Winter Worries of a Different Kind

By Paul Koch, Turfgrass Diagnostic Lab Manager, O.J. Noer Turfgrass Research and Education Facility &
Dr. Jim Kerns, Department of Pathology, University of Wisconsin - Madison

The date is January 6th, 2012, a Friday. Outside, the temperature is 48°F. Yesterday, the high temperature was 51°F. A perfectly average January stretch of weather for Atlanta, GA. Except these temperatures weren't being experienced in Atlanta, GA they were being experienced in Madison, WI and all throughout the upper Midwest. Since December 1st, Madison has experienced just 8 days with high temperatures less than 32°F. Over that same period, Madison has had 16 days with high temperatures over 40°F. Total snowfall in Madison this winter has been 4.4 inches, more than 15 inches below normal.

For many residents of the Midwest these numbers are cause for celebration. No bundling up on the way to work, no slipping and sliding amongst icy highways, no backbreaking shoveling to clear the driveway. And at first glance, this should also be good news for golf course superintendents. Less snow equals less snow mold, right?

Whoa there pardner, not so fast. It is true that extended periods of snow cover are required for Typhula blight to occur, and snow does provide optimal conditions for Microdochium to infect as well. But what happens when the snow returns? Most of the fungicides we're relying on for protection of our turf (and jobs) were applied prior to Thanksgiving, almost 2 months ago by the time you read this. Do we expect 2 months of dollar spot control from the propiconazole or boscalid we apply in June? Of course not. Should we expect 2, 3, 4, or even 5 months of snow mold control from our fall fungicide application in the winter.

The answer, maybe surprisingly, is yes in most cases. In a 'normal' winter, disease breakthrough is the exception and not the rule. Tank-mixtures of 2, 3 or even 4 active ingredients applied in November routinely provide protection throughout the winter months. But what about a winter such as this, where snow cover has been for the most part absent. Do the fungicides degrade due to exposure to the elements such as sunlight, wind, desiccation, etc?

To answer these questions Dr. Kerns, Dr. Stier, and myself began a multi-year research project in 2009-2010 that has been partially supported by the Golf Course Superintendents of America, the Wisconsin Golf Course Superintendents Association, and the Northern Great Lakes Golf Course Superintendents Association. The research looked to evaluate the degradation of the common snow mold fungicides chlorothalonil and iprodione under snow cover and in the absence of snow cover and to determine at what fungicide concentration Microdochium patch begins to appear. Each fungicide was applied shortly prior to the first significant snow fall of the year, then weekly samplings were taken until snowmelt from plots kept continuously covered in snow and from plots kept free of snow cover (Figure 1 and 2). Samples were analyzed for fungicide concentration via an enzyme-linked immunosorbent assay (ELISA) and Micorodochium patch protection analyzed via the bioassay method.

Figure 1. The fungicide degradation research plot at the OJ Noer center. The non-snow plots are on the inside, while the snow-covered plots are on the left and right side of the plot.

Figure 2. Sampling cores from the snow-covered plots.

The study is ongoing and all research results are preliminary, but in brief no significant differences in fungicide degradation were observed between snow and non-snow plots in either 2009-2010 or 2010-2011. Rather, fungicide degradation appeared to correlate more with soil temperature than the presence of snow. Once soil temperatures increased above 32°F, fungicide concentration fell rapidly (Figure 3) and disease severity increased rapidly during approximately the same time period (Figure 4). This suggests that microbial or plant metabolism of the fungicides, governed by temperature, is the driving force behind degradation of fungicides in a winter environment. Photodegradation of fungicides in our research did not appear to be a significant factor.

How do these preliminary results apply to the current situation? It suggests that with our without snow, fungicides will remain relatively constant if soil temperature remains at freezing or below. Along the same lines, if soil temperatures are consistently above freezing then fungicides will degrade and protection against fungal infection may be compromised after a prolonged period of warm soil temperatures.

With how mild most of Wisconsin and the upper Midwest was during November and December, a significant amount of fungicide applied in fall likely degraded. Whether enough remains to offer protection against snow molds if and when the snow returns is debatable, and depends on what product(s) were applied, at what rates, and the specific environmental conditions at that site.

Maybe the more pressing question though is not "Do I have enough fungicide remaining?" but rather "What do I do about it?" Many will consider a second fungicide application, but this should be done with great caution. As many superintendents learned from past ice-removal efforts, traffic on the course in winter can do more harm than good. And any fungicide applied should be a contact fungicide, as penetrant fungicides will need to be actively absorbed into the plant which is something not easily done in the winter.

As is usually the case, there is no one answer because of the unique conditions that exist at each golf course. The best response is likely one that is calculated, well thought out, and well communicated. In the next year the results of our research should be able to assist you in making more-informed decisions with regard to winter fungicides, information you can use to defend your decision to others at the facility. Peering out my window at the brown expanse of the OJ Noer…it looks like we might be one year too late.

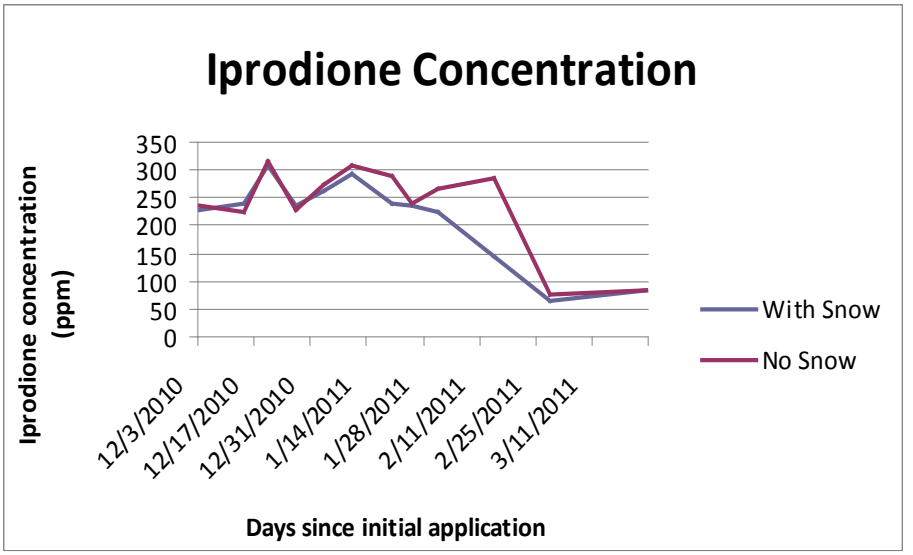

Figure 3. Iprodione concentration as measured by a commercially-available enzyme-linked immunoassay (ELISA) kit from Horiba, Ltd in 2010-2011.

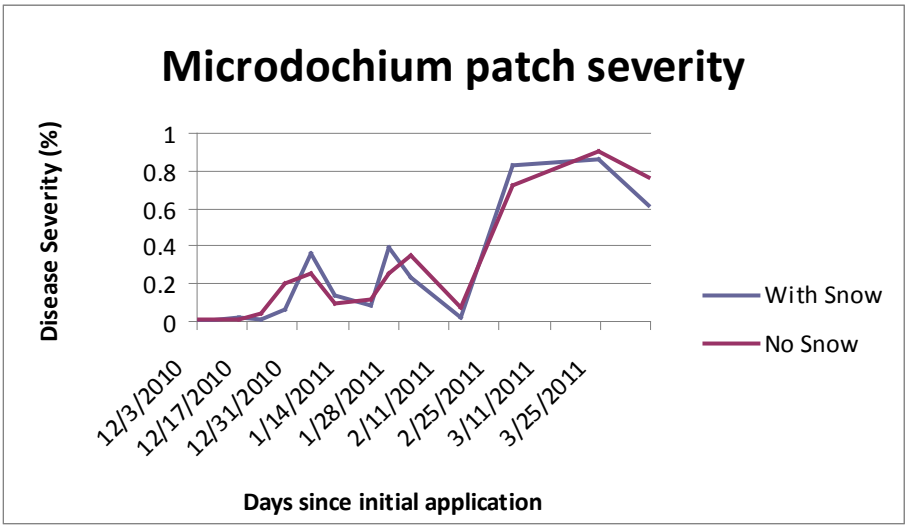

Figure 4: Microdochium patch severity in the growth chamber on cores sampled from the field and inoculated with M. nivale in 2010-2011.

Turfgrass Diagnostic Lab

OJ Noer Turfgrass Research & Education Facility
Paul Koch, Lab Manager
2502 County Hwy M
Verona, WI 53593

608-845-2535
Email - plkcoch@wisc.edu
Website - http://www.plantpath.wisc.edu/tdl