TURFGRASS TRENDS

SNOW MOLD AND GOLF TURF

Organic and Biologically Amended Fertilizers

PART 1 Can using these materials reduce snow mold damage on golf turf?

By Adam Van Dyke

Superintendents are inundated with commercial products containing organic sources of nutrients and biological organisms for managing turf. Beyond the "good feelings" described by Zontek et al. as reasons turf managers use "natural" or "organic" products, incorporating these types of materials into golf management practices may be a way to reduce synthetic inputs and consequently provide other benefits to turfgrass systems.

Potential benefits of using organic and biological materials may include improving soil structure and increasing beneficial microbes.

Snow molds (gray, *Typhula spp.*; and pink, *Microdochium nivale*) can occur annually in the Intermountain West and devastate golf turf if not treated with synthetic fungicides. One fungicide used to control these diseases, pentachloronitrobenzene (PCNB), was under federal review in 2008 and was the subject of a federal stop-sale, lifted in August 2011.

Given the uncertainty over future uses of PCNB in turf and an industry movement toward more sustainable management, alternatives to fungicides for snow mold control must be studied. This study tested commercially available organic and biologically amended fertilizers in the field under golf course conditions. The objective was to determine if these products can reduce snow mold damage of highly maintained golf turf.

Materials and methods

The experiment was conducted from 2009 to 2011 on a fairway at Willow Creek Country Club in Sandy, Utah using three replicate 6-foot by 10-foot plots.

The fairway was a mixture of perennial ryegrass (*Lolium perenne* L.) and creeping bentgrass (*Agrostis palustris* Huds.) mowed three times a week at 0.75 inches. Permanent snow cover begins around late-November or December and normally lasts more than 90 days. However, snow cover lasted less than 60 days the first winter (2010) and no snow mold damage occurred. Year 1 of the experiment was repeated at Glenwild Golf Club in Park City, Utah in 2010 — the same time Year 2 was being conducted

Continued on page 36

This is the first of a two-part series evaluating organic and biologically amended fertilizers on actual golf courses. In a later issue of *Turfgrass Trends*, the author will report more from this study about the influence of these organics and biologicals on turfgrass quality and chlorophyll content over two years compared to some synthetic fertilizers.

IN THIS ISSUE

OUR SPONSORS

Continued from page 35

at Willow Creek — to recover snow mold data after one growing season. The repeat of Year 1 was conducted on Kentucky bluegrass (*Poa pratensis* L.) rough mowed at 1.5 inches two times each week using three replicate 5-foot by 5-foot plots. Neither test area was treated with fungicides nor additional fertilizers.

Two granular organic fertilizers and two biologically amended soil inoculants containing nutrients were applied in season-long programs for two years and evaluated against a synthetic fertilizer control and a PCNB fungicide check. The synthetic fertilizers are listed in Table 1. The fungicide check treatment consisted of Turfcide 10G, a.i. 10% PCNB (Chemtura Corporation) applied once prior to snow cover. The organic fertilizers included a 5-2-4 material (Sustane Natural Fertilizers) and an experimental material "PTS1 organic" (analysis and company confidential). Biological materials included TurfPro liquid 0.5-0.2-0 (Organic Products Company) and Growth XL 16-4-8 (3 Tier Technologies).

Programs for snow mold control were determined by manufacturers' recommendations. Organic fertilizers were applied by hand every 60 days at 0.75 pounds of nitrogen (N) per 1,000 square feet from May to November each year. Synthetic fertilizers were applied at the same rate of N to normalize the treatments, but differences in other nutrients did occur.

TABLE 1: COMMERCIAL FERTILIZERS

TREATMENT	PRODUCT(S)	RATE (per 1000ft²)	SCHEDULE (beginning in May)
Synthetic control	Utah's Finest™ 23-3-16	0.75 lbs nitrogen (N)	Every 60 days
	Utah's Finest™ 20-4-20	0.75 lbs N (in 2009) 1 lb N (in 2010)	Once in late-fall
PCNB check	Turfcide 10G	10 lbs product (10% A.I.)	Once prior to snow cover
	Utah's Finest™ 23-3-16	0.75 lbs N	Every 60 days
	Utah's Finest™ 20-4-20	0.75 lbs N (in 2009) 1 lb N (in 2010)	Once in late-fall
PTS1 organic	Confidential	0.75 lbs N (1 lb N in late-fall 2010)	Every 60 days
5-2-4 organic	Sustane™ 5-2-4	0.75 lbs N (1 lb N in late-fall 2010)	Every 60 days
Turf Pro biological	Turf Pro™ liquid	6 fl oz product	Every 14 days in 2009, Every 30 days in 2010
	Turf Pro™ dry	10 lbs product	Once prior to snow cover
	Utah's Finest™ 23-3-16	0.75 lbs N	Every 60 days
	Utah's Finest™ 20-4-20	0.75 lbs N (in 2009) 1 lb N (in 2010)	Once in late-fall
Growth XL biological	Growth XL	3 fl oz product (in 2009) 6 fl oz product (in 2010)	Every 30 days
	Utah's Finest™ 23-3-16	0.38 lbs N	Every 60 days
	Utah's Finest™ 20-4-20	0.38 lbs N (in 2009) 1 lb N (in 2010)	Once in late-fall

Biologically amended treatments were foliar applied with a pressurized backpack sprayer from May to November in each year. TurfPro liquid was applied every 14 days at 6 fluid ounces per 1,000 square feet the first year, and at 30-day intervals at the same rate the second year. TurfPro dry (1.8-0-0.1) was also applied to these plots at 10 pounds per 1,000 square feet prior to snow cover each year (Table 1). Growth XL was applied every 30 days at 3 fluid ounces per 1,000 square feet the first year, and 6 fluid ounces per 1,000 square feet at 30-day intervals the second year. Growth XL and TurfPro materials provided some nutrition to the turf but needed to be supplemented with additional fertilizers. Granular fertilizers used in the synthetic control treatment were applied at half the rate of N (Table 1).

Snow mold damage was

visually assessed after snow melt at each location on a 0 to 100% scale, with 100% having complete damage and analyzed for differences. Gray snow mold infection centers were also counted at the Willow Creek location in 2011 and analyzed for differences. Reductions in disease severity were determined as a percentage of the synthetic control, with effective suppression being greater than 70% reduction as explained in Nelson and Craft.

TABLE 2: SNOW MOLD CONTROL

TREATMENT		YEAR 1		YEAR 2		
		Glenwild location		Willow Creek location		
		Damage[w] 5-5-11	Disease reduction[x]	Damage 2-16-11	Disease reduction	Centers[y] 2-16-11
		%	%	%	%	%
Synthetic control		81.7 a[z]	---	24.5 a	---	37.4 a
PCNB check		3.3 d	96	0.4 b	98	0.7 b
PTS1 organic		60.0 abc	27	20.0 a	18	31.0 a
5-2-4 organic		40.0 c	51	14.2 a	42	17.4 a
Turf Pro biological		53.3 bc	35	45.9 a	0	34.5 a
Growth XL biological		71.7 ab	12	40.0 a	0	44.0 a
ANOVA						
Effect	df					
Treatment	6	***	---	*	---	*

[y] *Granular fertilizers (synthetic and organic) were applied every 60 days at 0.75 pounds of nitrogen per 1000 sq. ft. for two growing seasons (Year 1, Year 2). Turf Pro biological was foliar applied at 6 fl oz per 1000 sq. ft. at 14 day intervals the first year, and 30 day intervals the second year. Growth XL biological was foliar applied at 3 fl oz (Year 1) and 6 fl oz (Year 2) per 1000 sq. ft. on 30 day intervals.*

[w] *Snow mold damage rating scale 0-100%, where 100= entire plot damaged.*

[x] *Determined as a percentage of synthetic control plots with >70% having effective suppression (Nelson and Craft, 1992a).*

[y] *Mean number of spots per three replicate 60 sq. ft. plot.*

[z] *Means within same column with same letter are not different significantly P=0.05.*

, **, *, ns, significant at P≤0.05, 0.01, 0.001, or not significant respectively.*

Snow mold control

None of the organic or biologically amended fertilizers tested in this experiment adequately controlled snow mold (<10% affected area, Hsiang and Cook, 2001) or had acceptable suppression (greater than 70% disease reduction, Nelson and Craft, 1992a) in both years (Table 2).

PCNB provided the best statistical control in both years, reducing damage 96% in Year 1 at the Glenwild location and 98% in Year 2 at the Willow Creek location.

Applications of 5-2-4 organic fertilizer and TurfPro biological materials appeared to reduce snow mold damage to Kentucky bluegrass compared to applying synthetic fertilizers alone after one year.

These materials are not registered fungicides and did not provide acceptable control of gray snow mold (Hsiang and Cook, 2001) — while applications of PCNB did. Furthermore, statistical reductions in snow mold damage were not observed after a second year of applying these materials. The lack of consistent results indicates a need for further studies.

The use of organic sources of nutrients and/or biologically amended materials may not replace the need for fungicides, but perhaps incorporating them into management practices may be a way to reduce the rates of fungicides.

Adam Van Dyke, M.S., is owner and president of Professional Turfgrass Solutions, LLC. He specializes in conducting scientific studies and consulting for the golf industry. He can be reached at adam@proturfgrass-solutions.com.

REFERENCES

Hsiang, T., and S. Cook. 2001. Effect of *Typhula phaccorrhiza* on winter injury in field trials across Canada. Intr. Turf. Society Research Journal. 9:669-673.

Nelson, E.B., Burpee L.L., and M.B. Lawton. 1994. Biological control of turfgrass diseases. *In:* Leslie, A.R (eds.) Handbook of integrated pest management for turf and ornamentals. 38:409-428. Lewis Publishers Inc., Chelsea, Michigan.

Nelson, E.B., and C.M. Craft. 1992a. Suppression of Dollar Spot on creeping bentgrass and annual bluegrass turf with compost-amended topdressings. Plant Disease 76(9):954-958.

Nelson, E.B., and C.M. Craft. 1992b. Suppression of Typhula blight with topdressings amended with composts and organic fertilizers: 1990-91. Biol. Cult. Tests Control. Plant Disease. 7:107.

Zontek, S.J., O'Brien, P., Brame, B., and J. Skorulski. 2005. Natural organic fertilizer considerations: Making superintendents better consumers. USGA Green Section Record. May-June: 15-17.