

Managing Moss in Turfgrass

Mosses are difficult-to-control weeds in both taller-cut lawns and low-mow golf course putting greens. Several different species of moss can infest lawn-height stands of turfgrass, but silvery-thread moss (*Bryum argenteum* Hedw.) is the most common species found in close-cut turf, such as golf course putting greens (Figures 1-2).



Figure 1 and 2: Silvery-thread moss in a creeping bentgrass putting green. Top photo by Cole Thompson, bottom photo by Zane Raudenbush.

Moss Biology

Mosses are bryophytes, and sometimes called “lower plants.” Unlike desired turfgrass species and other common grassy and broadleaf weeds, mosses are nonvascular plants, lacking conductive tissues (xylem and phloem) and roots.

Instead, most mosses are “ectohydric” meaning they absorb water and dissolved nutrients over their entire leaf

surface. Additionally, mosses produce an extensive rhizoid system, allowing them to anchor to almost any stable substrate. Rhizoids resemble the roots of vascular plants (Figures 3-4), but typically lack the ability to absorb water and nutrients from the soil rootzone. Mosses can spread through asexual (vegetative) propagation. Both rhizoids and leafy, green tissue of mosses (thallus) develop from a slimy, black mat (protonema) that can be mistaken for algae, especially on golf course putting greens.



Figure 3 and 4. Moss rhizoids anchoring silvery-thread moss into a thatch layer, and close-up view of rhizoids and shoots. Top photo by Cole Thompson, bottom photo by Zane Raudenbush.

As with most weeds, mosses most commonly occur where voids are present in

turf canopies. Shady, wet conditions favor some mosses.

Moss Management

Mosses can be difficult to control once established. Promoting turf health and a dense turfgrass stand is one of the best ways to prevent moss.

Lawn-height turf

Cultural practices that promote healthy turf are essential in any weed control program. Irrigating deeply and infrequently, aerating, maintaining a proper mowing height (e.g. 2½ to 3½ inches for tall fescue), and having a well-balanced fertility program will yield a more healthy lawn, and limit avenues for moss establishment. Mosses may out-compete turf species in shady areas, regardless of management strategies. It might be necessary to consider utilizing shade-tolerant turf species like fine fescues (Creeping, Chewings, and Hard fescue) or other landscape plant species that are even more competitive in very shady environments.

If moss encroachment is extreme, applying an herbicide might be an option. Quicksilver (active ingredient carfentrazone-ethyl) is a broadleaf herbicide that is labeled for silvery-thread moss control in lawns and on golf courses, and it has shown moss suppression in some studies of putting green turf. Terracyte (sodium carbonate peroxyhydrate) is a peroxide product with formulations labeled for lawn and golf course and moss reductions have been shown in some studies on golf course turf, but phytotoxicity has been reported. While these products are options in lawns, the cultural practices outlined above should be the primary strategy. Keep in mind that most products have been tested on and are labeled for silvery-thread moss, but many other moss species can occur. Mechanical weed control options may be necessary

when herbicides are not available/desirable. In this case, turfgrass managers can use a metal leaf rake to remove the moss thallus from the desirable turfgrass. However, most mosses can spread vegetatively, so the removed plant material should be transported off-site. In most instances, mosses are often a symptom of abiotic stress (poor soil fertility, inadequate drainage, over watering, dense shade, etc.), so turfgrass managers will need to address these factors in order to obtain long-term control.

Low-Mow Golf Course Turf

Mosses are invasive weeds in closely mown golf course putting greens. Increased moss encroachment has been observed with lower (0.125 inches) compared to higher (0.157 inches) mowing heights. Over fertilization can lead to excessive organic matter development, disrupt water infiltration, and favor moss development. Additionally, fertilization with sprayable nitrogen sources (urea and ammonium sulfate) has been found to increase silvery-thread moss encroachment. Promotion of turf health with aeration, balanced fertility, deep and infrequent irrigation, and (if possible) a higher mowing height will limit moss encroachment.

Quicksilver and the fungicide Junction (Section 2ee label; active ingredients mancozeb and copper hydroxide) are labeled for silvery-thread moss control in golf course turf. Several researchers have observed reductions in silvery-thread moss in putting-green height bentgrass with applications of Quicksilver, with no phytotoxicity to creeping bentgrass. In our research at Kansas State University, a management program including both core aeration and Quicksilver applications over several years significantly reduced moss coverage. Higher rates of Quicksilver can injure *Poa annua*, so be sure to consult the label before making an application.

Some control has been observed with Junction though phytotoxicity of creeping bentgrass is of concern. As mentioned above, Terracyte is a labeled product that has shown some efficacy, but with potential phytotoxicity. Many other chemicals have been evaluated for controlling silvery-thread moss but few are labeled. Currently, no

refereed publications have reported the complete control of silvery-thread moss with *any* products. Again, remember that most products have been tested on and are labeled for silvery-thread moss, but many other species can occur.

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