TYPHULA ZONES

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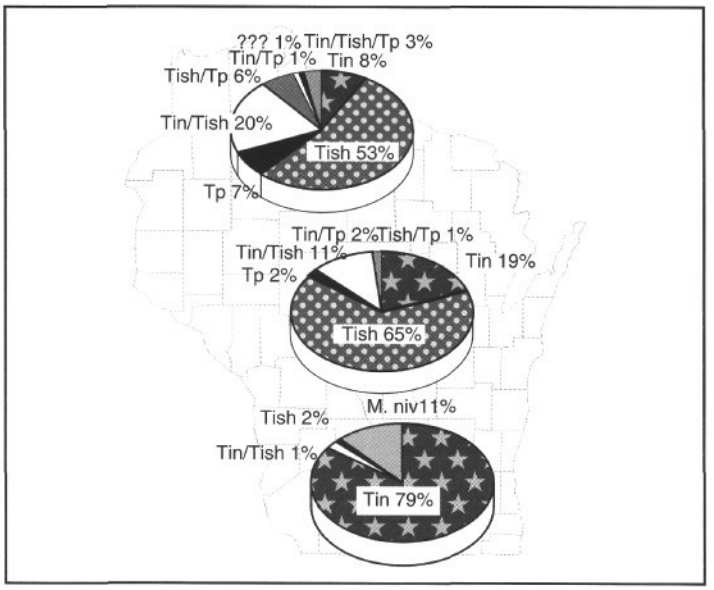
In the last issue, I presented a brief description of the Typhula Tour '97. The purpose of Typhula Tour '97 was to describe the distribution patterns of Typhula snow molds in Wisconsin. I collected more than 460 snow mold samples from 24 different golf courses ranging from Edgerton to Bayfield, Wisconsin. It took me about two months to sift through the samples and come up with this map (see Figure 1). The symbols used are as follows: Tin = *T.incarnata* (gray snow mold), Tish = *T. ishikariensis* (speckled snow mold), Tp = *T. phacorrhiza* (a reported biological control agent) M. niv = *Michrodochium nivale* (pink snow mold). These fungi were found in the samples either by themselves or in combination with others. The occurrence of *M. nivale,* causal agent of pink snow mold, is underestimated because I was purposely looking for patches with sclerotia. *M. nivale* has an important role in snow mold epidemics but this study is investigating the Typhula snow molds.

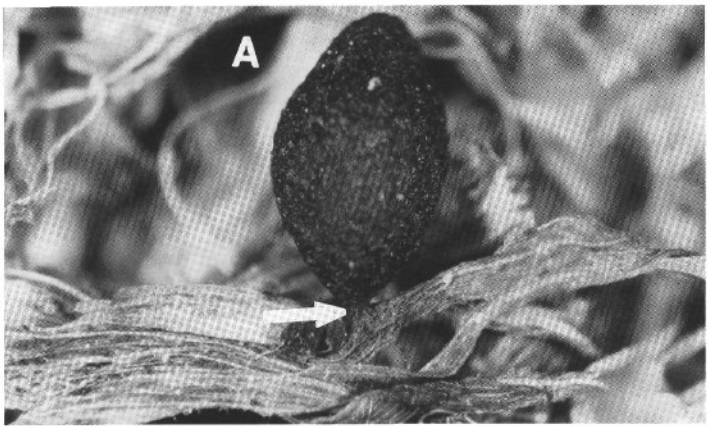
Figure 1. Percentage of snow mold fungi collected from golf courses. Tin=T. incarnata, Tish=T. ishikariensis, Tp=T. phacorrhiza, M.niv.=M.nivale

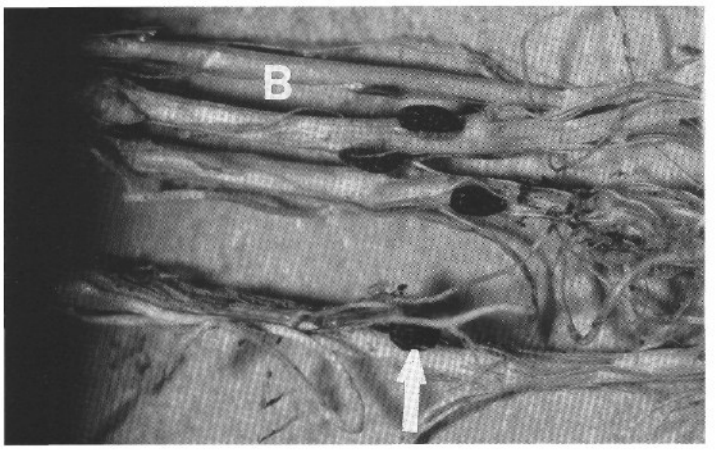


A look at the map shows that Tin is the most commonly collected sclerotial snow mold in the southern zone and that Tish is the most collected in the central and northern zones. Also, the central and northern zones have the distinction of being very diverse, including the occurrence of Tp. Two interesting things that surfaced were that Tp was associated with unique snow mold patches and that Tish was found on stolons and roots in areas that had a chronic and severe problem with snow mold control.

First, in the northern two-thirds of the State, Tp was found associated with snow mold damage. Sclerotia of Tp were usually found in combination with Tish but they were found alone on occasion. Tp has large, pear-shaped, dark reddish-brown sclerotia with short stalks (stipe) attaching them to their food source (Fig. 2A). The most detailed mycological description I could find on Tp was Khurana, 1980. Khurana's description and illustrations were enough to identify my isolates as Tp. However, for a second opinion, I sent sclerotia to Dr. Now Matsumoto in Sapporo, Japan, whom I consider to be the 'King of Typhulas.' Matsumoto concurred with my identification and has sent me duplicates of all his Typhula tester isolates. Dr. J. D. Smith, one of the world's leading authorities on low temperature pathogens, identified Tp for Dr. Gayle Worf in the early 80's. You may remember Smith as a speaker at the Milorganite Symposium in 1994. Dr. Smith recently sent me his snow mold herbarium collection. Wow, what an honor! Tp standards in this collection have the same physical characteristics as Wisconsin's Tp.

Figure 2. A. T. phacorrhiza is easily identified by its large, pear-shaped and dark reddish brown sclerotia with short stalks (stipe). Arrow indicates stipe. B. Sclerotia of T. ishikariensis on bentgrass stolons and roots. Arrow indicates sclerotium on root.





Although Tp is not new to Wisconsin, its importance as a pathogen is not fully described. Current research being conducted by Dr. T. Hsiang's group at the University of Guelph, Ontario, Canada, point to Tp as 'a good candidate for biocontrol of snow mold,' and that Tp-treated field plots did not express disease symptoms (Wu, et. al 1997a and b). This work is following up Dr. Lee Burpee's initial research that first investigated the potential of Tp as a biocontrol agent (Burpee, et. al 1987). Tp may well be a weakly pathogenic or saprophytic Typhula species.

Second, Tish was found on stolons and roots on turfgrass areas that had a chronic problem with Typhula snow mold (Fig. 2B). This may be one reason why some fungicide applications have failed to work. Granular formulations may not be able to provide timely delivery of the active ingredient into the thatch-soil interface. Also, spraying at lower water carrier rates may not be enough to be effective.

Keep this in mind when you are thinking about snow mold management. A good strategy for chronic areas in the northern two-thirds of Wisconsin would be to integrate wise cultural practices, proper nutrition, grade and drainage improvement, deployment of resistant varieties, and early application of a systemic fungicide followed by one or two applications of contact fungicides. Systemic fungicides used against Typhula snow molds should be applied when the grass is still growing and the Typhula fungi are becoming active, which is in the air temperature range of 50 to 60F. Contact fungicides should be applied after the grass has gone dormant and before permanent snow cover. Tank mix combinations of systemic and contact fungicides should be full rate for the contact and half rate for the systemic. Please read the entire pesticide label for the manufacturer's recommended rates. A good strategy for the southern zone will be the same as above but with fewer fungicide applications. For more information on Typhula snow mold management see 'Soylent Green', *The Grass Roots,* No. 6, 1995 and No. 5, 1996 and 'TDDL', No. 4, 1997.

My future work will describe the aggressiveness of the Tin, Tish and Tp isolates that I have collected from Wisconsin. Also, DNA identification utilizing the ITS region (see Emily's TDDL article) will be used to further describe these Typhula species. Pilot DNA analysis studies have been successful in differentiating these fungi and future efforts will be made to make these molecular tools even more accurate and rapid. The results of the Typhula Tour '97 indicate that there are differences in the distribution of Typhula snow molds. The northern two-thirds of the State face a more diverse and aggressive set of pathogens than the southern region. More research is needed to determine if these differences call for different management practices.

Literature cited

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