Moss in turf and on hard surfaces

Graham Paul gives you the opportunity of adding to your BASIS points while offering some very sound advice on clearing moss

Moss is believed to be one of the earliest plant forms to have evolved on dry land. Approximately 20,000 species of moss have been identified and they exist on every continent.

Mosses are classified in the phylum Bryophytes; a group that contains the liverworts (Marchantiophyta), the hornworts (Anthocerotophyta) and the mosses (Bryophyta). Evolutionists believe that the first life on earth began in the oceans and developed from primitive single-celled organisms. Around 1.5 billion years ago the first plants to evolve in these oceans were the algae – organisms that developed the chloroplast; giving them the ability to trap energy from sunlight in a process we call photosynthesis. All plants that exist today have evolved from types of algae that began to emerge from the seas some 450 million years ago!

In botanical terminology we refer to 'lower' and 'higher' plant forms, a reference to the degree of evolution and sophistication rather than the physical height! Bryophytes are considered to be lower plants and differ from higher plants in that they have no vascular transport system to distribute water and nutrients throughout the plant. They do not produce flowers or seeds but reproduce through spores. Bryophytes have no defined root structure for obtaining moisture and nutrients.

The life cycle of moss is complex, involving a sexual stage where the male gamete (sperm) fertilises the female gamete (eggs), to produce an embryo that gives rise to a spore-bearing structure known as a sporangium. During the sexual stage the motile male 'sperm' is transported on water droplets (rainfall or dew drops) to the female 'egg', therefore moss cannot survive in a totally arid environment. Moss spores are simple single-celled structures that serve to colonise new ground. They germinate in the presence of moisture to form new male or female plants. Asexual reproduction of mosses occurs by the development of new shoots from the previous year's growth or by fragmentation of the plant.

Mosses acquire nutrients through a variety of means; some get nourishment from direct contact with water droplets, others can extract nutrients from the soil or materials on which they are growing.

Dealing with moss in turf

Well managed actively growing turf will rarely suffer from the invasion of moss. Mosses are opportunists; they will only thrive where grass lacks vigour, so treatment with chemicals alone will not provide a long-term solution. We need to look for the cause of weak grass growth and take remedial action to provide sustainable moss control.

Just as moisture is an essential requirement for the growth of moss, it will also have an impact on turf health. Excessive moisture reduces the air supply to the

roots putting the grass under stress. We often see the worst moss infestations in the winter and early spring when the water table is high and surface moisture is in abundance. Waterlogged turf can be caused by inefficient or inadequate drainage and by water retention in the thatch layer. Examination of the drainage system and the soil profile should reveal the cause of poor water management in these situations so that remedial action may be implemented.

Too little moisture has obvious effects on plant vigour since drought conditions will thin out the sward making room for moss to take hold when the moisture levels are reinstated. It is therefore important to maintain adequate moisture in the sward by irrigation, where this is possible, during prolonged dry periods. The application of a suitable wetting agent in dry weather can help to move the irrigation water away from the surface, getting it quickly down to the roots where it is most needed.

Light is essential for healthy plant growth and where it is restricted by the season or by buildings, trees, shrubs and other objects, grass growth will be affected in the immediate vicinity. We cannot influence the seasonal patterns of solar radiation but we can in some cases address the problems caused by shading. Pruning or the complete removal/relocation of offending trees and shrubs may provide a dramatic improvement in turf health. While it may not be possible to achieve similar improvements near permanent structures such as buildings, it may be possible to increase light levels by making surfaces reflective with special coatings, cladding or reflecting paints.

Providing the correct balance of nutrients is important in encouraging strong growth, especially on intensively managed sandy soils. In most cases this requires a seasonal programme of feeding based on soil analysis that can identify deficiencies and supplement these when the conditions dictate. In striving for optimum grass growth one must also consider the need to avoid triggering other problems such as turf disease that can occur when the appropriate timing of fertiliser applications is not observed.

Soil analysis will provide essential data on the acidity, which can also have a detrimental effect on turf growth. Moss is quite often found in the thinned swards growing on acid soil. A pH value around 5.5 will provide the optimum pH for growing fine turf.

Scalping or mowing the grass too low can be a further cause of summer stress. Clearly the height of cut depends on the type of sward. Putting surfaces and bowling greens use grass cultivars that can adapt to a low cutting height and are more intensively managed to counter the effects of close mowing but even these areas have limits beyond which scalping will thin the turf. Therefore, where moss is a problem in turf, increasing the mowing height may be worthwhile.

The final consideration in the search for the cause of poor grass growth is compaction, resulting from heavy traffic (machinery and foot) – particularly during the wet seasons. Compaction restricts air movement through the soil and physically slows root penetration. The resultant loss of turf vigour will often give an opening for moss invasion. Dealing with compaction may require an increase in mechanical aeration, traffic management to steer users away from bottlenecks and problem areas or soil amelioration with aggregates designed to permit air and water movement such as 'Axis' based on diatomaceous earths.

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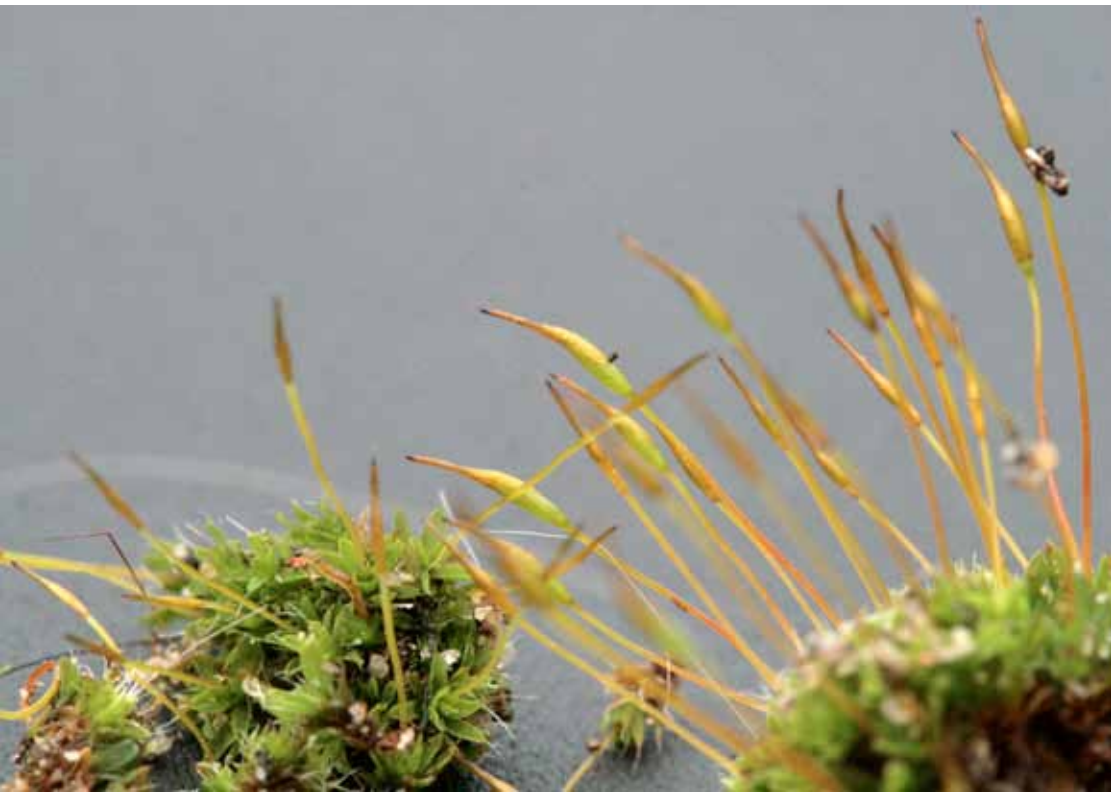
Treating moss on turf with chemicals

Fewer chemicals are available to deal with moss problems today, as legislation from the EEC has caused manufacturers to withdraw some of the more useful products. Prior to the early 1980's mercury-based moss killers, which contained calomel (mercurous chloride) were used for moss control. These were withdrawn, along with the mercury-based fungicides, because of their inherent broad spectrum toxicity and long soil persistence. They were quickly replaced with products containing dichlorophen e.g. 'Super Mosstox'. Dichlorophen had recommendations for use on both turf and hard surfaces and was known to have an affect on the spores as well as on the moss itself. However, dichlorophen was withdrawn after it failed make it into 'Annex 1' – Directive 91/414/EEC. This directive was issued under the Plant Protection Products Regulations 1995.

Today, only two alternatives are available for controlling moss in turf – these are:-

• 'Jewel' a selective herbicide spray from Scotts containing carfentrazone-ethyl and mecoprop-P that will control moss and a range of broad-leaved weeds.



• Products containing ferrous sulphate – available in a multitude of formulations; a ready-to-use liquid sold under the brand name 'Feromex', fertilisers containing high levels of ferrous sulphate e.g. Scotts 'Greenmaster Mosskiller', and various brands of lawnsand.

The use of wetting agents and adjuvants to counteract the hydrophobic conditions associated with moss will improve the effectiveness of liquid moss control products.

Controlling moss on hard surfaces

Moss will survive on a wide variety of hard surfaces such as roads, paths, playgrounds, athletic tracks, hard tennis courts, other solid sports areas, artificial turf, building surrounds, walls and roofs. It just needs moisture, some nutrients from dust and atmospheric fall-out and a small crack or crevice for anchorage.

Cultural control of moss on hard surfaces is not as effective as it can be on turf. However, drying out regularly affected surfaces may be possible by improving drainage to prevent flooding and by increasing the natural airflow that might be restricted by overgrown trees and shrubs. Brushing can be effective on certain surfaces.

There are no longer any approved pesticides for hard surface moss control. Products containing ferrous sulphate will leave rust stains on bricks, paving and other artificial surfaces so these should be avoided. However, there are a number of specialist hard surface cleansers that have proved effective in dealing with the problem.

Some surface cleaners require a very high water volume and are not easy to apply on large areas with conventional spray equipment. A promising new product 'Safor' works by denaturing chloroplasts with biocides and can provide a rapid, long-lasting solution for cleaning deposits containing algae, moss and lichen. The required water volume is well within the capability of knapsack and machine mounted sprayers.

Note that the use of surface cleaners will require an application of the material followed by a secondary cleaning operation after a few days to remove the loosened deposits. Also, when treating hard surfaces (especially artificial turf) it is important to test a small area for material safety before treating the whole area.

SELF ASSESSMENT

Use the questions below to check your understanding of this topic. Readers can claim two BASIS points if the questions are answered correctly, by filling in the form at:
www.sherriff-amenity.com/technical.asp?newsid=21

Circle the correct answer(s)

1) Mosses and all other plants we know today evolved from algae. At what approximate time in earth's evolution did these algae first appear in the oceans?
a) 450 million years ago
b) 300 million years ago
c) 1.5 billion years ago
d) 5 billion years ago

2) Which of the following characteristics distinguishes the Bryophytes from higher plants? (More than one may apply)
a) They produce green flowers only
b) They do not have leaves
c) They reproduce through spores
d) They do not have a vascular system to transport water and nutrients.

3) Which of the following can contribute to lack of vigour in grass? (More than one may apply)
a) Poorly drained turf
b) Aeration with solid tines
c) Shading by trees
d) Soil with pH below 4.0

4) In which year were the Plant Protection Products Regulations issued?
a) 1986
b) 1994
c) 1995
d) 1991

5) What is the chemical constituent of the active ingredient calomel (now withdrawn from use)?
a) Calcium chloride
b) Phenyl mercury acetate
c) Aluminium chloride
d) Mercurous chloride

6) How many pesticides are currently approved for moss control on hard surfaces?
a) 5 b) 2 c) 4 d) None