

# Moss control on greens

## IS HOPE ON THE HORIZON FOR THIS EPIDEMIC PROBLEM?

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**M**oss control on golf greens has moved to the forefront of golf course management concerns in recent years. Many have now considered this problem an epidemic. There are many theories on how moss has become such a problem and the various control options available. One thing is certain when discussing moss, very few can totally agree on why it is suddenly so prevalent and how to control it.

The moss plant affecting greens has been identified as Silvery Thread moss or *Bryum argenteum* (although this is still

being debated). Moss is classified as a bryophyte, which has no roots, no vascular system, and reproduces vegetatively and/or by spores. Again, some researchers are debating whether or not moss can actually reproduce by spores. Chemical control is difficult because moss lacks the vascular system necessary to translocate an active ingredient throughout the plant.

Moss also has the physiological ability to endure extensive drying periods, and then regenerate. Some literature states moss can dry out as much as 80 percent for a period of two years and still remain viable. Each



Photo: Kevin Ross

Drenching moss with diluted dishwashing soap provided inconsistent results and is an illegal use of the product.

plant also has the ability to produce some 50 million spores.

### Emerging problem

The big question is: Why has moss become such a problem recently? There is no sure answer to this question, only theories. The biggest single factor may be the disappearance of a number of older snow mold fungicides. Some believe these materials delivered a moss control side effect due to their metals content, such as mercury, in the formulations. Some believe the use of these materials over time provided an indirect control for moss.

One factor most agree with is that the increasing demand for low cutting heights to achieve faster green speed contributes to the problem. Matt Nelson of the USGA Green Section has noted, "I've never had anyone tell me that they have a moss problem on collars, tees, or fairways." At the same time, Nelson adds, "In reality, we can't cut our greens at 3/16 of an inch in today's golf climate, although this might solve the moss problem."

In achieving faster green speed, superintendents are also being forced to alter their fertilization practices by reducing nitrogen inputs. Low nitrogen fertilization reduces the vigor and density of greens turfgrass, which in turn allows easier invasion and competition by moss.

From a cultural practice standpoint, golf course superintendents have their hands tied. Because of the need to maintain green speed, inputs that could solve or help solve the problem – such as raising the cutting height and increasing nitrogen inputs – are not feasible.

This leaves chemical control as the primary option to combat an increasing moss problem. In attempts to find a silver bullet solution, superintendents have tried a wide variety of materials. Remedies have included iron sulfate, dishwashing soap, baking soda and others. Chemical companies have also brought products to the market, all of which have offered varied success.

Some of the first moss research was initiated in 1997 by Frank Dobie, superintendent of the Sharon Country Club, in Sharon, Pa. Dobie created a "Moss Network" of superintendents to deal with the ever-increasing moss problem and develop control options. He teamed with superintendents from neighboring states and tried various products for moss control. The "Moss Network" considered Ultra Dawn dishwashing soap, iron sulfate, ferrous ammonium sulfate and DeMoss. Unfortunately, the most effective option was de-

termined to be Ultra Dawn dishwashing soap. They found that 4 ounces of Ultra Dawn per gallon of water, drenching the moss on sunny days with temperatures between 60-80 F resulted in good control.

At that time Ultra Dawn seemed promising as the method of choice for control. Although an illegal use of the product – it is not labeled for use to control moss – a number of superintendents heard from others that it was effective and gave it a try. However, as more tried using the detergent, it failed to be the answer. The results were hit-or-miss and there were some drawbacks. It seemed to work one day but not the next, weather conditions being a critical factor, so superintendents began to scratch their heads once again.

Next came university research, most initiated in 1997-98. Various studies were conducted by Oregon State, Cornell, North Carolina State, Pace Consulting and others. Products evaluated for control including Ultra Dawn, Daconil, terracyte, copper sulfate, zinc sulfate, iron materials, copper hydroxide (Junction), fatty acid soaps (Moss-Aside) and others. The results to date show no conclusive control. Some products that showed promise at one site, completely failed at another. For example, Wendy Gelernter, Ph.D. and Larry Stowell, Ph.D. at Pace Consulting in San Diego, achieved good results with the use of Daconil and Ultra Dawn, while these products performed poorly at other sites. The research, although varied, also indicated that moss continued to reappear with time, under all control measures.

The latest and most promising news comes from work performed by Dr. Arthur P. Weber, published in the July/August 2003 edition of the *USGA Green Section Record*. The work focused on the relationship between metals and the destruction of moss chlorophyll. Weber found that Mercury was highly effective in its toxicity to moss chlorophyll but was not used in his work because of environmental concerns. This finding alone indicates the strongest relationship to date for the theory of control by the former mercury-based fungicides. It also could give credence to the fact that maybe lower cutting heights for greens is not as big a factor as the elimination of these fungicides.

Weber's research found that the metal silver has some of the same characteristics of mercury in destroying moss chlorophyll and re-



Photo: Kevin Ross

sulting in death of the plant. He then conducted research in conjunction with Thomas O. McAvoy, CGCS, superintendent at the Old Westbury Golf Club in New York. They conducted experimental applications of an aqueous silver nitrate solution on bentgrass/*Poa annua* greens. Their work indicated that under all environmental conditions, they were able to successfully eliminate moss infestations without any reemergence and with only a single application.

This may be the most exciting development in moss control, but where does this leave the superintendent anxious to eliminate a moss problem? Obviously, no one should go out and start spraying silver nitrate on their greens without the necessary research, product development and registration. However, this research does show promise for a true *silver* bullet control for what has become a major problem. GCN

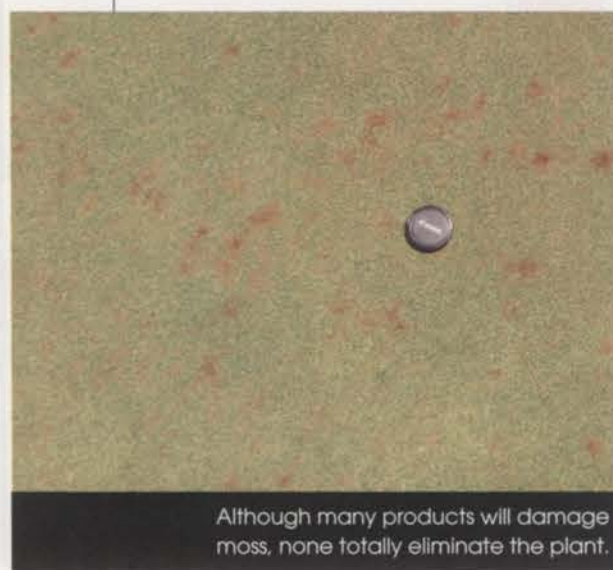


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