Title of project: Development of Velvet Bentgrass Sod as an Environmentally Compatible Turfgrass less Reliant on Fertilizers and Pesticides

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Abstract

Turfgrass disease management is a significant problem and rated the greatest challenge facing the turf industry based on the 2003 NY State Turfgrass Industry Survey. If sod farmers were able to produce a crop that required less pesticides to maintain they would be able to increase their marketing programs and overall pesticide use could decline. This project was designed to investigate the production and management of two velvet bentgrass varieties for potential as a sod and develop a management practices for golf course superintendent's who desire to grow velvet sod. Establishment studies indicated that lower seed rates were slower to reach adequate density (>85%) than normal or above normal seed rates. The 2006 growing season was among the wettest on record and many disease problems plagued the stand. The variety SR 7200 was less susceptible to diseases such as dollar spot and taker all patch than Vesper velvet bentgrass. Management factors such as low pH (5.3 or less), nitrogen fertility less than 2.0 lbs of nitrogen per 1000 ft2, and frequent grooming and topdressing provided the most desirable stand. Velvet bentgrass can be successfully established at normal seed rates and managed with less inputs than traditional golf turfgrasses.

Justification

New York is one of the most restrictive regulatory environments in the US regarding pesticide use. IPM Focus Group sessions identified environmental regulations, pesticide use, and development of new varieties less dependent on pesticides and reduction of chemical use as major threats, opportunities and changes that could make a difference to sod farmers in NY.

If sod farmers were able to produce a crop that required less pesticides to maintain they would be able to increase their marketing programs into golf courses. Golf courses spent over $17 million dollars on fungicides for turf diseases, as compared to only $4 million by homeowners in 2003. Clearly turfgrass disease management on golf courses is significant problem and rated the greatest challenge facing the golf turf industry.

Velvet bentgrass (*Agrostis canina*) has been shown in several studies to require significantly less pesticides, fertilizer and water than traditional turfgrass varieties. However, few sod farms are producing velvet sod and consequently golf course superintendents are not able to use this important species.

Objectives

The objectives of this project were to:
1. Investigate the effect of seed rate on the establishment of two velvet bentgrass varieties used for sod production.
2. Assess management practices for golf course superintendent's who desire to grow velvet bentgrass.

Procedures:

1. Investigate the effect of seed rate on the establishment of two velvet bentgrass varieties used for sod production.

Vesper and SR 7200 velvet bentgrass were seeded at three seed rates (0.5, 1.0 and 2.0 lbs of seed per 1000 square feet). This represents 0.5x, 1x and 2x the recommended seed rate.

The plots were seeded June 22, 2006 on an Arkport fine sandy loam, pH 6.3 with a drop spreader in 36 square foot plots. Starter fertilizer was applied to supply 1.0 lb of N, 2 lbs. of P and 1 lb of K per 1000 square feet.

Turf density was recorded every two weeks until plots reached 85% cover. Plots were mowed at 0.250" with a walk behind reel mower and then after reaching 85% cover heights were reduced in 0.020" increments until reaching 0.187".

2. Assess management practices for golf course superintendent's who desire to grow velvet bentgrass.

Two varieties (vesper and SR 7200)of velvet bentgrass sod (donated by DeBuck Sod Farms) were delivered and installed at the Turf Center in Ithaca, NY in July 2005. The sod was planted on an Arkport fine sandy loam, pH 6.3.

Immediately following successful rooting the sod was cored every month and heavily topdressed with sand. In addition, each variety was split into three 48 square foot subplots and elemental applied to two of the three plots to reduce the pH to about 4.0 and 5.0.

Mowing was performed daily with walk behind reel mowers at 0.130" and clippings collected. The research area was maintained to championship conditions with light frequent liquid fertilization applied weekly during the season. Total nutrient rates for the season was 1.5 lbs. N, 0.25 lbs. P and 0.75 lbs. K, all per 1000 square feet, with supplemental liquid iron for color.

Golf traffic is simulated daily during the season using a modified traffic device with two 0.5 meter diameter rollers that spin at different speeds to create slipping. The rollers are fitted with SoftSpikes. The amount of spikes and passes used are designed to simulate 30,000 rounds of golf.

Data were collected for turf quality, and disease incidence and severity. Data analysis was conducted using linear mixed models with compound symmetric covariance structure to assess overall treatment effects when repeated measurements were made on the same experimental unit over time. Treatment differences at individual measurement events were evaluated using analysis of variance and Fisher's protected least significant difference (LSD). The MIXED and GLM procedures in SAS/STAT software version 9.1 (SAS, Cary, NC) were used to perform the analyses.

Results

Due to the excessive precipitation, there were some days when the experimental area was too saturated to mow or traffic. On such occasions, data collection was postponed until conditions could be resumed without collateral damage to research area.

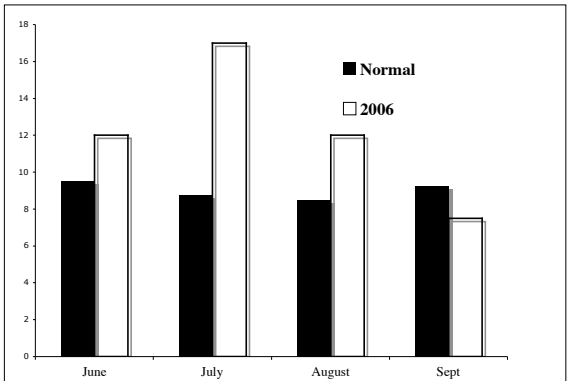

Figure 1. Comparison between normal and actual 2006 precipitation recorded (in cm) at Cornell Turfgrass Research Center.

Establishment Study

There was a main effect for seed rate on establishment, however to effect of variety or an interaction.

Clearly the increased seed rate accelerated establishment as the 2x rate reached 85% cover one week earlier than the recommended seed rate and more than two weeks before the 0.5x rate.

While this is consistent with other bentgrass varieties additional observations suggest that while plots are dense at higher seed rates the may not reach harvestable quality due to the lack of stolon development that is needed for adequate tensile strength. Therefore for sod growers the positive response to density from increased seed rate may not justify its use, however golf course superintendents might consider higher seed rate to decrease establishment time in damaged areas.

Table 1. Effect of seed rate on establishment of velvet bentgrass

Seed Rate (lb/1000)	**Days to 85% Cover**
0.5	42
1.0	35
2.0	27
LSD (p=0.05)	6

Management Study

The main effect of pH was significant for turfgrass quality (Table 2). There was no effect of any treatment on ball roll (Table 3) and an interactive effect of pH and variety on take-all patch incidence.

In general pH of 5.4 and below provided the highest quality turf and the least amount of disease suggesting that velvet bentgrass will perform well at low pH. In addition, the improved variety SR 7200 had significantly less take-all patch at similar pH levels compared to the older variety Vesper.

Table 2. Effect of soil pH on quality ratings of velvet bentgrass

	Turf Quality Ratings						
Soil pH	**5-Jul**	**11-Jul**	**17-Jul**	**24-Jul**	**8-Aug**	**16-Aug**	**22-Aug**
4.3	6.5	7.4	6.8	6.8	6.6	6.8	6.9
5.4	6.4	6.6	6.0	6.1	6.0	6.2	6.3
6.5	6.1	6.4	6.0	6.0	5.9	5.0	5.2
LSD (p=0.05)	NS	0.4	0.5	0.3	0.5	0.5	0.3

Table 3. Effect of pH on ball roll distances of velvet bentgrass

	Ball Roll							
pH	**25-Jun**	**5-Jul**	**6-Jul (am)**	**6-Jul (pm)**	**16-Jul**	**20-Jul**	**30-Jul**	**6-Aug**
4.3	11.4	12.3	12.2	12.5	12.8	11.8	11.2	10.9
5.4	11.9	12.5	12.3	12.5	12.6	12.3	11.5	11.0
6.5	11.8	12.3	12.4	12.2	13.0	12.4	11.4	11.0
LSD (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS

Table 4. Effect of pH and velvet bentgrass variety on take-all patch incidence and severity

	% Plot Infected			% Plot Infected		
	Vesper			SR 7200		
pH	**8-Aug**	**16-Aug**	**22-Aug**	**8-Aug**	**16-Aug**	**22-Aug**
4.3	0	7	10	0	0	0
5.4	10	15	20	7	9	12
6.5	22	30	35	13	15	20
LSD (p=0.05)	5	7	12	4	5	7

Implications

Velvet bentgrass production is a viable niche market for sod producers, however the long-term effect of seed rate on harvest interval could not be evaluated in this study. Still, as with most sod the longer it remains on the farm the less profitable it will be, especially with velvet bentgrass that will require more intense maintenance.

This one-year study confirms some earlier research concerning seed rate effect on establishment and the role of pH on velvet bentgrass performance. However, previous observations on lack of wear and heat tolerance were not confirmed as both varieties seemed to perform well under the simulated traffic and intense heat and wet conditions of 2006.

Velvet bentgrass does have significant disease resistance but obviously it is not immune to disease as evidenced by the high levels of take-all patch observed at pH above 5.4 on the Vesper variety. It appears that selecting the best variety in combination with pH management will lead to reduction in disease and reduced fungicide use.