# Biological Turf Disease Control — *Progress, Promises and Problems*

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You may be following the research reports, along with me. They are still only slightly more than a trickle, but they are there. I'm talking about the results of efforts by turf pathologists in scattered laboratories around the country that hint of fungi and bacteria that might be introduced into our turf environment to combat turf pathogens and successfully maintain crop health in lieu of chemicals or pesticides.

You may also agree with me—we need some successes in this arena!

Whether or not you share the perception of a growing vocal segment of our society that we are major contributors to the decadence of our environment(!), it would sure be nice to be able to spring forth with a new and different control method that would benefit our public relations portfolio. My perception is—if could put one good biological product on the market that is biologically sound and economically cost-effective, we could leverage that success into great goodwill and much incentive towards better and more imaginative disease control programs.

Several laboratory and greenhouse studies have identified a number of organisms that suppress turf pathogens, including *Pythium aphanidrematum* and other *Pythium* species. Catherine Smejkal, along with Dr. Jennifer Parke in this department, conducted several growth room studies two winters ago looking at possible turf disease control activity of organisms Dr. Parke is experimenting with as vegetable disease control possibilities. We also cooperated with Russ Spear and Dr. John Andrews a couple seasons ago, along with Jeff Bottensek at the Stevens Point Country Club. Andrews and colleagues have identified a genus of the fungus *Athelia*, which will work under snow to decompose scab pathogen-carrying apple leaves. We thought it might somehow colonize the grass surface and suppress *Typhula* or *Microdochium* (gray and pink snow mold organisms).

One of the best successes reported to date was by Burpee and colleagues at Guelph in the mid-eighties, before he moved to the warmer climates of Georgia. Using a saprophytic species of *Typhula (T. phacorrhiza)* which we see occasionally growing over corn stubble in Wisconsin (and other places), they reduced by about 75% the gray snow mold incidence in Canadian plots. He and others have produced similar levels of success with brown patch control, using closely related fungal species of the disease-causing *Rhizoctonia*.

The basic tenet of all this, of course, is to find an organism that is ecologically compatible to the niche that the turf pathogen occupies, and somehow displace or suppress it. And closely related species are logical possibilities. I was intrigued by some work that Dr. Bill Pfender reported not too long ago in Kansas about his use of *Limonomyces roseipellis* in suppressing the survival of the pathogen that causes tan spot disease in wheat. The degree of suppression was from 50-99%. But there's a downer—*L. roseipellis* is the causal agent of pink patch in turf! How many golf course superintendents and homeowners would support distributing that organism as a biological control agent?

That's identical to our opposition to the proposed (no longer!) use of *Verticillium dahliae* as a biological control agent for velvet leaf in Wisconsin. It's a lethal pathogen, and velvet leaf causes serious problems in our soybean fields. But that organism is also the cause of our ash decline, as well as diseases on other crops. And the organism survives indefinitely in the soil.

So there are many obstacles.

One of the more recent, and perhaps optimistic, reports is by Eric Nelson and Cheryl Craft at Cornell, where they are researching the bacterium *Enteroacter cloacae*. This organism has been used as a biological control agent against a number of plant pathogenic fungi. That could be a significant plus from a developmental perspective. It's one thing to find a useful organism that can pass the various biological criteria (including many we've not touched). But it also has to be made available to the superintendents. Pharmaceutical concerns are much more intrigued by the idea of investing in developmental research for such biologicals than formerly, particularly if the market potential appears big enough to justify the risk and start-up costs.

Their research was on putting greens at the Rochester, N.Y. Country Club in 1988 and 1989 using the organism as a biological control agent for dollar spot. Application was made via inoculated top dressings. Their results were encouraging, but were variable, e.g., not a whole lot different than we encounter when we are trying to develop rates, procedures, and schedules for applying new fungicides!

When—if ever—will we see a commercial breakthrough? I can't guess. My crystal ball is broken. The awareness of biological antagonism and its potential precedes my entry into the plant pathology world. But two big differences have occurred over the past decade. Society is now ready for it—and business and fiscal support to develop it might just be the stimulus of the '90's to bring it about before this century is over!