, C. 2000. Give me your poor, your tired, your dead bentgrass greens. *USGA Green Section Record.* 38(3):7.

Hartwiger, C. 1996. The ups and downs of rolling putting greens. *USGA Green Section Record.* 34(1-4).

Hanna, W. 1998. The future of bermudagrass. *Golf Course Management.* 66(9): 49-52.

NTEP Website www.ntep.org. 2000. Evaluation of bermudgrass for putting greens. *Progress Report 1999.* NTEP No. 00-7.

Unruh, J. B., and S. Davis. 2001. Diseases and heat besiege ultradwarf bermudagrasses. *Golf Course Management.* 69(4):49-54.

White, R. H. 1999. Unleash the potential of new bermudagrass cultivars. *USGA Green Section Record.* 37(5):16-18.

White, R. H. 2000. Relationship of environment, management, and physiology to bermudagrass decline. p. 27. In J. L. Nus and M. P. Kenna (eds.), 2000 Turfgrass and Environmental Research Summary. United States Golf Association, Far Hills, N.J.

White, R. H. 2000b. Performance and management of new dwarf bermudagrasses. 2000 Annual Research Progress Report. pp. 1-24.

CHRIS HARTWIGER *is on a first-name basis with the ultradwarfs in his travels as a USGA Green Section agronomist throughout the Southeast and Florida.*