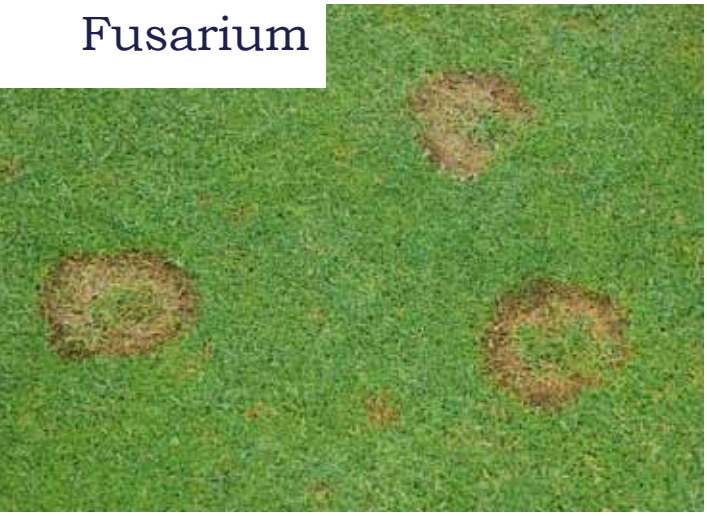
Turf diseases

When and where to look and how to identify them

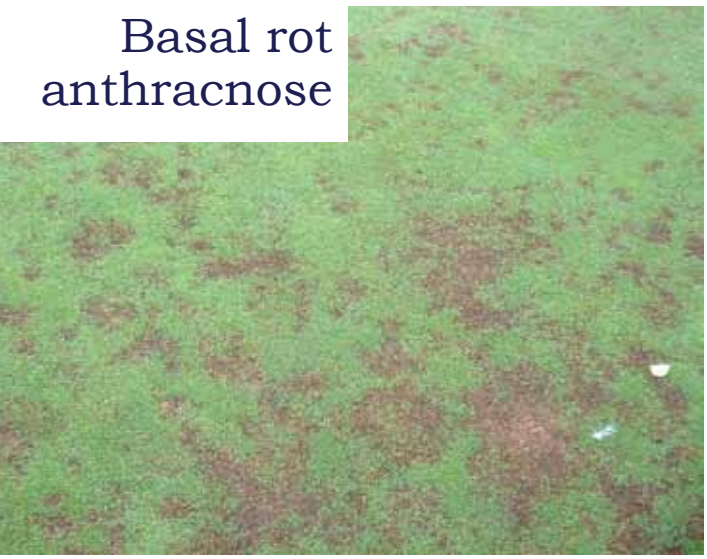
Dr Terry Mabbett looks at the **five most common turf diseases** in the UK and offers advice on how to identify, or more ideally avoid, them

Fusarium



ABOVE: Fusarium patch is still 'top dog disease' in UK turf (Picture www.greencast.co.uk)
RIGHT: Close up on a typical water soaked area of Fusarium patch disease (Picture Vitax)
BELOW: Aftermath damage caused by anthracnose infection and disease (Picture Headland Amenity)
INSET BELOW: Close up on basal rot anthracnose infecting older leaves at the crown (Picture Headland Amenity)

Basal rot anthracnose



Fine turf suffers from a surprisingly large number of different diseases given the limited number of grass species involved and the minimal amounts of grass, stem and leaf available for infection by plant pathogenic fungi.

The inherent nature of fine turf and the management practices required to maintain the close-cut condition as a professional playing surface is why fine turf is so susceptible to disease. By the same token it becomes difficult to distinguish between different turf diseases and non-disease symptoms on such tiny areas of stem and leaf.

A fuller appreciation of the factors which pre-dispose turf to disease can help turf managers spot problems early on by knowing when and where to look. Fungi responsible for turf disease are invariably present as saprophytes living on dead and decaying plant debris comprising the thatch at the base of the turf grass sward.

Thatch exists at varying depths and densities depending on turf grass species and the extent to which it is controlled. Thatch is a vital component within the turf grass sward imparting springiness for playability and player comfort but simultaneously harbouring disease, holding moisture and generating humidity to provide ideal conditions for infection.

By nature fine sports turf suffers wear and tear and,, therefore, stress from acute and chronic damage during normal every-day use. Laceration, bruising and soil compaction all contribute to increased disease susceptibility. For instance, anthracnose (Colletotrichum cereale) often starts as a discrete spot of diseased grass where the fungus has invaded leaves and is left bruised when golf balls land on the green.

Mowing to maintain turf grass at optimum heights for premium playability, according to species composition, function (green, tee, fairway) and the time of year, is the core of turf management. But the very act of mowing opens up the sward to fungal entry via the cut surfaces of grass stems and leaf blades at which oozing drops of nutrient-rich sap provide ideal infection sites.

Microdochium nivale the causal fungal pathogen of Fusarium patch uses these easy points of entry especially when mower blades are incorrectly set leaving jagged rather than clean-cut ends. Mowing of heavily infected turf can spread Microdochium inoculum (spores and mycelium) across the turf especially if wet with resulting infection patterns corresponding to wheel movements.

Cutting turf injures grass plants a regular basis and removes any fungicide that was on or inside the clippings. Mowing also takes away nutrients that were inside the severed leaf ends. Need to replenish nutrients lost in this way is one key reason why sports turf requires a continuous balanced programme of nutrition.

Plant nutrition and disease are closely related and turf grass is no exception. Plant health and resilience to disease is essentially a question of year-round continuity in nutrient balance. Simply unzipping the fertiliser bag in spring and autumn may simply accentuate any imbalance and aggravate thatch residing fungi like Microdo-

Red thread disease

Dollar spot

chium nivale and Colletotrichum cereale into action.

Fine turf on the golf course is clearly exposed and pre-disposed to disease. Due thought and consideration given to these facts about fine turf should help turf mangers on the look-out for diseases. Knowing when and where to look is just as important as deciding what pathogen is responsible by allowing early identification and, therefore, timely action.

Fusarium Patch

Fusarium patch is still the 'top dog' disease of fine turf in the United Kingdom. Over 90 per cent of greenkeepers are reckoned to encounter F usarium patch during any one year. Eighty per cent of all fungicide applications are targeted at Fusarium irrespective of the disease range quoted on the fungicide product label.

Fusarium patch can appear at any time. Prime times are spring and autumn when grass growth dynamics and environmental conditions are most conducive to infection, disease development and spread, and especially autumn when turf recovering from stress inflicted by summer-season traffic adds yet another dimension to overall disease susceptibility. Over-enthusiastic application of nitrogen based fertilizer is another factor making spring and autumn prime times for Fusarium.

The disease typically appears as orange-brown water-soaked patches some 2.5 to 5.0cm wide. Under ideal conditions including prolonged high humidity and surface wetness, and failing prompt remedial action (application fungicide with some curative action), these can quickly coalesce to cover large areas of turf.

Poa annua (annual meadow grass) is the most susceptible species followed by bent grasses (Agrostis). Others including fescues are susceptible, especially under snow cover or just after snow has melted when the pathogen is most active and therefore less discerning of turf grass species. Differing species susceptibility to Fusarium Patch is largely down to thatch with Poa annua and Agrostis classed as moderate to high thatch-forming grasses.

Golf courses receiving substantial snow cover in most years may find this the worst time for Fusarium. Symptoms are more specific and characteristic with obvious orange-brown rings surrounding a pale straw coloured central area with a distinct pink tinge, hence the alternative common name of 'Pink Snow Mould' for infections occurring at this time.

Some key pre-disposing factors for Fusarium are:

• Deep dense thatch with high water holding capacity and humid microclimate.

ABOVE LEFT: Red thread disease
Red needles (strands or threads) attached to grass leaves and a sure sign of red thread disease caused by the fungus Laetisaria fuciformis (Picture Bayer Environmental Science)

ABOVE RIGHT: Dollar spot
Straw coloured patches of dollar spot disease *(Picture Bayer Environmental Science)*

BELOW: Fairy rings
MAIN BELOW: Type 1 fairy rings showing a ring of killed grass *(Picture Bayer Environmental Science)*
INSET BELOW: Type 2 fairy rings and a circle of grass showing stimulated growth *(Picture www.greencast.co.uk)*

• Excess nitrogen available during mild and moist autumn conditions generating lush grass growth and high pathogen activity

• Periods of prolonged high humidity and/or surface wetness and impeded drainage

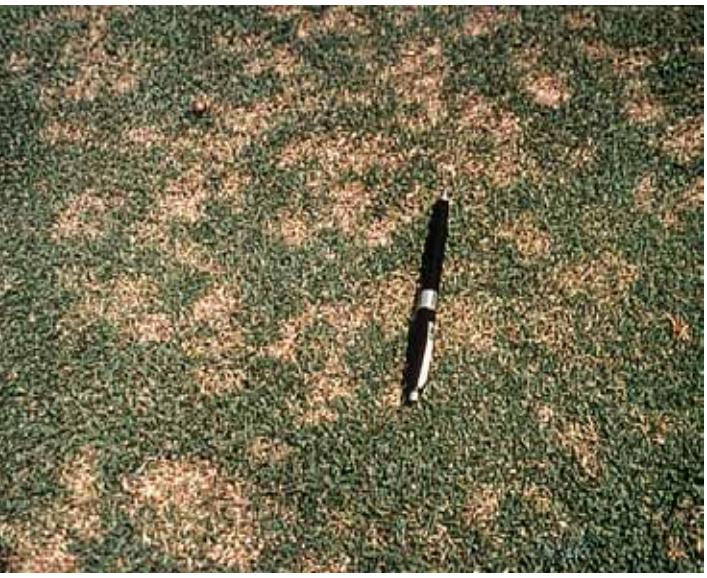
• Incorrectly set mower blades which tear rather than cut the grass.

Anthracnose

Basal (crown) rot of annual meadow grass appearing during a late autumn window was the only type of anthracnose that UK greenkeepers traditionally had to contend with. More recently the Colletotrichum cereale pathogen has stepped up a gear, starting earlier in the year and extending its disease activity into a broader range of turf grass species.

In addition to basal rot anthracnose UK greenkeepers now face 'foliar blight' first appearing as

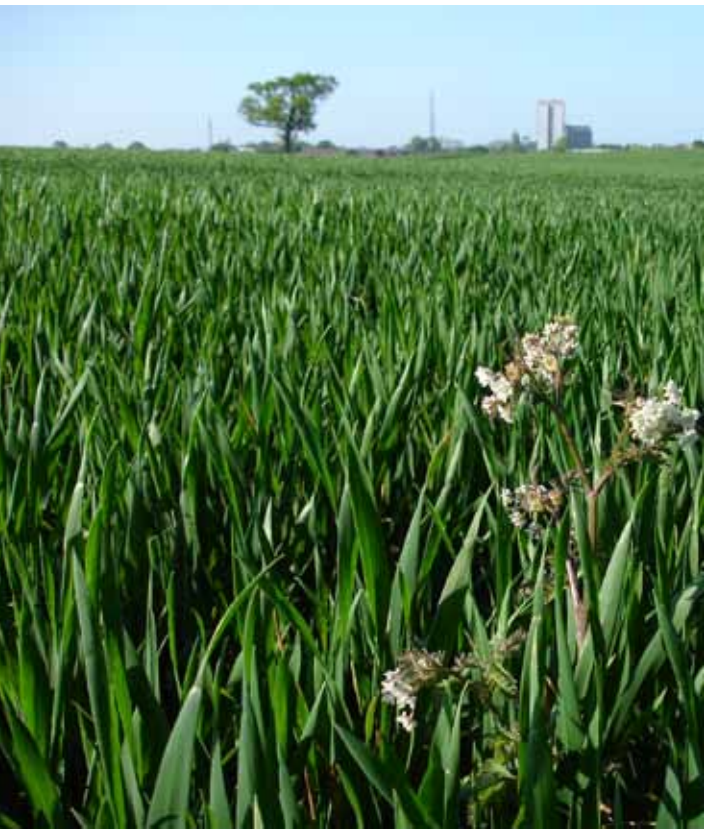
Fairy rings



ABOVE: Dollar spot Straw coloured patches of dollar spot disease *(Picture Bayer Environmental Science)*

LEFT: Red needles (strands or threads) attached to grass leaves and a sure sign of red thread disease caused by the fungus Laetisaria fuciformis *(Picture Bayer Environmental Science)*

BELOW: Identifying diseases on agricultural crops like wheat, which is essentially a grass allowed to grow and develop fully, is a whole lot easier than dealing with diseases on turf grass *(Pictures Dr Terry Mabbett)*



early as July at the height of the summer season. This new dimension has elevated anthracnose into the second most important disease after Fusarium on UK turf.

The 'seeds' of basal rot anthracnose are sown in summer on deep thatched turf stressed out from seasonal wear and tear on compacted soil, but symptoms of disease do not appear until autumn. Cool moist October weather encourages the anthracnose fungus out of its saprophytic existence on thatch to infect living Poa annua plants refreshed by rain and flushed with fertiliser.

Basal rot on Poa annua begins with infection of the older leaves on the crown. They go yellow and then orange/red to produce water soaked bases on the infected grass tillers which become easy to pull out. Later formation of dark spore-containing structures appear as black stained areas at the base of the plant which is why the disease is called 'anthracnose' (means like coal).

Poa annua is the only species acutely susceptible to basal rot so greenkeepers with a high proportion of annual meadow grass on greens should be on 'autumn watch' for anthracnose especially if 'starving out' of Poa annua is part of an on-going management programme.

Compacted summer swards with too deep and dense thatch are similarly the source and origin of anthracnose foliar blight. Only difference being is that foliar blight develops straightaway. The disease is triggered by summer rainfall and irrigation water impeded by thatch and dry water-repellent soil and therefore unable to percolate through to the root zone. As a result the water remains on the surface and gets soaked up by thatch to create high humidity and ideal conditions for fungal infection and development of foliar blight.

Turf patches blighted by this form of anthracnose are yellow at first and then bronze with affected grass becoming dull and darkened in appearance as spore-bearing structures mature. Subsequent transfer of disease to previously healthy areas is by spores spread by rain splashes, wind, on wheels and footwear. Annual meadow grass and creeping bents are prime targets with smooth-stalked meadow grass (Poa pratensis) and creeping red fescue (Festuca rubra) significantly affected.

Anthracnose is a self-perpetuating turf disease. Tillers and plants killed by basal rot and leaves destroyed by foliar blight add to and stoke up thatch thereby offering even more opportunities for Colletotrichum cereale as a saprophyte. Factors pre-disposing turf to anthracnose attack are similar to those for Fusarium

Dollar spot

Fusarium patch and anthracnose are first and second in UK turf disease rankings but most smart money is on dollar spot to become disease of the future. This view is based on experience from North America and Sclerotinia homoeocarpa being a warm season pathogen, cropping up in mid to late summer and lasting through to early autumn when soil fertility and turf vitality is at lowest ebb.

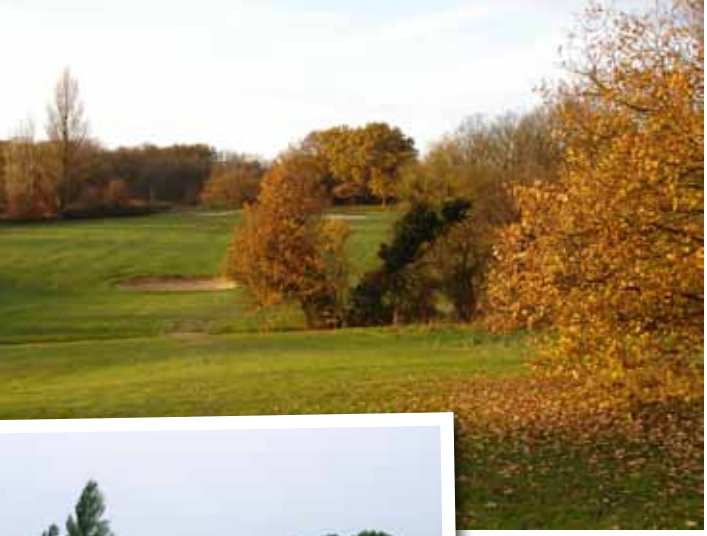
If widely predicted UK climate change materialises, with earlier springs, warmer steamier summers and extended autumns, this fungal pathogen will be presented with more favourable environmental conditions and turf grass swards with reduced vitality and rootzone fertility. Sclerotinia homoeocarpa, like the pathogens responsible for Fusarium patch and anthracnose, 'hides away and hitches a ride on thatch' but this pathogen prefers 'low nitrogen' soils and swards.

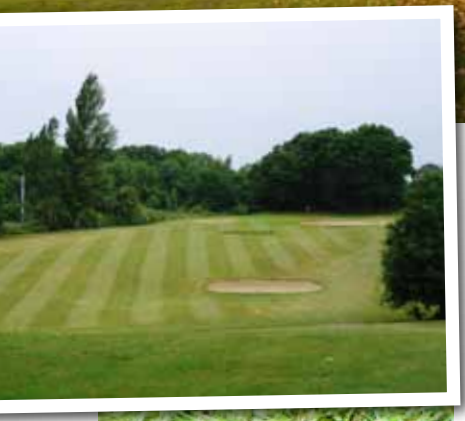
Dollar spot appears as small tan coloured spots usually the size of a 1 US dollar coin, round and rarely larger than 7.5cm wide. Dollar spot most often affects fescues although additionally attacks bent grasses and annual meadow grass.

Red thread

Red thread is fast becoming the 'Cinderella' turf disease being dwarfed by Fusarium and anthracnose and overlooked by current interest in dollar spot. However, red thread is widely spread amongst turf grass species including fine leaf fescues, especially red fescue (Festuca rubra), and perennial Ryegrass (Lolium perenne). Like dollar spot, red thread is a warm season disease appearing in summer and extending with ease through autumn and often into mild winters. Like dollar spot red thread thrives on nitrogen deficient turf.

Red thread is one of the easier diseases to recognise due to its distinct pink to reddish hues and colourations expressed in the foliar symptoms as the common name suggests. Overall symptoms appear as ill-defined patches of bleached grass with closer inspection revealing pink mycelium visible under





ABOVE/LEFT: The seeds of diseases like basal rot anthracnose and Fusarium patch are sown in summer stressed turf (left) but the diseases do not show up in intensity until the grass greens up (above) during cool moist autumn conditions *(Pictures Dr Terry Mabbett)*

LEFT: Most mainstream turf pathogens lurk in the thatch at the base of the turf grass sward in a saprophytic mode of existence *(Picture Dr Terry Mabbett)*

BELOW: Identifying diseases on agricultural crops like wheat, which is essentially a grass allowed to grow and develop fully, is a whole lot easier than dealing with diseases on turf grass *(Pictures Dr Terry Mabbett)*

morning dew cover. Extending from the tips of leaf blades is red-needle or strand-like structures that become brittle and break on drying to spread red thread into new areas.

But nothing is as simple as first seems. What is commonly called red thread is a disease complex involving two distinct fungal pathogens but quite easily distinguished in situ using a hand lens or magnifying glass. Laetisaria fuciformis is responsible for the 'red needles' (threads) extending from the leaf blades and Limonomyces roseipellis is characterised by pink tinged gelatinous mycelium and cottony 'candy tufts' of spores visible under early morning dew cover and more correctly called 'Pink Patch'. The two pathogens require similar conditions and are often found together.

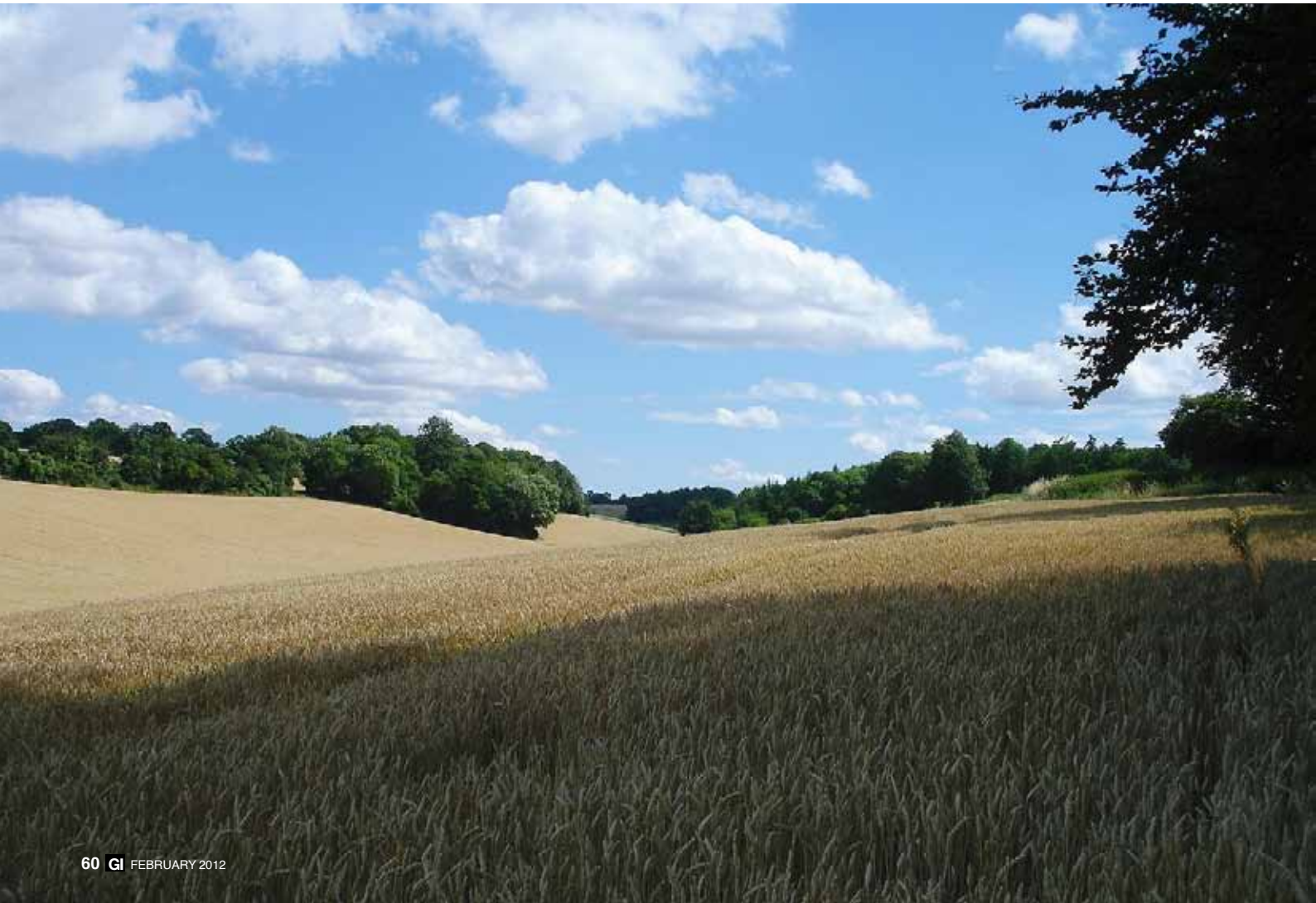
Fairy rings

Fairy rings are mired in mystery and mystique both in folklore and science. Unlike the classic foregoing foliar diseases fairy rings have an indirect and incidental effect on turf. What's more there are three distinct types generally designated Type 1, 2 and 3.

Fairy rings 'disease' is caused by Basidiomycete fungi in the rootzone restricting the availability of water and nutrients. That said fairy rings downgrade turf through disfiguring symptoms and spore bearing structures (toadstools or puffballs) appearing in circles just as the name implies.

Type 1 – recognised by a circle of dead or dying grass inside a larger band of dark-coloured grass and due to toxins produced by Marasmius oreades in the rootzone. Damage to grass is aggravated by a thick layer of waxy fungal mycelium inside the rootzone of the affected turf that prevents sufficient water from above percolating down to the roots. Net result is complete death of the affected ring of grass and eventual appearance of reddish tan to buff coloured toadstools or 'caps' arranged in ring.

Type 2 – characterised by a ring of visibly stimulated grass growth in which toadstools may appear at particular times of the year. Not as damaging as Type 1 since it does not kill the grass but still leaving disfiguring scars on close mown turf. Type 2 is particularly prominent and damaging during long hot summers when the dark bands or 'ribbons' of stimulated grass stand out within turf that otherwise lacks



colour. Type 2 fairy rings are generally caused by Lycoperdon fungi producing physiologically active chemicals that stimulate grass growth.

Type 3 – most easily recognised by the prominent circle of standalone toadstools or puffballs with no visible effect on the associated ring of grass, either through toxins killing plants (Type 1) or chemicals stimulating grass growth (Type 2). Type 3 is caused by different fungi including Hygrophorus and is the easiest type of fairy rings to live with, being temporarily removed during mowing.

No easy task

Experienced greenkeepers can instinctively recognise and identify the main diseases of turf, just like my first GP could do with childhood diseases. Already in his seventies and practicing since the turn of twentieth century he could stand at the bedroom door and tell a mother what disease her child was suffering from. Naturally he would examine the patient to confirm his initial diagnosis from a distance, just as a greenkeeper will get down 'on all fours' to inspect his turf and consult his local agronomist if unsure.

The situation for younger and less experienced greenkeepers is altogether different. Dealing with diseases in fine sports turf is much more difficult than crops in agriculture. The farmer inspecting wheat, which is essentially a grass allowed to grow naturally and completely, is looking at a sufficiently large leaf area that allows him/her to observe discrete and easily identifiable disease symptoms.

The greenkeeper does not have that luxury being essentially reduced to looking at fine turf in its entirety for spots or patches of discoloured and dying grass. That is why guideline descriptions for turf disease are generally reduced to simple statements like 'round straw coloured patches'. That one straw coloured patch, whether caused by a fungus or associated with parasitic nematodes, is very much like another is clearly cause for confusion and misidentification. Insect pest damage and even spilt mower fuel can add to the confusion. What's more wear and tear during play and unauthorised traffic, which may include the public with dogs delivering toxic urine and even foxes, can further complicate an already confusing situation with additional 'straw coloured patches'.

Of course there is always the local distributor at hand to offer an expert opinion and only too pleased to provide something in a bottle to solve the problem. If in doubt always ask for a second opinion but I would additionally invest in a microscope and some basic knowledge of microscope slide preparation and fungus staining techniques. With this facility at his/her fingertips the greenkeeper is now inside an altogether different disease dimension, able to observe for himself/herself mycelium, spores and spore bearing structures that he/she otherwise only reads about.

From then on identification with the help of a sound text book on turf pathogens and diseases is not rocket science. Given the quality of contemporary turf management courses and teaching I would be surprised if most young and academically qualified greenkeepers have not already been introduced to these basic techniques in plant pathology. They allow greenkeepers to be more resourceful and not totally reliant on the turf 'medicine man'.

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