Protecting Turfgrass from Typhula Blight

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Hopefully, you didn't forget the preventative application for snow mold caused by *Typhula* fungi this winter. If you did, keep it in mind for next winter, especially if you anticipate cold temperatures and heavy snowfall.

Typhula blight strikes fast. You can be fine in autumn and then overwhelmingly get lost at seeing grayish-brown dead circles on putting greens or fairways during snowmelt. Fungi causing *Typhula* blight have been growing in the turfgrass thatch and rootzone as soil temperatures drop to 50 degrees Fahrenheit (F). You even don't know the fungi are there during autumn when cool-season grasses grow well until the harsh winter front hits, and snow covers the grasses.

Winter hardiness of turfgrass can be maximized through a combination of maintaining mowing heights, fertilizing and slowly reducing irrigation during autumn, but fungicides are often required to prevent *Typhula* blight from killing closely mown turfgrass in the Northern states (Stier, 2005). The pre-emptive approach is a smart idea for those who simply cannot take a month or more to recuperate turfgrass damaged by *Typhula* blight in the next spring. Fungicide treatment is most effective if applied before onset of symptoms or before the fungi begin actively growing. It reduces initial fungus inoculum potential and alleviates the disease severity.

Typhula incarnata and *T. ishikariensis* are two major causal fungal pathogens of *Typhula* blight on most turfgrasses cultivated in the United States (Smiley et al, 2005). The fungus survives as tuber-like hardened mycelium, called sclerotia, throughout the summer. In late autumn sclerotia geminate and mycelium begins growing from them. Club-shaped sexual fruiting structures (sporocarps) are formed from sclerotia under certain environmental cues, including light, temperature, soil moisture and soil microorganisms.

Figure 1. Sporocarps fruiting structures of *Typhula incarnata* observed at our snow mold field plots established at Gateway Golf Course in Land O' Lakes, Wis., on Oct. 28, 2005. *T. incarnata* produces pinkish, club-shaped sporocarps that are 0.5-1 inches in height.

Both *T. incarnata* and *T. ishikariensis* are often present together and cause snow mold damage at the same time, although *T. ishikariensis* tends to be more dominant in the northern regions of Wisconsin, Minnesota and Michigan. *Typhula* blight becomes severe, with more than 60 days of snow cover, which provides the fungi with favorable conditions of high moisture and temperature above freezing (34-36 degrees F). Winter-stressed plants are slowly taken over by *Typhula* fungi, and eventually infected areas turn into patches of white to gray dead turf as snow recedes in early spring.

Typhula blight season in Wisconsin and Minnesota varies depending on the latitude and winter weather conditions, but turf damage becomes apparent in March and April. Early fungicide applications are started in mid-October when the activity of the fungi is at its peak. Usually, more than one chemistry with multiple applications are recommended in areas where snow cover is longer and temperature is lower in winter.

We have been testing 70 to 80 fungicide combinations at several locations in Wisconsin and Minnesota since 2002. Field evaluations were conducted at Sentryworld Golf Course in Stevens Point, Wis.; Gateway Golf Course in Land O' Lakes, Wis.; and Giants Ridge Golf Resort in Biwabik, Minn., on creeping bentgrass (*Agrostis stolonifera*) fairways in 2004-2005. Individual plots measured 3 feet by 10 feet (30 square feet) and were arranged in a randomized, complete-block design with three replications.

Individual treatments were applied at a nozzle pressure of 40 pounds per square inch (psi), using a CO_2-pressurized boom sprayer equipped with two XR Teejet 8005 VS nozzles. All fungicides were agitated by hand and applied in the equivalent of 2 gallons of water per 1,000 square feet. Granular applications were applied using a shaker jar. Early applications were applied on Oct. 14, 12 and 11, 2004, at Sentryworld, Gateway and Giants Ridge, respectively.

Figure 2. Individual sporocarps produced from dark brown sclerotia of *T. incarnata*. Mature sporocarps produce sexual spores (basidiospores).

Second applications were applied on Nov. 11, 3 and 14 at Sentryworld, Gateway and Giants Ridge, respectively. The experimental plot area was not inoculated, but *Typhula* blight occurs naturally. Snow continuously covered field plots from Jan. 1, 2005, to March 25, 2005, (84 days) at Sentryworld; from Nov. 27, 2004, to April 7, 2005, (132 days) at Gateway; and from Nov. 27, 2004, to April 3, 2005, (128 days) at Giants Ridge. *Typhula* blight pressure was high in the 2004-05 season, resulting in excellent evaluations for fungicide efficacy.

Results from our fungicide efficacy tests conducted in 2004-05 are summarized in Table 1. Disease pressure was low to moderate at Sentryworld with an average of 18 percent snow mold damage on non-treated check plots. The pathogen causing the most damage was mainly *T. ishikariensis*. Many tested treatments with single fungicide or combinations of two or three products provided nearly 100 percent control of the disease.

There were noticeable differences in the turf color after chemical applications, indicating that phytotoxicity can be issued when certain fungicides (e.g., PCNB) are applied at warmer temperatures. At Gateway and Giants Ridge, disease pressure was extremely high, mainly caused by *T. ishikariensis*. The untreated control plots had more than 96 percent disease damage at both sites.

Specifically, nine treatments (Nos.14, 21, 23, 39, 42, 43, 47, 48 and 53) using mixtures of two or three fungicides significantly reduced *Typhula* blight severity under 10 percent disease during the severe winter season at Gateway. Among those treatments, Nos. 14, 42, 47 and 48 provided consistently excellent control at an average of 10 percent or less disease at Giants Ridge.

Treatment Nos. 21, 23, 39, 43 and 53 still gave moderate disease suppression at 12 percent to 19 percent snow mold damage at Giants Ridge. The variations in the fungicidal efficacy between Gateway and Giants Ridge might be due to the time difference in disease progression and pressure and the experimental variability in the visual disease assessment. In addition, the application dates for treatments were different for each trial.

Fungicide Efficacy Results

Typhula blight and phytotoxicity ratings recorded on April 6, 2005, at Sentryworld GC, Stevens Point, Wis.; April 12, 2005, at Gateway GC, Land O'Lakes, Wis.; and April 11, 2005, at Giants Ridge GR, Biwabik, Minn.

	Treatment	Rate	Timing[a]	% Typhula blight[b]			Phytotoxicity[d]
				Sentryworld	Gateway	Giants Ridge	Sentryworld
1	Non-treated Control			18.3abc	98.3ab	96.3ab	6.0a-e
2	Endorse	4.00 OZ/M	Late	6.7 c-h	71.7 a-f	60 a-k	6.3 a-d
	Spectro	5.75 OZ/M	Late				
3	Endorse	4.00 OZ/M	Late	6.0 d-h	80.0 a-d	-C	5.0 d-g
	Spotrete	8.00 OZ/M	Late				
4	Spectro	4.00 OZ/M	Early				
	Endorse	4.00 OZ/M	Late	5.0d-h	58.3d-j	60a-k	6.3a-d
	Spectro	4.00 OZ/M	Late				
5	Daconil Weather Stik	5.50FL OZ/M	Late	10.0a-h	71.7a-f	86.7a-f	5.7b-f
6	Spotrete	8.00 OZ/M	Late	5.7d-h	88.3a-d	90.7a-e	6.0a-e
7	Endorse	4.00 OZ/M	Late	11.7a-h	91.7a-d	65.0a-j	6.0a-e
8	Spectro	5.75OZ/M	Late	4.0e-h	75.0a-e	90.7a-e	6.0a-e
9	Spectro	4.00 OZ/M	Late	5.0d-h	76.7a-e	50.0c-o	6.0a-e
10	Magnum	3.50 FL OZ/M	Late	16.7a-d	100.0a	-	6.0a-e
11	Medallion	0.14 OZ/M	Late				
	Daconil WeatherStik	2.40 FL OZ/M	Late	5.0d-h	38.3g-n	41.7f-q	6.0a-e
	Banner MAXX	1.70 FL OZ/M	Late				
12	Signature	4.00 OZ/M	Early/Late				
	Chipco 26GT	4.00 FL OZ/M	Early/Late	3.3e-h	13.3l-p	45.0e-q	6.3a-d
	Daconil WeatherStik	5.50 FL OZ/M	Early/Late				
13	Signature	4.00 OZ/M	Early/Late	0.0 h	19.0 k-p	10.3 n-q	6.3 a-d
	Armada	1.50 OZ/M	Early/Late				
14	Armada	1.50 OZ/M	Early/Late	0.0 h	4.0 op	1.0 q	4.3 fgh
	Turfcide 400	6.00 FL OZ/M	Early/Late				
15	Armada	1.50 OZ/M	Early/Late	0.7 h	45.0 e-l	17.7 k-q	4.3 fgh
16	Signature	4.00 OZ/M	Early/Late	9.0 b-h	91.7 a-d	96.7 ab	6.7 abc
17	Chipco 26GT	4.00 FL OZ/M	Early/Late	8.3 b-h	88.3 a-d	80.0 a-h	5.7 b-f
18	Daconil WeatherStik	5.50 FL OZ/M	Early/Late	2.3 fgh	71.7 a-f	73.3 a-l	5.3 c-f
19	Turfcide 400	6.00 FL OZ/M	Early/Late	0.0 h	85.0 a-d	53.3 a-n	4.7 e-h
20	LESCO 18 Plus	4.00 FL OZ/M	Early				
	LESCO Manicure Ultrex	5.00 OZ/M	Early	0.0 h	33.3 i-p	40.7 g-q	4.3 fgh
	LESCO Revere 4000	8.00 FL OZ/M	Late				
21	LESCO 18 Plus	4.00 FL OZ/M	Late				
	LESCO Manicure Ultrex	5.00 OZ/M	Late	0.0 h	3.0 op	19.0 k-q	5.3 c-f
	LESCO Revere 4000	8.00 FL OZ/M	Late				
22	LESCO Spectator	1.25 FL OZ/M	Early	0.0 h	40.0 f-m	40.0 g-q	4.3 fgh
	LESCO Revere 4000	8.00 FL OZ/M	Late				
23	LESCO Spectator	1.25 FL OZ/M	Late	0.0 h	7.0 m-p	13.3 l-q	5.3 c-f
	Medallion	0.50 OZ/M	Late				
24	LESCO Revere 4000	12.00 FL OZ/M	Late	0.0 h	76.7 a-e	51.7 b-o	2.3 j
25	Insignia	0.70 OZ/M	Early				
	LESCO 18 Plus	4.00 FL OZ/M	Late	4.3 d-h	28.3 j-p	40.0 g-q	6.3 a-d
	LESCO Manicure Ultrex	5.00 OZ/M	Late				
26	LESCO Spectator	1.00 FL OZ/M	Early				
	Insignia	0.70 OZ/M	Late	0.3 h	18.7 k-p	55.0 a-n	5.7 b-f
	LESCO Manicure Ultrex	5.00 OZ/M	Late				
27	Insignia	0.70 OZ/M	Early				

	LESCO Manicure Ultrex	5.00 OZ/M	Early	0.0 h	10.0 m-p	45.0 e-q	3.7 ghi
	LESCO Revere 4000	8.00 FL OZ/M	Late				
28	Compass	0.50 OZ/M	Late	0.3 h	16.7 k-p	24.3 j-q	5.0 d-g
	LESCO Revere 4000	8.00 FL OZ/M	Late				
29	Insignia	0.90 OZ/M	Late				
	Iprodione Pro	4.00 FL OZ/M	Late	0.0 h	16.7 k-p	23.3 j-q	3.7 ghi
	LESCO Revere 4000	8.00 FL OZ/M	Late				
30	Insignia	0.90 OZ/M	Late				
	Iprodione Pro	4.00 FL OZ/M	Late	0.7 h	12.3 m-p	32.3i-q	5.0 d-g
	LESCO Manicure Ultrex	3.20 OZ/M	Late				
31	LESCO 18 Plus	4.00 FL OZ/M	Late	20.0 ab	86.7 a-d	68.3 a-j	5.7 b-f
32	LESCO Manicure Ultrex	5.00 OZ/M	Late	13.3 a-g	76.7 a-e	97.7 a	6.3 a-d
33	LESCO Revere 4000	8.00 FL OZ/M	Late	4.3 d-h	81.7 a-d	60.0 a-k	3.3 hij
34	LESCO Spectator	1.25 FL OZ/M	Late	0.0 h	10.0 m-p	56.7 a-m	5.0 d-g
35	LESCO Spectator	1.00 FL OZ/M	Early	4.7 d-h	62.0 c-l	91.7 a-d	6.3 a-d
36	Insignia	0.70 OZ/M	Late	21.7 a	93.3 abc	87.3 a-f	6.0 a-e
37	Compass	0.50 OZ/M	Late	2.7 e-h	88.3 a-d	65.0 a-j	5.7 b-f
38	Iprodione Pro	4.00 FL OZ/M	Late	15.0 a-e	90.0 a-d	75.0 a-l	6.0 a-e
39	Chipco 26GT	4.00 FL OZ/M	Late				
	Daconil Ultrex	5.00 OZ/M	Late	1.7 fgh	5.0 nop	16.3 k-q	3.0 ij
	LESCO Revere 4000	8.00 FL OZ/M	Late				
40	Chipco 26GT	4.00 FL OZ/M	Late	15.0 a-e	91.7 a-d	87.7 a-e	5.3 c-f
41	Daconil Ultrex	5.00 OZ/M	Late	6.7 c-h	91.7 a-d	93.3 abc	6.0 a-e
42	Chipco 26GT	4.00 FL OZ/M	Late				
	Bayleton	1.00 OZ/M	Late	0.0 h	4.0 op	3.7 pq	3.3 hij
	Turfcide 400	6.00 FL OZ/M	Late				
43	Bayleton	2.00 OZ/M	Late	0.0 h	5.0 nop	13.3 l-q	4.3 fgh
	Turfcide 400	6.00 FL OZ/M	Late				
44	Bayleton	1.00 OZ/M	Late	1.7 fgh	81.7 a-d	81.3 a-g	6.0 a-e
45	Bayleton	2.00 OZ/M	Late	0.3 h	73.3 a-e	81.7 a-g	5.0 d-g
46	Turfcide 400	6.00 FL OZ/M	Late	2.3 fgh	85.0 a-d	51.7 b-o	5.0 d-g
47	Banner MAXX	3.00 FL OZ/M	Late	1.7 fgh	6.7 nop	7.3 opq	4.7 e-h
	Medallion	0.50 OZ/M	Late				
48	Banner MAXX	4.00 FL OZ/M	Late	0.7 h	1.7 p	10.0 n-q	6.3 a-d
	Medallion	0.50 OZ/M	Late				
49	Banner MAXX	3.00 FL OZ/M	Late	2.7 e-h	45.0 e-l	58.3 a-l	5.0 d-g
50	Banner MAXX	4.00 FL OZ/M	Late	3.3 e-h	26.7 j-p	46.7 d-q	5.0 d-g
51	Medallion	0.50 OZ/M	Late	10.0 a-h	73.3a-e	16.7 k-q	5.7 b-f
52	Daconil Weather Stik	5.50 FL OZ/M	Late	5.7 d-h	11.7 m-p	36.0 g-q	6.0 a-e
	Medallion	0.50 OZ/M	Late				
53	Prostar	3.00 OZ/M	Late	0.0 h	7.0 m-p	12.3 m-q	4.7 e-h
	Turfcide 400	6.00 FL OZ/M	Late				
54	Prostar	4.50 OZ/M	Late	0.0 h	83.3 a-d	55.0 a-n	6.0 a-e
55	Prostar	3.00 OZ/M	Late	0.7 h	86.7 a-d	68.0 a-j	6.3 a-d
56	Heritage	0.70 OZ/M	Late	0.7 h	46.7 e-k	31.0 i-q	5.7 b-f
	Turfcide 400	6.00 FL OZ/M	Late				
57	Heritage	0.70 OZ/M	Late	20.0 ab	93.3 abc	86.7 a-f	5.3 c-f

a Early and late fungicide treatments were applied on Oct. 14 and Nov. 11, 2004 at Sentryworld; Oct. 12 and Nov. 3 at Gateway; and Oct. 11 and Nov. 4 at Giants Ridge.

b Mean percent diseased area followed by same letter do not significantly differ at $P=0.05$, Duncan's New MRT. a=the most diseased.

C "-" means disease was not determined at Giants Ridge.

d Phytotoxicity was rated on a scale of 1-9 where 1=straw colored, 6=acceptable and 9=dark green.

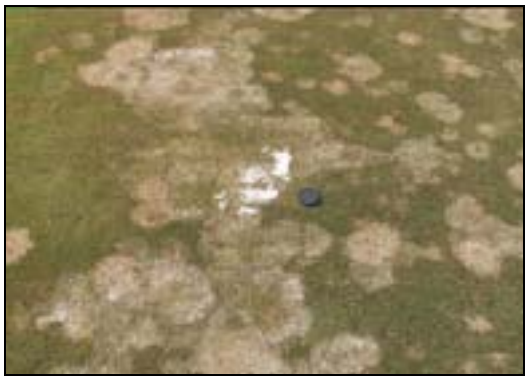

Figure 3. *Typhula* blight on a creeping bentgrass fairway. Gray circular patches with white and gray mycelium become distinct at snowmelt in early spring.

PCNB is one of the most common and effective fungicides and has been used to control *Typhula* blight for many years. Due to its phytotoxicity and a long residual effect, there have been a number of fungicides developed as an alternative of PCNB. Our field evaluation will provide turfgrass managers with more options to choose from for fighting back *Typhula* blight encroachment. The best combinations for snow mold control according to our 2004-05 test are the tank mixture of PCNB with systemic and/or contact fungicides with two split applications between mid-October and mid-November.

If you do not want to use PCNB, a combination of fludioxonil and propiconazole would be a next pick. In more southern regions having a moderate disease pressure, some other combinations such as a mixture of iprodione and chlorothalonil will hold down *Typhula* blight fairly well.

To further explore better *Typhula* blight control strategy, more than 60 new chemicals and tankmix combinations are being tested this winter at five geographically different locations, two in Minnesota and three in Wisconsin.

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