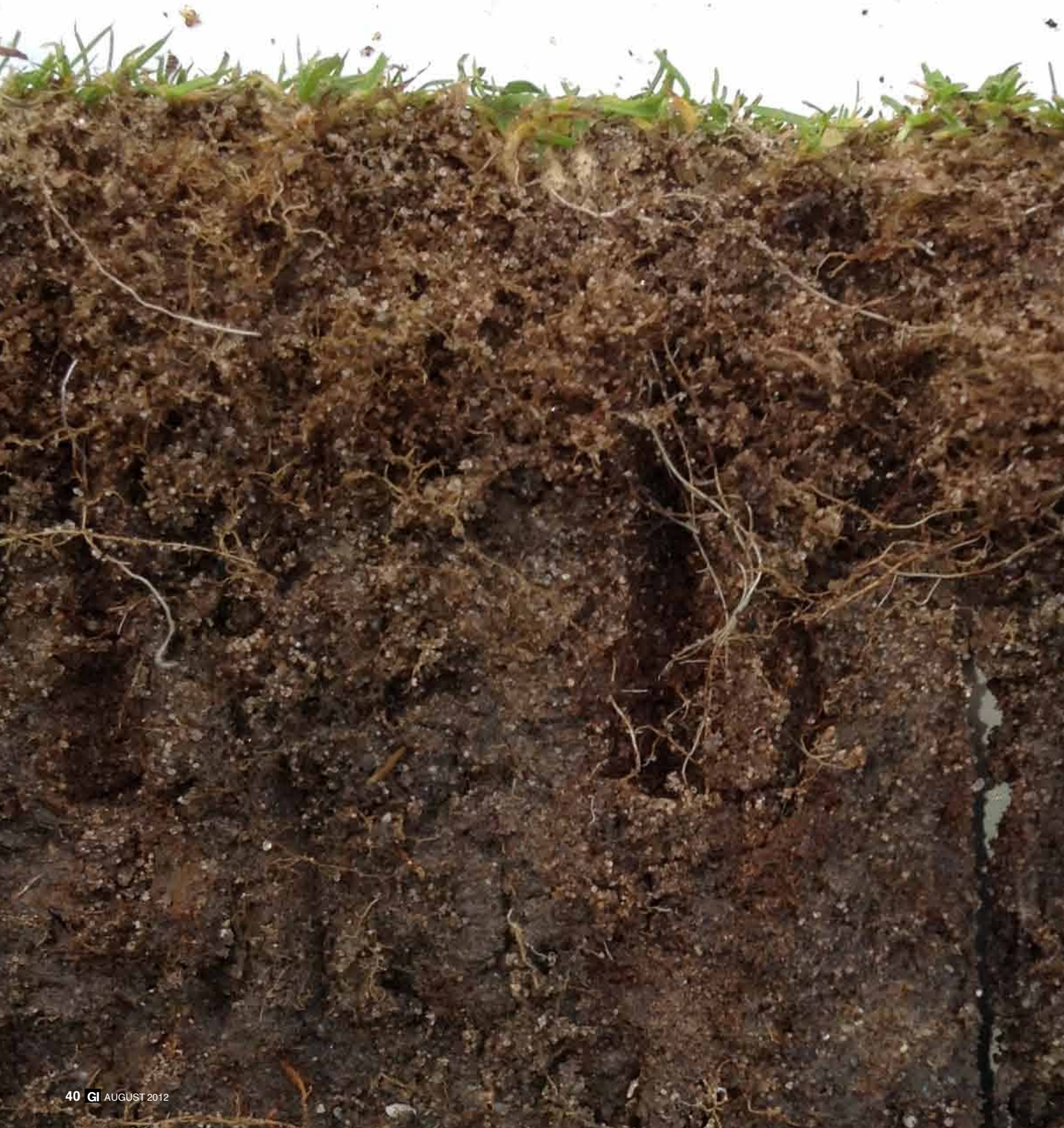
What is thatch?

This month, GI offers a beginner's guide to thatch, for those relatively new to greenkeeping. Thatch is all a question of balance, writes Dr Terry Mabbett. A more advanced look at thatch, is featured on pages 44-45



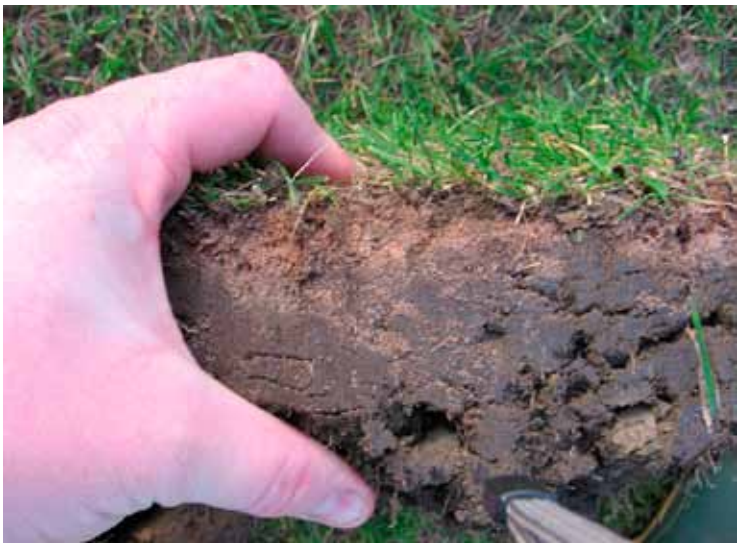
Thatch is the layer of intermingled and entwined dead and dying grass stems, leaves and roots which accumulates naturally in between the actively growing turf grass plants and the soil beneath. Thatch is a perfectly natural, normal and important part of a sports turf sward but like all things in life and nature it's all a question of balance.

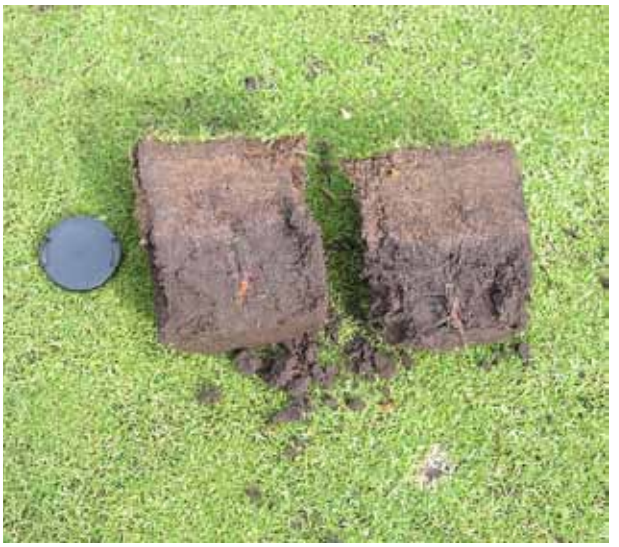
An appropriately thin layer of thatch creates a safe cushiony surface for sports or playgrounds, while protecting both turf and soil from traffic that can damage grass stems and leaves and compact the soil. Moreover it can insulate turf from rapid changes in soil temperature and moisture to protect against extremes and deliver more uniform growth. However, once thatch exceeds the optimum in depth and density all sorts of downsides will come into play and cause serious long term problems.

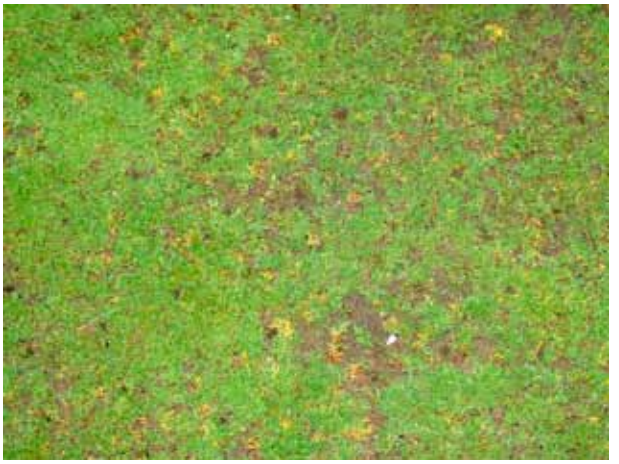
Effect of thatch on turf quality and resilience

Thatch has a marked effect on the quality of sports turf. A too thick thatch layer restricts air movement in the sward, and ability of water, nutrients and other applied materials to reach the grass root zone. Now unable to access oxygen and water and nutrients turf grass plants will readily root in the thatch itself to obtain these essential things for growth. Turf grass with roots restricted to the thatch layer becomes very susceptible and prone to drought stress and once it has dried out becomes very difficult to re-wet.

Even when the thatch stays moist other equally serious problems may arise. This dead layer of turf grass (and weed) material, is a natural reservoir for usually dormant fungi but when provided with the right conditions of temperature and humidity will 'step up to the plate' and become aggressive disease causing pathogens.







ABOVE TOP: Thatch development in soils close up
INSET ABOVE: Athracnose in action (*Images courtesy of STRI*)

Conditions inside thick moist thatch are ideal for the disease-causing activity of plant pathogens. If the temperature is right and humidity is high with grass plants in a weakened and stressed state, then this combination of conditions is ideal for fast fungal growth and infection of the grass plant to cause disease.

Microdochium nivale (Fusarium patch) and Colletotrichum graminicola (Anthracnose) are permanent features of the thatch layer, although they usually 'tick over' as saprophytes (fungi that live and feed on dead and decaying plant matter) or as weak parasites.

However, when presented with the right conditions they will suddenly become aggressive pathogens infecting grass leaves and spreading quickly to cause Fusarium patch and Anthracnose diseases, respectively.

The overall consequences of excess thatch is an unthrifty and unhealthy grass sward failing to respond to otherwise good turf management practice and vulnerable to long term damage from inclement weather (drought, surface water and frost), as well as infection by disease-causing fungal pathogens.

How thatch forms and accumulates

Failure of turf management practices are the major cause of excess accumulation of thatch. Adopting practices that reduce populations of decomposing organisms and, by the same token, selecting those that do is a recipe for excessive thatch. Key decomposers in the soil under turf are invertebrates like earthworms and microorganisms including both friendly fungi and bacteria.

Ideally rates of thatch formation and destruction are comparable and only when the former becomes faster than the latter do problems set in. Research shows how both earthworm and microorganism activities play a vital role in preventing excess thatch accumulation. Good aeration, a soil pH around 6.5 (very slightly acid) and adequate moisture favour the build-up and activity of these beneficial soil animals and microbes.

Problems with thatch are more frequent and acute in compacted soils and those with a clear acidic pH simply because 'decomposers' and especially microorganisms cannot flourish under such conditions. Poorly balanced fertiliser regimes and the indiscriminate use of fungicides and insecticides are two key factors which can impact negatively and heavily on soil animals and microbes with thatch decomposing capacities.

For instance fertiliser applications skewed too heavily towards nitrogen (nitrate and ammonia) promote not only the development of lush green grass growth but also insect pests and disease that take advantage of this abundant food supply. As the new lush growth is devoured by insects and infected by fungi it becomes dead and dying grass debris adding to the layer of thatch.

Many turf grass pathogens like ***Microdochium nivale (Fusarium patch) and Colletotrichum (anthracnose)*** have a quiescent or passive stage where they tick over on thatch as saprophytes and graduating into strong and aggressive parasites (feed on living tissue) when conditions are right. Simply put the thicker the thatch layer then the bigger and better the substrate to support these potential pathogens.

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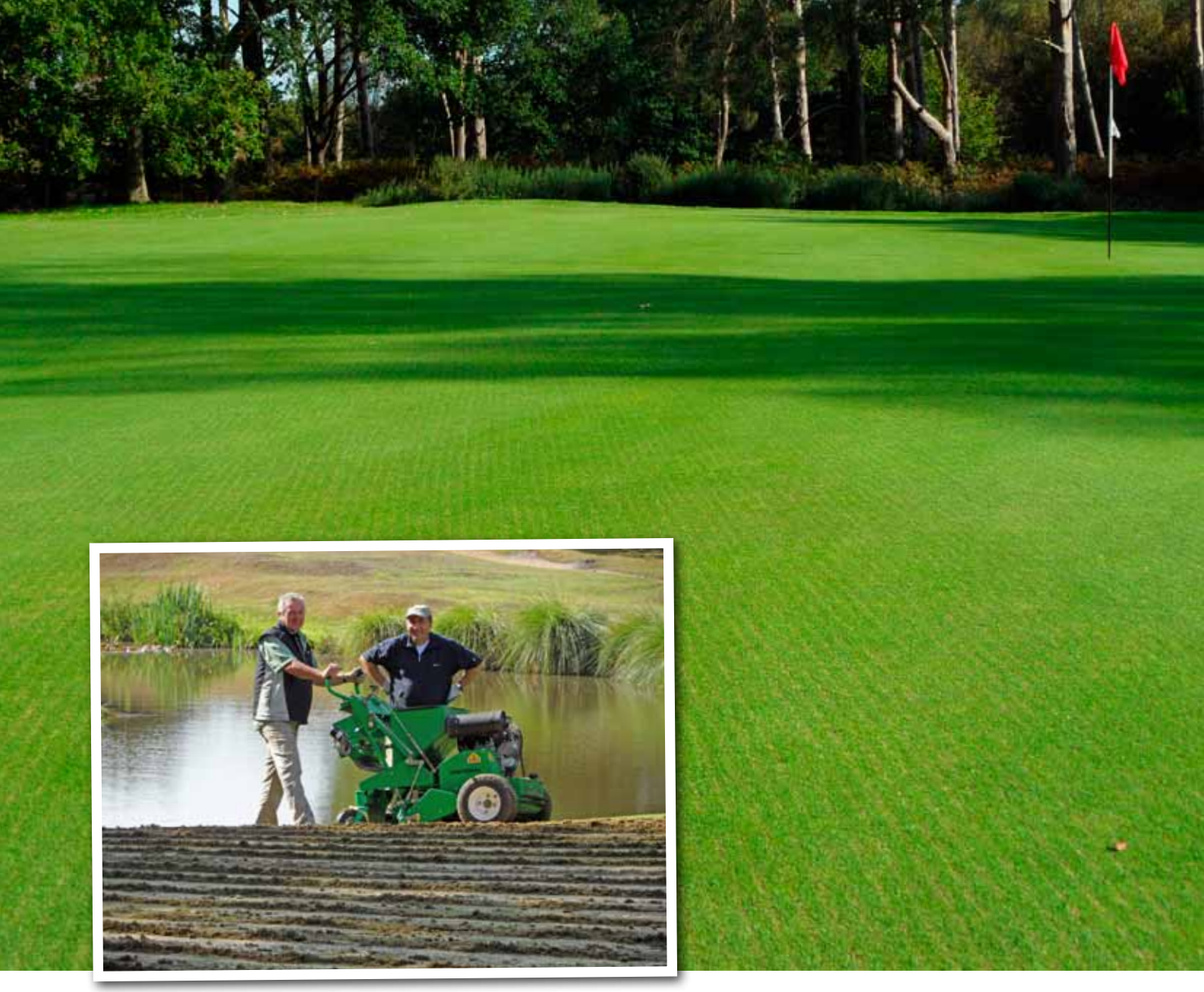
Generally speaking failure to remove grass clippings during mowing will encourage the build-up of thatch especially if the clippings are long. Leaving very short clippings on the turf is less of a problem, the argument being that any addition to the thatch layer by what is an ultra- fine biomass with a large surface area is essentially neutralised and compensated for by the promotion of thatch decomposing bacteria. They feed on the clippings to produce soluble nutrients which is a valuable natural resource fed back into the turf. Naturally fed turf is healthy and resilient turf and clearly requires less synthetic fertiliser and fewer applications of fungicide and insecticide.

Species and varieties of grass traditionally used in turf differ markedly in their capacity for thatch production. As a general rule of thumb, perennial creeping grass species spreading by rhizomes (underground stems) and stolons (stems spreading over the soil surface) are high thatch forming species. Smooth stalked meadow grass (Poa pratensis) and creeping red fescue (Festuca rubra) with



aggressive rhizomes, and creeping bentgrass (Agrostis stolonifera) which has stolons are all classic high thatch forming species.

Annual meadow grass (Poa annua) (in spite of its common name) is found in turf as biennial or even perennial biotypes spreading by stolons with accordingly high thatch accumulation. Other species such as perennial ryegrass (Lolium perenne) with 'bunch type' growth habits accumulate considerably less thatch.

How much is too much

The right depth of thatch is essentially a 'horses for courses' matter related to species and varieties of grass in the sward, soil growing conditions and the exact use to which the turf is being put. Some texts say up to one inch is okay but general consensus appears to be that anything much over one half inch of thatch, and even one quarter inch for turf on some cold and heavy soils, will start to create problems.

Poa pratensis and especially the aggressively growing and spreading varieties are reported to accumulate up to one fifth of an inch of thatch per year. This may not sound a lot, but when using the one half inch limit there is clearly not a lot of leeway to play with.

Proactive measures are clearly the best foundation for trouble free turf in this respect. Careful selection of turf grass species for the growing conditions presented and judicious use of fertilizer, irrigation, aeration and top dressing all help to minimise thatch accumulation.

Action in the form of de-thatching using dedicated machinery, such as a scarifier or hollow tiner, is something that will invariably be required sooner or later. General recommendations surrounding de-thatching are not to de-thatch when the turf is wet and not trying to remove all in one go.

Ideal time for de-thatching is spring or late summer/autumn and preferably the latter because weeds are more likely to invade a de-thatched area of turf in spring.

INSET LEFT ABOVE: Thatch removal and an overseed process carried out on a West Sussex green, and MAIN ABOVE: the same green 10 days after the work was done.

BELOW: The green immediately after thatch removal, overseeding and sweeping.

Pictures courtesy Kensett Sport

De-thatching is commonly part of a wider, integrated turf restoration and re-invigoration programme including top dressing, core aeration and over-seeding.