Carving an Edge in Snow Mold

Researchers continue to improve our understanding of these cool-season turf diseases.

BY MATT NELSON

Snow mold diseases are among the most serious problems of cool-season turf in northern locations of the United States and throughout Canada. Where disease development is extensive, recovery can be delayed well into the growing season and seriously affect playability and revenue generation. At many golf courses, snow mold scars in the spring are often colonized by *Poa annua* before recovery of more desirable grasses occurs, and snow mold disease can be a significant factor influencing the rate of *Poa annua* colonization into the preferred stand of turf.[8] Because of the potential for widespread turfgrass damage and prolonged recovery in the spring, turf managers most commonly attempt to control snow mold diseases with preventative applications of fungicides in mid to late fall.

At locations where snow cover is persistent, preventative fungicide treatments are timed according to historical performance and weather conditions, in hopes that the last application can be made just prior to permanent winter snow cover. More than a few golf course superintendents and their staffs have removed snow from putting greens to apply fungicide for the prevention of snow mold diseases. Pink snow mold, caused by *Microdochium nivale*, can be active in wet or maritime climates throughout the year and require more extensive control programs. Cultural control recommendations include selecting or promoting more disease-resistant turfgrass, improving drainage, correcting thatch problems, allowing for sunlight penetration to critical play areas during winter, removing snow in late winter, proper mowing, and developing an appropriate fertility program.

Dark brown and black sclerotia of *Typhula ishikariensis*. Accurate identification of the gray snow mold causal agent will influence proper fungicide selection.

FUNGICIDE RESEARCH

Preventative applications of fungicides for the control of the various snow mold diseases remain the cornerstone of an effective disease control program. At sites where snow mold disease pressure is fierce, the lack of suitable alternatives will present a serious stumbling block to pesticide-free golf course maintenance. Currently, research is underway to evaluate the efficacy of many newer fungicide products and combinations, as well as biological control products, compared to conventional control materials.

PCNB (pentachloronitrobenzene) has long been an industry standard for snow mold control throughout much of North America. Good disease control efficacy, affordability, and formulation choices have attracted its widespread use. Documented cases of PCNB resistance are rare, but at least one study has shown a loss of effectiveness at a site with extended snow cover and extreme disease pressure when PCNB is used alone.[4] This isn't terribly surprising, considering that most modern fungicide trials have shown that various product combinations with or without PCNB generally provide the best control where disease pressure is high.[4,7] Repeated use of the same active ingredient for the same disease organism can lead to selection of resistant genotypes.

Researchers at Washington State University have identified different classes of fungicides that provide control of one organism responsible for gray snow mold (*Typhula ishikariensis*) but not another (*Typhula incarnata*), and vice versa.[4] This information suggests that golf course superintendents should know conclusively the exact organisms responsible for gray snow mold at their golf course. Diagnostic laboratory testing or identification of sclerotia in the spring of the year are tools available to differentiate between the organisms responsible for gray snow mold. Sclerotia of *Typhula incarnata* are larger (up to 5mm in diameter) and red or brown in color. Sclerotia of *Typhula ishikariensis* are smaller (<2mm in diameter) and are dark brown or black, are located in the dead leaf tissue or mycelia crust, and appear as though pepper were sprinkled over the disease patch, giving rise to the common name speckled snow mold for this type of gray snow mold. Both organisms are commonly active at sites with severe winters and extended snow cover.

Selecting the most appropriate fungicide program for use at a specific golf course involves an assessment of disease

pressure, historical performance of various products, cost, and application method. Contact your regional Green Section office or university extension specialist to discuss disease control programs specific to the climate.

BIOLOGICAL CONTROL

Researchers have been investigating the potential of various biological control agents for the management of snow mold diseases for at least 20 years.[1] Investigators have been working with different fungal and bacterial organisms to offer a possible non-chemical control option for snow molds. Researchers in Canada have been working with isolates of *Typhula phacorrhiza* to suppress both pink and gray snow mold.[3,5] This organism is closely related to the *Typhula* species that cause gray snow mold, and it is suspected that competition for nutrients and space is the possible mode of action for suppression of disease-causing organisms. Trials across Canada have shown distinct promise, and the next steps will be more widespread testing in the U.S. and product registration for eventual trial in the marketplace.

Cultivars of creeping bentgrass exhibit varied susceptibility to both pink and gray snow mold.

Research conducted at Michigan State University has investigated the potential of *Pseudomonas aureofaciens* (Tx-1) to control pink snow mold. Initial studies have found that this organism can reduce disease incidence by reducing the amount of fungus in the fall prior to subsequent infection of turf.[2] The requirement of daily application of the organism for a prolonged period could preclude effective use at many locations.

In Alaska, research has indicated that the fungal organism *Trichoderma atroviride* can reduce disease pressure by parasitizing sclerotia of snow mold fungi.[6] Spring applications of this organism to snow mold patches may reduce subsequent disease the following winter. Preventative applications of this bio-control organism in the fall have demonstrated some disease control in Alaska, but trials in Washington and Montana did not show this organism to provide any suppression of snow mold diseases.[4] Perhaps the organism is adapted regionally to Alaskan conditions and could not compete or establish at lower-latitude sites.

The development of effective biological snow mold controls will be a real benefit to golf courses where snow mold disease pressure is significant, environmental sensitivity is high, pesticide use is contentious, and/or pesticide use is restricted. Before bio-control of snow mold is a reality, however, much more research and testing will be necessary to identify effective disease control agents that warrant the costs involved in product development and registration. Selecting pesticides with favorable environmental attributes, including low toxicity, low amounts of active ingredient required, low solubility, and short half lives, is another responsible management decision to safeguard the environment.

CONCLUSION

Recent snow mold research trials have indicated that a wide variety of fungicides and combinations, both old and new, can provide excellent control of snow mold diseases, depending upon the severity of snow mold pressure. Accurate identification of gray snow mold organisms can help develop a more refined disease control program. The development of effective biological snow mold controls is being investigated and is showing promise, yet it may still be some time before dependable products are available for use by the golf course superintendent. Realistically, incorporating biological control into the overall disease control program will likely provide the best results while reducing our dependence on fungicides.

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