(Continued from page 49)

As we crossed the bridge over the Wisconsin River I said to Tom "pull into the Celo Bottling Co. parking lot and I'll buy us each a cream soda. Maybe we will be lucky and see some bald eagles."

It was a lucky day for us. We saw a number of the big birds—enormous birds, really—as they flew rapidly along the water surface or perched, almost hunched over, in trees, and spiraling high into the spring sky before diving to the water. "Wish I had binoculars," Steady Eddie said.

"Saddle up, men, let's go," Tom ordered. Out of Sauk City, the road headed almost straight north through sandy soils deposited over the centuries. Wooded sandstone bluffs followed us along the left or west. Ahead, the south range of the Baraboo Hills was visible miles before we got there. These hills are the weathered remains of mountains that were once part of the landscape here.

The highway climbed up into the south range, cutting through the ancient pink quartzite that they are made of. They're 1.2 billion years old, older than any others in the state, and the quartzite deposit is famous to rock hounds all over the country. The park at Devil's Lake is as popular as any park the state operates.

So far, the trip had been leisurely and restorative. And we were getting close to our destination near Homesburg. We turned northwest out of Baraboo and the last miles to Cobble Valley went quickly. The guys were quiet and reflective; that included me. "This would have been a nice trip in the fall, when we are exhausted from the long season," Bogey observed.

"There's nothing to stop you from following in our exact tracks come September," Tom offered.

We drove through Homesburg, slowly, to enjoy this scenic town that was so well preserved, probably because it is off the beaten path. Clearly it was prosperous and was known for the many generations of Scots who were born, raised, worked and died here. It was easy to see why.

The course is on the edge of town. It is not a pretentious place. Rather, it is well cared for, neat and tidy and somewhat secluded. The clubhouse is some distance from the main road, although you can see it from there. We pulled into the full parking lot, found a place big enough for Tom's Explorer and parked.

There was only a slight breeze in the air this sunny afternoon. The flag was flying over the peak at the entrance of the clubhouse, and the warm weather had brought out the patio furniture. The awning fringe on the big veranda fluttered, and a number of our friends were gathered there. We could hear an occasion "rivit" from a frog, somewhere in the stream that ran along the right side of the 18th hole.

The clubhouse is a classic, suitable for a classic golf course like this one. It hadn't been added to in its entire history, going back to the earliest days of golf in Wisconsin, probably around the time of 1900. But time didn't date it; its architecture was more than appropriate for these days. The two story building had formidable limestone chimneys on each end. They were out of necessity large chimneys—the house had a fireplace on each end of both floors—four in total. It had touches unaffordable today—leaded windows, elaborate and intricate trim outside and native Wisconsin hardwoods inside. It was the mansion of the Hepstead estate before it became the Cobble Valley house.

Mac greeted us at the receptionist's desk where we were making sure our registration for the meeting had arrived.

"Glad to see you guys could make it to Cobble Valley," he said with a smile as he tamped the tobacco in his pipe and lit it. Mac was the third generation to run the CVCC golf course. His grandfather had built it under the close attention and scrutiny of Tillinghast himself. "Gramps always called him Tillie," Mac said as we visited about Cobble Valley.

"Dad spent his entire life here, and assumed the reins from Gramps just before WWII, although Gramps ran the place again while Dad served in the Army in Europe during the war. Dad came home in 1945 and stayed until 1975 when he retired and I was given his position. He still mows fairways for me and promised he'd join us for dinner,"

Mac lit his pipe again, drew a few puffs and continued. "The MacPhersons are three generations at Cobble Valley, but so are many of our members. The Marshes, the Donaldsons, the Blodgetts, the Graves', the Pringles', the Tuckers and the Bliss' all have three generations. There are dozens of more families who have enjoyed Cobble Valley continuously for going on a hundred years.

"Tradition counts for lots here, " Mac went on without any coaching from us. "The clubhouse, as you can see, has not had its original character altered. We have kept the infrastructure sound, but the appearance is timeless. Tillinghast would immediately recognize it if he were to show up today."

"And the golf course is the same. We have not found a need to redesign or remodel the golf holes to suit the game as it is played today with the implements the players use. It has, simply put, stood the test of time. Tillinghast had a great love for Cobble Valley and we have all his original detailed plans. Over the decades we have done modest reshaping to keep it true to his original course.

"Nobody compares Cobble Valley to Winged Foot or Baltusrol or San Francisco Golf Club. But we are almost thankful for that. Members here simply love golf and this golf course and like being left alone. Fame would spoil Cobble Valley.

"You guys would be shocked at how modest our budget is. Their love of the game and of this course do not require some of the extremes other clubs enjoy in conditioning.

"We have no tennis, no swimming, and only a very few golf cars, pretty much for those unable to walk and play anymore. The tradition of caddies is still strong."

The guys were nearly all in from the golf course, prompting Tom Morris to ask Mac if we could get a couple of those cars for a quick ride on the golf course. "Sure," Mac said. "I'll lead you on an abbreviated tour."

We grabbed scorecards, climbed into the electric golf cars and followed Mac. It was already getting cool, and the quiet of the rural countryside was comforting. Hole by hole Mac led us, stopping when something he knew would be of interest to golf course superintendents came up.

It was a true organic golf course. The land had been a great canvas for Tillinghast and little soil had been moved. His job, as Geoffrey Cornish always says, was to take the time and find the holes that were already in the landscape. AWT had succeeded.

Finally, we had reached the 18th, the "home" hole at CVCC. I had heard about this hole, a difficult, uphill par four. The distinguishing feature wasn't bunkering or length or even the uphill nature of it.

Rather it was the old spring house the hole played around. It was run down—had been for years, according to Mac—and all that remained were crumbling, vine-covered limestone walls. Nature had been allowed by Mac, on order from CVCC players, to take over the area. Obviously, since it was a spring house, a small stream flowed next to it. The spring house forced the home hole into a dogleg right, one of those holes Tillinghast had merely "discovered".

"Many tournaments have been won and lost on this hole," Mac said. "Some of those matches are legendary in CVCC history."

We parked the cars outside the pro shop and joined our colleagues — friends, really—in the clubhouse. "Better hurry," Mac said. "Dinner will be served before long."

The crowd gathered at Cobble Valley was ebullient. So was I. The meal we shared was excellent and the Club Captain—Mr. Donaldson—gave us a warm welcome. Jim Marsh, the chairman of the green committee, gave a great lecture to our WGCSA members about the history of Cobble Valley. Not a person moved the whole time he was talking.

And all too soon it was time to go home. In all my years I have never enjoyed a meeting more. The ride up through the Wisconsin landscape, the closeness of nature, and the company of friends were moments one should live for. The hours at Cobble Valley spoke volumes about the greatness of a great game, its history and designers and players and tournaments and, most of all, the venues.

The ride home was quiet. Oh, we were talking, but softly. All four of us were reflective and happy, secretly hoping we'd feel the same at the end of August. I was pretty sure we would.

The night was clear, the stars twinkled and the air was cool as we got out of the truck at Stinky's. Bogey sighed and said, "What a great way to spend a career." On this night, we all agreed.

1996

Wisconsin Turfgrass Association

SUMMER FIELD DAY

August 20, 1996

O.J. NOER RESEARCH FACILITY

1996 WGCSA MEETING SCHEDULE

DATE	LOCATION	SPEAKER/TOPIC
March 4 (Monday)	Spring Business/Educational Meeting Ramada Hotel — Fond du Lac, Wi	Environment Panel
April 15 (Monday)	Nagawaukee GC — Pewaukee, WI Charles Shaw—GC Superintendent	**Phil Pellitteri** UW-Madison, Dept. of Entomology "Japanese Beetles"
May ~~13~~ 20 (Monday)	Kettle Hills GC — Richfield, WI Robert Belfield—GC Superintendent	**Dr. Doug Maxwell** UW-Madison Dept. of Plant Pathology-Disease Diagnostic Lab
June 10	Baraboo GC—Baraboo, WI John Gallus—GC Superintendent	
July 15 (Monday)	Lake Breeze GC—Winneconne, WI Jim Hasz—GC Superintendent	
August 12 (Monday)	Foxboro GC—Oregon, WI Joe Wollner—GC Superintendent	
September 9 (Monday)	The Ridges GC—Wisconsin Rapids, WI Dave Murgatroyd—GC Superintendent	**Bob Vavrek** 1996 Year in Review
October 14 (Monday)	Country Club of Beloit—Beloit, WI Don Ferger—GC Superintendent	TBA

OTHER MEETING DATES

March 18	NGLGCSA Symposium
August 20	WTA Summer Field Day
October 5-6	WGCSA Dinner Dance, Oshkosh CC/Pioneer Inn
November 8-9	Wisconsin Turf Symposium, Milwaukee, WI

1997

January 7-8-9	Wisconsin Turfgrass and Green Industry Expo-Madison, WI
March 3	WGCSA Spring Business/Education

Influence of Plant Growth Regulators on Vertical Leaf Extension, Divot Recovery and Thatch Development on Golf Course Fairway Turf

By Dr. Frank S. Rossi, Emily Buelow and Amy Sausen
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INTRODUCTION

Plant growth regulator (PGR) technology is poorly understood by a majority of golf turf managers. PGR's are touted as tools for reducing moving, controlling annual bluegrass, and increasing green speed. PGR's regulate growth by inhibiting cell division or cell elongation. The PGR's recommended for use on high quality turf generally inhibit cell elongation for a period of time (weeks).

The process of regulating cell elongation includes the synthesis of giberillic acid (GA). Each PGR effects the synthesis differently. For example, studies have shown that paclobutrazol (Turf Enhancer) and flurprimidol (Cutless) block GA synthesis early in the pathway. This early blockage prevents the creation of the 50 or so GA's necessary for growth. This indiscriminate blockage can result in severe injury under stressful conditions. Also, this explains the morphological effects of Turf Enhancer with regard to widening the blades of bentgrass under regulation. Trinexepac (Primo) blocks the pathway at the very end after the 50 or so GA's are produced but before the important GA1, can trigger elongation. In essence, Primo is less physiologically disruptive.

PGR's for mowing management could extend the mowing intervals and allow for increased flexibility with staff time. Also, it could reduce wear and tear on mowers, reduce energy consumption and clipping problems.

This study is in the third year. The first two seasons investigated clipping reduction and visual quality. Data from these years indicate that regulation greater than 40% significantly reduces turf quality below an acceptable level. Assuming this information, the next two years of research will address morphological and functional parameters such as vertical leaf extension and ability to recover from divot injury.

DATA FROM THE 1995 BENTGRASS FAIRWAY MOWING MANAGEMENT TRIAL

			Visual Quality						Thatch Levels**		
Treatment	Rate (lbs. ai/A)	Appl. Interval	June	July	Aug.	Sept.	1995 Quality Mean	Typhula Snow Mold^	Initial (mm)	Final (mm)	% Change
Untreated			7.1	6.8	6.1	7.0	6.7	5.0	7.0	6.9	-1.1
Primo 1EC	0.02	1wk	6.8	6.7	6.4	7.3	6.8	4.3	6.5	7.0	7.7
Primo 1EC	0.02	2wk	7.1	7.3	6.2	7.1	6.9	5.0	6.6	7.1	7.0
Primo 1EC	0.04	2wk	7.0	6.7	6.3	7.3	6.8	4.5	7.1	6.3	-10.5
Primo 1EC	0.04	4wk	7.2	7.1	6.5	6.7	6.9	4.5	6.7	6.1	-8.6
Primo 1EC	0.08	2wk	6.5	6.6	6.9	8.0	7.0	5.0	7.2	6.6	-7.3
Primo 1EC	0.08	4wk	7.1	6.8	6.8	7.8	7.1	4.3	7.2	6.4	-10.6
Primo 1EC	0.17	4wk	6.8	6.7	6.1	7.0	6.7	4.8	7.2	7.4	3.1
Untreated			6.5	6.6	5.9	6.8	6.5	5.3	6.3	6.6	5.2
Untreated			6.7	6.4	6.6	7.6	6.8	3.5	6.5	6.1	-5.8
Cutless 50WP	0.125	2wk	7.1	7.0	6.6	7.5	7.1	4.0	5.9	7.1	21.8
Cutless 50WP	0.25	4wk	6.0	6.1	6.5	7.5	6.5	4.0	6.5	6.8	4.8
Cutless 50WP	0.5	4wk	6.8	6.5	6.8	7.8	7.0	4.0	6.2	7.1	14.9
Cutless 50WP	0.75	4wk	5.7	5.6	6.8	7.8	6.5	4.5	4.9	6.3	28.8
Cutless 50WP	1	4wk	5.6	5.7	6.5	7.4	6.3	4.5	4.9	6.6	35.2
Turf Enhancer	0.125	4wk	6.9	6.6	6.2	7.1	6.7	4.0	6.4	6.8	6.3
Turf Enhancer	0.25/0.125	4wk	6.1	6.1	6.4	7.3	6.5	5.0	6.6	6.3	-3.6
Turf Enhancer	0.25/0.25	4wk	5.9	6.0	7.0	8.0	6.7	5.3	7.1	6.6	-6.9
TGR+Fert.	0.25	4wk	6.3	6.0	4.3	4.9	5.4	4.8	5.3	6.8	28.6
TGR+Fert.	0.5	4wk	5.9	5.8	4.8	5.5	5.5	4.5	6.9	6.8	-0.5
LSD (0.05)			0.5	0.6	0.5	0.7	0.3	NS	5.3	0.3	13.9

^/ Typhula Snow Mold incidence rated from 0 to 9; where 0=no disease, 9=severe disease

**/ Thatch levels determined by the press-method.

EXPERIMENTAL METHODS

Plant growth regulator treatments were applied for the third consecutive year to a Penncross creeping bentgrass fairway turf growing on a Batavia silt loam pH 7.4. Applications were made at various intervals from July through September. Fertilizer applications are made to supply 2.5 to 3.5# N/M/year. Plots are irrigated to prevent stress.

Vertical leaf extension was measured daily w/a Turf-Chek Prism for 7 weeks after the initial application date. Plots were mowed one time per week for the first 4 weeks then because of severe mowing quality reductions, schedules expanded to three times per week. The MSU/UW Divot Extraction System was used to create uniform divots in each plot coinciding with the scheduled 4 week treatments. This resulted in 3 sets of divots per month of the season. Divot recovery was measured weekly with the point quadrant method recording a hit when the vegetation was encroaching the divot. Visual quality ratings were recorded monthly from 1 to 9; where 1 = poor turf; 6 = minimum acceptable turf; 9 = excellent turf.

RESULTS

After the second full year of PGR treatments, no snow mold fungicide applications were made. The turf had continued to become thatchy and the spring of 1995 brought a severe Typhula spp. snowmold infestation. The plot area required two months to recover from the damage, and, therefore delayed treatment initiation until early July. One could speculate that ability to recover might be evident in

Data from the 1995 Bentgrass Fairway Mowing Management Trial

Treatment	Rate (lbs. ai/A)	Appl. Interval	Weekly % Divot Recovery* Divots Taken in July	Divots Taken in August	Divots Taken in Sept.	Mean Weekly Divot Recovery	Average Weekly % Vertical Leaf Extension^ Week 1	Week 2	Week 3	Week 4	2 app	Week 5	Week 6	Week 7	Mean Vertical Leaf Extension
Untreated			9.8	22.6	34.2	22.2	25.7	42.0	58.3	52.5		49.9	57.4	79.0	52.1
Primo 1EC	0.02	1wk	8.9	20.0	36.8	21.9	17.2	40.6	56.1	58.4		42.3	38.3	50.2	43.3
Primo 1EC	0.02	2wk	11.9	20.4	36.8	23.0	13.4	37.9	57.0	50.2		33.4	27.7	33.4	36.1
Primo 1EC	0.04	2wk	8.3	22.6	34.3	21.8	19.2	48.5	46.4	52.7		55.1	71.9	136.0	61.4
Primo 1EC	0.04	4wk	8.6	24.3	35.3	22.7	14.5	52.2	52.7	56.5		56.0	69.3	124.5	60.8
Primo 1EC	0.08	2wk	8.6	17.4	35.0	20.3	10.0	41.9	53.8	55.9		43.6	42.5	60.0	44.0
Primo 1EC	0.08	4wk	7.5	18.9	40.6	22.3	0.0	46.3	53.0	48.5		42.4	46.2	73.0	44.2
Primo 1EC	0.17	4wk	8.1	22.5	36.5	22.4	12.1	39.0	54.6	52.5		37.4	33.4	43.2	38.9
Untreated			10.1	21.0	35.1	22.1	14.8	42.5	63.7	55.5		37.0	30.9	37.3	40.2
Untreated			8.8	19.4	37.5	21.9	3.4	41.9	58.2	58.7		42.4	38.2	49.9	41.8
Cutless 50WP	0.125	2wk	7.5	19.9	37.9	21.7	13.2	48.1	55.6	54.7		47.3	51.1	80.1	50.0
Cutless 50WP	0.25	4wk	8.8	18.8	36.2	21.2	5.8	43.8	57.0	55.9		43.0	41.3	57.6	43.5
Cutless 50WP	0.5	4wk	7.8	20.0	37.4	21.7	1.3	37.9	63.4	55.1		32.9	24.6	26.6	34.5
Cutless 50WP	0.75	4wk	7.1	22.1	37.1	22.1	15.5	45.3	55.3	48.3		39.6	40.6	60.3	43.5
Cutless 50WP	1	4wk	8.2	21.9	35.9	22.0	6.6	38.4	64.0	48.4		29.1	21.8	23.7	33.1
Turf Enhancer	0.125	4wk	8.8	21.1	36.5	22.1	14.3	55.4	63.5	56.9		49.7	54.2	85.7	54.2
Turf Enhancer	0.25/0.125	4wk	9.8	21.1	33.9	21.6	4.7	43.6	68.7	52.1		33.1	26.3	30.3	37.0
Turf Enhancer	0.25/0.25	4wk	12.8	21.3	38.1	24.0	0.0	46.8	72.6	54.9		35.4	28.6	33.4	38.8
TGR+Fert.	0.25	4wk	9.1	20.9	41.3	23.8	0.0	41.2	65.1	71.1		45.0	35.6	40.8	42.7
TGR+Fert.	0.5	4wk	10.3	21.5	42.3	24.7	1.8	46.1	64.6	68.5		48.8	43.5	56.2	47.1
	LSD (0.05)		NS	NS	NS	NS	12.2	4.7	6.3	5.9		13.5	28.6	42.4	12.9

*/ Divot recovery measured using the point quadrat method and recovery expressed as perecent divot fill/week

**/ Leaf extension measured daily with the Turf-Chek apparatus and measurements expressed as percent increase in height / week

the June quality ratings, where the soil active material treated plots, TGR, Turf Enhancer and Cutless, had less than acceptable quality.

The influence of PGR's on turf density has been reported by several researchers. The lack of significant differences between treatments and the untreated plot for divot recovery could be interpreted as being consistent with the idea that active lateral growth or tillering continues.

Vertical leaf extension was substantial across the entire turf facility. Environmental conditions were conducive to active top growth if moisture was not limiting. Untreated plots from week 3 through week 7 increased leaf height by at least 50%. This means that if you mowed once per week you'd remove 1/2 of the foliage with each mowing. And as is expected, close-cut bentgrass often requires several mowings per week.

There are significant differences among the treatments; however, only a few Primo and Cutless treatments at 4 week intervals provided acceptable regulation and maintained quality. In both cases it was immediately following the second 4 week application. Primo at 0.02 lbs. a.i./acre applied every two weeks did provide excellent regulation, acceptable visual quality with slight, but insignificant increase in thatch.

In the second year of measuring thatch, every effort was made to increase the individual plot sampling to account for within plot variability. As a result, thatch level changes were significant and indicate that 3 years of regular Cutless use could lead to significant increases in thatch level. No other PGR approached the same level of changes in thatch.

SUMMARY

Plant growth regulators for mowing management are viable options; however, a growing season that is conducive to excessive top growth will neutralize the regulation to a great extent.

Therefore, the light frequent applications of low rates of Primo gave excellent regulation (about 35%), maintained acceptable quality (6.9) and did not significantly reduce divot recovery. However, increased Primo rates to 0.04 demonstrated substantial release of regulation (rebound) that may have a physiological consequence predisposing the plant to low-temperature stress.

TGR + fertilizer plots exhibited significant phytotoxicity from applications made under high temperature when the bentgrass may have been stressed. However, the same rate of PGR in Turf Enhancer provided excellent quality and steady regulation throughout the season. Cutless treatments resulted in darker green turf that had a rather non-uniform appearance. Regulation with Cutless was adequate. However, increased rates to compromise quality and result in thatch accumulation greater than the untreated.

Editor's Note: Emily Buelow is a graduate student studying under Dr. Rossi. Amy Sausen is a Turfgrass Outreach Specialist at the UW-Madison, where she is also a grad student.

Effectiveness of Three Thatch Reducing Products on Creeping Bentgrass

by Steven Kuretsky

Introduction

In golf course management, there are many variables involved in maintaining a healthy turfgrass plant. Some of major variables include water, light, soil conditions, and nutrition. Although a minor variable, thatch has given golf course superintendents problems over the years. Thatch is a tightly intermingled layer of living and dead grass stems, leaves, and roots that develops between the verdure (green live tissue) above and the soil below (1). Thatch is a variable that can create problems in the soil profile.

The turf profile consists of three distinct sections: the verdure, the thatch, and the root layer. The verdure layer encompasses the green living plant tissue remaining after mowing (2). Below the verdure layer lies the thatch. The root layer makes up the area of soil that the roots occupy. The condition of each of the layers in the turf profile has separate impacts on the overall turf health. The thatch layer is no exception.

Thatch has both good and bad qualities, depending on its thickness. A desirable thickness is between one-half and 1 inch,depending on the purpose of the surface (green, tee, or fairway) (3). A certain amount of thatch suppresses weed growth. Thatch insulates the ground from extreme temperature, and provides a cushion to help reduce compaction of the soil from traffic (3). If the thatch layer is too thin, grass roots may be damaged from freezing or excessive heat and the soil may become compacted from the weight of traffic. Normally these problems only occur when first establishing turf.

More serious problems may result when the thatch layer is too thick: wilted grass, interception of chemicals, favorable insect and disease conditions, and scalped grass. First, a large buildup of thatch can create a hydrophobic layer during dry periods, which prevents water from reaching the soil and roots. Water runs off the surface, bypassing the roots, and results in wilt. Another problem is the interception of chemicals. Fertilizers and plant protectants are less effective because they get trapped in the thatch matrix (4). This prevents them from reaching the roots and soil, areas where the grass takes them up. A third problem arises from waterlogged thatch. The wet conditions create a favorable environment for disease and insect infestation. The last problem results from scalping when mowing. With too much of a cushion, mower blades scalp the verdure because the heavy machine sinks, giving a shorter cut than intended. Because of these problems, turf manager have to attempt to maintain the proper thickness of thatch to promote a healthy turf.

There are two principal methods of thatch control-mechanical and biological. One mechanical method is aerification. Aerifying removes cores from the ground and allows more oxygen to reach the zone where the decay of organic matter occurs. With more oxygen available, the microbes responsible for thatch reduction decompose it at a faster rate. A second mechanical method is verticutting. Verticutting uses vertical blades to dig into the ground and remove thatch, leaving parallel cuts over the ground surface. This method physically removes thatch rather than improving conditions for biological decomposition. Both of these mechanical methods can be labor intensive on golf courses because the mess created must be removed to allow golf play.

There are two approaches to biological reduction of thatch. The first is topdressing. Topdressing adds a light coat of sand, sandy topsoil, or compost to the grass surface. The topdressing is then worked into the thatch by dragging a mat over the area. When added to thatch, topdressing maintains better moisture and temperature relationships (3). Other benefits may include improved nutrition for microbes and the introduction of a new supply of microorganisms that increase thatch decomposition. The second type of biological control and the focus of this research project is the addition of biological agents. By adding biological agents, the micro- organism population or activity is increased, improving thatch reduction. This method increases microorganism numbers significantly more than topdressing alone, especially if pure sand is used for topdressing. Applying biological products takes little effort because it only involves spreading or spraying the material over the grass surface. No clean-up is needed that would interrupt golf play or keep employees from other duties.

All these methods of control are important to practice in a turf management program. Each one attacks the thatch problem from a different angle, allowing for a more uniform control. If only one method is used, thatch reduction may not equal thatch buildup, allowing continued increases in thatch thickness. With different methods in the thatch control arsenal, managers can choose the method that is the most economic and prudent to use at a articular time. Including biological agents in thatch control programs increases the options for managers.

This research project was designed to see how well three biological control products performed along with other control practices on a golf course tee. The research was performed at the University Ridge Golf Course in Verona, Wisconsin, on the sixth gold tee.

Methods

The three products tested were Carbo-Aid, Envirogenesis Thatch BioDigest, and Bio- Groundskeeper Thatch Reducer. These products were selected because they have different modes of action. Carbo-Aid is a high-energy food for microbes that stimulates growth and activity of the native microorganism population. BioDigest adds microorganisms to the turf. Thatch Reducer reportedly acts by creating a more favorable environment for microorganisms.

The area of the study the sixth hole gold tee sits on an elevated mound surrounded by open space, which allows for good air circulation and full sunlight. The original construction of the tee in 1991 was 6 to 8 inches of pure sand overlying and bounded by native silt loam soil. Normal cultural practices on the tee were not interrupted during the experiment. The bentgrass is mowed at 1/2 inch twice a week. The tee is rarely used so traffic is light. Core cultivation and sand topdressing have been carried out on a regular basis. The tee is irrigated to prevent moisture stress and fertilized with 4 to 5 lb N per year.

The four treatments (the three reducing products + an untreated control) were randomly assigned to 6 x 10 foot plots in four blocks, giving a total of 16 plots. After the plots were staked out, five soil cores were randomly removed from each plot for measurement of initial thatch thickness and the percent organic matter in the thatch layer. Thatch thickness was found by compressing the core and measuring thatch depth with a ruler. The organic matter content of the thatch was found by removing the layer from the soil core, brushing off sand grains adhering to the outside of the thatch core, and obtaining the oven-dry weight. The core was then crushed and heated to 600 C for 2 hours to burn off the organic matter. Subtracting the final weight from the initial weight gave the percent organic matter.

After sampling the plots, the thatch control products were applied as solutions with a CO_2-powered backpack sprayer. Carbo-Aid was applied at 16 oz/M each of the first 2 weeks. The Envirogenesis product was applied at a 1 gal/A rate once a week for 3 weeks. The last product, Bio-Groundskeeper Thatch Reducer, was applied only once at a rate of 32 oz/7,500 ft2. These rates are those recommended by the manufacturers.

The first application date was September 15. On November 13, or about 2 months after treatment began, cores were once again removed from the plots for thatch measurement and determination of organic matter content.

Results and Discussion

Initial thatch thickness on the tee averaged 33 mm, or 1.3 inches. Because of repetitive core cultivation and sand topdressing, the original thatch organic matter content was only 9.61%. The changes observed in thatch thickness and organic matter content were as follows:

	Thickness reduction (mm)	Organic matter reduction (%)
Control plot (no treatment)	0.3	0.85
Carbo-Aid	0	1.68
Envirogensis Thatch BioDigest	0	1.08
Bio-Groundskeeper Thatch Reducer	0.3	1.78

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Statistical analysis revealed that none of the reductions in thatch thickness or organic matter content could be attributed to the treatments applied. Rather, the changes observed were merely due to uncontrolled random variation in the plots and/or the samples collected.

Failure to see a change in thatch thickness is understandable. Core cultivations and sand topdressing have intermixed so much sand into the thatch layer that thickness of the layer is controlled by the sand present. A more proper term for this type of layer is mat rather than thatch.

The plots were cultivated and sand topdressed during the study. The addition of more sand to the thatch may well account for the reduction in percent organic matter observed in the control treatment. If it is assumed that all other treatments were similarly affected, the reduction of 0.85% organic matter in the control treatment needs to be subtracted from the reductions in the other treatments to see how the products affected thatch organic matter content. Doing this reveals organic matter reductions from 0.23% in the Envirogenesis treatment to 0.93% in the Bio-Groundskeeper treatment.

Although the reductions in thatch organic matter content were not significant, it has to be borne in mind that study was conducted for only 2 months in the fall of the year. Given this short time period and the fact that declining temperatures in fall slow microbial activity, it seems reasonable to conclude that the Carbo-Aid and Bio-Groundskeeper products merit further testing as thatch biocontrol agents.

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Wisconsin TDDL Takes Big Step Forward

By Bob Erdahl

When you have a disease problem on your golf course, how do you go about finding a solution? Most of us rely on our experience; we know what diseases occur at certain times of the year and the weather conditions that spell trouble. We have learned to anticipate problems and do everything possible to prevent a disease from damaging both our golf course and our reputation.

Sometimes, however, we run into an unknown disease that stumps us. Then what? Well, we can call our fellow superintendents for their advice, we can blow the dust off of one of those books that have all the full color pictures of every turfgrass disease known to man, we can call in the USGA and we can pray—a lot.

Starting in 1996, the answer to many a prayer will be answered when the Turfgrass Disease Diagnostic Lab (TDDL) opens at the O.J. Noer Turfgrass Research & Education Facility. The TDDL will be a great step forward for all turfgrass managers in the state of Wisconsin. It will provide a multitude of services including: rapid, and accurate diagnosis of turfgrass diseases, research aimed at developing new technologies to identify pathogens that are difficult to detect and support for the educational programs at the O.J. Noer Turfgrass Research & Education Facility.

Like most large steps forward, the TDDL for 1996 owes its existence to a series of smaller steps that have occurred over a number of years. The origins of turfgrass disease diagnosis in Wisconsin go back to Dr. Gayle Worf at the University of Wisconsin-Madison. Dr. Worf was the pioneer UW-Extension Turfgrass Pathologist from the early 70's to the early 90's. His work focused on snowmold control, testing of new fungicides, and the identification of *Leptosphaeria korrae* as the causal agent of Necrotic Ring Spot. Dr. Worf's advice and counsel were responsible for bailing many a golf course superintendent out of hot water.

The current UW-Extension Turfgrass Pathologist, Dr. Julie Meyer, came on board in 1992. Her work consists of turfgrass disease research at the O.J. Noer Turfgrass Research & Education Facility and at sites throughout the state of Wisconsin. Dr. Meyer was on parental leave during the 1995 season and will return for the upcoming year.

The first facility in Wisconsin for the diagnosis of plant diseases was the Plant Pathogen Detection Clinic at the UW-Madison Department of Plant Pathology. Established in the mid 70's, the clinic is responsible for diagnosing disease problems on all agricultural crops, including turfgrass, in the state of Wisconsin. As the UW-Extension Turfgrass Pathologists and members of the faculty in the Department of Plant Pathology at UW-Madison, both Dr. Worf and Dr. Meyer have been responsible for overseeing the turfgrass side of the clinic.

As 1995 opened, two key factors began to drive the future of turfgrass disease diagnosis in the state of Wisconsin. First of all, Dr. Julie Meyer was going to take a parental leave for the 1995 growing season. Secondly, the turfgrass industry in Wisconsin (especially golf course superintendents) were calling for turfgrass diagnostic services that were more responsive to the needs of the turfgrass industry in the state of Wisconsin. To meet these challenges, the Department of Plant Pathology decided to create an independent facility for turfgrass, the Turfgrass Disease Diagnostic Lab (TDDL).

The TDDL was put under the supervision of Dr. Doug Maxwell. Dr. Maxwell was long on plant disease research and short on experience with diseases of turfgrasses. He appointed

FIGURE 1. Percent distribution of turfgrass managers that submitted samples to the University of Wisconsin, Department of Plant Pathology, Turfgrass Disease Diagnostic Lab in 1995.

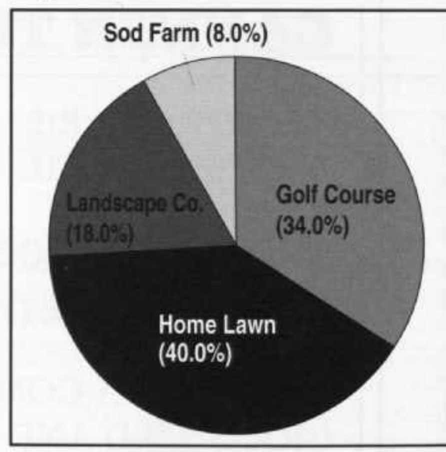

FIGURE 2. Number of samples submitted monthly to the TDDL by grower in 1995. GC=Golf Course, HL=Home Lawn, LC=Landscape Company and SF=Sod Farm.