

The Effect of Winter Protection Products on Putting Greens

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Background

Winter injury to putting greens in Iowa will vary each year depending on environmental conditions. Open and dry winters with a lack of snow cover can cause winter desiccation of both creeping bentgrass and annual bluegrass. Synthetic covers, blankets, anti-desiccants, and heavy topdressing are often used to minimize this type of injury. Turf colorants have also been reported to improve winter performance. Fungicides are routinely used in Iowa to control snow mold on putting greens. Generally these products protect putting greens in the winter, however, under certain undetermined conditions golf course superintendents have observed unexpected phytotoxicity and in some cases turf loss. The study was initiated to compare a variety of winter protection products. The fungicide PCNB has been suspected of causing a phytotoxic bleaching of turf during the winter. Superintendents are encouraged to place a 4ft by 8ft piece of plywood on the edge of a green prior to any application of winter protection products. Remove the board after treatment and this provides an excellent side by side comparison with a non-treated control.

Objective

To assess the performance of products and practices used to reduce winter injury.

Methods

This study was conducted at two sites in Ames, Iowa. One was located at the Horticulture farm and the other at Veenker Memorial Golf course, Iowa State University. On each site the study followed a randomized complete block design with 20 treatments. Three replications were used on the native soil/Pennncross bentgrass putting green at Veenker Golf Course. Five replications were used at the Horticulture Research Station on the Crenshaw bentgrass/USGA putting green.

All turf was maintained at a 0.15 inches. Treatment description and rates appear in table 1. Chemicals were applied on December 7, 2003 with a CO₂ back pack sprayer using 3 gallons of water per 1000 ft². All chemicals and mixtures were prepared 2 days before spraying and mixed constantly during application. Winter protection covers were placed on 10 December 2003 before the first big snow event of the season and they were removed on 23 March 2004. Visual ratings were taken on 24 March, 5 April and 3 May. Color rating were based on a scale of 1-9, 9=best, 6= least acceptable green color. Anova and LSD tests were performed on the data.

Table 1. Treatment description and application rates.

Treatment #	Description	Rate	
		Oz./1000ft ²	^(a) ml-g/25ft ²
1	Control – no treatment	n/a	n/a
2	Water only no fungicide	384	285
3	Banner Maxx	3.0	2.18
	Daconil Weather Stick	5.5	3.99
4	Banner Maxx	2.0	1.45
	Medallion	0.5	0.36
5	Banner Maxx	3.0	2.18
	Medallion	0.5	0.36
6	Banner Maxx	2.0	1.45
	Medallion	0.5	0.36
	Daconil Weather Stick	5.5	3.99
7	Primer select	4.0	2.90
8	Leaf shield	2.0	1.45
9	Aca 1820	6.0	4.35
10	Regreen	12.0	8.70
11	Regreen	24.0	17.40
12	Regreen	12.0	8.70
	Banner Maxx	3.0	2.18
	Daconil Weather Stick	5.5	3.99
13	Greenlawnger	32.0	25.00
14	Green Jacket cover	n/a	n/a
15	Sand Topdress	1/8"	1 gal/plot
16	Evergreen cover	n/a	n/a
17	Watering (3/season)	10240/ea.	7800/ea.
18	PCNB granular	120	85.0
19	PCNB WP	8.0	5.80
20	PCNB F	16.0	11.60

^(a)Units are either milliliter per 25 ft² or grams per 25 ft² depending the nature (liquid or solid) of the product.

Results

The winter of 2004 in Ames, IA had 42 inches of snow with approximately 70 days of continuous snow cover from January through early March. There were no reports of winter injury from Iowa Golf Course Superintendents and in general soil moisture was not considered to be excessive or deficient. The severe putting green desiccation that occurred during the winter of 2003 did not exist in 2004. Golf course superintendents in Minneapolis and South Dakota experienced up to 90% turf loss on some putting greens even when covers were used. The type of cover used could not be directly linked to turf injury. In Minnesota injury occurred on covered and non-covered greens with *Poa annua* receiving severe injury while creeping bentgrass was only slightly injured. In Huron, South Dakota creeping bentgrass putting greens were severely damaged by winter desiccation, even under covers.

Visual turf color was used to evaluate injury from winter and phytotoxicity. Table 2 shows the treatment results on 24 March before turf green-up occurred, on 5 April as green-up was occurring, and on 3 May after green up was complete and mowing had initiated. All treatments were compared to an untreated control plot.

Table 2. Color ratings of creeping bentgrass

Treatment description	Color ratings					
	Veenker Golf Course			Horticulture farm		
	24-Mar	5-Apr	3-May	24-Mar	5-Apr	3-May
1 Control	4.00	5.67	7.50	4.20	5.40	7.50
2 Water application	4.67	7.00	7.33	4.80	5.80	6.80
3 Banner Maxx Daconil Weather Stick	1.33	4.00	7.50	2.00	3.20	7.00
4 Banner Maxx Medallion	1.33	5.00	7.00	2.40	3.00	7.20
5 Banner Maxx Medallion	1.33	4.67	7.33	1.80	2.80	6.90
6 Banner Maxx Medallion Daconil Weather Stick	1.00	4.00	7.50	1.80	3.20	7.10
7 Primer select	4.33	6.00	7.67	5.00	5.80	7.40
8 Leaf shield	5.33	6.00	7.33	4.20	4.20	7.20
9 Aca 1820	3.33	6.33	7.50	3.60	4.80	7.40
10 Regreen	9.00	9.00	7.00	9.00	9.00	8.00
11 Regreen	9.00	9.00	7.00	9.00	8.00	8.00
12 Regreen Banner Maxx Daconil Weather Stick	9.00	9.00	7.50	9.00	9.00	8.00
13 Greenlawnger	9.00	9.00	7.67	9.00	8.00	7.80
14 Green Jacket cover	6.67	7.00	7.33	8.00	7.60	7.40
15 Sand Topdress	5.00	6.00	7.33	6.00	6.40	7.80
16 Evergreen cover Green	8.00	7.67	7.67	8.00	6.40	7.50
17 Waterings (3/season)	4.33	6.00	7.33	5.00	6.00	7.30
18 PCNB granular	3.67	7.00	7.33	4.80	5.20	7.60
19 PCNB WP	3.67	6.33	7.83	4.60	4.80	7.20
20 PCNB F	1.00	6.33	7.50	3.00	4.60	7.20
LSD _{0.05}	1.42	1.39	0.56	1.10	2.05	0.47

Management Practices (Trts. 15 and 17)

Sand topdressing and winter watering are two management practices used to reduce winter desiccation. Because of the generally wet conditions we experienced in 2004 there was no benefit from the winter watering treatment. Sand topdressing improved turf appearance at the pre-green-up evaluation on 24 March for both the native soil and USGA study sites.

Fungicides (Trts. 3-6 and 18-20)

Putting green turf that is stressed in the winter will sometimes exhibit a light tan to bleached white color. This was observed for several of the fungicide treatments containing Banner Maxx, Daconil Weather Stick, and Medallion. When Banner Maxx and Daconil were mixed with Regreen no turf discoloration was observed even on the last observation date of 3 May after the effect of the turf colorant had dissipated. PCNB flowable also caused some bleaching while PCNB granular and wettable powder caused no winter turf discoloration. All winter discoloration caused by fungicide treatments had dissipated by 3 May and turf color was determined to be acceptable.

Despite the moderate amount of snow cover and adequate moisture that we experienced in 2004 there were no observable differences among treatments related to snow mold injury.

Turf covers

Two different winter protection covers were used. The Evergreen turf enhancement cover is an open weave high density, translucent polyethylene which allows for air and water penetration. Green Jacket makes a white cross-laminated high-density polyethylene cover that is impermeable to water. On the soil green at Veenker Golf Course both covers improved turf color in March and April compared to the non-covered control but by 3 May both covers were similar to the control. On the USGA sand green at the Horticulture Research Station both covers provided the same level of greening when the covers were removed on 24 March and again both covers were better than the control. By 5 April only the Green Jacket cover was better than the control. A dramatic green color enhancement was noted when the covers were removed on 24 March but by 5 April turf color had actually declined after the grass was exposed to the ambient environment.

Turf colorants (Trts. 10-13)

Turf colorants applied in December were still visible on the plots during green-up in March and April and obviously contributed to the darker color ratings prior to complete green-up. By 3 May the dye colorant was no longer apparent but there were still differences in natural turf color. On the native soil green at Veenker Golf Course Greenlawnger had better color than Regreen by 3 May, however both were no different than the untreated control. On the USGA Green at the Horticulture Research Station Regreen had better color on 3 May than the control but Greenlawnger was no better than the control. Banner Maxx and Daconil Weather Stick caused turf bleaching as previously indicated. Combination of these fungicides with Regreen resulted in remediation of the observable turf injury, even at the 3 May observation when the colorant had worn away (compare trt 3 with trt 12). Turf colorants provided better appearance, however, because of the mild winter conditions it could not be determined if it had a direct effect on winter survivability.

Anti-desiccant and wetting agents (Trts.7-9)

The anti-desiccant Leaf Shield and the wetting agents Primer Select and ACA 1820 were similar to the non-treated control and did not provide any turf appearance benefit during the adequate moisture conditions in the winter of 2004.

Conclusions

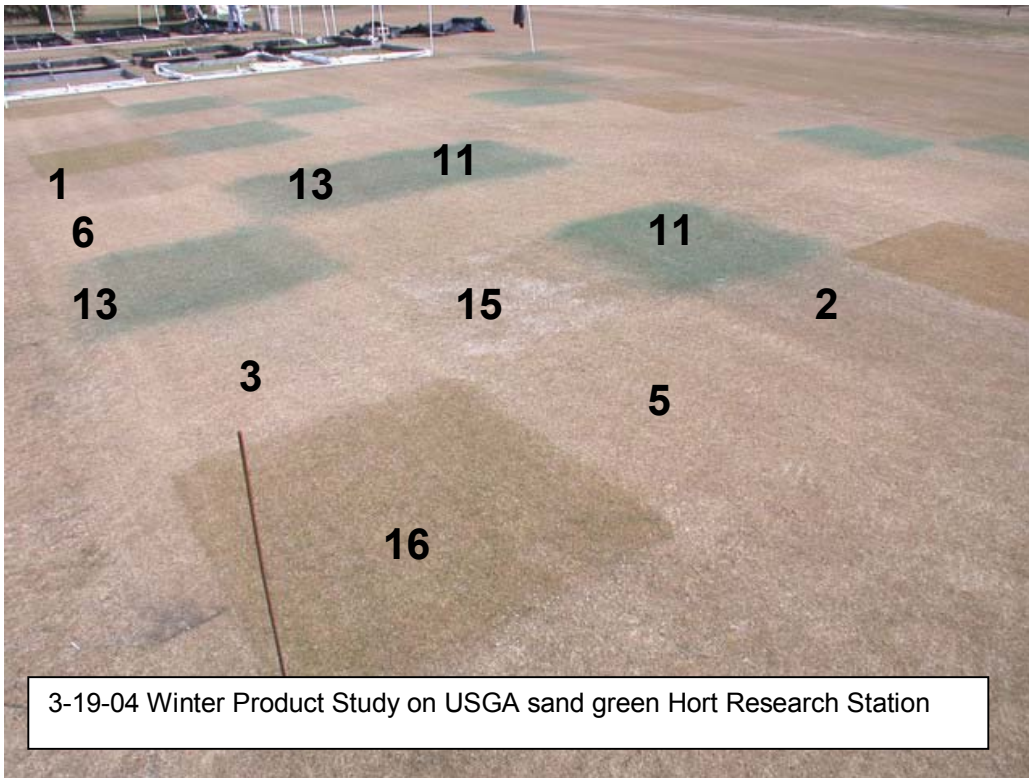
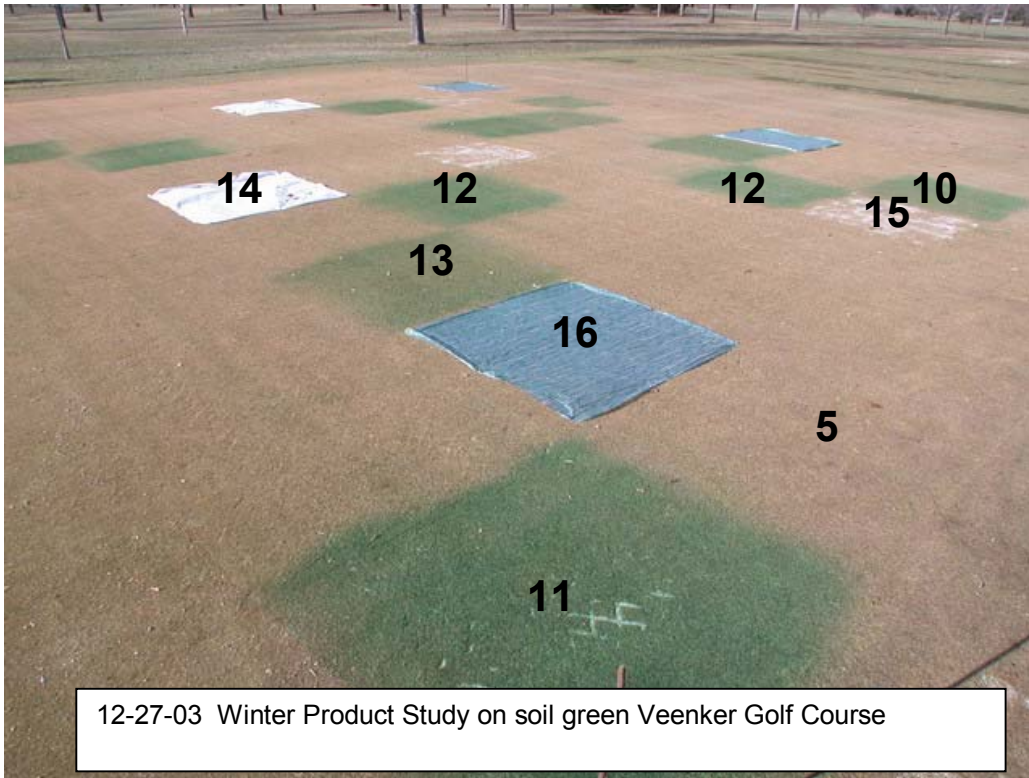
- Golf course superintendents need to develop a non-treated control to determine any benefit or detriment from winter protection products.
- Winter desiccation conditions in 2004 were mild and consequently many winter protection strategies had little response.
- Turf covers provided the best turf appearance during spring green-up.
- Fungicides can cause bleaching of the turf that is noticeable during the winter and delays green-up in the spring. No fungicides resulted in loss of turf cover or density.
- Turf colorants improved turf color during the winter and provided a slight advantage in turf color even after the colorant was no longer visible.

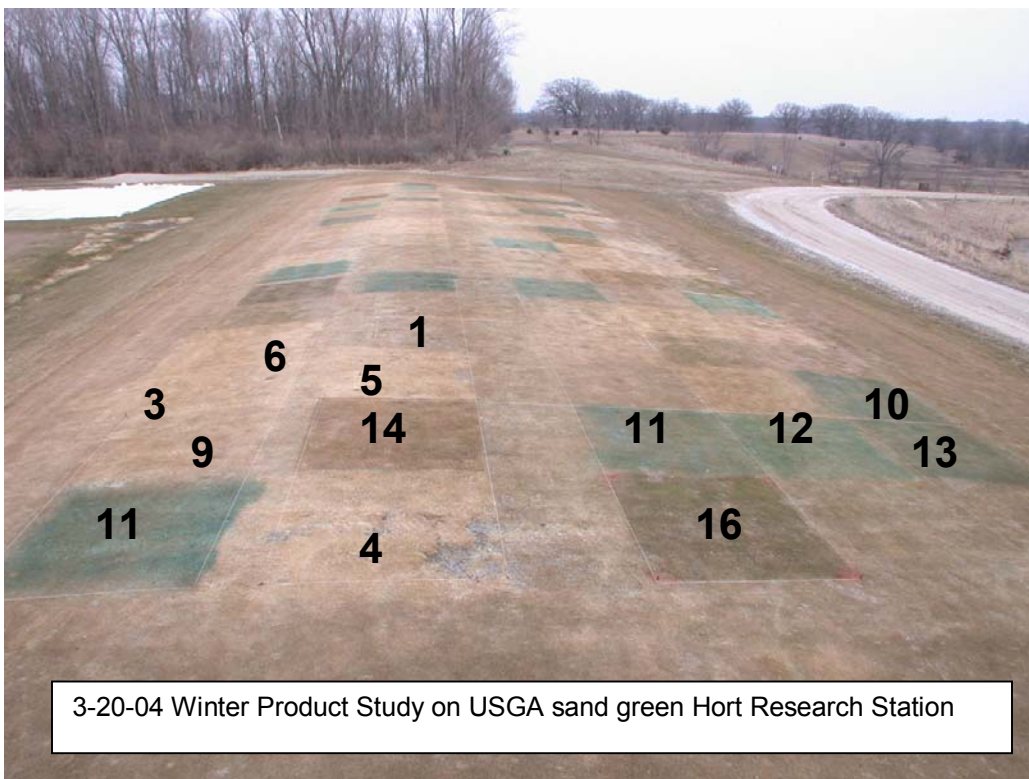
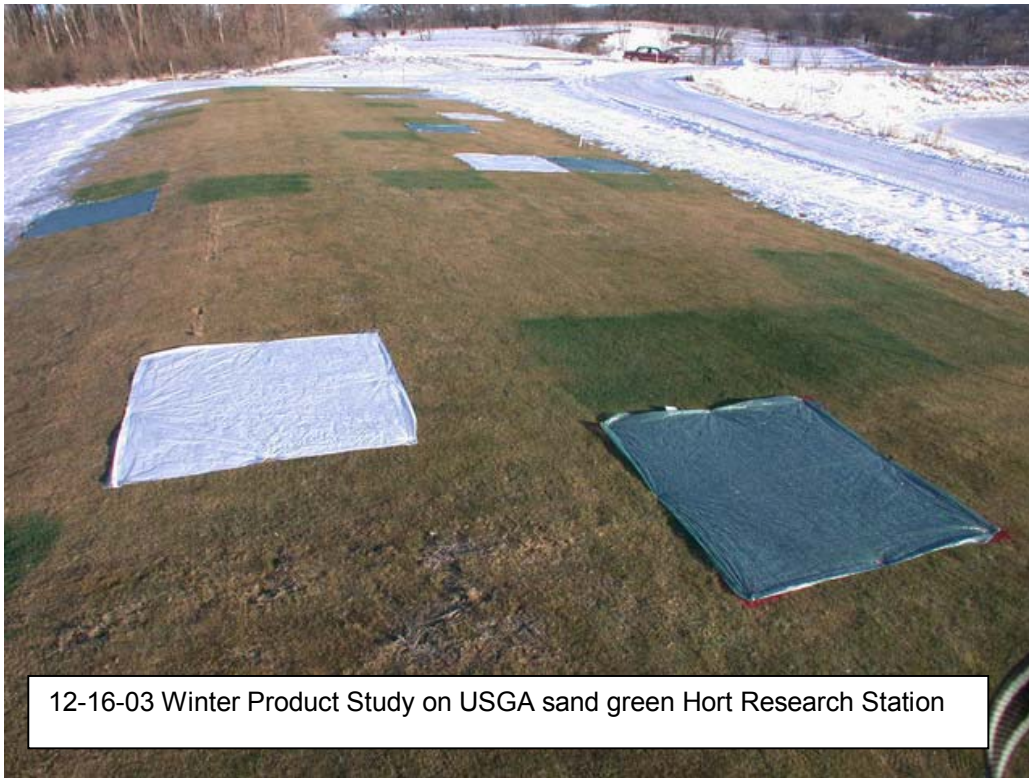
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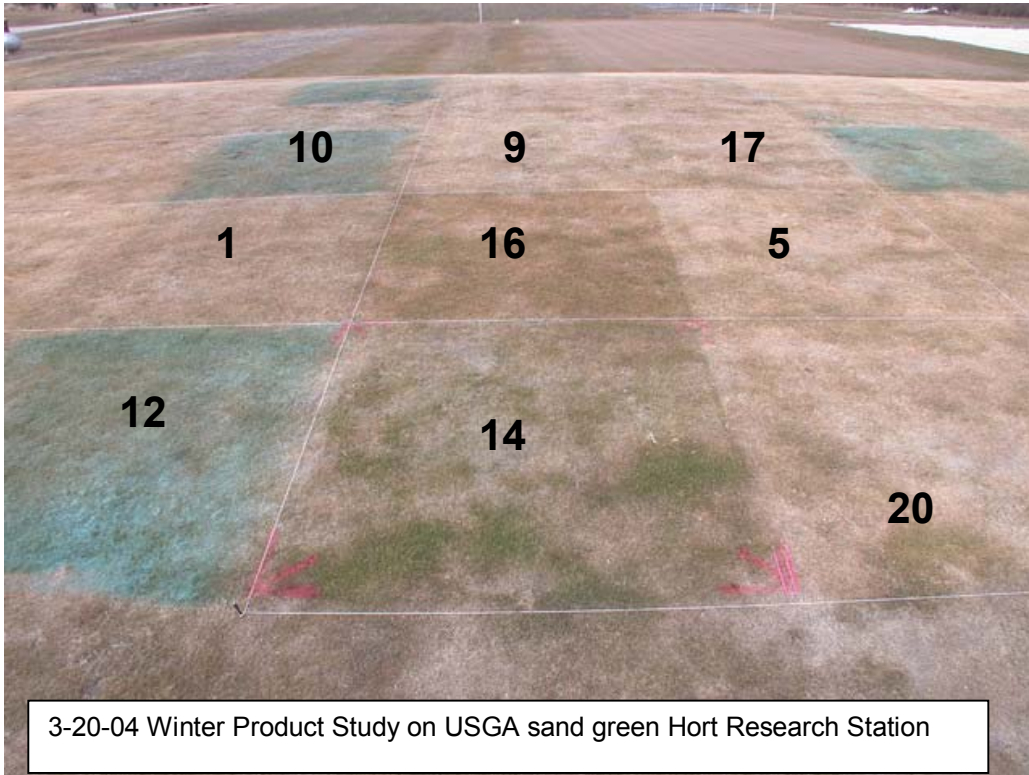
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12-7-03 Winter Product Study being applied on soil green Veenker Golf Course







3-20-04 Winter Product Study on USGA sand green Hort Research Station