

## Silvery Thread (*Bryum argenteum*) Moss Control on Creeping Bentgrass (*Agrostis palustris*) Putting Greens and Tees With QuickSilver™ T & O Herbicide

### Introduction

Silvery thread moss (*Bryum argenteum*) has become an important management consideration on creeping bentgrass (*Agrostis palustris*) putting greens and tees. Once thought to be only of concern in moist areas receiving low light intensity and mild climates this non-vascular plant is invading creeping bent grass turf areas around the world from the higher elevations on several continents to intensively managed putting greens in coastal areas of southeastern United States. Today, silvery thread moss is found in many areas previously considered unsuitable for this type of plant growth. Control of silvery thread moss growth is a potential management consideration wherever creeping bentgrass is grown under intensive management practices such those employed on most putting greens.

The debate as to why silvery thread moss has become a problem in so many new areas is ongoing. Most agree that the gradual changes in management practices on creeping bentgrass greens have contributed to increased moss infestation. Three widely accepted changes in management practices are: (1) the decline and removal of mercury based fungicides used for disease control; (2) lower mowing height and mowing cycles to achieve faster speed of roll; and, (3) changes in fertility programs reducing the nitrogen input resulting in reduced turf density and opportunity for moss to become established. Other factors that may encourage increased moss establishment include over irrigation, shade and poor air circulation. Many of these factors can be managed; however, the desire for faster greens may override one's ability to provide cultural management of a moss problem. Therefore, superintendents must use chemical control measures as part of their moss control program.

### Biology

Mosses are small perennial plants with chlorophyll, which develop in bare areas of the putting green. In many cases the first area to show signs of moss are those areas of the green where turf density is reduced due to ridges and mounds where scalping and drought stress might have influenced the turf density. Moss will not kill the turf but will thrive in those less dense stand areas.

While thousands of mosses exist, true mosses are classified as Bryophytes. The four major types of mosses causing the most concern in creeping bentgrass putting greens have been: *Bryum argenteum*, *Bryum lisaе*, *Amblystegium trichopodium* and *Bracylecium spp.* Silvery thread moss (*Bryum argenteum*) appears to be the most common type of moss generally associated with issues on putting greens.

Mosses are primitive plants with no vascular system (nutrient and water conductive tissues) or true roots. Rhizoids are the structures, which may resemble roots on the moss plant, but their primary purpose is to anchor the plant on various surfaces. Unlike plants, mosses lack conductive tissues such as xylem and phloem that would provide a translocation mechanism for systemic herbicides. Contact herbicides, however, may provide control opportunities provided adequate coverage is obtained.



Mosses reproduce by both sexual and asexual means. Sexual reproduction is accomplished by the production of spores contained in distinctive capsules on the moss plant. These spores once released from the capsules may travel by wind to new areas conducive for germination and grow into new plants. Asexual or vegetative reproduction is accomplished when small fragments of a shoot or leaf from an existing moss plant is removed and deposited in bare soil where it develops into a new moss plant. These small fragments may be created by foot traffic and/or maintenance equipment (fragmentation). Also, wind and water may move small fragments of moss plants from one area to another. Since moss plants can easily be dispersed to new areas, and different stages of growth are likely to be present at any time, control of this plant can be difficult.

## **Management**

Due to the unique biology and the changes in cultural management of creeping bentgrass putting greens and tees traditional control measures have been less than adequate. Researchers around the world have evaluated many types of control approaches for silvery thread moss control. These include application of plant nutrients such as iron, various fungicides, fatty acid soaps and cultural practices. Whatever practice is used it is clear that growing a healthy dense turf is key to preventing moss from overtaking the bentgrass turf.

When silvery thread moss develops, chemical application is needed to displace the moss and create opportunities for the bentgrass to reestablish in the voids. Research to manage silvery thread moss has resulted in the discovery of a turf herbicide that will provide quick control of the moss and timely reestablishment of the bentgrass. QuickSilver T&O herbicide (carfentrazone-ethyl) has been evaluated by turf researchers in several states. Results have shown that QuickSilver T&O herbicide can be a valuable tool to golf course superintendents for management of moss.

## **Directions For Use**

QuickSilver T&O herbicide may be used to control silvery-thread moss occurring in bentgrass variety Penncross or variety Crenshaw putting greens and tees. The application rate of 6.7 fluid ounces of product per acre (0.154 fluid ounces of product per 1,000 square feet) followed by another application in two weeks at a rate of 6.7 fluid ounces of product per acre provides control. A third application at lower rates may be applied if needed in two or more weeks after the second application to control moss which may have reestablished.

Good coverage is essential for effective control. QuickSilver T&O herbicide should be applied in total spray volumes of 100 gallons per acre or greater (2.5 gallons per 1000 sq.ft. or greater). To ensure good coverage, use a non-ionic surfactant (NIS) in the spray mix at a rate of 0.25% volume/volume (1 pint per 50 gallons of water). Follow all adjuvant manufacturers use guidelines.

Most creeping bentgrass varieties are tolerant to QuickSilver T&O herbicide applications. Many newer varieties of creeping bentgrass are becoming available to the market daily. Therefore, if you apply to a variety other than Penncross or Crenshaw you should consider confirming tolerance by making an application to a small test area first.

Do not tank mix with other pesticides for silvery thread moss control. Application to bentgrass turf that is under stress due to extreme high (>90° F) or low temperatures, disease infection, insect infestation, or extreme high or low moisture conditions may cause transitory yellowing. Application of QuickSilver T&O herbicide to bentgrass under stress from core aeration may also cause discoloration and should be delayed until the bentgrass has recovered from the aeration operation. *Poa annua* may be damaged at rates greater than 2.0 fluid ounces per acre.

Always read and follow label directions. Check your state authorities to see if QuickSilver is registered for moss control in your state, or call 1-800-321-1FMC.