Nitrogen Fertilization and Brown Patch

By Michael Fidanza and P. Dernoeden

1996 Interaction of Nitrogen Source, Application Timing, Fungicide on Rhizoconia Blight in Ryegrass.

The goal of an Integrated Pest Management (IPM) program is to maximize plant health so that as stress and pest pressures increase the plant is able to maintain acceptable quality. Several questions arise from the examination of this goal. How do you know if your plant is healthy? Even if the plant is healthy, if pest presure is severe, will the plant be attacked? And of course, what is acceptable quality?

Researchers at the University of Maryland, Dr. Michael Fidanza and Dr. Peter Dernoeden, investigated the interaction among nitrogen source, application timing and fungicide on Rhizoconia Blight (brown patch) on perennial ryegrass maintained at golf course fairway height. With the scarcity of information available regarding the influence of turfgrass nutrition on disease incidence and severity, this is important research. The research focused on spring vs. fall emphasized fertilization programs of Ringer's Lawn Restore (a slow release nitrogen source) and water soluble urea. The intersting aspect of the work was the fungicide treatment. Ipridione (Chipco 26019 among others) was applied at the recommended rate, but at 21-day intervals as opposed to the 10-to 14-day interval on the label to determine if N fertilization influenced disease severity (i.e. will the brown patch kill the turf?).

In general, the plots not treated with the fungicide did not maintain acceptable quality as a result of severe brown patch infestation. In addition, spring N fertilization enhanced growth of the fungus during the initial infection periods from late June to late July in Maryland. However, there was a significant reduction in brown patch associated with the fall-emphasized program of Ringer's Lawn Restore as compared to the spring program with water soluble urea. While the reduction was significant, the turf quality was deemed unacceptable for golf course fairway turf.

These results support the work of our Dr. Eric Nelson, who observed reduced brown patch when using Lawn Restore back in 1990. Furthermore, the Maryland researchers concluded, "in regions where brown patch is not a chronic and severe disease problem, fungicide application frequency may not be as important as it was under conditions of this study." A conclusion that truly challenges us to practice IPM.

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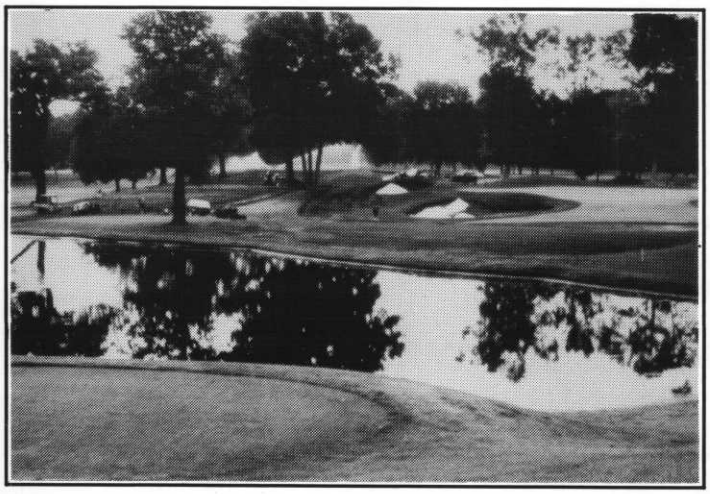
Edina Country Club Undergoes a Facelift

By Dale Wysocki

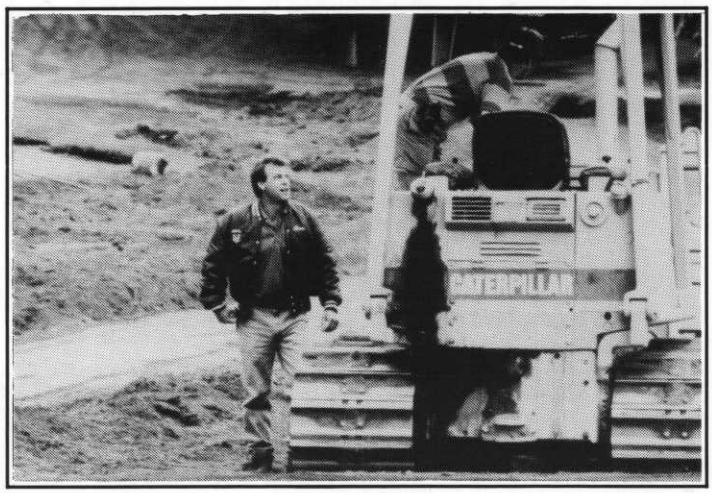
As you drive onto Edina Country Club via the maintenance access road, the first thing you notice is a lack of ball washers, flagsticks and other golf course accessories. But you see the greens, tees, fairways and rough. Yes, there is a golf course here, it's a golf course under construction. Both nines are closed. Basically there's no play. Could this be a Golf Course Superintendent's dream? The Ping putter lies dormant in the bed of the maintenance cart. Only tools of the construction trade are in there now: marking paint, marking flags and a shovel. This is a very tough way to break into the business.



Redesigning can make a golf course a very busy place.

Second year golf course superintendent Dave Simeon is getting a constructive education. Dave became the general contractor for this project, the person responsible for scheduling everything. That meant being in contact with Roger Rulewich, the designer. Mr. Rulewich formerly with Robert Trent Jones, Sr. brought a wealth of experience to the table, and this design experience should take Edina Country Club well into the next millenium. The golf course was not modified just here and there. Rather, the desing was a total re-design with the idea of giving Edina a new look.

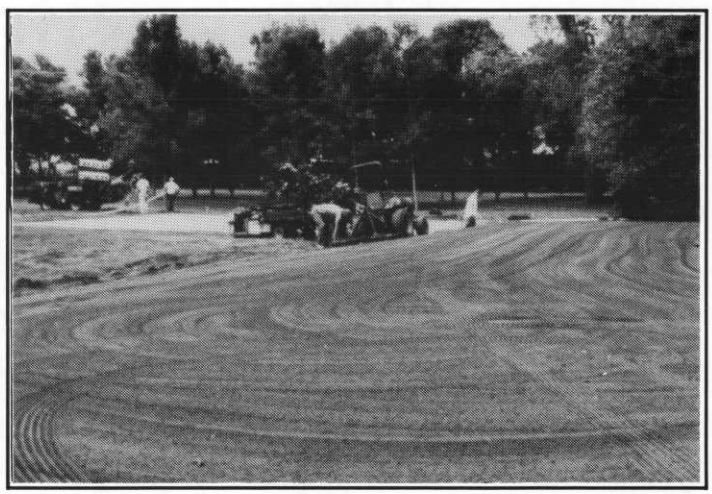
The groups selected to do the actual work at Edina are no strangers to the golf construction business. Golf Group, Inc. did a majority of the earthmoving and green construction while Roloza Turf was the supplier of the new sod for the greens. The unique part of this year's project was that the project only lost two days due to weather delays. With the construction project going on and no play, some may think that since the golf course has been closed since July



General Contractor (Edina CC Sup't.) Dave Simeon.

22, this could mean prime time with the family, no 4:00 a.m. mornings, less all around pressure. However, new sod has to be irrigated (most often by hand), and there still is the pride of keeping Edina Country Club in top playing condition. The grounds department was "beefed up," and at times three-fourths of the staff was supporting the project to make sure that the project was finished on time.

The entire construction project began in July right after the Western Junior Open and finished according to schedule. Next year after the snows of winter have cleared, and Mother Nature awakens the earth, you will find a new golf course emerging from dormancy.



Putting finish grade on the tee.

Controlling Snow Mold

By Eric Nelson
Dept. of Plant Pathology — Cornell University

Courtesy of Cornell University Turfgrass Times

Over the past few years the entire northeastern United States has been under severe snow mold pressure. This has been due to the unusually heavy and persistent snow cover as well as the wet and cool spring conditions. It is time now to begin considering strategies for minimizing snow mold damage this winter and the following spring.

In New York, two major snow mold diseases cause problems on home lawns and golf courses: gray snow mold, or Typhula blight, caused primarily by Typhula incarnata; and pink snow mold, or Fusarium patch, caused by Microdochium nival. These diseases each affect turfgrasses quite differently, with pink snow mold being potentially the most damaging. The management strategies for snow mold diseases necessarily must be multifaceted, including cultural, biological and chemical approaches.

Fertility Management

Fertility management is key to minimizing snow mold damage. It is important to avoid heavy fertilizer application late in the fall to avoid stimulating unnecessary foliar growth that is more susceptible to infection. Fertilization should occur much earlier or should be applied as dormant applications. Often, heavy dormanat applications of organic fertilizers, particularly those that are compost-based, are quite helpful in minimizing snow mold damage. These materials provide significant levels of biological activity that help to suppress the activities of the snow mold pathogens. Applications to sensitive areas of between 10 and 200 lbs./1,000 sq. ft. have been effective. However, make sure that composts are adequately stabilized and have an "earthy" odor. Material applied at rates of 200 lbs./1,000 sq. ft. must be removed from golf course turf prior to breaking dormancy in the spring.

Water Management

Water management is another key component of successful snow mold management. It is important that turfgrass soils be well-drained and free of significant levels of compaction. It is often helpful to maintain lawn turf at a minimum cutting height so that a dense turf canopy, which often holds more moisture and maintains higher relative humidity, does not become snow covered. Thatch accumulation should also be kept to a minimum since excessive thatch levels can result in high levels of water retention. It is equally important to reduce the amount of snow cover, if at all practical, and to prevent compaction of the snow cover on disease-prone areas. Generally, the greater the snow cover, the longer the soil pH (less than 6.0) and balanced soil fertility is particularly important in reducing pink snow mold damage.

Fungicide Applications

Preventive fungicide applilcations are quite helpful in minimizing snow mold damage. However, oftentimes the fungicides effective against Typhula blight are not always effective against pink snow mold. Among the better choices for fungicide applications are chlorothalonil (e.g., Daconil 2787 40F) applied at 8 oz./1,000 sq. ft. or propiconazole (Banner 1.1E) applied at 4 oz./1,000 sq. ft. These fungicides are usually applied in late October to early December. Banner should be applied toward the early part of that window whereas Daconil may be applied in early December prior to snow cover.

In the spring, be sure to rake out any diseased areas to facilitate drying and fertilize to promote turfgrass growth. Snow molds generally are not devastating, but, if left untreated, could destroy vast areas of turf. So take some time now to prepare your turf for next spring.

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The Influence of Plant Growth Regulators on Golf Course Turf

By Frank Rossi
Extension Turfgrass Specialist

Courtesy of Cornell University Turfgrass Times

Plant growth regulator (PGR) technology is poorly understood by a majority of golf turf managers. PGRs are touted as tools for reducing mowing, controlling annual bluegrass and increasing green speed. PGRs recommended for use on high quality (or Class A type) 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 affects 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 GAs 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 GAs are produced but before the important GA[1], can trigger elongation. In essence, Primo is less physiologically disruptive.

PGRs 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, 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.

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 with a Turf-Chek Prism for 7 weeks after the initial application date. Plots were mowed one time per week for the first four 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 four week treatments. This resulted in three 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 from the damage, therefore delayed treatment initiation until early July. One could speculate that ability to recover might be evident in the June quality ratings, where the soil active material treated plots, TGR, Turf Enhancer and Cutless, had less than acceptable quality.

The influence of PGRs on turf density has been reported by several researchers. The lack of significant differences between treatements 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 half 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 four-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 three years of regular Cutless use could lead to significant increases in thatch level. No other PGR approached the same level of changes in thatch. *(Continued on Page 19)*

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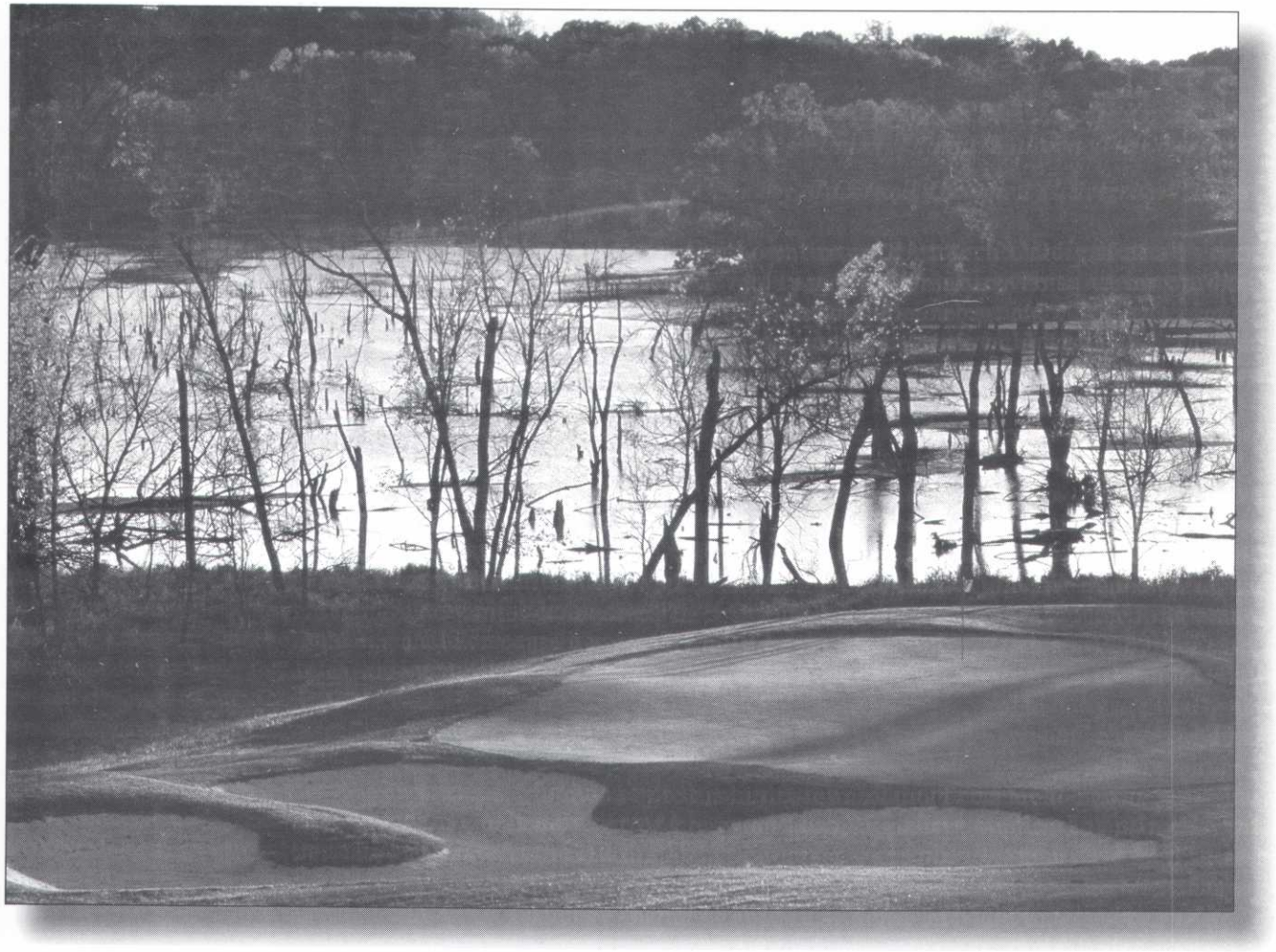

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Plant Growth Regulators—

(Continued from Page 17)

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 compromise quality and result in thatch accumulation greater than the untreated.

Table 1. Data from the 1995 Bentgrass Fairway Mowing Management Trial showing divot recovery and vertical leaf extension.

			Weekly % Divot Recovery*				Average Weekly % Vertical Leaf Extension**							
Treatment	Rate (lbs. ai/A)	Appl. Interval	Divots Taken in July	Divots Taken in Aug.	Divots Taken in Sept.	Mean Wkly Divot Recovery	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Mean Vert 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 percent divot fill/week.
** Leaf extension measured daily with the Turf-Chek apparatus and measurements expressed as percent increase in height/week.

Table 2. Data from the 1995 Bentgrass Fairway Mowing Management Trial showing visual quality and thatch levels.

			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	6.0	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	4.2	6.5	7.0	7.7
Primo 1EC	0.02	2wk	7.1	7.2	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	7.0	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	4.2	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	5.2	6.3	6.6	5.2
Untreated			6.7	6.3	6.6	7.6	6.8	3.5	6.5	6.1	-5.8
Cutless 50WP	0.125	2wk	7.1	7.0	6.5	7.5	7.1	4.0	5.8	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	6.3	6.8	6.3
Turf Enhancer	0.25/0.125	4wk	6.1	6.0	6.4	7.3	6.5	5.0	6.5	6.3	-3.6
Turf Enhancer	0.25/0.25	4wk	5.9	6.0	7.0	8.0	6.7	5.2	7.0	6.6	-6.9
TGR+Fert.	0.25	4wk	6.3	6.0	4.3	4.9	5.4	4.8	5.2	6.8	28.6
TGR+Fert.	0.5	4wk	5.9	5.8	4.8	5.5	5.5	4.5	6.8	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.

The Art Of Cup Cutting

Superintendents use a range of strategies in locating cups on greens, from formal "clock" or "grid" strategies to unstructured "mix-it-up" viewpoints. Whatever the strategy, superintendents' attention to detail makes the game more enjoyable for golfers and protects turf.

Cup Cutting Considerations

- Strive for a balance of fair, challenging and in-between holes.
- Locate on a constant slope or flat area.
- Avoid edges of the green.
- Locate the pin high and dry, avoiding drainage areas when rain is likely.
- Assess the condition of grass around proposed hole locations and avoid areas with shoe wear, scuffs and depressions.
- Consider heat, humidity, compaction, moisture, amount of play and wind direction.
- Train appropriate staff utilizing one or two crew members for consistency. Critical: Designated staff must understand golf.
- Designate same crew members to set tee markers to insure consistent course yardages.
- Provide quality control check of their work on a regular basis.
- Clean flag often. Replace as needed.
- Clean cup and wipe flag stick.
- Provide special treatment during tournaments, i.e., paint cups.
- Replace old cup cut evenly avoiding "volcanoes."
- Insist staff adhere to facility's cart rules which may mean they can't drive up to the green when performing duties.
- Involve the golf professional when necessary.
- Use cup cutting staff as "eyes and ears" for potential problems since they are often first on the course.

Sources: John Carlone, CGCS, Middle Bay Country Club, Oceanside, N.Y.; Richard Lavine, CGCS, Peacock Gap Golf and Country Club, San Rafael, Calif.; Ronald Ross, CGCS, Hillcrest Country Club, Lincoln, Nebr.; Gary Skolnik, Fountain Grove Resort and Country Club, Santa Rosa, Calif.