CORNELL UNIVERSITY TURFGRASS TIMES

CUTT

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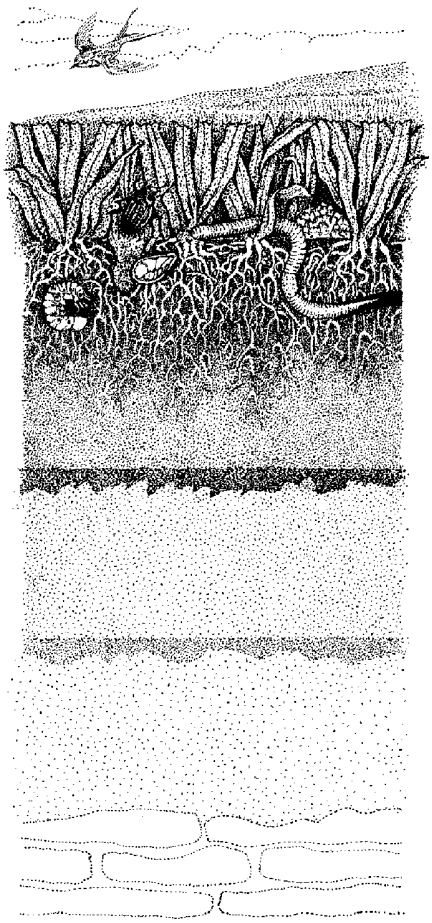

The Influence of Plant Growth Regulators on Golf Course Turf

Plant growth regulator (PGR) technology is poorly understood by a majority of golf turf managers. PGR's are touted as tools for reducing mowing, 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 (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 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 GA_1, 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 3rd 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 func-

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This Times

Short Cutts

If you have responsibility for athletic field maintenance, you should attend the* Winning Fields *program September 19, 1996 at Doubleday Field in Cooperstown, NY from 8:00 am – 3:00 pm.

The 1996 New York State Turfgrass and Grounds EXPO will be held in Rochester, NY November 12-15. The EXPO's theme is "Grow with Us!"

Winning Fields Program

If you have responsibility for athletic field maintenance, you should attend the *Winning Fields* program sponsored by the New York State Turfgrass Association (NYSTA), Cornell University and the New York State Association for Superintendents of School Buildings and Grounds. The program will be held September 19, 1996 at Doubleday Field in Cooperstown, NY from 8:00 am – 3:00 pm.

The goal of the program is to provide an educational experience that addresses basic and advanced topics with emphasis on understanding the fundamental principles of sports turf management. Speakers include Frank Rossi of Cornell, Bob Emmons of SUNY Cobleskill, Dominic Morales of SUNY Delhi, John Liburdi, Jr. of Heritage Park, Jim Hornung of North Americare Park, and Joe Harris of Doubleday Field. Up to 7 DEC pesticide recertification credits may be earned by attending the program.

The registration fee for NYSTA members is $50 (nonmembers $60) and includes all seminars, coffee breaks and lunch. There also will be a commercial vendor exhibit area. For further information about attending the *Winning Fields* program contact NYSTA, PO Box 612, Latham, NY 12110, (800) 873-TURF, (518) 783-1229, fax (518) 783-1258. For information on exhibiting at the program contact Jim Hornung (716) 851-4179, or John Liburdi, Jr. (518) 869-2054.

Grow with Us! 1996 New York State Turfgrass and Grounds Exposition

Excitement is building towards the 1996 New York State Turfgrass and Grounds EXPO to be held November 12-15, 1996 at the Rochester Convention Center.

The theme for the 1996 EXPO "Grow with Us" exemplifies the tremendous growth in attendance and improvement in the educational program over the last 48 years. Also, it illustrates the "next generation" of the turfgrass conference to be held in 1997 at the OnCenter in Syracuse. Most importantly, the 1996 show will help us bid farewell to Rochester on a high note with an exciting educational program organized cooperatively by the New York State Turfgrass Association and the Cornell Turfgrass Team!

The traditional Tuesday one-day seminars brings us "Back to Basics", but also adds 3 exciting programs including "A Tree Workshop with Alex Shigo", and a Golf Course Construction seminar lead by Dominic Morales, the Delhi Professor who was responsible for "Bringing it All Together" with the addition of 9 holes to the Delhi College Course. Headlining that seminar are Dr. Michael Hurdzan and former Cornell Turfgrass Team member Dr. Norm Hummel. And rounding out the lineup on Tuesday is the first ever, Sports Turf Seminar with a full-day program that addresses sports turf soils, drainage, irrigation, renovation, and infield care.

The excitement grows on Wednesday with the Keynote Speech from Paul Maguire, former Buffalo Bill and now a color analyst with NBC Sports. Then the breakout sessions with international experts such as Dr. James Beard, Dr. David Minner, the inventor of SportGrass, renowned author Bob Emmons and of course your Cornell Turfgrass Team Members (Villani, Neal, Nelson, Ferrentino, Gruttadaurio, Petrovic, White, and Rossi). A special general session is planned for Thursday afternoon with Mr. Michael Zagata, the Commissioner of the New York State Department of Environmental Conservation, speaking on "Future Directions of the DEC". Following Commissioner Zagata, the Dean of the College of Agriculture and Life Sciences at Cornell, Dr. Daryl Lund will discuss future partnerships among the turf industries and Cornell, later Dr. Frank Rossi will provide his vision of the New York State Turfgrass Industry.

Once again the Trade Show is sure to be the largest display of turfgrass equipment and wares

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"The Seed Police?"

Did you ever wonder if what you purchase in a bag of seed is actually what the label says it is? A Registered Seed Technologist is one of the few reliable resources for accurately determining seed purity and viability, yet, what if you wanted to know the variety?

Researcher's at Ohio State University in Dr. Karl Danneberger's laboratory (Dr. Patty Sweeney and Rob Golembiewski) utilized current analytical techniques for effective discrimination of turfgrass varieties. In developing a protocol procedure, varieties of chewings fescue, creeping bentgrass, Kentucky bluegrass, tall fescue, and perennial ryegrass were tested.

The two questions that the researchers addressed were 1) could current genetic techniques be used to discriminate turfgrass varieties from seed, and 2) could genetic material from a single seed be used for variety identification. The answer to both questions was yes! Several university laboratories throughout the country could provide this service.

(From: Patricia Sweeney, R. Golembiewski, and K. Danneberger. 1996. Random Amplified Polymorphic DNA Analysis of Dry Turfgrass Seed. HortScience 31(3):400-401.)

Short Cutts

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lest the national shows. Also, many new products are sneak previewed only for attendees of the EXPO. Preliminary programs have been mailed to NYSTA members, so register now! If you'd like more information, contact Beth Seme, Executive Director of the New York State Turfgrass Association, at (800) 873-TURF(8873).

Farewell From Joe Neal

Joe Neal, Associate Professor of Weed Science, couldn't leave without saying a personal goodbye—Ed.

You may recall from the last issue of *CUTT* that I will be leaving Cornell to accept a similar position at North Carolina State University. I could not leave without thanking you and the turfgrass and landscape industry organizations for the support, encouragement, and friendships offered so freely over the past twelve years. My decision to leave has more to do with opportunities and family ties in North Carolina than with

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Nitrogen Fertilization and Brown Patch

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 pressure is severe, will the plant be attacked? An 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 Rhizoctonia 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 interesting 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 sever 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.

(From: Michael Fidanza and P. Dernoeden. 1996 Interaction of Nitrogen Source, Application Timing, Fungicide on Rhizoctonia Blight in Ryegrass. HortScience 31(3):389-392.)

Scanning the Journals

A review of current journal articles

The researchers asked: 1) could current genetic techniques be used to discriminate turfgrass varieties from seed, and 2) could genetic material from a single seed be used for variety identification. The answer to both questions was yes!

There was a significant reduction in brown patch associated with the fall program of Ringer's Lawn Restore compared to the spring program with water soluble urea.

Plant Growth Regulators

continued from front cover

Plant growth regulators are touted as tools for reducing mowing, controlling annual bluegrass, and increasing green speed. PGR's regulate growth by inhibiting cell division or cell elongation.

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.

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

Frank Rossi, Extension Turfgrass Specialist
Cornell University Turfgrass Team

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

Treatment	Rate (lbs. ai/A)	Appl. Interval	Weekly % Divot Recovery*				Average Weekly % Vertical Leaf Extension**							
			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.

Treatment	Rate (lbs. ai/A)	Appl. Interval	Visual Quality						Thatch Levels**		
			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.

Research Update

The objective of this study is to evaluate select bluegrass cultivars managed under medium to low maintenance golf course fairway conditions.

Prolonged periods of high temperature and high humidity resulted in a significant decline in turf quality for most cultivars.

Kentucky Bluegrass Golf Course Fairway Cultivar Evaluation

Kentucky bluegrass (*Poa pratensis*) is a major turfgrass species in New York State. It was introduced in the United States by the early colonists possibly in the hay brought for livestock. Today, it is widely used for home lawns, golf courses, sod production and sportsturf. National evaluations have been conducted for several years throughout the country to evaluate the performance of Kentucky bluegrass under various management regimes.

In 1992, several genotypes of Kentucky bluegrass were selected that exhibit characteristics such as compactness, aggressiveness, disease resistance and color retention. All selected cultivars performed in the top 5% at sites where mowing heights were 1 inch or below. The objective of this study is to evaluate select bluegrass cultivars managed under medium to low maintenance golf course fairway conditions.

Experimental Methods

Plots were established from seed at a rate of 1.75 lbs. pure live seed (PLS)/ M in September, 1992 on a Batavia silt loam with pH 7.2. Plots are mowed with a Jacobson Estate Mower set at 0.75", 2 times per week. Fertilizer applications are made to supply 2.5 to 4 lb. N / M/ year. The area is irrigated to prevent dormancy and in 1995 experienced substantial heat stress that required irrigation. A herbicide application was made in 1995 to control broadleaf weed invasion (Confront @ 0.75 ai/A).

Visual color and quality ratings are recorded monthly during the growing season on a scale of 1 to 9; for Color 1=brown turf, 9=dark bluegreen; for Quality,1=poor quality, 6=minimum acceptable quality, 9=ideal turf; and for pest incidence, 0=no damage, 9=severe damage.

Results

Prolonged periods of high temperature and high humidity resulted in a significant decline in turf quality for most cultivars. This is not surprising, as the selections are predominantly elite bluegrass types that require high levels of maintenance to provide acceptable quality. As a measure of the stress, two distinct pest infestations were evident in August. Turf injury associated with black cutworm (*Agrotis ipsilon*) and necrotic ringspot (*Leptosphaeria korrae)* was cultivar specific. Cynthia, Ram I, and Crest all had pest incidence and damage that could be considered objectionable. As a result, quality of these cultivars was reduced below an acceptable level.

Alpine, a cultivar from the Pickseed Co., forms a high quality, dense, fine textured, compact turf. It is possible that ball lie on this cultivar might be similar to a bentgrass fairway maintained at 0.5 inch. Alpine has demonstrated poor spring color that is typical of the dark green, compact bluegrass types such as Midnight and America. Quality of Alpine in 1995 was significantly below the 3 year average, most likely a result of a stressful summer. Also, Midnight Kentucky bluegrass which has been a top performer in many national trials, suffered several months of below acceptable quality ratings and high incidence of necrotic ringspot. The performance of these cultivars is consistent with research that investigated recovery from summer dormancy.

Summary and Conclusions

Overall cultivar performance during the 3 year period is very good with all mean quality ratings at an acceptable level. The 1995 growing season provided information on heat and moisture stress tolerance, as compared to previous years that were predominately cool and wet.

This study indicated that Kentucky bluegrass cultivars, commercially available in New York, can tolerate close mowing and medium to low maintenance. Cultivars of note include Alpine, Cynthia, Asset, Touchdown, Indigo, Welcome and Eclipse.

When deciding on Kentucky bluegrass for close mowing conditions, consider blending at least 3 to 5 cultivars because the seed of a Kentucky bluegrass cultivar produce genetically identical plants. Therefore, blending cultivars provides the needed diversity for pest and stress tolerance.

Golf course fairway turf blends should have higher proportions of compact types (Alpine, Indigo, Midnight, America and Glade) and Aggressive types (Touchdown, Limousine, and Princeton-104) to provide a dense turf that will withstand regular traffic.

FRANK ROSSI, EXTENSION TURFGRASS SPECIALIST
CORNELL UNIVERSITY TURFGRASS TEAM

Table 1. Data from the Kentucky Bluegrass Fairway Cultivar Evaluation.

	Visual Quality									Pest Damage	
Cultivar	Spring Color	May	June	July	Aug.	Sept.	Fall Color	1995 Mean	3 Year Mean	Cutworm*	NRS**
Alpine	2.9	4.2	8.8	8.4	7.2	6.8	6.7	7.1	7.6	0.3	1.3
Cynthia	7.1	7.4	6.5	6.8	6.0	6.7	6.6	6.7	7.3	2.8	4.8
Asset	7.3	7.7	7.3	7.6	6.0	6.8	6.6	7.1	7.3	0.0	0.5
Touchdown	7.1	7.4	7.2	7.6	6.6	7.4	7.3	7.2	7.2	0.0	0.3
Indigo	5.7	6.0	6.5	6.8	6.3	7.1	6.9	6.5	7.2	0.0	0.3
Welcome	6.8	7.2	7.2	7.6	5.8	6.6	6.4	6.9	7.2	0.3	1.0
Eclipse	6.8	5.6	6.8	7.2	6.2	7.0	6.9	6.6	7.1	0.0	1.0
Bristol	6.7	7.0	5.9	6.2	5.9	6.6	6.5	6.3	7.0	0.0	2.0
Enmundi	6.8	7.2	6.6	7.0	6.0	6.7	6.6	6.7	7.0	1.5	2.8
Adelphi	7.2	6.7	7.2	7.6	6.2	6.9	6.8	6.9	7.0	0.0	0.8
Bronco	7.8	8.2	6.7	7.0	6.5	7.3	7.1	7.1	7.0	0.0	1.0
Midnight	5.7	6.0	5.6	5.9	6.2	6.9	6.8	6.1	7.0	1.5	3.3
Ram I	7.3	7.7	6.7	7.1	5.8	6.5	6.3	6.7	6.9	5.5	7.8
America	4.3	4.5	6.5	6.8	5.9	6.6	6.4	6.0	6.9	1.0	2.3
Glade	5.9	6.2	6.8	7.1	6.6	7.4	7.2	6.8	6.9	0.5	0.8
Victa	6.2	6.5	6.0	6.3	5.9	6.6	6.5	6.3	6.8	0.0	0.5
Crest	6.2	6.5	6.1	6.4	5.7	6.4	6.3	6.2	6.8	3.0	5.3
Coventry	4.6	4.8	7.2	7.6	5.4	6.1	6.0	6.2	6.7	0.3	0.8
Banff	5.7	6.0	5.5	5.7	5.8	6.6	6.9	5.9	6.7	0.0	0.0
Liberty	6.8	5.9	5.8	6.1	6.1	6.9	6.7	6.1	6.6	0.3	2.0
LSD (0.05)	0.9	0.7	0.6	0.8	0.3	0.3	0.4	0.4	0.5	1.0	1.5

* Cutworm damage rated on a scale of 0 to 9, where 0=no damage, 9=severe damage.
** NRS is the incidence of necrotic ringspot rated on a scale of 0 to 9, where 0=no disease, 9=severe disease.

Short Cutts

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any dissatisfaction with Cornell. I have truly enjoyed working with my colleagues at Cornell, the Extension agents, and your industry organizations to provide weed management guidelines and educational opportunities. While my departure will leave a temporary void, you still have at Cornell one of the best turfgrass management teams in the country. I'm sure you will continue to support them as they work to help you and your industry.

I will miss my friends and colleagues at Cornell and throughout New York, but take with me many fond memories and all that I have learned from you (well, maybe not all but at least as much as an absentminded professor can retain). I bid you a fond farewell but look forward to seeing many of you at the NYSTA conference in November.

Cornell Turf Short Course Announced

The 12th annual Cornell Cooperative Extension Turfgrass Management Short Course will be held in Ithaca, NY January 6-10 and 13-17, 1997.

The 2-week long Short Course includes 75 teaching hours focusing on the principles of turfgrass establishment and maintenance. Topics studied include grass morphology, identification and selection; principles of soils, drainage, irrigation, fertilization, cultivation, and renovation; and pest management topics including identification and control strategies for insects, diseases and weeds. Additional subjects covered for professional development include developing budgets, communication skills, customer relations, motivation in management, developing turfgrass management strategies, and the selection, establishment and maintenance of ornamentals.

Forty instructors and assistants from Cornell University's Turfgrass Science Program, SUNY Agricultural and Technical Colleges at Cobleskill and Delhi, and the turfgrass industry

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The 12th annual Cornell Cooperative Extension Turfgrass Management Short Course will be held in Ithaca, NY January 6-10 and 13-17, 1997.

NTEP Evaluation of Bentgrass Cultivars for Fairways and Tees

Research Update

Bentgrass use in the United States is almost exclusively limited to low-cut, high maintenance turf. Fairway turf can account for 90% of all high maintenance turf on a golf course. In addition, the expansive nature of golf course fairways stretches them over a variety of soil types and microenvironments.

The National Turfgrass Evaluation Program (NTEP) was initiated in 1980 under the direction of Dr. Jack Murray. NTEP is a cooperative venture between the United States Department of Agriculture (USDA), the Agricultural Research Service (ARS), and the National Turfgrass Federation (NTF). Trials are conducted at hundreds of locations throughout North America and coordinated by Kevin Morris of the USDA in Bethesda, MD.

Bentgrass *(Agrostis spp.)* use in the United States is almost exclusively limited to low-cut, high maintenance turf. The explosion of new bentgrass cultivars provides a variety of options for the golf course superintendent. Fairway turf can account for 90% of all high maintenance turf on a golf course. In addition, the expansive nature of golf course fairways stretches them over a variety of soil types and microenvironments.

New cultivars are being released that are specific for use on finer textured soils, found on fairways, while others are developed exclusively for sand-based putting greens. Still, all cultivars are judged based on their performance relative to Penncross. After 40 years of dominating the bentgrass market, it is hard to argue the benefits of a cultivar that has provided excellent quality in one 3- or 5-year test, when Penncross has performed adequately over 40 years! The objective of this NTEP trial is to evaluate creeping, colonial and dryland bentgrasses for quality under golf course fairway and tee conditions.

Experimental Methods

Thirty experimental and commercially available creeping and colonial bentgrass cultivars were seeded at 1#/M on May 26, 1993 on a Batavia silt loam pH 7.2. Fertilizer applications are made to supply 2.5 to 3#N/M/yr. Plots are mowed three times per week with lightweight triplex mowers set at 0.4 in. Irrigation is supplied to maintain adequate soil moisture.

Fungicide applications for dollar spot and brown patch control were made on a curative basis and included Sentinnel, Daconil, Chipco, and Banner. Visual quality ratings were recorded monthly on a scale of 1 to 9, where 1=poor quality, 6=minimum acceptable quality, and 9=ideal turf. Disease incidence is rated from 0 to 9, where 0=no disease, 3=objectionable level, and 9=severe infestation.

Results

Following establishment of the trial in 1994, no preventative snow mold control was applied. Snow mold ratings demonstrate substantial differences among bentgrass species and cultivars. Colonial bentgrasses such as Exeter and OM-At-90163 had little incidence, while SR7100 and Tendez were surprisingly infested. Among the creeping bentgrasses, Cato, Providence, Pro/Cup, and BAR WS42102 all demonstrated substantial tolerance to snow mold. Penncross was severely infested with snow mold which lead to an uncharacteristically poor spring color rating. However, most cultivars recovered and provided excellent quality in May.

As the season progressed, the cultivars began to show the effects of the heat and humidity. Throughout June, July and August no less than 50% of all cultivars provided acceptable quality. However, Penn G-6, G-2, Cato and Providence maintained excellent quality during the stressful months. G-2 and G-6 had significant incidence of brown patch while Cato and Providence were relatively disease free. The colonial bentgrasses have a particular weakness to brown patch infestations that were evident throughout this trial in 1995. The good thing about the growing season in 1995 was that by late August, the heat stress had subsided and most cultivars recovered and provided exceptional fall color and quality.

Summary and Conclusions

Several commercially available cultivars such as Providence, Pro/Cup and Penneagle have demonstrated better quality than Penncross for several years. Also, Cato has performed at the top of the trial for the last few years.

The Penn series of G-2 and G-6 displayed the characteristically dense, upright habitat noticed in the A-1 and A-4 selection at putting green height. Observations regarding the "puffy" appearance of the G-series was obvious in 1995 and may require lower mowing heights or additional thatch management in the future.

FRANK ROSSI, EXTENSION TURFGRASS SPECIALIST
CORNELL UNIVERSITY TURFGRASS TEAM

Table 1. Data from the National Turfgrass Evaluation Program 1993 bentgrass fairway/tee trial.

	Visual Quality								Pest Damage*	
Cultivar	Spring Color	May	June	July	Aug.	Sept.	Fall Color	1995 Mean	Typhula Snow Mold	Brown Patch
G-6	5.5	7.7	7.4	8.0	7.0	8.1	8.8	7.6	2.3	2.3
Cato	5.2	7.4	7.0	7.6	6.6	7.8	8.5	7.3	0.7	0.7
G-2	5.7	6.9	7.1	7.7	6.7	7.8	8.5	7.3	2.2	2.2
BAR Ws42102	5.2	6.4	6.9	7.5	6.5	7.4	8.1	6.9	1.2	1.2
Providence	5.7	6.8	6.6	7.1	6.2	7.8	8.4	6.9	1.3	1.3
Crenshaw	6.1	7.5	6.3	6.9	6.0	7.2	7.9	6.8	2.8	2.8
Southshore	5.5	6.6	6.6	7.2	6.3	6.9	7.5	6.7	2.7	2.7
P. Links/Putter	6.5	7.4	6.2	6.7	5.9	7.3	8.0	6.7	3.0	3.0
Penneagle	6.6	6.5	6.5	7.0	6.2	7.0	7.6	6.6	1.8	1.8
Trueline	5.7	6.6	6.4	7.0	6.1	6.8	7.4	6.6	4.0	4.0
Lopez	5.7	7.0	6.2	6.8	5.9	6.8	7.4	6.5	3.7	3.7
18th Green	5.2	7.1	6.2	6.8	5.9	6.5	7.0	6.5	1.5	1.5
Pro/Cup	5.7	6.7	6.1	6.6	5.8	7.0	7.6	6.4	1.5	1.5
DF-1	5.5	6.6	5.9	6.5	5.7	7.2	7.8	6.4	3.3	3.3
BAR As493	5.2	7.7	5.6	6.1	5.3	6.6	7.2	6.3	2.7	2.7
ISI-At-90162	5.7	7.4	5.6	6.1	5.3	6.8	7.4	6.3	2.7	2.7
Penncross	5.7	7.4	5.6	6.0	5.3	6.6	7.2	6.2	3.2	3.2
OM-At-90163	5.7	7.1	5.5	5.9	5.2	7.0	7.6	6.1	1.5	1.5
SR 7100	7.0	7.5	5.2	5.7	5.0	6.7	7.3	6.0	3.2	3.2
Med 20685	6.1	6.7	5.4	5.9	5.2	6.7	7.2	6.0	4.5	4.5
Med 20695	5.5	7.0	5.3	5.8	5.0	6.8	7.4	6.0	2.7	2.7
Med 21149	5.8	7.1	5.4	5.8	5.1	6.4	7.0	6.0	3.5	3.5
Med CB 46-2	5.5	7.1	5.5	6.0	5.2	5.6	6.1	5.9	4.0	4.0
Med 20556	5.9	7.1	5.1	5.6	4.9	6.7	7.3	5.9	3.3	3.3
Med 20686	5.7	7.1	5.2	5.7	5.0	6.4	7.0	5.9	4.2	4.2
Exeter	6.1	7.0	5.2	5.6	4.9	6.6	7.1	5.8	0.8	0.8
Med 20693	5.6	7.1	5.1	5.5	4.8	6.5	7.0	5.8	3.3	3.3
Tendez	5.7	7.2	4.8	5.3	4.6	6.7	7.2	5.7	2.0	2.0
Med 46-1	5.6	7.0	5.1	5.5	4.8	5.3	5.8	5.5	3.0	3.0
Seaside	6.4	6.4	3.8	4.2	3.6	5.3	5.8	4.7	2.2	2.2
LSD (0.05)	0.5	0.7	0.4	0.5	0.8	0.6	0.4	0.3	0.4	0.6

* Disease incidence rated on a scale of 0 to 9, where 0=no damage, 3=objectionable amount of injury, 9=severe injury.

Short Cutts

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are involved in teaching the lectures and laboratories. Class enrollment is limited to 75 participants.

A pass/fail final exam is given at the end of the course to assess achievement of the course's educational goals from both the instructor's perspective as well as from the student's perspective. A Certificate of Completion is awarded at the end of the course.

The Short Course satisfies the New York State requirement for the 30-hour eligibility course for pesticide certification and 15 pesticide recertification credits are given upon course completion.

If you have any questions or would like to receive a registration form contact Joann Gruttadaurio, Short Course Director, at (607) 255-1792. Registration forms will be mailed to you in late October.

Pest Watch

continued from back cover

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.

ERIC NELSON
DEPT. OF PLANT PATHOLOGY

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.

CUTT Cumulative Index

Back issues of* CUTT *are available for $4.00 each and may be ordered by contacting Frank Rossi, 49C Plant Science, Cornell University, Ithaca, NY 14853.

Since its inception in the spring of 1990 *Cornell University Turfgrass Times (CUTT)* has published 20 issues. Many newer readers are unfamiliar with the important topics *CUTT* has presented over the years. To aid readers in finding articles that interest them from past issues herewith is a cumulative index. Note that Short Cutts and Scanning the Journals sections are not indexed.

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Changes are underway for the publication. A new design should debut early in 1997 offering a fresher look. Hopefully, these changes, together with *CUTT's* high standards of editorial depth and breadth will continue to make the publication even more popular and useful than it already is. Please give us your feedback on how *CUTT* can be of the greatest value to you.

Spring 1990, Vol. One Number One
- The Advent of Biological Controls for Turfgrass Disease Management by Eric Nelson.
- Is Coated Seed Worth It? by Norman Hummel.
- The Cornell University IPM Program by Gerard Ferrentino.
- Waging War on Crabgrass by Joseph Neal.

Summer 1990, Vol. One Number Two
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- Weed, Disease and Insect Control.
- New York's Top Twenty Ryegrasses.

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- What is IPM by Gerard Ferrentino.
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- AREST Facility

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Pythium Root Rot Disease by Eric Nelson.

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Reduce Your Reliance on Pesticides by Gerard Ferrentino.
Classifying Kentucky Bluegrasses by Norman Hummel.

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The Insect and Plant Disease Diagnostic Laboratory at Cornell University by Diane Karasevicz.

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Enhancing Biological Disease Control in Turfgrass with Composts by Eric Nelson and Cheryl Craft.
The Drought of 1995 and Weeds and Weed Control in 1996 by Joseph Neal.

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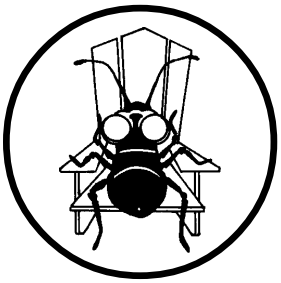
Controlling Snow Mold



Pest Watch

In New York, two major snow mold diseases cause problems on home lawns and golf courses: gray snow mold and pink snow mold.

The keys to minimizing damage include fertility and water management, and fungicide applications.

Cornell Cooperative Extension

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 nivale. 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 dormant 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 will stay wet in the spring. Maintaining low soil pH (<6.0) and balanced soil fertility is particularly important in reducing pink snow mold damage.

Fungicide Applications

Preventive fungicide applications are quite helpful in minimizing snow mold damage. However, oftentimes the fungicides effective against

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