Tackling THATCH

by ANDY COLE, Sports Turf Research Institute

Thatch is a term used loosely in greenkeeping circles to describe the layer of accumulated organic matter (old leaves, stems and roots) found between the soil and its live vegetation cover. Thatch is often used to describe all deposits of fibre, but a clear distinction would be helpful from the start and the following definitions can be used as a guide:

Mat/Litter

Generally found in less intensively managed turf, where the sward is cut perhaps once a week without boxing off the clippings and very little additional mechanical work undertaken. This results in a loose build up of grass clippings and decaying plant debris in between the grass stems at the base of the sward. It is more characteristic in old and neglected lawns or areas of turf which are not so intensively managed, such as semi-rough.

Fibrous Thatch (Fibre)

Fibre is more commonly found under acid, moorland turf which tend to favour the finer *Agrostis* and *Festuca* grass species. It develops as a hard, brown, often dry layer and is sometimes referred to as resembling coconut matting with its rough, wiry texture. In dry weather, these fibre layers can make the turf prone to drought stress and shown symptoms of dry patch, particularly on featured areas; the fibre drying out and acting like a thatched roof. Mechanical aeration and treatment with a proprietary non-ionic wetting agent can be employed to overcome the symptoms by aiding water penetration.

PROBLEM	CURE
Grass Composition Annual meadow grass overwatered and overfertilised promotes rapid accumulation of thatch. Thatch in turn promotes shallow rooted species, hence more thatch – the problem feeds upon itself!	**Grass Composition** Improve grass composition by sound management practices to promote bent and fescue species.
Thatch Restricts root penetration, therefore less drought tolerant. Pitchmarks, soft in winter, surface moisture encourages moss.	**Thatch** Removal of existing thatch by hollow tine aeration. Encourage natural thatch breakdown by getting air into the surface by regular aerating. Prevention of further accumulation by verticutting, etc. and again by sound maintenance.
Compaction Restricts water movement, promotes shallow rooting and annual meadow grass, generally poor growing conditions.	**Compaction** Relief of compaction by slit/solid tine; Vertidrain, Twose Vibrating mole plough, compressed air.

Spongy Thatch (Thatch)

Thatch is used to describe the yellow/brown, foul smelling, moisture retentive material producing anaerobic conditions often associated with wet, compacted, poorly drained soil and waterlogged throughout most of the year. *Poa annua* invariably predominates the sward, since this species survives better under these conditions than the finer grasses, but questions still arise as to whether *Poa annua* causes thatch or whether thatch is encouraged by *Poa annua*.

Leaf growth is most productive in the spring and early autumn (less so in mid-summer) while root growth more so through late autumn and early winter, ie. when not very cold. The life-span of each leaf, root, rhizome is relatively short and a continuous cycle of tissue production and death takes place to perpetuate these perennial grass species. Natural decomposition of plant organic matter depends on environmental conditions and seasonal fluctuations, with thatch accumulation resulting from tissue production proceeding at a rate in excess of that for decomposition.

Whether turf thus develops thatch or not depends mainly on plant growth rate, the composition of the plant tissues, maybe the quantity and type of pesticide being used, as well as fertility, aeration, temperature and moisture in the thatch environment. Under intensively managed turf, scarification/verticutting also has a role in keeping thatch build-up under control.

Decomposition of plant material is carried out by soil micro-organisms, microfauna and macrofauna in succession; no one species seems to have all the necessary enzymes

required to break down the components of higher plants. Certainly, the sequence and interactions are complex and different from one habitat to another but is thought to be initiated by fungal activity, bacteria and nematodes feeding on the bacteria/fungi. A succession of micro-organisms is essential if total decomposition is to be achieved, each group feeding on the residues remaining from a previous groups' activities. More detailed research is required to determine closer relationships.

Micro-organisms require nitrogen to decompose organic matter, which is itself rich in carbon. A low C : N ratio (< 20 : 1) favours decomposition by micro-organisms. Unfortunately, nitrogen can be rapidly leached out of the thatch layer which allows the C : N ratio to become rather high. It has been shown that when frequent, moderate applications of fertiliser are applied, thatch decomposition can be accelerated, but if there are excessive fertility levels, turf production rates are increased but not decomposition rates. Therefore more organic matter (thatch) becomes deposited and nitrogen in the soil is not available to the micro-organisms in the thatch.

Where fibre is a problem, with a tough, hard, brown fibre layer in the turf, over-acidic conditions could be added to the situation – breakdown often being most rapid at about pH 6.0, the rate decreasing rapidly as acidity or alkalinity is dramatically increased. In rare cases it may be necessary to raise the pH level, but the side effects could prove disastrous, particularly on fine turf with increased annual meadow grass, worm and weed activity, with the possibility of take-all patch developing. Lime is therefore only recommended after careful consideration and *not* as a matter of routine.

Temperature, moisture and soil aeration all play a significant role in the thatch situation. Dry conditions may inhibit thatch breakdown and under prolonged dry weather the thatch can be difficult to re-wet, the surface actually repelling water. Excessive moisture and lack of air in the soil, either as a result of over-watering, heavy clay soil or compacted layers, produce the characteristic anaerobic, foul smelling,spongy thatch, which can often be reduced through better management practices or installation of a drainage system as required. All biological activities are temperature dependent, therefore increased thatch production is to some extent counteracted by increased microbial activity and temperature becomes less significant than aeration and moisture.

In practice, sound basic maintenance work can be geared to minimising thatch problems, for example minimis- ➡ 50

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THATCH

'Addition of a sandy top dressing dilutes thatch and increases its permeability'

49 ➡ ing the use of water and fertiliser to maintain grass growth but not force a lush sward. Scarification/verticutting also has an important part to play during the growing season to lightly flick through the turf, removing creeping growth and surface litter. A comb attachment for the mower is useful in this respect.

A more thorough verticutting treatment in early autumn, setting the blades to cut into the turf, can be beneficial, but may not resolve the problem alone. Hollow tine aeration in the autumn or spring is very helpful as this physically removes a small proportion of the unwanted fibrous material, which can be replaced with a more free-draining sandy top dressing – a type of soil exchange. It must, however, be appreciated that hollow tining using 12mm diameter tines at 50mm centres removes only 5% of the surface, which is a relatively small proportion and must therefore be continued over a number of years.

More recently, with the introduction of the Coremaster 12 fitted with quadra-tines, it may be possible with severe problems to hollow tine through the summer without undue surface disruption, this coupled with monthly top dressing. Hollow tining can also be used to relieve compaction or barriers near the surface, but for deeper seated drainage problems the use of sub-aerators such as the Verti-Drain or Twose Turf Conditioner is useful. Solid or slit tine aeration must also be carried out on a regular basis to relieve surface compaction and permit air into the soil to promote natural thatch breakdown and encourage deeper rooting.

The addition of a sandy top dressing dilutes thatch and increases its permeability, providing a more open texture which can be attacked by micro-organisms. Top dressing with a sandy soil is also believed to prolong the available nitrogen supply to the thatch layer, which in turn promotes more decomposition. The objectives are to intersperse sandy top dressing with the thatch to keep it open and promote natural breakdown – not just to bury it. Aeration through the winter helps with the 'mixing process', as well as promoting air circulation.

Where the thatch layer exists for several centimetres, such as on an old golf green, it may be possible to cut the turf thinly; cut and discard the layer of thatch, rake up the turf bed and replace the turf or, indeed, remove the turf and thatch in one go and either seed or turf. A drastic measure perhaps, but not to be discounted in extreme circumstances. It should be realised, however, that unless the cause of the thatch is eliminated the thatch will merely tend to accumulate once again after the turf has been replaced. Conventional maintenance should be stepped up before such measures are considered.

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