An Exploration of Velvet Bentgrass (Agrostis canina) Use on Golf Greens

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Velvet bentgrass (Agrostis canina) has been a potential turfgrass species for golf greens for many years. However, over the last 40 years it has received little use on golf courses due to the inability of seed producers to find a variety that seeded well and golf course superintendent hesitation. The recent development of improved seeded varieties has made velvet bentgrass a renewed option for golf greens. Currently, velvet bentgrass is mostly used in the Northeast United States, but it has potential for other locations (Boesch, 2005). The decision to use velvet bentgrass on a golf course green requires exploring the advantages and disadvantages of its use, followed by developing establishment and management protocols.

Advantages

In a study involving 10 professional golfers, all 10 said that velvet bentgrass produced a better putting surface than five cultivars of creeping bentgrass (Agrostis stolonifera) (Monteith and Welton, 1932). Therefore, the use of it on golf greens should be considered. Through examining the advantages of velvet bentgrass, its characteristics and requirements, one can see why velvet bentgrass could be considered a better turfgrass for golf greens than creeping bentgrass.

Characteristics

The main characteristics that make velvet bentgrass a good turfgrass for golf greens are its fine leaf texture and high shoot density. Velvet bentgrass has an average leaf width of 0.52 mm and density of 245,756 shoots/m2. This can be compared to creeping bentgrass with an approximate leaf width of 0.71 mm and density of 115,104 shoots/m2. The finer leaf blade and high shoot density allow velvet bentgrass to create a smoother and more consistent playing surface than creeping bentgrass (Torello and Lynch, 2005).

Requirements

Velvet bentgrass golf greens require less light, fertility, and water when compared to other turfgrass species commonly used on putting greens, which can save golf courses money, time and energy. Reid (1933) evaluated velvet bentgrass and creeping bentgrass shoot growth in full sun, sun until noon then shade, shade until noon then sun, and speckled sun. He found that velvet bentgrass had similar shoot growth in all light conditions, while creeping bentgrass growing in the shade treatments had half of the shoot growth of creeping bentgrass growing in full sun (Reid, 1933). The results of this study are important, because quality turfgrass growth on shaded putting greens is difficult to attain and light quantities on golf greens can be difficult to manipulate.

Velvet Bentgrass

As with light, velvet bentgrass responds favorably to lower nitrogen fertilizer rates.

In the 1998 National Turfgrass Evaluation Program (NTEP) quality ratings, velvet bentgrass had the highest ratings when fertilized with at least 4.1 lbs of nitrogen per year, while creeping bentgrass had the highest ratings when fertilized with at least 6.1 lbs of nitrogen per year (Morris, 2000). This data demonstrates that fertility requirements for quality turfgrass are lower for velvet bentgrass than creeping bentgrass.

The irrigation requirements for velvet bentgrass are also lower than for creeping bentgrass. DaCosta and Huang (2006) evaluated turfgrass quality of bentgrass species under different irrigation treatments. The authors concluded that creeping bentgrass maintained at 60% of evapotranspiration (ET) had unacceptable turf quality, while velvet bentgrass maintained at 60% of ET retained acceptable turf quality during the summer months.

Therefore, they recommended that creeping bentgrass be irrigated at 80% of ET and velvet bentgrass at 60% of ET during the summer (DaCosta and Huang, 2006). Similar findings for creeping

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bentgrass irrigated at 80% of ET were reported by Sass and Horgan (2006). Moreover, DaCosta and Huang (2006) found that during the fall months, both creeping and velvet bentgrass were able to maintain quality levels at 40% replacement of ET (DaCosta and Huang, 2006).

The lower light, fertility and water requirements of velvet bentgrass make it a superior turfgrass for golf greens, because fewer inputs of time, money and energy are required. The described characteristics and requirements of velvet bentgrass are advantages of velvet bentgrass greens to golf course superintendents, golfers and the environment.

Disadvantages

One major reason for the lack of velvet bentgrass use on golf greens is the perceived disadvantage of thatch and chlorosis. They are perceived disadvantages, because current technology enables turfgrass managers to avoid/correct these issues (Radko, 1968).

Thatch

Thatch, the layer of organic matter and living tissue between the turfgrass shoots and soil, can be a problem with almost any turfgrass species if incorrect management occurs (Christians, 2004). Velvet bentgrass is more sensitive to incorrect management due to its high shoot density and fine leaf texture (Hollman et. al, 2005). The management practices that lead to thatch build-up in velvet bentgrass putting greens include overfertilization, limited aerification and inadequate topdressing.

Velvet bentgrass is often mistakenly fertilized like creeping bentgrass. This causes it to produce excessive vegetative tissue, which contributes to the thatch layer. By reducing the amount of nitrogen fertilizer applied to velvet bentgrass golf greens, the production of tissues can be reduced, therefore reducing thatch accumulation (Skogley, 1975). (The correct nitrogen rates will be discussed in the management section.) Besides fertilizer problems, primitive aerification equipment existed during the period of high velvet bentgrass use. The lack of decent equipment at this time limited the ability of turfgrass managers to aerify, therefore impeding their ability to reduce thatch in greens. However, today's aerification equipment is improved and it can effectively reduce thatch (Hollman et. al, 2005). Another way to reduce thatch accumulation is through topdressing, which is much easier to perform today due to equipment advances (Torello and Lynch, 2005). Through appropriate fertilizing, aerifying and topdressing, the thatch produced by velvet bentgrass is manageable.

Chlorosis

The other perceived disadvantage of velvet bentgrass is chlorosis, which is caused by iron deficiencies or incorrect soil pH (Radko, 1968). However, like thatch, chlorosis can be managed with today's tools. The main tool available to the present day golf course superintendent is the soil test. Soil tests can measure the iron level and the pH of the soil. If an iron deficiency is detected by a soil test, the regular application of chelated iron will reduce the chlorosis in a velvet bentgrass turf stand (Fermanian and Voigt, 2005). However, the usual cause of

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chlorosis in velvet bentgrass is soil pH. Velvet bentgrass prefers a soil pH between 6.0 and 6.5, and it can perform well at a soil pH between 5.0 and 5.5. If the soil has a high pH, ammonium sulfate (Torello and Lynch, 2005) or sulphuric acid should be applied in small quantities during the growing season to lower the soil pH (Reid, 1932). Through proper soil testing, the chlorosis problem in velvet bentgrass is manageable.

As described, there are numerous advantages of velvet bentgrass use on putting greens, which far outweigh the disadvantages. Therefore, velvet bentgrass should be used more on golf greens. However, prior to establishing a velvet bentgrass golf green one should understand the proper establishment and management procedures.

Establishment

Proper turfgrass establishment is essential to having a quality-playing surface that is sustainable. The proper establishment of any turfgrass involves soil preparation, starter fertilizer, seeding time, seeding rate, seeding depth, seeding method and irrigation. Of these, the factors directly affecting velvet bentgrass establishment are cultivar selection, seeding time and seeding procedures.

Cultivar Selection

In recent years, velvet bentgrass cultivars have been included in turfgrass evaluation trials and produced varying results. The 1998 NTEP bentgrass (putting green) trial tested the quality, color and spring green up for the velvet bentgrass cultivars 'Vesper', 'Bavaria', and 'SR 7200'. The results of this test were average quality ratings (for all test sites) of 5.4 for 'Vesper', 5.2 for 'SR 7200', and 3.9 for 'Bavaria', based on a 1-9 scale, with 6 being average (LSD0.05= 0.2). In the color ratings 'Vesper' received a 6.5, 'SR 7200' a 6.2, and 'Bavaria' a 5.3 based on the same scale (LSD0.05= 0.3). Finally, for spring green up, 'Vesper' received a 5.9, 'SR 7200' a 6.2 and 'Bavaria' a 5.4 based on the 1-9 scale (LSD0.05= 0.3) (Morris, 2000).

The velvet bentgrass cultivars Greenwich, Vesper and SR 7200 were involved in a study performed at Rutgers between 2002 and 2004. In this study, the average quality rating for 'Greenwich' was 6.2, 'Vesper' was 6.1, and 'SR 7200' was 5.9 based on the previously mentioned scale (LSD0.05= 0.6). The spring green up ratings were 4.3 for 'Greenwich' and 7.3 for 'SR 7200' (LSD0.05= 1.6) (Weibel et. al, 2004).

The University of Minnesota's 2004 NTEP bentgrass (green) trial evaluated the velvet bentgrass cultivars 'Vesper', 'Greenwich', 'Legendary', and 'SR 7200'. The University of Minnesota's data for average quality rating were 6.9 for 'Vesper', 6.4 for 'Greenwich', 6.2 for 'Legendary', and 5.9 for 'SR 7200' based on

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the 1-9 scale (LSD0.05= 0.5) (University of Minnesota, 2004).

Based on these trials conducted around the United States, the velvet bentgrass cultivars 'SR 7200' and 'Vesper' had consistently higher ratings; therefore, they would be good cultivar selections for golf greens. However, each golf course superintendent should evaluate cultivars in his/her respective area to assist in determining the best cultivar for their situation.

Seeding Time

Each turfgrass manager deals with different environmental conditions, which affect the establishment of any turfgrass species. Based on the environmental conditions in the location were velvet bentgrass is being established, the proper seeding time will vary. In the Northern United States (where velvet bentgrass grows best) the best time of the year to establish velvet bentgrass is during the late summer and/or early fall, preferably around the end of August to the beginning of September (Torello and Lynch, 2005). During this period, the temperatures are high enough for seed germination, there is a reduced threat of disease, and fewer weeds germinate in the disturbed soils (Christians, 2004).

Seeding Procedures

The correct seeding procedure for velvet bentgrass golf greens involves seedbed preparation, starter fertilizer, seeding and covers. The preparation of the seedbed for planting a velvet bentgrass green is the same as the preparation to seed any golf green. A fertilizer high in phosphorus, such as a 1-2-1 ratio, needs to be incorporated into the seedbed. This fertilizer should be applied at a rate between 1.5 and 2 lbs of N per 1000ft2 to ensure good velvet bentgrass germination (Skogley, 1975). Once fertilizer is incorporated, the velvet bentgrass should be seeded at a rate of 0.33 to 0.67 lbs per 1000ft2 (Fermanian and Voigt, 2005). After seeding, it is highly recommended that the seeded area be covered with a germination blanket to reduce the potential loss of seed due to rain, wind or other factors.

The normal maintenance practices for any golf green establishment (i.e. adequate watering, no traffic, constant monitoring, etc.) should be followed after seeding until the velvet bentgrass begins to germinate. Velvet bentgrass seed typically germinates in five to seven days, however it may take longer based on environmental conditions (Boesch, 2005).

Management

Once the velvet bentgrass begins to germinate, it is time to begin specific management techniques. This includes the same basic management tasks for creeping bentgrass golf greens, but with different techniques. The main management practices that are different for velvet bentgrass golf greens are mowing, watering, aerifying, topdressing and fertilizing.

Mowing

The process of mowing is essential to the precise management of golf greens. The average heights of cut for velvet bentgrass range from 0.110" to 0.560" (Boesch, 2005 and Fermanian and Voigt, 2005). Although velvet bentgrass can be cut up to 0.560", higher heights of cut are not recommended because of the rapid thatch accumulation (Fermanian and Voigt, 2005). Further, velvet bentgrass performs best when it is mowed at a height of 0.110" to 0.125" on greens, because it leads to denser velvet bentgrass growth

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(Boesch, 2005). The frequent mowing thatoccurs on golf greens increases the transpiration / water loss; therefore, irrigation inputs need to be understood.

Irrigation

Each turfgrass species needs varying amounts of water to remain healthy, especially on golf greens. It is difficult to specify the exact amount of water that velvet bentgrass needs due to the variety of management practices, environmental conditions and soils. As was discussed earlier velvet bentgrass needs less water than creeping bentgrass and can survive by replacing 60% of ET during the summer (DaCosta and Huang, 2006).

Aerification

Due to the thatch problems associated with velvet bentgrass, aerification is a necessary management practice. Traditionally creeping bentgrass golf greens are core aerified; however, slicing aerification is better for velvet bentgrass (Skogley, 1975). Since copious amounts of thatch accumulate quickly, the aerification process should occur at least every fall and preferably two times a year (Christians, 2004).

Topdressing

Along with appropriate aerification, topdressing is an essential component of velvet bentgrass management. Topdressing on velvet bentgrass greens should accompany a vertical mowing program. Topdressing should occur once every 2 to 3 weeks, with vertical mowing occurring every month (Boesch, 2005). The topdressing should be applied in light amounts that can easily be brushed in to insure minimal disruption to golfers (Christians, 2004). This topdressing program will not only reduce the thatch accumulation, but also improve the quality of the playing surface (Skogley, 1975).

Fertilizing

Fertilization is another component of a good management program that will improve the quality of the golf green. Velvet bentgrass requires 3 to 5 lbs of nitrogen per 1000 ft2 per year (Skogley, 1975). Unfortunately, this is not a hard rule, because this amount can vary depending on soil type, rainfall and traffic. On fine-textured soils, 2 lbs of nitrogen per 1000 ft2 per year can lead to good results (Torello and Lynch, 2005). While, on sandy soils, 5 to 7 lbs of nitrogen per 1000 ft2 per year can achieve good results (Boesch, 2005). No matter what conditions are influencing fertilization rates, the research shows that velvet bentgrass requires lower nitrogen rates to limit potential problems (Skogley, 1975).

Maintaining velvet bentgrass involves the traditional putting green maintenance practices: mowing, watering, aerifying, topdressing and fertilizing, with some twists. By following the proper establishment and management techniques for velvet bentgrass, a high quality golf green can be produced.

After examining the advantages and disadvantages of velvet bentgrass, along with the proper establishment and management techniques, the decision to use velvet bentgrass on a golf green can be made. Velvet bentgrass produces an elite playing surface due to its characteristics and requirements. Past problems, which led to the formation of negative connotations towards velvet bentgrass, are manageable. With the recent release of new velvet bentgrass cultivars and an understanding of the topics in this paper, the use of velvet bentgrass on golf greens can occur.

(Editor's Note: References used in this article may be found at www.mgcsa.org.)