Managing Earthworm Problems in Turfgrass

Daniel A. Potter

Earthworms have been called the "intestines of the earth" because of their importance in breaking down plant litter, recycling nutrients, and enriching the topsoil. **Generally, you'll have much healthier turfgrass where earthworms are abundant.** Their burrowing reduces soil compaction and improves air and water infiltration. Earthworm tunnels may account for two-thirds of the total pore space in soils. Earthworms enrich the soil with their fecal matter, called castings. Their feeding breaks down thatch while mixing topsoil into the thatch layer, enhancing its suitability for turfgrass growth. Thus, earthworms perform a function much like mechanical topdressing. Their activity encourages microbes that further decompose thatch and enhance soil fertility. **Conservation of earthworms is important in lawns and other turf sites where thatch is a concern.**

But on golf fairways, an abundance of earthworms can be too much of a good thing. Mud mounds abound where the earthworms have pushed up castings through the close-mowed grass. Golf carts and mower tires compact these mounds, smothering patches of grass. Golfers' drives may stop short on worm-softened fairways, and golf balls may be muddied where they land. Mower blades are dulled, and mowers return to the Operations Center caked with mud.

Over the past decade, my research team ran several multi-year field tests to evaluate the effects of turfgrass pesticides on earthworms. My original intent was to help turf managers to avoid killing earthworms, but I've since learned that there are two sides to this issue. Indeed, most of the interest in our earthworm research has been from golf superintendents who were more concerned with suppressing earthworms. Here are some options for managing this problem:

Strictly speaking, turf managers in the United States cannot apply pesticides for earthworm control because no chemicals are labeled for such use. **However, several products will kill a portion of the earthworms as a non-target effect when they are applied for control of insects or diseases listed on their labels.**

According to our research, the insecticides **bendiocarb** (Turcam®), **carbaryl** (Sevin®), **ethoprop** (Mocap®), or **fonofos** (Crusade®) are toxic to earthworms. Any of these products, applied at rates labeled for grub control and watered in (1/2 to 1 inch [1.25–2.5 cm] of irrigation), generally will give an 85 to 95% reduction of earthworms. The fungicide thiophanate-methyl (Cleary's 3336®) provides similar suppression. The impact is greatest if the application occurs when the soil is moist and the earthworms are active near the surface. One application often will reduce casting activity for 2 months or longer, not from residual toxicity, but because the earthworms are slow to reproduce or recolonize treated areas.

In England, carbaryl (Twister®), and the fungicides carbendazim (Turfclear®) and gamma HCH and thiophanate-methyl (CastAway Plus®) are registered for "control of earthworm casts." These products are not labeled for worm control in the United States. Availability and registration of products in other countries varies.

Most earthworm species are intolerant of acidic soils. Application of aluminum sulfate or sulfur to lower the soil pH to 5.8 or less may reduce their populations.

The Moss Network

James B Beard

Under the leadership of superintendent Frank Dobie of the Sharon Golf Club in Ohio, a group of 18 superintendents from 8 different states, ranging from New Jersey to Pennsylvania to Ohio to Illinois to Nebraska to Arizona, participated in a networking arrangement. The objective was an interchange of information on the relative success of various methods of moss control on putting greens. Based on an interchange of results from previous control methods that had been attempted, each of the 18 superintendents selected certain chemical control approaches that each was interested in trying during the 1997 growing season. Based on these tests a strong consensus evolved as to the most effective material in controlling moss with minimal damage to bentgrass (*Agrostis* spp.) and annual bluegrass (*Poa annua*) putting green turfs.

Continued on page 7

The Moss Network

Continued from page 5

The best treatment was Ultra Dawn dishwashing detergent which was mixed at 4 ounces in 1 gallon of water (30 grams per liter) and applied by spot treatment using a backpack sprayer. Each moss spot was thoroughly soaked. The symptoms of effective control were that the moss turned orange-brown within 24 hours. **Generally the best control was achieved when air temperatures were between 55 and 80°F (13–27°C), on days with full sunlight.** If the Ultra Dawn treatment was applied at temperatures above 80°F (27°C) a slight discoloration of the surrounding desirable turf was observed, but the turf did recover within a few days.

Concerning the conditions under which moss was most likely to occur, there were no definite trends in terms of grass species, root zone mix, cutting height, soil pH, age of green, nitrogen fertility rate, or topdressing source. However, **in many cases, the moss was most prevalent if there was a thatch layer that was kept moist, even on greens with good drainage.** Typically, the moss problem occurred in full sun. If one green on a golf course had moss, it would readily spread to the other greens within a few years.

The 18 superintendents generally considered treatments involving iron sulfate or ferrous ammonium sulfate to be relatively ineffective. The material DeMoss® did kill the moss, but resulted in excessive damage to the surrounding turf.

These results represent the coordinated findings from one year. Thus, most probably there will be some touch-up applications required in the following years before cleanup of the moss problem stabilizes. Superintendent Frank Dobie has prepared a summary of the test observations conducted by various superintendents around the country. Those interested in further information or possible participation in 1998 can contact Superintendent Frank Dobie, The Sharon Golf Club, P.O. Box 8, Sharon Center, OH 44274; Phone: 330-239-2383; Fax: 330-239-1390.

RESEARCH SUMMARY

Fungicide Effects on Bacteria Used as Biological Control Agents

Seven fungicides were evaluated for their effect on six bacterial populations that are being assessed for use in the biological control of specific turfgrass diseases. The bacteria included *Azospirillum*, *Enterobacter*, *Pseudomonas,* and *Serratia* species. Nearly all the tank-mixed fungicides resulted in statistically significant reductions in each of the bacterial populations. The most consistently inhibitory fungicide was Banner® (propiconazole), which inhibited all 6 bacterial strains tested. Certain fungicides such as Daconil® (chlorothalonil) and Chipco 26019® (iprodione) enhanced some bacterial populations. **These results indicate that many of the commonly used turfgrass fungicides have negative impacts on bacteria used for the biological control of diseases.** This research covers the first year of a multi-year study.

Additional studies are needed to assess the relative effects of these fungicides on the actual disease control efficacy of each bacterial strain under field conditions. Certain fungicides may have a strong negative effect on disease control where bacterial populations are being applied. By the same token, there is evidence that continued research may identify fungicides that are compatible with the bacteria so they can be used in combination to maximize disease control with minimum chemical fungicide usage. **[By E.B. Nelson and C.H. Craft in 1996–1997 Cornell Turfgrass Annual Report. pp. 14–19.]**

TURFAX™
© Ann Arbor Press
Introductory offer: $69.95 + shipping and handling
6 issues/year
Available by mail and/or fax

Ann Arbor Press
121 South Main Street
P.O. Box 310
Chelsea, MI 48118
Telephone: 800-858-5299; 734-475-4411
Fax: 734-475-8852
Email: turfax@aol.com