NCR Regional Affairs Director Bill McCarthy shared a creative approach on golf rules and correct calls in the field.

Dennis Robinson accepted a 50-year member plaque on behalf of Horst Distributing from the WGCSA.

Steve Schmidt and Dave Hills were on hand to receive the 25-year membership plaque from Jack Tripp.

such as desiccation, snow mold, cold temperatures and crown hydration. Green covers have been shown to protect turf against winter desiccation. However, even green covers could not protect the turf in Alaska when temperatures dropped to more than 50 degrees below zero. The comfort level provided by the greens covers will vary among golf course superintendents. However, research and field studies have yet to provide a sure thing in regards to green covers. The USGA is currently researching green covers with various colors. Hopefully, this research will reveal an additional tool to superintendents in our frustrating attempts to beat Mother Nature.

John Spitzer, Technical Director, USGA, discussed a few of the thousands of pieces of golfing equipment (golf clubs, golf balls, etc.) submitted to the USGA for their review. These products are reviewed, researched and tested to determine whether each piece of equipment falls within the equipment specifications or rules of golf. John spent the majority of his presentation discussing titanium drivers and the new golf balls. Today's new equipment has begun to exceed the intentions of past restrictions. Those restrictions are being reanalyzed for future modifications.

Jim Reinhart, USGA Executive Committee, presented the purpose and success of the USGA Foundation. The Foundation has grown to encompass additional needs in the golf community. Today, the Foundation operates as the broad-based philanthropic arm of the USGA. One of the Foundation's goals is to maintain and improve the opportunities for all individuals to take part in the game of golf. The USGA Foundation has been awarding grants through its "For the Good of the Game" Grants Program in an effort to make golf more affordable and accessible. The First Tee program is another opportunity created to increase the number of youth participating in the game, with an emphasis on those who would not otherwise have access, by developing affordable golf learning facilities where kids can learn the game of golf at places where they are welcome to play. Although this paragraph does not do justice to all of the USGA Foundation efforts, please feel free to visit the USGA Foundation website to learn more.

Bill McCarthy, Director, Regional Affairs, USGA North Central Region called upon attendees to "make the call" regarding actual rule violations. In his *"So, You Want to Be a Rules Official"* presentation, Bill presented video coverage of PGA/USGA golf tour-

naments illustrating obvious and not so obvious rule violations. Hand picked volunteers were put on the spot as a "rules official." It became evident that many of the attendees need to brush up on the rules of golf.

The WGCSA Spring Meeting followed lunch. Laura Schoesser, Milwaukee County, reminded golf course superintendents of the need to provide *"Workplace Safety."* Although Laura's talk was just a brief overview of OSHA requirements, it was sensed among the audience their workplace safety needed to be improved. She provided significant information regarding hearing protection and also the use of respirators. OSHA requirements are not easily memorized. Please utilize the OSHA website or the state contact to educate and update all workplace safety concerns or requirements.

President Brandenburg presented the meeting agenda and all areas were addressed. All committee chairpersons presented their reports and the expectations of the upcoming season. Treasurer Michael Lyons reported the final 2002 financial figures. The Association finished the year $15,250 ahead of budget. The approved 2003 budget was presented again.

Jack Tripp presented the membership report. Jack presented 25-year plaques to members: Dave Beno, Dave Hills, Steve Schmidt, Pete Van De Hey and Roy Zehren. A 45-year member plaque was given to the Reinders Brothers; Wisconsin Turf received a 47-year plaque and Horst Distributing received a 50-year plaque. This is the first year the Association has awarded affiliate members. The WGCSA would like to thank all those who support the association.

President Brandenburg introduced the Club Relations Committee. This committee includes Rod Johnson, David Brandenburg, Pat Sisk, Kris Pinkerton, Wayne Otto, and Dustin Riley. This newly formed committee will serve as a resource to clubs searching for a superintendent and also desiring to find ways of improving their golf courses.

David also reported that Monroe Miller has received the Newsletter Editor Award from GCSAA at the conference in Atlanta. This is the 19th year in a row Monroe has received this award for his outstanding work with the Grass Roots. The association greatly appreciates Monroe's outstanding

contribution to this fine magazine. We can all be proud thanks to Monroe's efforts. The Grass Roots had income during 2002 of $32,359.50 and expenses of $34,671.98. This results in a negative variance of $2,312.48. We feel this is a small expense for such a nice magazine. Thank you Monroe!

President Brandenburg spent the remaining minutes of the Spring Meeting discussing the implementation and requirements of GCSAA's PDI, which is set to begin in July. These requirements and how they may affect each member can be found on the GCSAA website. If Internet access is not available, please contact President David Brandenburg for any concerns.

Dustin Riley and Brian Zimmerman presented the 2003 monthly meeting schedule and related educational opportunities. The schedule is listed below.

The WGCSA would like to extend an appreciation to all superintendents and their respective golf courses in their generous offering to host a monthly meeting. Meeting sites for 2004 are already being requested. If anyone is interested in hosting a WGCSA monthly meeting please contact Dustin. Golf and Arrangements Chair, at 262 567-6212 or ogcriley@voyager.net. The monthly meeting notices will be arriving soon. Please consider participating in these events and getting involved with the association. Have a great season.

2003 Monthly Meeting Schedule

Mon, April 28: Trempealeau Mtn. GC, Trempealeau, WI
- Speaker Dr. Geunwha Jung, "Snow Mold Research"

Wed, May 28: Wilderness Woods GC, Wisconsin Dells, WI
- WI PGA - Super-Pro Tournament

Mon, June 30: North Brook GC, Luxemburg, WI

Mon, July 21: Crystal Springs GC, Seymour, WI

Tues, Aug 12: WTA Field Days, OJ Noer Center, Verona, WI

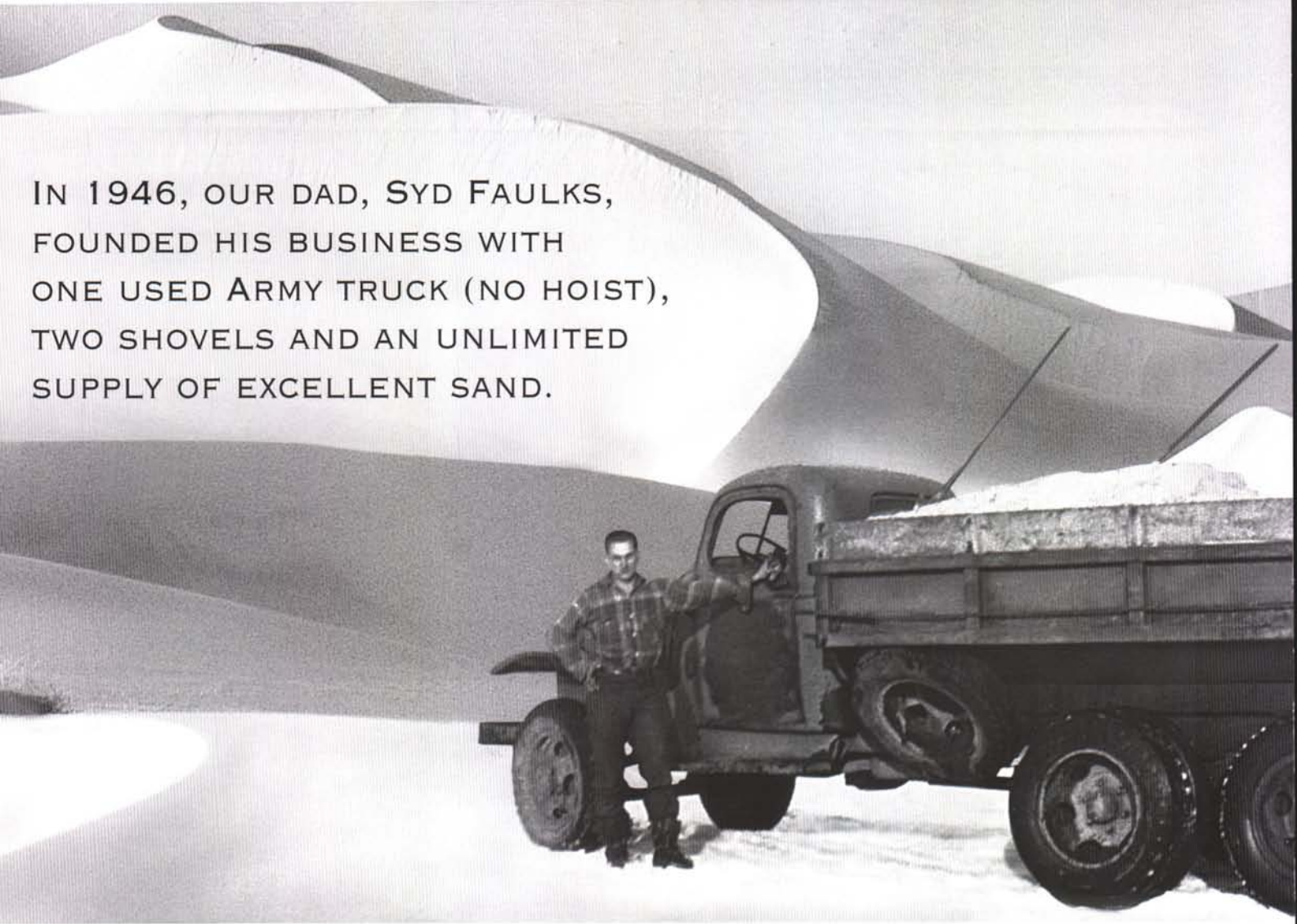
Mon, Sept 22: Nakoma GC, Madison, WI
- Superintendent Tournament
- Speaker Bob Vavrek, "Year in Review"

October 3/4th: Greenwood Hills CC, Wausau, WI
Dinner Dance

Wed, Oct 8: The Bull at Pinehurst Farms, Sheboygan Falls, WI
- WTA Fundraiser Golf Outing

Tues, Oct 14: Racine CC, Racine, WI
- Superintendent/Guest
- Speaker Mark Kuhns "Restoration and Renovation"

Tues/Wed, Nov 18, 19: Symposium American Club, Kohler, WI



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The Year of Phytotoxicity

By Jeff Gregos, *Departments. of Plant Pathology and Horticulture, University of Wisconsin-Madison*

We have known for years that PCNB can cause leaf-tip burn when applied for snow mold in the fall. We also know that it can be more severe if there is a warming trend following applications. It has been shown in the past that if temperatures get above 55°F, phytotoxicity from a PCNB application will be increased. But, what about other chemicals?

In the past no observations have been noted on a regular basis for other chemicals causing phytotoxicity. Additionally, this was a year that we did not see that late season rise in temperatures. But what was observed this past winter was open ground (no snow cover or limited) with sub-zero temperatures. This would probably have been chalked up as coincidence, but this was observed at every site that the snow mold trials were conducted, each with slightly different weather conditions. This year included seven sites: O. J. Noer Facility, Pine Hills Country Club, Eau Claire Country Club, Sentryworld, and Gateway Golf Club, all in Wisconsin; and Northland Country Club and Giants Ridge Golf Resort, both in Minnesota.

Most snow mold fungicides are applied around the time of winter dormancy. At this time most of the physiologic processes of the plant have either slowed down or ceased for the year. So, most would think that there would be little or no affect from a fungicide application. But, for some reason this year has presented something quite different. While most golf courses would not note this effect, due to the applications over an entire green or fairway, in research plots where there are 81 different treatments, the differences are striking. In

Table 1, all 81 treatments evaluated this year are included with ratings for phytotoxicity from three sites in Wisconsin. There is wide range of phytotoxicity observed among the treatments. While all treatments cannot be discussed some interesting observations will be presented below.

An example of the increased phytotoxicity this winter from snow mold applications. (The lighter colored turf is the snow mold plot at Pine Hills CC, the fairway (darker turf) around the plot was treated with PCNB alone)

Treatments 1-3 are similar with the exception of timing. Like wise treatment 4-6 are similar, but 4-6 use Iprodione instead of Concorde in treatments 1-3. While there is not much difference observed at the Noer Facility or Sentryworld (both nearly 100% bentgrass stands), there is a difference observed at Pine Hills where there is a higher annual bluegrass population. This is an interesting fact in that we generally associate annual bluegrass with slow green-up in the spring. But, for some reason it would appear that there is an adverse reaction between these mixtures and creeping bentgrass. At Pine Hills C C the annual bluegrass is less affected then creeping bentgrass when Iprodione is used in the mix instead of Concorde.

A noteworthy chemical for the reduction of phytotoxicity would be Chipco Signature. Whether it is just the pigment in the formulation, or possibly the net result of the chemical (has been shown to induce physiological processes in the plant), the turf plants tend to have a greener color in the spring. Even when there is some senescent tissue, a green cast is present, which would indict the green pigment. This is amazing that this greening can last upwards of 6 months under winter conditions. A prime example of the affects of Signature can be seen in treatments 21 and 22. The only difference between the treatments is the addition of Signature and, at two of the three sites there is a significant difference observed, with the treatment including Signature having less phytotoxicity. In general the treatments that included Signature did not display much of any signs of phytotoxicity.

Another treatment that had some differences was that of Banner MAXX. Treatment 27 was applied generally around the second week of November, while treatment 67 was in the third week of October. At most sites the earlier application had significantly reduced phytotoxicity. This was also observed in some of the mixtures that included Banner MAXX, with the early applications resulting in less damage due to phytotoxicity.

Finally, as usual the PCNB tip-burn was observed. Since PCNB is pretty much a staple in most of our snow mold management plans, this is difficult to overcome. But one topic that seems to surface every time I discuss PCNB is the root-pruning incidence. While I have not studied this in depth in a research study, I have done literature reviews and have had many discussions with other researchers on the topic. I have only been able to find one article on the topic of root pruning by PCNB and that was on

Trt No.	Treatment Name	Rate Rate	Unit	Timing	Noer Phyto Apr-13-03	Pine Hills Phyto Apr-11-03	Sentry Phyto Apr-09-03
1	Insignia	0.9	OZ/M	Early	3 d-g	3 def	3 efg
	Concorde	5	OZ/M	Early			
	Propiconazole	3	FL OZ/M	Early			
2	Insignia	0.9	OZ/M	Late	3.3 c-f	2.67 ef	3 efg
	Concorde	5	OZ/M	Late			
	Propiconazole	3	FL OZ/M	Late			
3	Insignia	0.9	OZ/M	Ea/La	2.7 efg	2.33 f	2.67 fgh
	Concorde	5	OZ/M	Ea/La			
	Propiconazole	3	FL OZ/M	Ea/La			
4	Insignia	0.9	OZ/M	Early	2.3 fg	3.67 b-e	3.33 def
	Iprodione	4	FL OZ/M	Early			
	Propiconazole	3	FL OZ/M	Early			
5	Insignia	0.9	OZ/M	Late	2.3 fg	4 a-d	2.33 gh
	Iprodione	4	FL OZ/M	Late			
	Propiconazole	3	FL OZ/M	Late			
6	Insignia	0.9	OZ/M	Ea/La	2 g	4 a-d	2.33 gh
	Iprodione	4	FL OZ/M	Ea/La			
	Propiconazole	3	FL OZ/M	Ea/La			
7	Bayleton	2	OZ/M	Late	3.3 c-f	4 a-d	2.83 e-h
	Compass	25	OZ/M	Late			
	Turfcide 400	8	FL OZ/M	Late			
8	Bayleton	2	OZ/M	Late	2.7 efg	3.33 c-f	3.67 cde
	Compass	0.25	OZ/M	Late			
	Daconil Ultrex	3.2	OZ/M	Late			
9	Signature	4	OZ/M	Ea/La	3.3 c-f	4.67 ab	5 a
	Bayleton	2	OZ/M	Late			
	Compass	0.25	OZ/M	Late			
10	Signature	4	OZ/M	Ea/La	4 a-d	5 a	5 a
	Bayleton	2	OZ/M	Late			
	Chipco 26 GT	4	FL OZ/M	Late			
11	Signature	4	OZ/M	Ea/La	5 a	5 a	5 a
	Chipco 26 GT	4	FL OZ/M	Late			
	Turfcide 400	8	FL OZ/M	Late			
12	Signature	8	OZ/M	Late	5 a	5 a	5 a
	Chipco 26 GT	4	FL OZ/M	Late			
	Turfcide 400	8	FL OZ/M	Late			
13	Signature	8	OZ/M	Late	5 a	5 a	5 a
	Chipco 26 GT	4	FL OZ/M	Late			
	Daconil Ultrex	3.2	OZ/M	Late			
	Turfcide 400	8	FL OZ/M	Late			
14	Signature	8	OZ/M	Late	4.7 ab	4.67 ab	5 a
	Chipco 26 GT	4	FL OZ/M	Late			
15	Chipco 26 GT	4	FL OZ/M	Late	3.3 c-f	3.33 c-f	2.33 gh
	Daconil Ultrex	3.2	OZ/M	Late			
	Turfcide 400	8	FL OZ/M	Late			
16	Chipco 26 GT	4	FL OZ/M	Late	4.7 ab	3.67 b-e	2.67 fgh
	Turfcide 400	8	FL OZ/M	Late			
17	Chipco 26 GT	4	FL OZ/M	Late	3.3 c-f	4 a-d	2.67 fgh
	Chipco Triton	0.3	OZ/M	Late			
	Turfcide 400	8	FL OZ/M	Late			
18	Chipco 26 GT	4	FL OZ/M	Ea/La	2.7 efg	3.33 c-f	2 hi
	Daconil WeatherStik	5.5	FL OZ/M	Ea/La			
	Turfcide 400	8	FL OZ/M	Ea/La			
19	Signature	8	OZ/M	Ea/La	5 a	5 a	5 a
	Chipco 26 GT	4	FL OZ/M	Ea/La			
	Daconil WeatherStik	5.5	FL OZ/M	Ea/La			
	Turfcide 400	8	OZ/M	Ea/La			
20	Signature	4	OZ/M	E/M/L	4.7 ab	4.67 ab	5 a
	Chipco 26 GT	4	FL OZ/M	Mi/La			
	Turfcide 400	8	FL OZ/M	Mi/La			
21	Chipco 26 GT	4	FL OZ/M	Mi/La	5 a	5 a	5 a
	Signature	8	OZ/M	Mi/La			
	Turfcide 400	8	FL OZ/M	Mi/La			
22	Chipco 26 GT	4	FL OZ/M	Mi/La	3.3 c-f	4 a-d	2 hi
	Turfcide 400	8	FL OZ/M	Mi/La			
23	Chipco 26 GT	4	FL OZ/M	Mi/La	5 a	5 a	5 a
	Signature	8	OZ/M	Mi/La			
24	Chipco 26 GT	4	FL OZ/M	Ea/La	3.7 b-e	4 a-d	2.33 gh
	Chipco Triton	0.3	OZ/M	Ea/La			
	Turfcide 400	8	FL OZ/M	Ea/La			
25	Compass	0.25	OZ/M	Ea/La	3 d-g	2.67 ef	2.33 gh
	Bayleton	2	OZ/M	Ea/La			
	Turfcide 400	8	FL OZ/M	Ea/La			
26	Daconil WeatherStik	5.5	FL OZ/M	Late	3.7 b-e	4 a-d	4 bcd
27	Banner Maxx	4	FL OZ/M	Late	2 g	2.67 ef	2 hi
28	Medallion	0.5	OZ/M	Late	4.3 abc	4 a-d	3.67 cde
29	Heritage	0.4	OZ/M	Late	5 a	4 a-d	3.67 cde
30	Banner Maxx	4	FL OZ/M	Late	2.7 efg	3 def	3.33 def
	Medallion	0.5	OZ/M	Late			
31	Daconil WeatherStik	5.5	FL OZ/M	Late	4 a-d	4 a-d	4 bcd
	Medallion	0.5	OZ/M	Late			
32	Banner Maxx	4	FL OZ/M	Early	2.7 efg	3.33 c-f	2.67 fgh
	Medallion	0.5	OZ/M	Late			
	Daconil WeatherStik	5.5	FL OZ/M	Late			
33	A13705B	2.5	FL OZ/M	Early	2.7 efg	4 a-d	3 efg
34	A13705B	2.5	FL OZ/M	Mid	4.7 ab	3 def	3.33 def
35	A13705B	2.5	FL OZ/M	Late	2.7 efg	4 a-d	3.67 cde
36	Anderson Daconil	15.1	LB/M	Late	2.7 efg	4 a-d	4.33 abc
	Anderson Bayleton	12.5	LB/M	Early			
	Anderson Fungicide V	5.95	LB/M	Late			
37	Anderson Daconil	15.1	LB/M	Snow	3.3 c-f	3.33 c-f	4.33 abc
	Anderson Bayleton	12.5	LB/M	Snow			
	Anderson Fungicide V	5.95	LB/M	Snow			
38	Anderson Fungicide X	7.21	LB/M	Early	3 d-g	4.33 abc	4.67 ab
	Anderson Bayleton	12.5	LB/M	Late			
	Anderson Fungicide V	5.95	LB/M	Late			
39	Anderson Fungicide X	7.21	LB/M	Snow	3 d-g	4.33 abc	4.33 abc
	Anderson Bayleton	12.5	LB/M	Snow			
	Anderson Fungicide V	5.95	LB/M	Snow			
40	Anderson Fungicide X	7.21	LB/M	Early	4.3 abc	3.67 b-e	4.67 ab
	Anderson Daconil	15.1	LB/M	Late			
	Anderson Fungicide V	5.95	LB/M	Late			
41	Anderson Fungicide X	7.21	LB/M	Snow	4.3 abc	4.33 abc	4.33 abc
	Anderson Daconil	15.1	LB/M	Snow			
	Anderson Fungicide V	5.95	LB/M	Snow			
42	Anderson 1215	12.5	LB/M	Early	4.3 abc	4.33 abc	4 bcd
	Anderson Daconil	15.1	LB/M	Late			
43	Anderson 1215	12.5	LB/M	Snow	3.3 c-f	4 a-d	4.67 ab
	Anderson Daconil	15.1	LB/M	Snow			
44	Anderson 1121	5.05	LB/M	Early	5 a	4.67 ab	4.67 ab
	Anderson FF II	6.36	LB/M	Late			
45	Anderson 1121	5.05	LB/M	Snow	5 a	4.33 abc	5 a
	Anderson FF II	6.36	LB/M	Snow			
46	Anderson 1121	5.05	LB/M	Early	2 g	4.33 abc	4.67 ab
	Anderson 10-0-14 PCNB	6.36	LB/M	Late			
47	Anderson 1121	5.05	LB/M	Snow	3.3 c-f	2.67 ef	1.17 i
	Anderson 10-0-14 PCNB	6.36	LB/M	Snow			
48	PCNB + Novex 9-0-19	6	LB/M	Late	5 a	5 a	4.67 ab
49	Lesco 18 Plus	4	FL OZ/M	Late	4.3 abc	3.67 b-e	2.67 fgh
	Lesco Revere 4000	8	FL OZ/M	Late			
	Lesco Manicure	3.2	OZ/M	Late			
50	Turfcide 400	16	FL OZ/M	Late	4.3 abc	4 a-d	3 efg
51	Turfcide 400	12	FL OZ/M	Late	3.7 b-e	4.33 abc	3.67 cde
52	Turfcide 400	8	FL OZ/M	Late	5 a	4.33 abc	4 bcd
53	Turfcide 400	4	FL OZ/M	Late	4.3 abc	5 a	3.67 cde
54	Chipco 26 GT	2	FL OZ/M	Mi/La	3.7 b-e	3.67 b-e	2.67 fgh
	Daconil WeatherStik	2.75	FL OZ/M	Mi/La			
	Turfcide 400	4	FL OZ/M	Mi/La			
55	Chipco 26 GT	2	FL OZ/M	Late	3.7 b-e	3 def	3 efg
	Daconil WeatherStik	2.75	FL OZ/M	Late			
	Turfcide 400	4	FL OZ/M	Late			
56	FF II 14-3-3	104	OZ/M	Late	4.3 abc	4.67 ab	4.33 abc
57	Calogran	128	OZ/M	Late	4.3 abc	4.33 abc	4.67 ab
58	Calodor	3	OZ/M	Late	4 a-d	3.67 b-e	2.33 gh
59	Terraneb	9	OZ/M	Late	4.3 abc	4.33 abc	3.33 def
60	Bayleton	2	OZ/M	Early	4 a-d	4.33 abc	3.67 cde
	Prostar	4.5	OZ/M	Early			
61	Bayleton	2	OZ/M	Late	3.7 b-e	4.33 abc	3 efg
	Prostar	4.5	OZ/M	Late			
62	Heritage	0.4	OZ/M	Early	3 d-g	4 a-d	3.33 def
	Banner Maxx	4	FL OZ/M	Early			
63	Heritage	0.4	OZ/M	Late	2.7 efg	3.67 b-e	3 efg
	Banner Maxx	4	FL OZ/M	Late			
64	Compass	0.25	OZ/M	Early	4 a-d	3.67 b-e	4 bcd
	Prostar	4.5	OZ/M	Late			
65	Insignia	0.9	OZ/M	Late	4.3 abc	4.33 abc	4 bcd
66	Terraclor	8	OZ/M	Late	4.7 ab	4.33 abc	4 bcd
67	Banner Maxx	4	FL OZ/M	Early	3 d-g	3 def	3.67 cde
68	Bayleton	2	OZ/M	Late	4 a-d	4.67 ab	3.67 cde
69	Chipco 26 GT	4	FL OZ/M	Late	4.7 ab	3.33 c-f	3.17 d-g
	Daconil WeatherStik	5.5	FL OZ/M	Late			
70	Honor	0.2	OZ/M	Late	4 a-d	4.67 ab	4 bcd
71	Compass	0.25	OZ/M	Late	4.3 abc	4.67 ab	3.67 cde
72	Heritage	0.4	OZ/M	Late	4 a-d	4 a-d	3.33 def
	Daconil WeatherStik	5.5	FL OZ/M	Late			
73	Compass	0.25	OZ/M	Late	3.3 c-f	4.33 abc	3.33 def
	Daconil WeatherStik	5.5	FL OZ/M	Late			
74	Honor	0.2	OZ/M	Late	3 d-g	4.33 abc	3.67 cde
	Daconil WeatherStik	5.5	FL OZ/M	Late			
75	Insignia	0.9	OZ/M	Late	4 a-d	4 a-d	3.33 def
	Daconil WeatherStik	5.5	FL OZ/M	Late			
76	Daconil Ultrex	3.2	OZ/M	Late	4 a-d	4.67 ab	3.33 def
77	Prostar	4.5	OZ/M	Late	5 a	3.83 bcd	5 a
78	Chipco 26 GT	4	FL OZ/M	Late	4 a-d	4.67 ab	3 efg
79	Chipco Triton	0.3	OZ/M	Late	3.3 c-f	4.67 ab	3.67 cde
80	Spotrete	8	OZ/M	Late	4.3 abc	4.33 abc	3.33 def
81	Untreated Control				4.7 ab	5 a	4.67 ab
	LSD (P=.05)				1.2	1.15	0.98
	Standard Deviation				0.8	0.7	0.61
	CV				20	17.6	16.7

Table 1. Phytotoxicity (Scale of 1-5, with 5= no phytotoxicity and 1=death) of three snow mold trials from around Wisconsin. Early applications were applied around the 3rd week of October, mid-applications were applied the last week of October, and the later applications were applied the 2nd week of November.

beans. There is no current evidence out there to support the possibility of root pruning at this time. Yes, we have seen some incidence of increased take-all patch, but this was not observed under controlled situation and numerous other possibilities could play a factor.

These results may be just a condition of this previous winter. But they will provide us some insight if they are observed in the future. This will also help us to adjust application timing for some of the products, as we did observe differences. So if you are having delayed spring green-up, realize that you are not alone. Also realize that it may not be just the weather, but could include some phytotoxicity issues from you fall application for snow mold.

Additionally, if anyone would like a copy of the results from the snow mold studies this year, please feel free to send me an email (jsg@plantpath.wisc.edu) requesting a copy.

Biostimulants: Time for a Change in Attitude?

By Dr. Wayne R. Kussow, *Department of Soil Science, University of Wisconsin-Madison*

Biostimulants abound in the marketplace. Nelson(1998) appropriately described biostimulants as a broad group of turf products that include microbial inoculum, energy sources for microbes, soil conditioners, plant hormones, and other non-nutritional growth-promoting substances. I include in this list vitamins, amino acids and homeopathic applications (frequent treatment at very low rates) of essential plant nutrients and micronutrients in particular. If biostimulants have one common claim, it is to reduce biotic and abiotic stresses in turfgrass. The primary target is golf putting greens.

The scientific community views biostimulants with a high level of skepticism. The products are developed with some type of rationale that generally has some science backing. But all too often that science involves research remotely related to field-cultured turfgrass. The research has often been conducted with very different plant species under very artificial conditions. Another issue is the paucity of field research that substantiates when and if use of the biostimulant results in significant benefit(s). We now need to dwell for a moment on the word "significant". To be successful in getting their work published in technical journals, researchers have to subject their data to very rigorous statistical analysis and from this establish when the influence of an experimental treatment can rightfully be declared significant and not simply a random occurrence. In the scientific world, statistical significance is generally set at what is known as the 5% probability level. What this means is that if the treatment in question were applied 20 times under conditions similar to those under which the experiment was conducted, we can reasonably expect a significant

treatment effect 19 out of the 20 times the material is applied. This is a very stringent requirement that gets relaxed a bit when taking the research findings out into the real world or when companies are asked to submit to the Department of Agriculture, Trade and Consumer Protection scientific evidence that their product performs as claimed. The requirement becomes one in which a significant plant response to the product is expected "only" 9 out of every 10 times that it is applied.

As long as the rates of application are reasonable, no one questions the value of N-P-K fertilizers in turf management. The prevailing perception is that some benefit will always be realized when fertilizer is applied. Yet, we've long known that in the case of perhaps all nutrients other than N, as we build up levels of plant available forms of nutrients in soil, the point is eventually reached where the soil is supplying all that the plant can productively utilize. We then interpret the soil tests for those nutrients as being "high", "adequate" or "sufficient".

As the soil test level of any particular nutrient increases from low to high, the probability of plants benefitting from additional quantities in the form of fertilizer progressively decline. When soil test levels are high and the nutrient is applied, the chances of seeing a positive plant response are in the range of 5 to 30% (Kelling, et al. 1998). To put this in perspective, if your all 18 of your greens test high in P and you apply fertilizer P every year, the fertilizer can be expected to benefit the turfgrass on as few as one or two of the greens, or none of them.

When soil test levels of nutrients rise above the "high" or "sufficiency" category, the probability of obtaining a significant response by turfgrass to an application of that nutrient drops to less than 2% (Kelling, et al.1998). In 2002, soil and tissue samples were collected from 590 golf putting greens in Wisconsin. Based on the analyses of those samples, phosphorus applications likely produced a beneficial bentgrass response on just 2% of the greens. The potential for K response was somewhat greater. Estimates are that 2 % of the greens had a 30 to 60 % probability of the bentgrass responding to K fertilizer and another 3.9% had a 5 to 30 % chance of responding. For

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