NORTHWEST TURFGRASS TOPICS

The Official Publication of the Northwest Turfgrass Association

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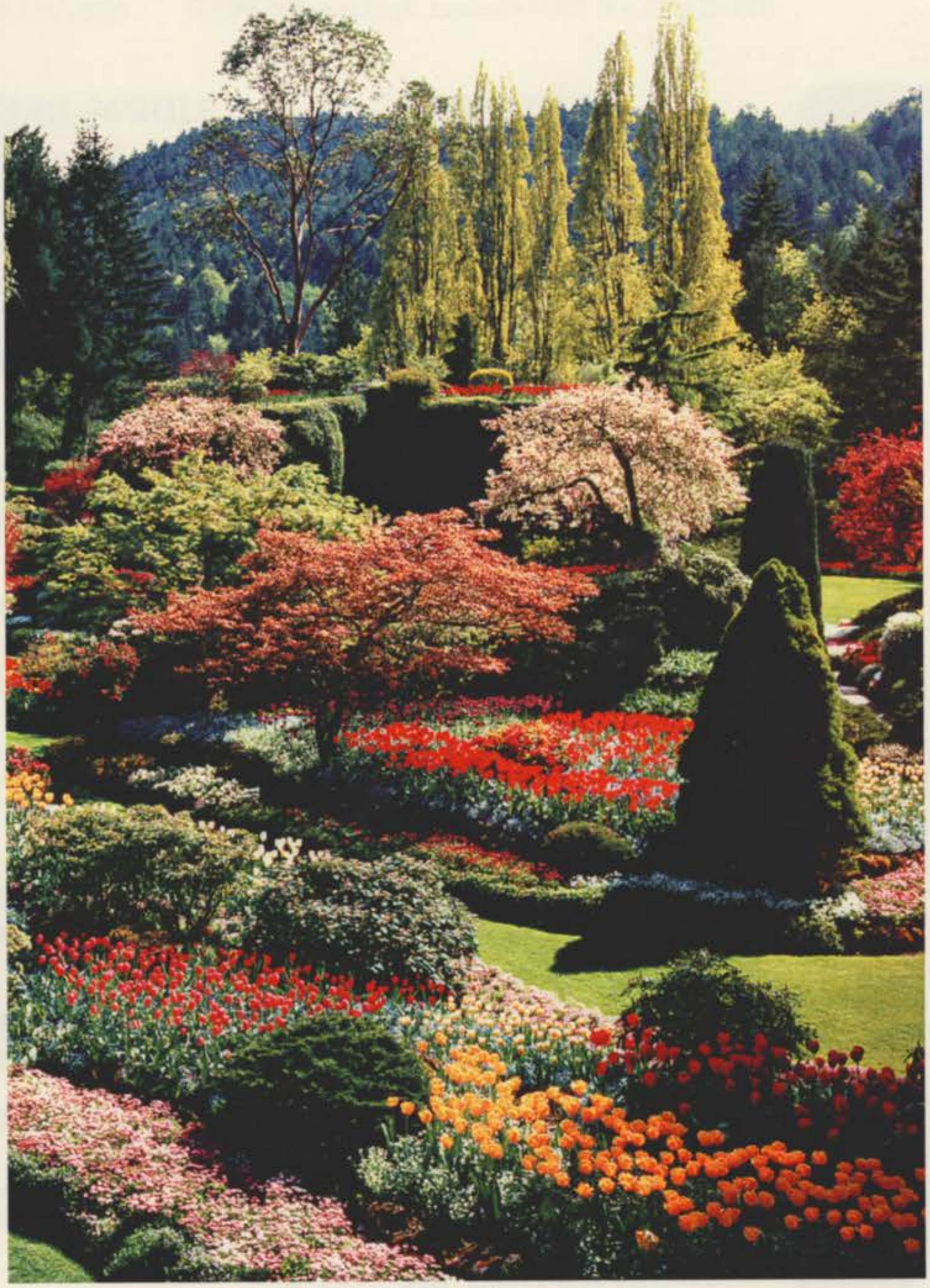

Victoria Conference Centre

50th Conference Sept. 30th - Oct. 3rd

EDITORIAL COMMENT:

Well, as editor of this newsletter, I made the most common error of the printed media business - a "TYPO". My printer told me, "Now, you know that no matter how many times you proofread this copy, you will miss something!" Articles are written, faxed to me, presented typed, and/or formatted on a disc to re translated into columnar print in the newsletter. I read every word three to five times throughout the process of newsletter production and the mind "sees" what it intends to see sometimes and not what is actually there.

In the article on page 20 of Volume 39, No. 1 Spring '96, by Greg Crawford, Media Director, entitled Spikeless Golf Shoes Gaining Momentum, he quotes Walter Mattison, CGCS, as saying, "Since our ban took effect on May 1, 1996, I have noticed a difference for the better in our putting surfaces. I have always been a proponent of alternative spikes and I am now (*not* was printed) convinced more than ever alternative spikes are the way to go." Sorry, Greg and Walter - I'll try harder!!

In this edition, either as part of the newsletter or as an insert, information regarding the 50th Northwest Turfgrass conference to be held in Victoria, British Columbia, is included. The outline of the Educational conference itself, the pre-conference seminar co-sponsored by the University of British Columbia and Northwest Turfgrass Association, the Pre-Conference Turf Tour, Roy L. Goss Research Golf Tournament, Companion Program, and Annual Banquet are all part of our celebration of the past 50 years. No successful program is a "one-man show." Considerable effort by your Board of Directors and committee members on your behalf as members make everything the NTA does successful or not. This years conference will attempt to acknowledge the past and look to the future. So many things are under consideration that will affect NTA's future at times it "boggles the mind".

Is it possible to consolidate efforts for research and education in the Pacific Northwest? Could turf students at WSU, OSU, UBC, as well as others in other population centers be taught by professors from all the universities by fiber optic two-way video conferencing? Can we make reasonably sure that our Pacific Northwest research needs haven't already been done somewhere else in the world? Can we spread the financial funding for research to the true benefactors of the results? How about a single "source book" for all golf courses and professional turf managers in the Pacific Northwest? All these things and more are being considered and are possible. We are limited only by the imagination, determination and persistence of the gifted professionals in the turfgrass industry.

STAY TUNED, THERE'S MORE TO COME!!

Donald A. Clemans, C.P.Ag.
Executive Director

NORTHWEST TURFGRASS TOPICS

COVER PHOTO:

"Sunken Garden - Spring"

Provided Courtesy of the Butchart Gardens

DO NOT MISS

GOLDEN ANNIVERSARY CELEBRATION
50TH NTA CONFERENCE
VICTORIA, B.C.
SEPTEMBER 29 - OCTOBER 3, 1996
SEE YOU THERE!!!

THOMAS A. CHRISTY, CGCS
INGLWOOD COUNTRY CLUB
KENMORE, WASHINGTON

EVALUATION OF DIVERSE KENTUCKY BLUEGRASS FOR POTENTIAL TURFGRASS USES![1]

Matthew C. Nelson, Dr. William J. Johnston, Dr. Richard C. Johnson, and Charles T. Golob.[2]

1 Presented at the 49th Northwest Turfgrass Conference, Skamania Lodge, Stevenson, Washington, October 8-12, 1995.

2 Graduate student, Assistant Professor, Agronomist, and Research Technician III, respectively, Department of Crop and Soil Sciences, Washington State University and USDA/ARS, Pullman, Washington.

INTRODUCTION

Kentucky bluegrass (*Poa pratensis L.*) is used in over 40 million North American lawns and is an important turfgrass for golf courses, parks, and sports fields (Bashaw and Funk, 1987). The tri-state region of Washington, Idaho, and Oregon produces more than 75% of U.S. Kentucky bluegrass seed (Ensign et al., 1989). The USDA-ARS plant introduction collection of Kentucky bluegrass consists of 267 diverse germplasm accessions from 27 countries, and may contain genotypes that have improved turfgrass characteristics and improved seed production capacity under traditional (burning) and alternative (non-burning) residue management strategies. Basic evaluation of this collection for agronomic descriptors has not, however, been completed and is needed to identify genotypes for residue management studies. From the collection, 228 accessions were evaluated along with 17 established cultivars from eight diverse morphological groupings (Table l)(Murphy, 1990).

OBJECTIVES

1. Evaluate the USDA-ARS Kentucky bluegrass collection for agronomic descriptors.
2. Establish a core collection representing morphological diversity within the USDA-ARS collection.
3. Select accessions based on turf quality and seed yield, for future studies of turfgrass quality and seed production under alternative residue management systems.

MATERIALS AND METHODS

Germplasm accessions were evaluated for diversity at a 28- by 28-m irrigated site at Pullman, W A. Accessions were planted in 1-m strips with 0.3 m spacing in a randomized complete-block design with three replications. A total of 245 germplasm accessions were planted on 24 May 1994. Evaluation parameters (Table 2) were adapted from the standard descriptor list developed by the Forage and Turf Grass Crop Germplasm Committee. The plot was irrigated during the first growing season, and not irrigated during the second growing season. Broadleaf weeds were controlled with 0.42 kg a.i. ha1 bromoxyinil (Buctril) during establishment. Witchgrass (*Panicum capillare L.*) was treated with two applications of MSMA (Bueno 6) at 4.6 kg a.i. ha-1 on 21 June 1994 and 12 July 1994 (Robocker et al., 1977). Heading date, flowering date, and harvest date were measured in Julian days. Seed was hand harvested, threshed, air cleaned, and weighed for yield. In cases when plant stand was less than the 1 m planted, yield was adjusted to be proportional to 1 m. Cluster analysis was completed with SAS using Ward's clustering method (Romesberg, 1984).

RESULTS AND DISCUSSION

Data were collected on 17 parameters for 245 diverse Kentucky bluegrasses (Table 2). Wide variation existed in disease resistance, seed yield, and dwarfing character. Although highly significant, less relative variability existed in heading, flowering, and harvest dates. A core collection was generated from the data by cluster analysis. Twenty-two clusters were developed and one representative accession from each cluster was chosen at random to constitute the core collection (Table 3). This core represented 12 countries and approximately 10% of the accessions studied (228 PI accessions). Cluster data for turf potential and seed yield are presented in Table 4. Clusters 14, 15, and 16 all contain accessions with high seed yield. Clusters 9 and 11 represented dwarf types, with generally good turf characteristics, but relatively low seed yields. Clusters 10 and 12 also had accessions with good turf characteristics, and cluster 16 had accessions with good seed yield and turf characteristics. Cluster 22 represented fine textured types, and clusters 17 and 18 represented accessions with forage type characteristics. The core collection, nine cultivar checks, and 17 selections based on turfgrass potential and seed yield were chosen for future studies of seed yield under alternative residue management strategies and turfgrass characteristics.

CONCLUSIONS

Variability within the USDA-ARS plant introduction Kentucky bluegrass collection was pronounced; all parameters evaluated were highly significant. Although more testing is needed, germplasm within the collection has been identified that was superior for some traits compared to widely used established cultivars. Due to such variation, there is potential for selection of germplasm with improved seed yield under alternative residue management regimes, and improved turfgrass quality. Evaluation data will be available on the Germplasm Resources Information Network (GRIN) and PI collection seed is available from the W estern Regional Plant Introduction Station, Pullman, WA.

REFERENCES

Bashaw, E. C., and C. R. Funk. 1987. Apomictic grasses p. 40-82. In W. R. Fehr (ed.) Principles of cultivar development. Vol. 2 Crop Species. Macmillan Publisher, New York, NY.

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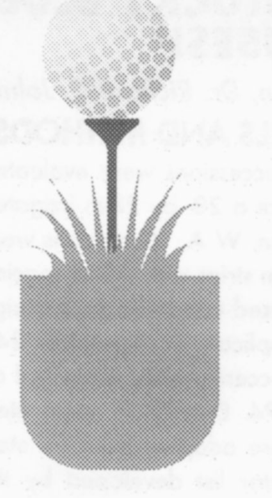


Table 3. Core collection.

Cluster number	nt	PI no.	Origin
1	13	206725	Turkey
2	22	237282	Denmark
3	12	349223	Alaska
4	18	372738	Alaska
5	15	380992	Iran
6	7	371769	Alaska
7	13	372741	Alaska
8	13	371775	Alaska
9	13	368233	Alaska
10	13	349225	Alaska
11	6	349160	Alaska
12	14	574523	Maryland
13	1	440601	USSR
14	13	539057	USSR
15	11	229721	Iran
16	6	368241	Alaska
17	9	204491	Turkey
18	17	505898	USSR
19	11	303053	Sweden
20	5	286381	Netherlands
21	6	371771	Alaska
22	7	349178	Alaska

tn = number in cluster.

Table 1. Cultivar checks.

Subgroup A;	Compact types	'Midnight', 'Nublue'
Subgroup B;	Bellevue types	'Banff', 'Dawn'
Subgroup C;	Mid-Atlantic types	'Monopoly', 'Plush'
Subgroup D;	Julia types	'Julia', 'Ikone'
Subgroup E;	Very aggressive types	'Mystic', 'Washington'
Subgroup F.	Other or Cela types	'Coventry', 'Eclipse','Bartitia'
BVMG types		'Baron', 'Victa'
Midwest types		'Kenblue', 'Park'

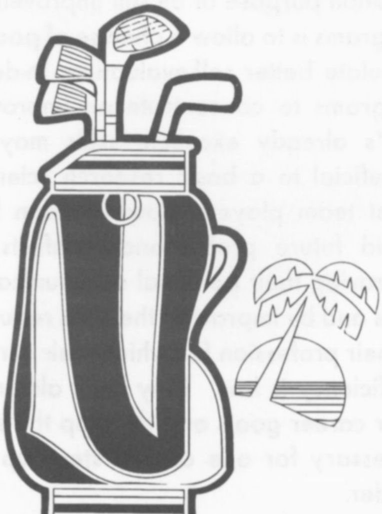
Table 2. Agronomic paramaters evaluated.

Parameter	Mean	Std. Dev.	CV	Range
Emergence (d)	14.5	2.72	19	10-20
Texture (1-9)	5.7	0.93	16	2-9
Genetic color (1-9)	5.7	1.03	18	2-9
Uniformity (1-9)	5.8	1.83	32	1-9
Leaf habit (1-9)	5.0	1.28	26	2-8
Dwarf character (1 -9)	4.0	2.02	51	1-9
Biomass (l-9)	5.3	1.38	26	1-9
Mean canopy height (cm)	16.9	5.32	31	3-36
Turf potential (1 -9)	5.4	1.04	19	3-8
Spring greenup (1-9)	5.6	1.36	24	2-9
MS MA phytotoxicity(0-3)	1.4	0.62	44	0-3
Powdery mildew (0-3)	0.9	0.99	110	0-3
Heading date (Julian date)	123.1	8.40	7	115-145
50% anthesis (Julian date)	148.3	7.34	5	135-176
Harvest date (Julian date)	181.2	6.42	4	171-222
Height at harvest (cm)	79.2	17.17	22	26-112
Adjusted seed yield (g m- 1)	56.7	34.27	60	1.6-191

*Qualitative traits rated by scale; 9=finest texture, best color, most uniform, upright leaf growth, most dwarf, most biomass, best turf potential, best spring greenup. MSMA and powdery mildew rated by scale; 0=no phytotoxicity, no infection, 3=severe burn, severe infection.

tStd. Dev. = standard deviation.

ttCV = coefficient of variation.



PROFESSIONALISM, WHOSE TURF?

Norman Goetze, Emeritus Crop Scientist and Extension Agricultural Program Leader, Oregon State University, Corvallis, Oregon

Being a professional is a very personal obligation to one's chosen field of endeavor. The professional recognizes the obligation of his particular assignment, the opportunity for his own self-improvement, and how he can best share his strengths with others to contribute to the success of the group.

Every position in society has both responsibilities and opportunities. Successful career development is first dependent upon one's ability to honestly assess his individual goals and to realize which strengths and contributions will be most helpful in reaching those goals. Making short term decisions primarily upon early opportunities frequently leads to blind alleys. If you don't know where you are going, every road you take will get you there. Most professionals change positions several times during their careers. However, career changes are less frequent. Choices of career result from early exposures, family association, and hero imaging. Outstanding teachers, clergy, and society leaders also have significant effects upon early career choices.

Within a given career, most professionals enter at the lower position levels. Their rate of advancement is dependent upon magnitude of successful performance in each successive professional step. Lateral promotions rarely occur until the middle management layers. Even there lateral transfers are looked upon with suspicion by those immediately below.

A most serious problem with advancing within a narrow position career path is that little latitude is normally present to allow for major career changes. Secondly, most everyone eventually reaches a maximum proficiency level. A promotion beyond that level would benefit neither the profession nor the over-promoted professional. It is often difficult for many professionals to realize and admit that they are performing at their optimum level and that further advancement would be detrimental to both the career and the profession.

Most professional workers are honestly attempting to perform well in

Table 4. Cluster data.

Cluster number (l-9)	Turf nt (g m-1)	Seed potentialt	<u>Cluster means</u> yield	Cultivar
1	13	4.9	26.6	Banff, Plush
2	22	4.8	36.5	
3	12	5.0	19.5	
4	18	4.8	56.0	Park, Eclipse
5	15	4.9	51.6	
6	7	5.6	62.4	
7	13	5.1	51.4	
8	13	5.7	49.0	Mystic, Coventry, Bartitia
9	13	6.3	17.5	
10	13	5.8	35.6	
11	6	6.0	30.7	
12	14	6.1	25.7	Dawn, Nublue Midnight, Ikone, Julia
13	1	3.7	46.8	
14	13	5.4	99.8	
15	11	5.3	109.9	Kenblue
16	6	5.7	145.7	
17	9	4.8	86.2	
18	17	5.5	74.3	Washington
19	11	5.1	68.7	
20	5	5.5	75.2	
21	6	5.4	82.6	Monopoly, Victa, Baron
22	7	5.9	88.8	

tn = number in cluster.
t tTurf potential rated 1-9; 9=best.

their positions. Or conversely, few are deliberately avoiding efforts to reach maximum output levels. Why then is there so much job dissatisfaction and strife among and between professional workers in America? I will offer several major causes and suggest some possible methods of self improvement for professionals.

A major cause of professional inefficiency is the professional's lack of knowledge of his own career wishes and of his strengths and weaknesses. He has not honestly done a good job of self-appraisal or has not listened well to constructive appraisal by his peers or superiors. He doesn't know or doesn't want to admit where he stands in relation to normal performance expectations. The obvious solution lies in seeking honest peer and supervisory evaluation and weighing often conflicting evaluations honestly by himself in relation to his own career goals.

A major problem of communication arises when several different agencies or disciplines are working collaboratively on the same problem or within the same career goals. Professionals who don't communicate their goals and their intended outputs for the mutual benefit of the society or community goal are quickly misunderstood and lose interest in the project. This disinterest is followed by mistrust and ultimately by lack of involvement. The resulting lower performance then lowers the efficiency of the group and seriously impairs the non-communicating professional's future growth. The solution is a deliberate cooperative mode of communication by all. This should most frequently be in a non-authoritative attitude.

Jurisdictional disputes among employees or agencies who should be cooperating often leads to serious loss of professionalism and impair the strength of cooperative programs. Even though agencies may agree to cooperate, lack of professional cooperation by just one member of a group can lead to turf battles which are very disruptive of cooperative programs. These problems are not easily alleviated by a simple single solution. First each agency must want to cooperate in the solution of a particular problem and must want to contribute significantly thereto. This willingness must be accompanied by administrative leadership which will contribute to the motivation of each member of the group to this goal. An internal reward mechanism for constructive support to the program can eliminate many serious problems but to be effective must be accompanied by strict periodic administrative evaluation.

Many professional turf battles arise because the combatants have the mistaken idea that they are superior or at least equal to their competitors in every criterion. Yet every outsider knows that a team is made up of specialists, each of whom has superior attributes and some qualities which are below the median of the team. The most successful team is the one which can play to the advantage of its strengths and the one which can avoid putting pressures on its weaknesses. Teams of individuals and agencies by the same manner can be most effective by recognizing individual and agency strengths and playing to them. A simplistic example is two teachers of the same subject; one is a fantastic lecturer, and the other is a good motivator and counselor. The teaching team gets a lot further by having the good lecturer prepare and deliver class materials while the counselor motivates student performance in an informal manner.

No professional remains static in his profession. He either continues to improve or he falls behind those who are improving. Professions are very competitive. Therefore every motivated professional must develop and execute a professional self improvement program. It can take on one or more of a variety of forms. Perhaps the single common purpose of all self improvement programs is to allow a change of pace to stimulate better self-evaluation. In-depth programs to concentrate on improving one's already excellent skills may be beneficial to a basic research scientist. Most team players, however, can best avoid future professional conflicts by improving their personal communication skills and by improving the skills required in their profession for which their current proficiency is low. They most also note their career goals and develop the skills necessary for one or two steps up the ladder.

Self-improvement programs can be intensively sporadic or at a steady lower level. Most importantly they must be a part of a deliberate long term plan which is changed only as the interests of the professional change. Agencies and disciplines suggest different levels of total mid-career self-improvement levels ranging from 1 percent to 20 percent of total employment. Obviously, society demands that jet pilots and heart surgeons have as much professional improvement as possible. Yet other non-critical professions could receive equal use of state-of-the-art techniques by better self-improvement programs. My former agency suggested an average of 9 percent self-improvement activities, yet we had many, including a high percentage of administrators, who had much less than that.

In order to have a balanced outlook on life every professional needs time for his family, friends, community, and hobbies. He must schedule time away from his profession to enjoy his family and his friends and to avoid the traumatic stresses of workaholism. We all know far too many of our peers who have permanently ruined their careers by this mistaken idea that they had to perform never-ending Herculean tasks to be successful. Correcting this problem for high achievers among the professionals is often very difficult. Encouraging these individuals to realize that every professional is replaceable and that the profession continues after each of us completes our service to it is perhaps a good start. If we could make better use of the parable of teaching more people to fish instead of providing fish for those potential fishermen to eat in one day, better professional accomplishments would result.

Seven years after formal retirement, I now am actively involved in voluntary leadership in commercial agricultural commodity development programs at state, national, and international levels. The principles of professional development are equally relevant now as they were in early or mid-career. Thirty-six years after completing my formal professional training I most highly respect those Purdue University faculty and turf professionals who were "complete" professionals. Though I was a somewhat reluctant student, they finally convinced me to develop career goals, to have a continuously positive attitude, to openly communicate, to cooperate with others, to play to my strengths, and to continue to improve my professional competence. I wish to repay this lifelong debt of gratitude by helping others in their professions and by recognizing that I should have a good time with my family and friends. (Which I am doing!).

SCREENING ANTAGONISTIC MICROORGANISMS FOR SUPPRESSION OF MICRODOCHIUM NIVALE AND GAEUMANNOMYCES GRAMINIS VAR. AVENAE[1]

Gwen K. Stahnke, Carrie Foss, and Lenora Jones[2]

1 Presented at the **49th Northwest Turfgrass Conference**, at Skamania Lodge, Stevenson, Washington, October 10-12, 1995.

2 Extension Turfgrass Specialist, Diagnostic Plant Pathologist, and Research Technician, respectively, Washington State University, Puyallup, Washington

Utilizing naturally occurring microorganisms to suppress turf diseases would provide an environmentally acceptable alternative to repeated fungicide applications. Microbial suppression of plant pathogens has been extensively documented in the literature (Sutton and Peng; Weller, et al.; Nelson). During the first phase of the biocontrol project, a literature search was conducted and researchers working with suppressive organisms were consulted nationwide, including Dr, Eric Nelson (Cornell University), Dr. David Weller (USDA-Pullman), and Dr. Fred McElroy (Eden Bioscience). We obtained information indicating that greenhouse testing would provide more reliable results than laboratory screening. Based on that information, it was determined that the focus of the study would be screening three organisms in the greenhouse on turfgrass for suppression of take-all and Fusarium patch diseases. Isolates of *M nivale* and *G. graminis* var, *avenae* were cultured from golf course and home lawn samples. Organisms suppressive to take-all of wheat, *G. graminis* var. *tritici*, were obtained from Dr. David Weller at USDA-Pullman. In addition, Eden Bioscience, under the direction of Dr. Fred McElroy, has cooperated on this project by providing protocols, culturing microorganisms, and treating seed with the antagonistic microorganisms for a preliminary experiment.

FUSARIUM PATCH DISEASE; *Microdochium nivale*

INTRODUCTION

Fusarium patch is a foliar turfgrass disease caused by the fungus *Microdochium nivale*. This disease can damage most grass species, The disease is observed as circular patches which may first appear water-soaked and later may change color from orange-brown to dark brown and finally gray. Fusarium patch is active during cool, wet weather. Succulent grass produced by high nitrogen fertility is more susceptible.

Fungicide applications, in addition to cultural strategies, are used to manage Fusarium patch disease in high quality turfgrass. Fusarium patch disease problems can be reduced by providing balanced fertilization, avoiding overfertilization, and not applying urea as a sole nitrogen source. However, fungicides may be applied repeatedly to manage this disease. Fungicides recommended for management of Fusarium patch include several highly or moderately at-risk fungicides. Repeated use of these fungicides may result in strains of *M. nivale* resistant to the fungicide (Chastagner and Vassey). Bacterial antagonists identified as suppressive to Fusarium patch disease could provide an alternative to fungicide applications.

MATERIALS AND METHODS

Fusarium patch disease was diagnosed on turfgrass samples submitted to the WSU Puyallup Diagnostic Laboratory. The causal organism, *M nivale*, was cultured from the diseased samples. A single spore culture of each isolate was prepared and transferred to dilute PDA to induce sporulation. Two isolates were selected, 203 and 1159, and stored in cornmeal /sand medium.

PRELIMINARY EXPERIMENT

A preliminary experiment was conducted to evaluate the ability of the selected isolates to infect and to determine nitrogen sources and fertilization rates for predisposition of the ryegrass to infection. Sixteen perennial ryegrass seeds (Essence+) were planted into each 1" diameter cone-tainer tube packed with vermiculite. Plates of the two *M nivale* isolates were flooded with deionized/distilled water and scraped. The solution was filtered twice through 4 layers of cheesecloth and applied with a spray bottle to the ryegrass. Six tubes of each fertility level were inoculated. All plants received standard fertility of 1/4 lb N/1000 sq ft using Peter's 20-20-20 weekly. The three treatments consisted of: (1) standard fertility only; (2) additional fertilization with two 1/2 lb N/1000 ft one week apart; (3) additional fertilization with two 1 lb N/1000 ft2. The cone-tainer tubes were place in a dew chamber for 48 hours, then placed in the greenhouse. The ryegrass plants were evaluated 20 days after inoculation.

FUSARIUM PATCH EXPERIMENTS

Two experiments were conducted which included the bacterial antagonists. In each experiment, Essence+ ryegrass was planted in 1" diameter tubes. The grass was fertilized twice with 1lb. urea prior to inoculation in addition to standard fertilization with Peter's solution. The ryegrass plants were treated bacterial antagonists (2-79, *Bacillus* sp., or Q65c-80) or water two weeks after planting. Colony forming units (CFUs) of antagonists and other foliar organisms were determined 24 hours after treatment. The treated plants were then inoculated with a *M nivale* spore or hyphal suspension, containing approximately 4 X IO5 propagules per ml. Three weeks after inoculation, plants were rated for color and disease infection. Grass samples from each replication were cultured on cornmeal agar to determine recovery of *M. nivale.* Color was rated on a scale of 1 to 9 with 1 corresponding to brown grass and a 9 rating for dark green. Disease was rated on a scale of 0 to 5. Replications rated 0 had no diseased plants and a 5 rating corresponded to > 95% of the blades infected.

RESULTS

In the preliminary experiment the greatest infection was found on plants fertilized twice with 1 lb. urea N/1000 ft2 which was the highest rate tested. Both *M nivale* isolates chosen, 203 and 1159, were pathogenic to the ryegrass in the preliminary experiment.

CFUs of bacterial antagonists varied between 102 and 104 per cm leaf blade in the Fusarium patch experiments. The bacterial antagonist 2-79 reduced Fusarium patch disease symptoms caused by isolate 1159 as compared to the treatment with a water application. The foliage color in treatment 2-79/1159 was significantly better than treatments *Bacillus* sp,/1 159 and Q65c-80/1159. There were no differences in color between the 203 isolate treatments.

DISCUSSION

The bacterial antagonist 2-79 reduced disease on plants inoculated with the 1159 isolate. There was no suppression of disease using 2-79 and the 203 isolate when compared with the water treatment control. This may have been observed due to variance of isolates in their pathogenicity. This may also have resulted because the inoculation of ryegrass plants with *M nivale* isolates 1159 and 203 was conducted in the third experiment using a hyphal suspension which increases variablity in infection.

TAKE-ALL PATCH, *Gaeumannomyces gramlnls* var. *avenae*

INTRODUCTION

Take-all patch disease can cause serious damage to newly established sand-based bentgrass turf. It is caused by *G. graminis* var. *avenae,* a soil-borne microorganism which infects roots and stolons during cool, moist weather. Symptoms may change from small, light brown patches initially to larger bronze or reddish-brown rings or patches. This disease is difficult to control with fungicides. It has been observed, however, that as competing or antagonistic microbial populations buildup in the soil environment, the disease declines in severity in a manner similar to take-all of wheat (Nilsson and Smith).

MATERIALS AND METHODS

The purpose of this project was to test antagonistic microorganisms for suppression of take-all patch disease in a greenhouse study. The three bacteria tested in the first phase of the project were 2-79, Q65c-80, and *Bacillus* sp. 2-79 and Q65c-80 are strains of *P. fluorescens,* 2-79 has been extensively studied for its ability to suppress take-all of wheat (Bull, et al.; Weller and Cook).

Pathogenic isolates of *G. graminis* var. *avenae* were cultured from six golf course samples of *Agrosris* sp. Basal stem pieces were sterilized with l% silver nitrate, rinsed in sterile distilled water three times, dried and plated onto SMGGT3 media (Juhnke et al.) Colonies

(Continued on page 11)

50th Conference

Northwest Turfgrass Association

Victoria, British Columbia

September 30 - October 3, 1996

Pre-Conference Registration

and

University of British Columbia/NTA Seminar

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"Frontiers In Environmental Turf Management"

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Registration Information

Roy L. Goss Golf Tournament for Research

Companion Program

NORTHWEST TURFGRASS ASSOCIATION
50TH CONFERENCE DETAILS

Sunday, September 29, 1996, 9:00am to 4:30pm

The University of British Columbia, in cooperation with The Northwest Turfgrass Association - Pre-Conference Seminar

Frontiers in Environmental Turf Management

CEU'S AVAILABLE - SEE DETAILS ON UBC PAGE

Sunday, September 29, 1996, 2:00pm to 6:00pm

50th Conference Registration Desk is open in the Victoria Conference Center Plaza

EVERGRO Welcome Reception - Hosted by Evergro Sales, Inc. in the outdoor courtyard adjacent to the Victoria Conference Center Plaza 5:00pm to 7:00pm

Monday, September 30th, 1996

Roy L. Goss Golf Tournament - Cordova Bay Golf Club

and/or

Pre-Conference Turf Tour (See enclosed details)

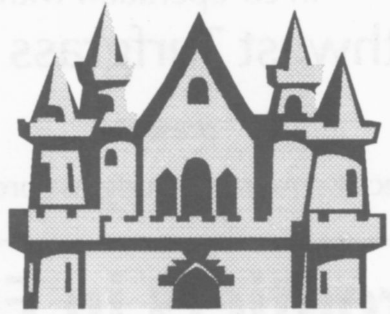
Tuesday, October 1 thru Thursday, October 3, 1996

Educational Conference (See speaker schedule)

Companion Program (See article describing this program)

Wednesday, October 3, 1996 7:00pm to ?

Reception, Banquet and Entertainment



CONFERENCE HOUSING:

Primary Conference housing will be at The Empress Hotel (see enclosed registration form). Room block for our Conference will be held through August 29, 1996. Get your reservations in early!!!

There are many other housing options available. For more information and for reservations, call Tourism - Victoria at 800/663-3883 for hotels, motels and bed & breakfasts.

TRANSPORTATION:

Transportation Information Center - 604/953-2033

FERRY SCHEDULES: SEPTEMBER 29, 1996- OCTOBER 3, 1996

VANCOUVER TO VICTORIA

(TSAWWASSEN TO SWARTZ BAY)

7:00AM - 9:00 - 11:00 - 12:00NOON

1:00 - 2:00 - 3:00 - 4:00 - 5:00 - 6:00 - 7:00 - 9:00PM

VICTORIA TO VANCOUVER

(SWARTZ BAY TO TSAWWASSEN)

7:00AM - 8:00 - 9:00 - 11:00 - 12:00NOON

1:00 - 2:00 - 3:00 - 4:00 - 5:00 - 6:00 - 7:00 - 9:00PM

The Ferry schedule from Washington to Vancouver Island is available through Washington State Ferries (206/464-6400) and Black Ball Transport, Inc. (360/457-4491 or FAX 360/457-4493). Check times for your intended point of departure.

THE UNIVERSITY OF BRITISH COLUMBIA

in co-operation with

The Northwest Turfgrass Association

presents

A special seminar for turfgrass professionals

Going for Greener: Frontiers in Environmental Turf Management

Sunday, September 29, 1996 9:00 am - 4:30 pm

Victoria Conference Centre – Victoria, British Columbia

Program

Moderator: **Dr. Brian Holl**, UBC Department of Plant Science

(presentations will include time for questions and discussion)

0900 - 1030	**Geographic Information Systems: Powerful Diagnostic and Management Tools with Economic & Environmental Benefits** *Infra-red remote sensing, GIS, aerial mapping, global positioning systems (GPS)*	Hally Hofmeyr, Resource Planning, B.C. Ministry of Agriculture, Fisheries & Food
1030 - 1045	**Refreshments**	
1045 - 1200	**Integrated Pest Management: The Latest!** *Design, construction and renovation for IPM, weed control, disease suppression*	Dr. Linda Gilkeson, Pesticide Management, B.C. Ministry of the Environment
1200 - 1315	**Lunch (included)**	
1315 - 1445	**The Audubon Co-operative Sanctuary System: Stewardship in Action** *Ecological wildlife management and habitat protection*	John Santacrose, Executive Director and Counsel, Audubon Society of New York
1445 - 1500	**Refreshments**	
1500 - 1630	**Reality and Risk: Airing the Issues & Bringing the Public On-side** *Understanding risks, benefits and risk perception, effective public relations*	Shona Kelly, UBC Health Care and Epidemiology

0.5 CEU's have been approved by the GCSAA for credit toward certification renewal requirements only. Approved for credit by the CGSA.

For more program information, call Maureen Garland at UBC (604) 822-5072 Fee $100.00

1996 ROY L. GOSS GOLF TOURNAMENT FOR RESEARCH

1996 is an exciting year for the celebration of our 50 year anniversary. The R. L. Goss Golf Tournament is one way you, as an individual, can contribute and have a great day of fun and fellowship. This year, preceding the annual conference in Victoria, B. C., the golf tournament will be hosted by Cordova Bay Golf Course, a beautiful course surrounding Cordova Bay on Vancouver Island.

Our hosts, Jim Goddard, Head Professional and Dean Piller, Golf Course Superintendent at Cordova Bay, have made it possible to waive green fees to our association. This response will allow for a sizable contribution to the Research and Scholarship effort.

Here are the particulars:

Date: Monday, September 30, 1996

Place: Cordova Bay Golf Course
5333 Cordova Bay Road
Victoria, B. C., Canada, V8Y 2L3
Phone: 604/658-4444

Format: 4-Man Scramble

Fees: $100 (U.S.$) for U.S. residents
Carts - No Host rental = $25.00 (Canadian $)
Note: Due to the beauty and terrain of the Cordova Bay Course, you will find walking easy and enjoyable.

Lunch: Hosted by Toro (Western Equipment & PacWest) and will be a hamburger bar-b-que at completion of the tournament at the club facilities.

Prizes: Dollar values will be adjusted to the quantity of participants.

1. Long Drive
2. Closest to Pin
3. Team Low Gross

The format, again, will be four-man best ball scramble. This format allows for a fast pace of play and lots of fun for all. Prizes will be awarded to winners present and on site and must be redeemed at the Cordova Bay Pro Shop.

JOIN US!!!!

COMPANION PROGRAM PACKED WITH GOODIES

Butterflies to pastries to chocolates will fill the Companion Program this year beginning with a pastry decorating demonstration by Daniel Vokey of Patisserie Daniel on Tuesday, October 1 at The Empress Hotel. Luncheon will follow with the "fruits" of Daniel's labor served as dessert. After lunch, at short walk from the Hotel will bring us to the Royal British Columbia Museum, a MUST stop for visitors to Victoria. The Museum tracks the growth and development of British Columbia from the age of the dinosaurs to the First People to modern day. If you can tear yourself away, shopping is always wonderful and exciting in the shops of Old Town.

Wednesday, October 2, after a Continental Breakfast, we will board a bus and make our way to the Roger's Chocolate Factory. Mr. Charles 'Candy" Rogers opened his first candy store in 1885. His Victoria Creams were his crowning achievement and we will get a chance to sample these and many other wonderful creations after a very interesting tour of the factory.

After leaving Roger's Chocolate Factory, we will make our way to Butterfly World near Parksville. A stop there will be filled with beautiful color and exotic sights. The next stop will be lunch at Butchart Gardens at the Blue Poppy Restaurant. There will be plenty of time to stroll through this lovely garden and see flowering plants ranging from Ageratum to Zinnias and lots of flowers in between!! The bus will drop us back at The Empress Hotel at approximately 4:00PM.

Thursday morning will be a fun get-together. We will meet at 9:00AM for a Continental Breakfast and a style show presenting unisex clothing designed by a Canadian company. The company is called EzzE Wear...have you heard of them yet? You will!!

PRE-CONFERENCE TURF TOUR

"Commonwealth Games Legacy (2 years later)", says Kay Kinyon, Board Member in charge of the tour, "is the focus of the afternoon of September 30 in Victoria, B.C. A visit to the Juan de Fuca Parks & Recreation site of the Commonwealth Games in 1994 will give you a view of sand-based soccer fields, baseball fields, bowling greens, an "Astro-Turf" synthetic soccer field and porous paved tennis courts. Then, some liquid refreshment en route to the second stop, the University of Victoria. The group will compare another sand-based soccer field and a Velodrous synthetic-surfaced field hockey pitch that is topdressed, before returning to the Empress Hotel."

THE EMPRESS HOTEL
PRE-CONFERENCE REGISTRATION FORM

PHOTOCOPY AND MAIL TO: RESERVATION DEPT.
THE EMPRESS HOTEL * 721 GOVERNMENT STREET
B.C., CANADA V8W 1W5

Thank you for requesting reservations at The Empress Hotel. Our entire staff would like to take this opportunity to extend a warm welcome to you during your upcoming meeting.

PLEASE DON'T FORGET TO MAKE CHEQUE OR MONEY ORDER PAYABLE TO THE EMPRESS HOTEL
PLEASE DO NOT SEND CURRENCY.

GROUP: **NORTHWEST TURFGRASS ASSOCIATION**

MEETING DATES: September 30 to October 2, 1996

PLEASE RESERVE ACCOMMODATIONS.

NAME ________ (PRINT OR TYPE) AFFILIATION OR COMPANY ________ POSTAL CODE/ZIP ________

ADDRESS ________ TELEPHONE ________

CITY/STATE/PROV. ________ FAX ________

SHARING ROOM WITH ________ Please indicate if room will be shared by a third adult.

SIGNATURE ________ (NAME) ________

conf. # 091964H29

Important to note: Check out time: 12 noon; Check in time: 4 pm
Please include a 1st night deposit to confirm and guarantee your reservation or indicate a "Major" credit card name and card number.

Card # ________ **Expiry Date:** ________

PLEASE NOTE: RESERVATIONS NOT GUARANTEED FOR LATE NIGHT ARRIVAL WILL NOT BE HELD PAST 6 P.M.
(Refundable if reservation is cancelled 48 hours prior to arrival. Please retain cancellation number provided.)

Please indicate preferred rate & category below*

Accommodations	Premiere	Business Class	Indicate Preference
SINGLE: One Person	$135.00		SMOKING
DOUBLE: Two Persons	$135.00		
TWIN: Two Persons	$135.00		NON-SMOKING ✓
Third person in room additional	$25.00 ADDITIONAL		
SUITES - 1 Bedroom	$495.00		
- 2 Bedrooms	$725.00		

Arrival Date OCT 1

Arrival Time 4:PM

Departure Date OCT 3 (Check out by 12 noon)

Block of rooms held at hotel until: ________

Reservations received after this date will be on a space available basis.

* If rate & category requested are not available, nearest will be assigned. Rooms will accommodate 3 persons only. Rates subject to Provincial and Federal Taxes. Rates quoted in Canadian Dollars.

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Hotel Phone: (604) 384-8111
Hotel Fax: (604) 381-4334

NORTHWEST TURFGRASS ASSOCIATION
50TH CONFERENCE * VICTORIA, B. C.

Tuesday, October 1

7:30-8:00 AM Welcome

8:00-9:00AM Keynote Speakers,
Dr. Roy L. Goss
Dr. Al Law
NTA History

9:00-10:00 Dr. Norm Hummel
U.S.G.A. Green Specs - Good for the Pacific Northwest?

10:00-10:45 Dr. Gwen Stahnke
WSU Research Report
Puyallup

10:45 - 11:00 Coffee Break

11:00-12:00 2-Way Live Video Conference
Dr. Joe Vargas, Michigan State
Poa annua Guru Speaks Out
and
Mr. Gordon LaFontaine,
Executive Director,
Michigan Turfgrass Foundation
Research Funding

12:00-12:30 Dr. Tom Lumpkin, Dept. Chair, WSU, Pullman, Washington
The Future of Turfgrass Teaching and Research in the Pacific Northwest

12:30 - 1:00 Questions & Answers

1:00 Adjourn

Wednesday, October 2

7:30-8:30 AM Tom Cook,
OSU Research Report
Corvallis, OR

8:30-9:15 Annual Meeting

9:15 - 9:45 WSGA/PNGA - OGA
Jim Gibbons

9:45-10:00 Coffee Break

10:00 - 11:00 Special Guest Speaker
Gene Bates of
Fred Couples-Gene Bates Golf Design

11:00-11:45 Larry Gilhuly, USGA,
Director, Western Region
1996...A Good Year?

11:45-12:30 Jim Connolly,
NTA Board/Jacklin Golf
History of Golf Course Maintenance in America

12:30-1:00 Dr. Jeff Nuss, GCSAA
GCSAA Research - What's In It For You?

1:00 Adjourn

Thursday, October 3

7:30-8:30 Dr. Norm Hummel
Balancing Physical and Chemical Soil Characteristics for Sports Fields

8:30-9:15 Dr. Bill Johnston
WSU Research Report, Pullman

9:15-10:00 Leslie S. McDonald, P Ag
B. C. Ministry of Agriculture, Fisheries & Food

10:00-10:45 Dr. Brian Holl,
University of British Columbia

10:45 - 11:00 Closing Comments

11:00 Adjourn Conference

which produced pigmentation in the media and hyphal tips curving at the margin of the colony were identified as *G. graminis* var. *avenae*. Two take-all isolates were selected and used to inoculate sterilized oat kernels. The oat kernel culture was grown at room temperature for three weeks. The inoculum was then ground and mixed with sterile sandy loam at 0.5% w/w after screening through a #8 screen. Five grams of the inoculated soil was layered onto sterile vermiculite in cone-tainer tubes.

Bacterial antagonists, *Bacillus* sp., Q65c-80, and 2-79 were separately mixed with methyl cellulose and applied to bentgrass seeds. Treatments with methyl cellulose only, untreated seed, and non-inoculated soil were also included in the experiments. There were five replications per treatment with 160 seed per replication. Three experiments were conducted to test the effect of the three antagonists on suppression of take-all infection.

The treated and untreated bentgrass seeds were layered onto the soil and covered with a fine layer of sterile vermiculite. The bentgrass was fertilized using l/4 lb. N/1000 ft2 rate of Peter's (20-20-20). After 4 weeks, the bentgrass was harvested by rinsing the roots. Plants were rated for disease according to Weller, et al. (0 = no disease, 5 = plant dead). Crown segments were cultured on SMGGT3 for recovery of the pathogen.

RESULTS

There was no statistically significant take-all patch disease suppression as a result of seed treatment with the three bacterial antagonists tested. Though, not statistically significant, there were fewer root infections in the *Bacillus* sp./RCl treatment compared to the water/RCl or MC/RCl treatments. The highest disease rating was observed in MC/RCl treatment.

DISCUSSION

Suppression of disease-causing organisms in a field situation is affected by several factors, including the amount of disease inoculum, pathogenicity of the disease-causing organism, and effectiveness of the antagonistic bacterial strains. The concentration of *G. graminis* var, *avenae* inoculum added to the sterile soil (0.5% w/w) was based on research conducted with take-all of wheat (Weller, et al.). The inoculum level has not been determined for take-all disease development in the Pacific Northwest. It is possible that the inoculum level used in these experiments could be reduced and correspond to a field situation. More effective bacterial antagonists may be identified through further greenhouse experimentation.

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BALANCING ENVIRONMENTAL CONCERNS ENVIRONMENTAL PRESSURES IN THE EASTERN VERSUS THE WESTERN UNITED STATES[1]

ROBERT Y. SENSEMAN[2]

1 Presented at the 49th Northwest Turfgrass Conference, Skamania Lodge, Stevenson, Washington, October 8-12, 1995.

2 Former Agronomist, Northeastern Region United States Golf Association Green Section

A comparison between the environmental pressures that persist in the Northeastern Region (which includes New York, New Jersey and New England) versus the Pacific Northwest are in stark contrast to one another. The major factors that contribute to these differences are the severe weather patterns which persist in both the winter and summer. A large percentage of rainfall occurs in the summer months in the form of violent thunderstorms usually followed by periods of intense heat. Poor soils and poor grass growing environments contribute to the stress that is placed on the plant.

The predominant turfgrasses found in the region are cool season grasses. Of those, Poa annua, perennial ryegrass and creeping bentgrass are the most widely grown. The turfgrass manager must exercise careful and diligent management as well as rely on the use of pesticides to combat the effects of disease, weeds, and turf-destroying insects. Pesticide budgets range anywhere from $30,000 per year up to a high of in excess of $100,000. The southern portion of New Jersey is very much in the transition zone and pesticide usage will be higher there than in upstate New York where the environmental pressure is not as great. Correspondingly, Long Island and Westchester Counties have moderate to severe environmental pressure and pesticide usage is variable although it is much higher than what normally is found in upstate New York.

Public awareness of pesticide usage is extremely prevalent especially, in Nassau and Suffolk Counties. Typically, for a new pesticide to gain registration, the manufacturer will have to conduct separate groundwater studies on Long Island, in addition to the national testing required by the EP A. This often leads to lengthy and costly investigative studies and many times the pesticide does not gain registration. In contrast, Westchester County and upstate New York are more lax than Nassau and Suffolk Counties, however registration is far more difficult than in neighboring New Jersey which appears to have very few regulatory constraints prohibiting new pesticide registration. Golfer awareness of specific pesticides such as Daconil and phenoxy-based herbicides such as dicamba is great and on some courses, their use has been banned by the Board of Governors of the Club. Many superintendents are initiating integrated pest management programs in an effort to reduce pesticide usage.

Certainly, there are a number of other factors which contribute to disease pressure such as compaction, thatch accumulation, poor drainage, bad growing environments and imbalanced plant nutrition. A good growing environment is critical to minimize the effects of summer heat stress. Many northeastern courses have been over planted with trees and as a result, many greens, tees and fairways are grown in shade and in areas of poor air circulation. We all understand the positive effects that occur when there is adequate light and good air circulation, however there is an attitude among golfers that restricts aggressive tree thinning and removal. In some cases, proper tree thinning cannot be performed due to property line restrictions. In those cases, electric oscillating fans are being used to promote air circulation.

A poorly drained rootzone is a haven for development of root and foliar pathogens, not to mention wet wilt. After the middle of June, northeastern weather patterns become severe.

Violent thunderstorms are capable of depositing 1"-2" of rain at a time. After the clouds clear, it is very likely that daytime temperatures can reach 900F. or higher, with relative humidity levels ranging between 90-100%. The intense heat and high relative humidity can stimulate the development of wet wilt and the extended leaf canopy wetness duration promotes diseases such as Pythium, brown patch and summer patch. To improve the rootzones on putting greens, superintendents are using a combination of three cultivation methods. Typically, core aerification is performed in either the spring or fall, or both, followed by at least one deep aerification treatment, normally in the fall. The HydroJect aerifier is becoming a popular method to improve water permeability and rooting.

THE RIGHT GRASS

Selecting and growing the most adaptable turfgrass is critical for both summer and winter survival. During the past several years, annual bluegrass and perennial ryegrass has been severely injured in the winter due to crown hydration injury and in the summer due to extreme heat stress and disease activity. Obviously, the most desirable grass for putting greens is creeping bentgrass, however even under the best circumstances, older putting greens normally will not have creeping bentgrass populations in excess of 70-80%. The real dilemma occurs when cultivating fairway turf. Perennial ryegrasses do withstand traffic quite well, however, they are extremely susceptible to crown hydration injury as well as Pythium and brown patch disease. The creeping bentgrasses are highly adaptable to the region and conversion programs can be initiated whereby clippings are collected, lightweight mowers are used and the spread of creeping bentgrass can be accelerated by using plant growth regulators. To a lesser degree, perennial ryegrasses are being grown. Prograss has proven to be extremely effective when 2-3 applications are used in the fall, in conjunction with aggressive overseeding of perennial ryegrass, to convert annual bluegrass fairways to perennial ryegrass. However, the Prograss program is expensive, and many superintendents have lost confidence in perennial ryegrass due to winter injury and their susceptibility to summer diseases.

DISEASE PRESSURE

Disease pressure in the northeast region can be extremely great. Depending upon the exact geographical area where the course is located and membership expectations, fungicides will be applied on the greens, tees, and fairways. Most courses will treat fine turfgrass areas for pink and gray snow mold. This spring Red Thread diseases on perennial ryegrasses and fine leaf fescues were extremely high as well as red leaf spot on creeping bentgrass and required treatment. Creeping bentgrass is susceptible to dollar spot and more and more cases of basal crown rotting anthracnose are being reported. Diseases that are particularly severe on perennial ryegrasses include brown patch as well as foliar Pythium. The most widely treated disease of Poa annua, aside from those already mentioned, is summer patch. Normally, only putting greens receive preventative fungicide treatments which call for 3-4 applications of a sterol inhibiting fungicide at high rates.

INSECT PRESSURE

A whole host of insects are capable of invading turfgrass stands in the Northeast, but perhaps the most common insect problems that are treated include cutworms, annual bluegrass weevil and white grubs. Many courses elect not to treat for Hyperodes weevil as this is a form of annual bluegrass control. However, on those courses which have high populations of annual bluegrass, they have no choice. Typically, Hyperodes weevil populations will begin to evade as adults when forsythia blooms in the spring. Around the first part of June, the eggs that the adults have laid in the leaf sheaths of annual bluegrass plants will hatch and larvae will begin to voraciously feed on Poa annua. The larvae begin invading from the perimeter edges of fairways and roughs to the closely mowed grass on the putting greens. Initially, contact insecticides such as Dursban are used to control the adults, however as larvae begin to proliferate, soil insecticides such as Turcam and Oftanol are required. It is not unusual to see 3-5 generations of Hyperodes weevil throughout the course of the summer season.

White grubs are capable of creating damage to fairways and roughs in August and early September either by root feeding or as a result of animals digging up the turf to feed on the grubs. Most courses will treat fairways and green surrounds preventatively to prevent turf loss due to grub activity.

Aside from annual bluegrass, crabgrass and goosegrass are the most problematic summer annual weeds, and are routinely treated for on fairways, green surrounds, tees, and to a very limited extent, putting greens. Pre-emergence treatments for crabgrass usually account for 20-40 acres of treated turf. In an effort to reduce the amount of pesticide applied, many have tried using Acclaim post-emergence herbicide in light frequent rates for control of crabgrass and goosegrass or have mapped areas and spot-treated with pre-emergent herbicides. As one can see, the potential for turf loss due to environmental stress is extremely high and it is possible to apply a great deal of pesticide to combat these pressures. Many superintendents have abandoned blanket spraying and are using mapping, and aggressive scouting and sampling techniques to reduce pesticide usage. However, with the scouting and spot-treating techniques, a major component for an effective program is timely spray applications. At many courses, this is not feasible and turf may be lost due to golfer restrictions of timely treatments. The other major concern in the region is the fate of pesticide rinsate and equipment wash-rack rinsate. Unlike many golf courses in Northwest, very few have initiated 100% containment programs to capture and recycle rinsate.

CONCLUSION

The Pacific Northwest is fortunate in that environmental pressure is relatively mild compared to that of the Northeastern Region. However, regardless of which portion of the country you are located in, all efforts must be made to select disease and insect resistant grasses. scouting techniques and good integrated pest management programs can reduce the acreage treated, and thus, limit environmental exposure.

INDOOR TURFGRASS FOR WORLD CUP '94 AND BEYOND[1]

Dr. John N. Rogers, III, Mr. John Stier, Dr. James R. Crum, and Dr. Paul E. Rieke[2]

1 Presented at the 49th Northwest Turfgrass Conference, Skamania Lodge, Stevenson, Washington, October 8-12, 1995.

2 Department of Crop and Soil Sciences Michigan State University East Lansing, MI

In November 1991, the Detroit World Cup '94 Bid Committee requested help from turfgrass scientists at Michigan State University to install and maintain a natural turf field inside the Pontiac Silverdome for the 1994 World Cup soccer tournament. At least $120 million was expected to be pumped into the local economy, much of the money coming from international visitors.

Research began in the summer of 1992 to determine the installation and management procedures required for a natural turf field inside the Pontiac Silverdome. Preliminary research was conducted inside the stadium during June/July '92. Grass types, plant growth regulators (PGRs), and supplemental lighting were evaluated.

Due to use restrictions inside the Silverdome and time restrictions (the demand by FIFA to prove the indoor turf concept would work by playing a U S. Cup game in June 1993), a 6600 ft2 research dome was built in August 1992 at the MSU Hancock Turfgrass Research Center. The fiberglass fabric used to cover the research dome is the same type of fabric used at the Pontiac Silverdome and other facilities around the world. Lack of suitable light poses the greatest obstacle to maintaining turfgrass inside the stadium as the fabric transmits less than 10 % of total sunlight and filters out much of the blue light crucial for plant growth. Diseases, heat, and moisture problems have also proven to be important factors in the management of indoor turfgrass.

Over one dozen experiments were conducted inside the research dome between autumn 1992 through winter of 1994. Two grass species, three soil types, five PGR rates, five fertility regimes, and six light levels were tested to devise a comprehensive program for managing turfgrass inside the Pontiac Silverdome. In addition, a prototype of the modular system for containing the portable turfgrass field was built and installed inside the research dome in January 1993. The construction of the mini-field provided vital information on the techniques required for the Pontiac Silverdome field.

Construction of the field at the Pontiac Silverdome began March 1, 1993. The soil, a sand:peat:soil mix, had been prepared inside the Pontiac Silverdome from January 2-4 and stored in a shed on the stadium parking lot. Over 1850 steel hexagonal modules, 49 ft2 each, were placed together to form the field and filled with the soil mix. The soil was compacted and the field leveled prior to sodding. The sod, a mixture of 85% Kentucky bluegrass and 15% perennial ryegrass, was grown in California during the winter of '92-'93 and shipped to Michigan by refrigerated trucks. On average, 10,000 ft2 of sod per day was installed between April 12-22. Ten to 30 people worked 10-12 hours each day to construct the field from March 1 through April 22. Labor was supplied by local golf courses, lawn care companies, and MSU students, staff, and faculty.

Establishment of the field occurred during the latter half of April until the beginning of June, 1993. The field was mown and irrigated daily to encourage a high plant density and prevent moisture stress. Six traveling sprinklers (rain trains) were used to irrigate the field. Reel mowers were used to provide a high quality cut at low mowing heights (2" initially then decreasing to 1.25" prior to moving the turf indoors). Fertilizer was applied biweekly to maintain a consistent supply of nutrients.

Between June 7 to June 11, thirty people worked over a 44 hr period to move the field inside the Pontiac Silverdome. The modules were moved inside the stadium on flatbed trailers. Fork trucks were used to position the modules on the floor to form the field. Over the next few days the field was rolled and mown to prepare it for play. Seams between the individual modules were topdressed and rolled to achieve a uniform, level playing surface.

On June 19, 1993, in the first major sporting event ever played indoors on natural grass, defending world champion Germany defeated England 2-1 in the final game of the U.S. Cup '93. Over 62,000 spectators attended the game. Forty-five million people in 70 countries watched the game on TV. Players, coaches, and spectators alike loved the field. "The field is perfect..." exclaimed German coach Bernie Vogts. "I've never experienced a field in such perfect condition-a big compliment," Germany's leading scorer Juergen Klinsman commented. On June 21 the world champion U.S. national women' s team defeated the Canadian national women' s team 3-1. Then, for four days, the field was used for the '93 Watchtower Convention. Finally, two additional soccer games were played on the turf during the next 10 days.

The turf held up well through all four games and team practice sessions. FIFA officials flew in from Zurich, Switzerland on June 29 and proclaimed the " experiment" a tremendous success.

Between June 30-July 2 the field was moved outdoors and reassembled in the parking lot (total time = 28 hrs.). During the rest of the summer and autumn the field was maintained as a high quality athletic field, with daily mowing and irrigation. Proper fertilization aided recovery of the turf and no sections required replacement or even overseeding. In mid-December a winter cover was placed on the field to prevent winter desiccation. The cover was allowed to stay on until mid-March when it was removed just prior to the advent of warm weather.

Fertilizations and mowing started in late March, speeding the springtime recovery of the turf. Throughout the spring of 1994 the turf was mown daily and irrigated frequently using two large water reels (another type of traveling sprinkler). Sand topdressings were applied several times to maintain a level playing surface.

Television crews and newspaper reporters/photographers were continually present at the Pontiac Silverdome field during the spring and summer of 1994. The media was often on hand for such routine practices such as mowing and fertilization. All of the field maintenance was done by MSU staff and students who performed remarkably well, especially in the light of TV cameras, and without any mishaps.

Installation techniques were improved upon from 1993. Between June 10 to 12, 1994, the field was moved back inside the stadium over a working period of only 30 hours. Seams between the modules fit together so well that additional topdressing was not required. Ball roll and bounce evaluations were conducted by World Cup turfgrass evaluator Steve Cockerham (University of California-Riverside) and were deemed quite acceptable. Except for lining, the field was ready for play within 24 hours after the last module was placed. On the afternoon of June 10 an international press conference was held on the floor of the stadium with the partially installed field covering nearly one-half the surface. MSU turfgrass scientists, World Cup, and Pontiac Silverdome officials were interviewed by news media from Great Britain, Japan, Mexico, Switzerland, and other nations, plus over one dozen national newspapers and television stations.

On June 14 the field was lined and the goal posts were installed. The field was relined twice more during the tournament, once on June 20 and again on June 27. Beginning during installation, the field was rolled daily using a combination of single drum, three-gang, or mower-type rollers. Following rolling, the field was brushed to stand the turf upright for mowing. Occasionally a turfgrass sweeper brush was used to remove turfgrass debris. The field was mown daily at a height of 1" (2.54 cm). Clippings were collected and discarded. Irrigation was unnecessary while the turfgrass was inside the stadium.

The first week the turf was indoors the weather was hot and humid, with temperatures and humidity in the 90's. Twelve portable, industrial fans were moved constantly around the field to aid air movement and promote drying of the turf to prevent disease development. Non-turf related traffic was kept to a minimum in order to minimize additional turfgrass stress. Advertisement signboards and television cameras comprised the bulk of the non-turf related traffic. In addition, the field was visited by representatives from the (National Football) Players Association, Chuck Schmidt, the general manager of the Detroit Lions, Wayne Fontes, the head coach of the Detroit Lions, and many of the Detroit Lions team members.

On June 17 the Swiss national soccer team held practice for 1.5 hrs. in the stadium and appeared quite satisfied with the field conditions. Afterwards the U.S. soccer team held their practice, followed by an inspirational video and music that evening. On Saturday, June 18, the U.S. and Switzerland played to a 1-1 draw before an enthusiastic crowd of over 70,000 people. Despite the week of hot, humid weather, ideal neither for turf or spectators, the field conditions after the game remained outstanding. No divots had torn through the turfgrass mat layer to expose the soil despite the use of steel cleats by many players. Divots were repaired the day following the game by lifting and pulling the sides of a worn area together similarly to fixing divots on a golf green.

The day after the game temperatures and humidity finally decreased to 70-80 F with 6080% humidity. On June 21 the Romanian national team practiced on the field. The following afternoon, June 22, Switzerland defeated Romania 3-1. On June 23 the Swedish national team practiced inside the stadium, followed in the afternoon by the Russian national team. One of the Russian coaches remarked that in Russia they could only dream of having such a high quality field. Unfortunately for the Russians, on Friday, June 24, they were soundly defeated by the Swedes 4-1.

During the weekend of June 25-26 the divots were once again repaired. On Monday, the Brazilian national team entered the stadium for the last regular practice session inside the Silverdome during the World Cup. On June 28, Brazil and Sweden played to a 1-1 draw. Brazil went on to win the World Cup 1994 championship, with Sweden finishing third.

From June 29-30 the sod was cut from the field and shipped to Belle Isle, Michigan, where it was used in the construction of a new soccer field. The soil was sold to a golf course construction firm and used to build nine putting greens. The steel modules were shipped to a remote site of the Pontiac Silverdome property where they were put up for sale by the World Cup Host Committee to help defray field operating expenses. As in 1993 the turf survived the four soccer games and six practices in fine condition. Many players spoke quite favorably of the indoor portable turfgrass field' s quality., none expressed dissatisfaction. Coaches, fans, and media alike were thrilled with the indoor turfgrass field. The success of the turfgrass system has generated interest in indoor turfgrass for sporting events around the world. Japan leads the pack of potential indoor turf users–in July 1994 they tested an indoor turfgrass system for the new Japanese Football (soccer) League at the Fukuoka Dome.

Research is continuing at Michigan State University to develop management schemes for turfgrass under low light levels, including both outdoor and indoor situations. Now that we have established the techniques for the short-term maintenance (< 60 days) of indoor sports turf, much of the current and future research will be aimed at maintaining turfgrass indoors or under low light levels on a long-term (> 60 days) or permanent basis. During the summer and autumn of 1994 several companies/groups have approached Michigan State University exploring the potential for indoor turfgrass for sports fields. Negotiations are underway with some of these companies to develop indoor turfgrass fields.

Research currently in progress includes evaluation of several Kentucky bluegrass varieties, both old and new, for their performance under shade. In a second project undertaken in conjunction with a Japanese [stadium] architectural and construction firm, we are evaluating the use of iron and magnesium applications to improve the quality and durability of Kentucky bluegrass under three levels of reduced light.

A third main project focuses on the use of a novel turfgrass species from Germany, Poa supina. Collected in the Alps, it is related to annual bluegrass but is a perennial species like P. supina is stoloniferous, able to quickly Kentucky bluegrass. Unlike other - Poa species, Poa supina is stoloniferous, able to quickly recolonize an area disrupted by traffic. In addition, the grass is purportedly shade and traffic tolerant. Our research objective is to determine the suitability of the species for use as a sports turf in both outdoor and indoor applications. Plots have been established both indoors and outdoors. Experiments are underway to define fertility and light requirements of the grass, its ability to withstand sports-type traffic, and the use of PGRs and iron to improve its color. Other experiments are defining its disease susceptibility.

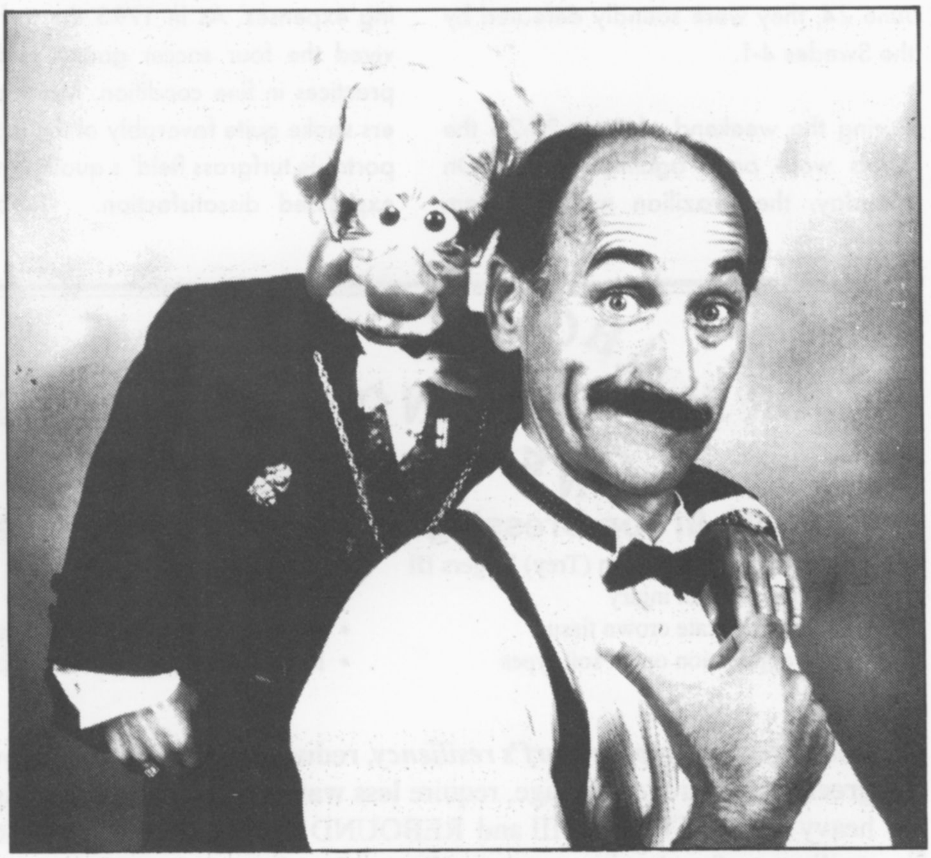
DON BRYAN & NOSEWORTHY

Banquet entertainment

Don Bryan's interest in Ventriloquism goes back over thirty years. At the age of twelve, he first started performing for his school. The creator of his own puppets, even then his skills were recognized with awards in talent and craft shows.

Don's father was a professional theater actor in London, England, after World War II, the family immigrated to Canada in 1947 where Don grew up and eventually embarked on a career of his own, carrying on a family tradition of theater.

During his teen, he met the great master himself, Edgar Bergan, who was impressed with Don's talent, not just as a ventriloquist but as a accomplished puppet carver. "Don's figures are among the finest I have ever seen," said Bergan.



Don's first puppet was a pretty simple toy store version of Howdy Doody. After working with this inadequate piece of equipment, he moved on to creations of his own. Over the years, Don has created and carved over forty puppets for many other amateur and professional ventriloquists. His work was in demand worldwide. However, he soon stopped playing "Chepeto," the creator and pursued performing instead.

Don's passion for perfection and detail is evident in his puppet creations and performances.

Don's partner, Noseworthy, came to life in 1963. The town have performed worldwide to all types of audiences, young and old, for 28 years. Other characters shore the stage with the duo, adding variety and unique appearance to the act.

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