

# Gather no moss

Mosses are primitive chlorophyll-containing green plants one rung up the evolutionary ladder from the algae and one down from ferns and bracken (Pteridophytes). Some 12,000 species of moss along with their close relatives called liverworts belong to the plant group Bryophyta, writes Dr Terry Mabbett

**Primitive they may be, and much more so than grasses, but this does not stop a range of moss type and species from invading turf, both professional and amenity in status. 'A rolling stone gathers no moss' goes the age old saying, but poorly managed turf will gather moss, and rapidly too, causing costly repair work if left unchecked.**

Mosses are generally less than 5cm tall and commonly grow in dense clumps or mats comprising many tiny and soft, non-flowering plants with rudimentary green leaves on thin wiry stems. Mosses have neither a vascular system nor a proper root system. Individual moss plants are anchored to the substrate (soil, bark, timber, brick, concrete and tarmac) by 'non-absorbing' roots called rhizoids.

Moss mats and cushions generally thrive in moist shady situations and locations, relying on sufficient moisture in the immediate sur-

roundings to be transferred directly, together with nutrients, into the leaves. Not being flowering plants they lack formalised flowers, fruits and seeds but at certain times of the year produce beak-like capsules containing spores and borne aloft on thin stalks.

When growing in turf, moss is simply a green plant in the wrong place at the wrong time and is therefore classed as a weed, albeit a very primitive one but also a highly successful one. Moss is more apparent and a bigger problem in close-cut professional turf simply because the tiny plants are more obvious and not shaded out as they are in less frequently and higher cut amenity grass swards.

## **Underlying cause of moss invasion**

Since moss lacks a proper water-absorbing root system, and is therefore totally reliant on direct transfer of water (and nutrients) from the

Late winter coming into early spring is the time to assess moss levels in turf.

immediate surroundings and into the leaves, sufficient and persistent surface moisture is essential for its successful establishment and spread. All things being equal moisture is most likely to occur and persist in autumn when turf grass starts to lose its competitive edge with moss, because growth is slowing down in response to falling temperature and reduced light regimes. Early spring is the time to assess the amount and extent of moss in turf and also the best time to tackle it. Late March and into April is the time to start dealing with moss.

Be that as it may, moss will grow during most of the year especially in grass swards where shading, poor drainage, soil compaction and poor mowing practice allow for faster growth compared with the turf grass. Indeed moss invasion of turf is a symptom of poor grass growth and a 'sure-fire' indicator of more basic and deep-seated turf problems. Growth of moss



Moss growing on a wall showing dehiscent (spent) capsules



Cushion moss under pine trees with evidence of foraging by birds for invertebrate animals



Moss bearing beak-like spore bearing capsules on thin filaments



Cushion forming moss is prevalent under trees especially along side exposed tree roots



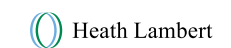
Liverworts are also found on damp poorly drained turf

in turf is invariably accompanied by broad leaved weeds including self-heal, parsley piert, mouse-ear chickweed, slender speedwell and creeping cinquefoil which thrive in the same moist surface conditions, but even these will be choked off once the moss mat spreads and a dense cushion of moss foliage is formed.

Moss is essentially a soil surface weed competing for space and light with grass plants but the root causes of moss are above and below ground in factors like persistent shade and poor soil drainage. Solving a moss problem is not just a case of reaching for a bottle of dedicated moss killer but all-round, year-round good proactive management practice. Greenkeepers and groundsman faced with extensive and lasting moss need to look long and hard at turf management in its broadest context to reduce shading by pruning trees, water-logging through improved drainage and the relief of soil compaction.

**Moss more complex than first seems**

Moss problems are invariably more complex than at first they



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seem. There are three distinct types of moss which invade turf – cushion moss, trailing moss and upright moss – each an indicator weed of specific problems in the turf environment.

- Cushion forming mosses are tiny ground-hugging clusters of moss indicative of closely mown and scalped swards, especially where deep thatch is impeding air circulation and aggravating surface moisture retention.
- Trailing mosses with their fern-like, feathered leaves are symptomatic of inherently poor drainage and heavy persistent shade
- Upright mosses comprising larger, taller and more tufted plants are found on drier more acidic (lower pH) soils

Moss growth becomes most apparent in early spring but greenkeepers should be mindful of moss throughout the year and take appropriate measures that deter invasion and suppress existing growth. Heavy persistent shade cast by trees clearly serves to encourage and maintain turf surface moisture levels and therefore moss, and especially the year-round reduction in light level caused by conifers and

other evergreens like holly. Think twice before planting evergreen trees near greens and tees and have the pruning saw ready to cut low hanging branches and even fell trees if necessary.

Regular ‘cleaning out’ of turf by scarification and aeration by spiking all help to avoid the compaction and persistent dampness that encourages moss. But regular water logging of turf causing perpetual moss growth will require a deeper solution to an obvious soil drainage problem.

A balanced fertiliser programme is important to give turf grasses a constant edge in growth and surface spread at the expense of moss. Timely spring and early summer liquid feeds give grass the advantage it needs, while slower but more solid benefits of autumn top dressing should build up soil fertility and stack the odds against moss, especially where soils are sandy and/or shallow.

Moss thrives on low soil pH and its persistent growth, especially on sandy and free draining soils, may indicate that over-acidity is root cause of the problem.

Confirm this using a soil pH test which if less than 5.5 means some



Dense carpet of moss on a golf tee in late winter



Outside of turf and on hard surfaces moss is an important component of many habitats like rotting tree stumps

remedial measure is required. An application of ground limestone can be used but consult on and monitor rates carefully. Rising pH and soil alkalinity from liming can soon cause general deterioration by encouraging weeds, worms and disease, while suppressing the health and growth of fine turf grasses.

'Shaving' the turf at less than the recommended cutting height weakens the grass and creates a window of opportunity for moss, particularly on damp surfaces where mower 'scalping' occurs. Consistency in mowing is important.

Cut at regular intervals using cut heights appropriate to turf type, season and the changing nature and condition of the turf. Autumn moss growth on damp and dew covered grass may have its 'roots' back in summer when drought caused bare patches and paved the way for later invasion by moss.

### Moss management and control

Comprehensive and consistent turf management practice should largely banish moss from the turf grass sward, but extensive and actively spreading areas of moss

may require targeted control. Given current emphasis on the fast formulation delivery of dedicated moss control products it is easy to forget long-established and long term benefits of lawn sand. Lawn sand mixtures contain the 'old favourite' ferrous sulphate (iron sulphate or sulphate of iron) to give grass a tonic boost while disposing of moss.

The fine particle formulation is spread over the turf preferably from April to the end of June when the ground is moist.

The fine particles of the powder-like formulation cling to the coarser moss leaves (and broad-leaf weeds) but not to the smoother and finer leaves of grass. This allows the ferrous sulphate component to scorch the moss, which turns black and dies. And without a proper root system there is no prospect of re-growth. The powder should be washed off the foliage naturally by rainfall, or by watering if rain does not fall within two days of application.

Lawn sand also contains ammonium sulphate, which together with the tonic effect of iron, boosts grass growth and assists in fast coverage of the gaps left by dead patches

## Outside of turf and on hard surfaces moss is an important component of many habitats like rotting tree stumps



Moss provides important protection for moisture loving woodland plants like sweet violet shown here



Moss will readily grow on a wide range of vertical as well as horizontal surfaces



Moss and surface casting earthworms are active in the same moist turf conditions



Moss invariably occurs together with a variety of broad leaf weeds like parsley piert, slender speedwell and dandelion, among others, shown here

of moss. Typical lawn sand may contain three parts of ammonium sulphate and one part of ferrous sulphate in 20 parts of very fine sand or compost.

Many proprietary moss killers are based on almost 'pure' ferrous sulphate for mixing with water and application by vehicle mounted power sprayer or a lever operated knapsack sprayer depending on the size of area treated. Granular products are generally easier and more accurately applied and therefore safer to use. The moss will blacken and die relatively quickly while the iron simultaneously gives the turf grass a 'short-in-the-arm' from its natural function as a plant nutrient.

Iron sulphate is widely offered as a fertiliser and soil amendment (acidifying) agent but unless it is contained within a proprietary lawn moss killer it will not be approved for use as a pesticide and therefore cannot be legally used to control moss. Whether using ferrous sulphate in lawn sand or in a proprietary moss killer it is essential to read the product label with regard to rate, dosage and all other application conditions. When used

in excess or under inappropriate conditions, especially in lawn sand, ferrous sulphate can blacken and seriously damage turf grass.

Ferrous sulphate in lawn sand or as a proprietary moss killer will usually control closely related liverworts as well as algae and lichens at rates recommended for moss control. Algae and lichens can be problematic on neglected and/or persistently wet turf. Algae are simple green plants even further down the evolutionary 'pecking order' than mosses, and they appear on turf as green or black slime. Lichens, which appear in the form of leaf-like growths, are brownish or blackish when 'fresh' turning grey with curled up edges when dry. Lichens are not individual plants but a symbiotic (mutually beneficial) relationship between an alga and a fungus. The alga manufactures the food and the fungus absorbs water and nutrients.

Dead moss should be removed by scarification or raking but the now cleaned up turf will have gaps where the dead moss was taken from. Bare soil in turf is vulnerable to further invasion but this time by opportunistic fast spreading broad-

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leaved weeds like dandelions and self-heal taking full advantage of the fertile conditions created to discourage moss. Rapid turf repair by seeding to re-populate with existing or new grasses is a priority.

Mosses growing in turf and on some hard surfaces are strictly weeds but otherwise they are important components of different ecosystems and habitats including heathland, damp woodlands and tree stumps. They are a rich source of insects and other invertebrate animals. This becomes abundantly clear when cushions of moss in turf under trees, and especially around exposed tree roots, are pecked to bits by blackbirds, starlings and other birds feeding on invertebrate animals.