

MOSS CONTROL ON GREENS

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Moss is a four letter word. Just ask any golf course superintendent who has had to deal to this annoying pest on their greens. Forming a dense mat, it crowds out the turfgrass, makes a terribly uneven putting surface, and is downright ugly in a green. What is it? Why is it in my greens? Most important, what can be done to prevent or eradicate it? These are the questions most often raised by golf course superintendents

NOT EVERYTHING YOU TOUCH IS GOLD

There are many species of mosses found in lawns and other turfgrass settings. The most prominent moss species infesting greens is *Byrum argentium*, or silvery thread moss. This scourge of golf course greens derives its name from the silvery appearance it has, especially under dry conditions. When soil water is high, it will have more of a lime green to blackish green color.

Scientists who devote their careers to studying mosses call silvery thread moss a "cosmopolitan" species. This means that you can find silvery thread moss just about anywhere, from the mortar between patio bricks, to the roof on your house, to a rock outcropping. You can imagine then, that there must be an ample source of "inoculum" just about everywhere to inseminate your greens.

Why then has it not been a problem until just a few years ago? There are a couple of possible explanations for this. First and foremost, superintendents have met the demand for faster putting surfaces by keeping their greens shorter and hungrier. The weakened turf on these greens leaves plenty of bare ground exposed for moss spores or vegetative parts to take hold. Notice how moss usually shows up first on knolls and green perimeters where the grass is usually weakest.

Another reason moss may be more prevalent today is because of the loss of mercury fungicides. While the fungicidal properties of mercury products are well known and appreciated, few realize that they were also the most effective moss killers around.

A few years ago, the Metropolitan (New York) Golf Association sponsored a 3-year research project to look at practices that could be used by golf course superintendents to control moss. While an absolute solution was evasive, we did learn enough about this beast to provide some guidelines for reducing its presence in greens.

CULTURAL STRATEGIES

Don't Drown Your Greens

Growing vigorous, healthy turf is the primary strategy in any weed control program. Moss prevention is no exception. Recognizing the limitations on cultural management options for greens, as well as the demands for faster greens, what's a superintendent to do?

There are a couple of things you can do to minimize moss encroachment in greens. First, be careful with your water. While silvery thread moss survives dry conditions, it flourishes when it's wet. In fact, when silvery thread

moss first colonizes an area, it has a black slimy appearance; similar to algae. If surface conditions remain moist, the green vegetative structures will soon form. The moss is off and running!

If drainage in your greens is impeded in the top 3 to 4 inches, try some form of deep tine aeration. In our studies we found that deep spiking twice a year resulted in a reduction in moss on greens greater than core aeration alone. Core aeration twice a year, followed by a heavy sand topdressing also resulted in a reduction in moss.

Don't Starve Your Greens

Fertilization, without question, had the greatest impact on moss reduction. It makes sense, doesn't it - a vigorously growing turf is going to compete well with moss. In our trials we looked at annual nitrogen (N) rates of 0, 3, and 6 lbs of actual nitrogen per 1000 square feet, split into monthly applications. Potassium (K) rates of 0, 2 and 4 pounds K per 1000 square feet were also looked at. Finally, iron was applied at rates of 0 and 8 ounces per 1000 square feet per month.

The two-year test was performed on a practice green that had about 40% of its surface covered with moss. Changes in moss population as affected by fertility program was monitored annually. Fertilization had a very significant impact on moss reduction.

Nitrogen had the greatest impact of the three nutrients tested. Moss populations decreased as nitrogen rates increased - as much as a 96% reduction in moss at the highest nitrogen rate.

Monthly applications of iron were also helpful, especially at the moderate and high rates of nitrogen. Iron had little effect when no nitrogen was applied.

Potassium, by itself, did not contribute to a reduction in moss. In combination with nitrogen, however, it was important. We found that our middle rate of nitrogen (3 lb N/1000 sq. ft) was nearly as effective as our highest rate, as long as it was supplemented with the high rate of potassium.

This is good news for those of you maintaining those lightning fast greens. Only moderate amounts of nitrogen are needed (1/2 lb N/1000 sq. ft/growing month) as long as your potassium fertilization program provides about 0.8 lb K₂O per growing month.

These results still point out the need to feed your greens. Try other means of maintaining greens speeds, such as double cutting and light rolling. These practices may allow you to provide slightly more nitrogen for your greens without sacrificing speed.

Squirt and Pray

Over the course of our three year study, we worked diligently trying to find a chemical that would selectively control moss out of greens. In four different screenings involving over thirty different materials, only mercury provided over 90% control.

There were a couple of other materials that showed some promise, but were inconsistent. One was Scotts Goosegrass/Crabgrass Control; a bensulide/oxadiazon combination. We obtained over 80% control in one trial with this product. Now that several golf course have tried this, the conclusion is "inconsistent". It has worked for some, but not all. Realize that this product is hard on bentgrass, and will cause moderate to severe discoloration.

A moss-killing soap product that is commercially available was tested, and resulted in only a 23 to 38% reduction in moss in one year.

The other materials tested were either ineffective or very inconsistent. On the bright side, there has been some new herbicide chemistry introduced to the market since these trials were conducted. New studies may be performed soon to see if any of these hold promise for controlling moss.

If You Can't Beat It, Pull It

Once you first notice moss in your greens, you need to act quickly. A sure method of eliminating it is to physically remove it. One superintendent I know of assembled a "Moss Patrol". This group patrols the greens on a regular basis and plugs out any moss present. Since the patrol is on top of the moss problem, most moss tufts are cut out with a pocket knife and repaired like a ball mark.

A similar approach would be to spot treat the moss tufts with Roundup. An applicator that works very well, and is very selective to the moss is a Bingo dauber.

IN SUMMARY

This article has probably reaffirmed what you already know; that moss is one heck of a weed to control in greens. To summarize, my suggestions for a moss eradication program are as follows:

1. Increase your nitrogen fertility to provide at least 1/2 lb of actual nitrogen per 1000 square feet per growing month.
2. Provide at least 0.8 lb K₂O per growing month.
3. Apply iron sulfate at a rate of 8 ounces per 1000 square feet every two weeks. Higher rates may be used, but be careful of burning.
4. If weather conditions permit, verticut in two directions to open up the tufts.
5. Develop your own "Moss Patrol" to deal with moss as it comes into the greens.