Fine Fescues and Colonial Bentgrasses For Golf Course Fairways

By Dr. Brian Horgan, University of Minnesota
John Stier, University of Wisconsin-Madison

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Rationale and Problem Description

Fine fescues and colonial bentgrasses have been used for years on fairways and roughs of golf courses in the United Kingdom. In recent years fine fescues have been commonly used as un-mown rough and in a few cases on fairways in the US (Anonymous, 1989, Stier, 2002). Colonial bentgrass was used in the U.S. during the early 20th century as a component of South German bentgrass. Advances in creeping bentgrass, Kentucky bluegrass, and perennial ryegrass along with availability of irrigation systems and improved turf chemicals led to the relatively high input fairways currently used across much of the northern U.S. and Canada. However, tremendous improvements have been made in fine fescue and colonial bentgrass germplasm during the last decade, which provide better turf quality than older cultivars.

Public pressure to reduce potable water and chemical usage, including synthetic fertilizers, will require a fundamental change in the way golf courses are designed, permitted, and managed. Specifically, grass systems that require less intensive inputs compared to conventional grasses need to be evaluated (Kenna and Horst, 1993). Fine fescues have significantly less water and lower fertility requirements than most other turfgrasses (Bourgoin, B., 1997, Kenna and Horst, 1993). In northern golf courses, snow mold diseases require preventive fungicide applications, often at high rates, which is not compatible with environmental concerns and may become restricted due to the Food Quality Protection Act. Recent golf course projects have indicated that fine fescues are resistant to all snow molds; colonial bentgrasses have better resistance and shorter recovery time to snow mold damage than creeping bentgrass (Casler et al., 2001). Dollar spot is the most costly disease on turfgrass in the US (more fungicides are used for its control than any other disease), but both fine fescues and colonial bentgrass have greater tolerance to dollar spot than creeping bentgrass (Brilman, 2001; Newman et al., 1989). Wear tolerance has often been cited as a factor for turfgrass selection, but the newer cultivars of fine fescue and colonial bentgrass may provide suitable wear tolerance. Recent cultivar trials have shown colonial bentgrass has better wear tolerance at fairway height than creeping bentgrass (Bonos et al., 2001) and Chewings and hard fescue are more wear tolerant than other fine fescues (Bonos et al., 2001, Stier et al., 2002).

A few golf courses are now utilizing fine fescues and/or colonial bentgrass for fairways either to gain permitting approval or to provide a Links-style course. However, research data for cultivar selection are limited to scattered cultivar trials of monostands. Other data show that the attributes of single cultivars are not necessarily additive in mixtures and/or blends, and individual cultivars may not survive (Brede and Duich, 1986). Information on the ideal type of fertilizer is also lacking. Superintendents from the United Kingdom routinely use organic N sources and feel synthetic, water-soluble N sources are not suitable for fine fescue/colonial bentgrass fairways (Stier, 2002). Furthermore, some of the cultivars that perform well at fairway height may have higher N requirements than cultivars not mowed low and subjected to traffic.

Objectives

The objectives of this research are to 1) determine the best cultivars and combination(s) of fine fescue and colonial bentgrass for use as a fairway turf, and 2) evaluate the effect of organic versus water-soluble fertilizer on turf quality and fine fescue/colonial bentgrass competition.

Benefits to Superintendents

The research will start to build a body of literature on the performance of the best fine fescue and colonial bentgrass cultivars for fairway use both alone and in various combinations as influenced by fertilizer type, traffic, and divoting. The data will be useful for superintendents and architects for designing, establishing, and permitting new golf courses or reconstruction projects as it will narrow the potential cultivars and mixes to be considered. The results will also provide guidelines for fertilization of fine fescue, colonial bentgrass, and their mixtures. The disease resistance for snow mold and dollar spot should allow superintendents to use less fungicide on their courses, which is critical as the impact of the Food Quality and Protection Act increasingly restricts fungicide use on amenity turfgrasses. Interest in using turfgrasses that require fewer inputs, particularly in terms of water and fertilizer, will only grow.

MATERIALS AND METHODS

Plot Establishment and Maintenance

Two field trials will be conducted; (1) at the University of Minnesota Turfgrass Research, Outreach and Education (TROE) Center in St. Paul, MN and (2) at the O.J. Noer Turfgrass Research and Educational Facility in Verona, WI. Replicating the research project within the North Central Region in effect allows results to be verified and will strengthen a peer reviewed journal publication.

Plots were established by seed, mulched, and irrigated until established during autumn 2002 at the O.J. Noer Facility and in autumn 2003 at the TROE Center. Starter fertilizer (1:2:1) was applied at the time of seeding to supply approximately 1 lb P2O5 per 1000 ft2 (M). A soluble form of nitrogen will be applied biweekly at a rate of 0.5# of N/M until satisfactory ground cover is achieved. All plots will be maintained at 0.75" mowing height and they will be irrigated once

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weekly at 50% evapotranspiration (ET) once established. Golf cart traffic will be applied from May to September to simulate six golf cart passes each week beginning in the summer 2003 (Stier et al., 2002).

Grass types include two colonial bentgrasses ('Tiger II' and 'SR 7100'), two Chewings fescues ('SR 5100' and 'Longfellow II'), one hard fescue ('SR 3100'), and one strong creeping red fescue ('Jasper II') as monostands, blends and mixtures. Fine fescue and colonial bentgrass mixtures were comprised of 80% fine fescue and 20% colonial bentgrass (by weight) to achieve roughly equivalent amount of plants per unit area and to emulate current practices (Anonymous, 1989; Stier, 2002). Equal parts of each variety of a given species were used in blends. The varieties were selected based on top performance in National Turfgrass Evaluation Program (NTEP) trials and ancillary studies conducted by UW-Madison on golf courses and the O.J. Noer facility between 1992 to 2002. One creeping bentgrass ('Penncross') and a Kentucky bluegrass blend ('Blue Carpet', Olds Seed Solutions) are used for comparisons.

Beginning spring 2004 in Madison and spring 2005 in St. Paul, plots will be split to evaluate the effect of fertility rate and type. Sub-plots will be used to test low and high N rates (1 lb vs. 3 lb N/1000 ft2). Nitrogen will be applied at 0.5 lb N/1000 ft2 in May and September for the low N rate; fertilization for the high N rate will be applied at 0.5 lb N/1000 ft2 monthly during the growing season (May - October). Sub-plots will be split (sub-sub plots) to evaluate the type of N carrier at each rate, organic versus synthetic (Milorganite versus water-soluble). The water-soluble N carrier will be a combination of urea and/or ammonium nitrate combined with a phosphorus source such as superphosphate to achieve a P rate equivalent to Milorganite.

Once plots are established pesticide applications will be applied only as necessary to prevent pest/disease outbreaks which threaten the integrity of the project. There may be one herbicide application made during the establishment year to eliminate broadleaf weeds during grow-in.

Data Collection and Analysis

Turf quality will be evaluated monthly from April to October using a 1 to 9 visual assessment scale once the turf is established. Percent living ground cover will be evaluated three times annually in May, July and September. Disease occurrence will be evaluated on an as need basis and reported as percent damage of each plot. Weed encroachment will be determined by estimating the percent area infested by weeds once each year, generally late summer. Spring greenup will also be evaluated annually following establishment.

Playability and environmental data will also be collected. A divot tool will be used to create divots on each treatment (Calhoun & Branham, 1996) three times annually (May, July and September). Divot recovery will be evaluated by measuring the diameter of the divot on a biweekly basis for a month following the simulation, then on a monthly basis up to six months (the final analysis for September divots will be conducted the following May). Golf ball lie will be evaluated each spring, summer and fall (Cella and Voigt, 2000).

Expected Results / Outcomes

We expect the fine fescue/colonial bentgrass mixture will provide best turf quality, and Chewings fescue will dominate creeping red and hard fescues. We also expect one cultivar of each species may dominate the other cultivar(s) of similar species if the genetic distance is large (J. Stier and G. Jung, unpublished data, 2001). One outcome of the project will be basic information for cultivar, blend and mixture recommendations for fairways. A second outcome will be science-based information for fertilizer selection and rate for fine fescue/colonial bentgrass fairways.

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