Focus on Fusarium

the foremost disease of UK turf

Dr Terry Mabbett takes an in-depth look at the most prolific turf disease in the country.

At first sight turf appears to suffer from surprisingly severe foliar disease given the relatively small proportion of grass shoot and leaf displayed on frequently cut and well-managed swards.

However, with wider and deeper consideration it is easy to see why a perennial ecosystem perpetually wounded by mowing, stressed in summer from drought and heavy traffic then flushed with fertiliser under moist misty autumn conditions is susceptible to fungal infection and disease spread.

Fungal pathogens are present year round in thatch and spread by traffic and turf machinery, to gain easy entry through cut leaf surfaces and develop more rapidly on physiologically under-par turf grass.

Sports turf in the United Kingdom suffers from around a dozen different foliar diseases but one stands head and shoulders above the rest in spread, severity, damage and cost of control. Surveys show how over 90% of all UK greenkeepers expect to deal with Fusarium patch disease in any one calendar year.

Fusarium is a fast moving disease and once established can only be eradicated by the use of fast-acting curative fungicides.

However, there is still a lot the greenkeeper and groundsman can do to minimise infection and reduce the rate spread and damage caused should Fusarium patch disease appear.

Success lies in deep knowledge of the pathogen and the disease and by establishing through the seasons and over the years those management practices which minimise infection and subsequent spread and development.

Fusarium on an occasional basis and one fifth of local authority pitches where disease monitoring is generally less, and more than half of all professional football pitches are affected by Fusarium patch disease in any one calendar year.

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More than half of all professional football pitches are affected by Fusarium on an occasional basis and one fifth of local authority pitches where disease monitoring is generally less.

As much as 80% of all fungicide applications to UK sports turf are targeted at Fusarium although other diseases are managed at the same time especially by broad-spectrum fungicides.

That said, new products released onto the market have Fusarium at the top of the fungicide label’s target list even though a wider range of diseases will invariably fall within the activity spectrum.

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Microdochium nivale

Pink snow mould is still appropriate because symptoms may appear as straw coloured patches which are sometimes found in cross walls and width x length dimensions of 2.5-5.0 x 1-3.0 microns [$\mu$m], 1 micron [$\mu$m] is one thousandth of a millimetre.

Survival in thatch and subsequent spread

Microdochium nivale has no trouble in surviving unfavourable conditions, including hot dry summers, because it ‘rests up’ on grass debris provided by thatch.

When conditions become favourable the pathogen infects the leaves of living grass plants through fungal hyphae growing up from the thatch or via germinating conidia.

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Factors pre-disposing to Fusarium Patch

Pre-disposing factors related to climate, weather, soil conditions and management practice provide ideal conditions for infection by M. nivale and its subsequent development and spread. They include:

- Humid atmosphere, shade and surface wetness especially when accompanied by cool temperature conditions.
- Inadequate circulation of air above the grass award.
- Rapid, forced, soft and succulent growth especially in autumn from late application of fertiliser especially nitrogen.
- Soil pH in the neutral to alkaline range (pH 7+) and inappropriate use of lime that raises pH to alkaline levels.
- Oversubstantial use of fertiliser especially if poorly balanced.
- Damaged turf grass due to high wearing and surface wetness especially when accompanied by cool temperature conditions.

Fusarium Patch, while high availability of water is indicative of wet turf and higher risk of Fusarium patch.

Under suitable conditions small sized reddish brown spots may start to appear on low cut turf. Ring-like patches may appear on lawns cut turf. As disease spreads along and around the green on wheeled equipment (mowers, spreaders and sprayers) on boots and the feet of animals.

Poor drainage favours Fusarium Patch disease.

Huge numbers of conidia produced at this time are readily and rapidly spread along and around the green on wheeled equipment (mowers, spreaders and sprayers) on boots and the feet of animals.

The pathogen sheds down and becomes inactive during periods of warmth sunny weather which cause the grass canopy to dry out.

Slow growing turf with deep thatch provides the ideal substrate for M. nivale. Such situations exist during cool wet conditions (32 to 46 °F (8 – 8°C)) and when turf grass is covered with snow.

Specific conditions that encourage spread of the fungus include: drizzle, fog, frost occurring night after night and alternating thawing and snow cover.

Poor drainage favours Fusarium Patch as does long uncut grass leaves becoming matted down to create a humid microclimate within the canopy.

Which turf grass?

Most cool climate turf grass species are susceptible to Fusarium Patch disease although there are some marked differences which can be exploited.

Annual meadow grass (Poa annua) is particularly susceptible to Fusarium especially in the autumn when cool and moist environmental conditions bearing down on summer-stressed turf are ideal for disease development.

Poa annua is not a resilient grass, being highly susceptible to heat stress and drought stress and prone to cold injury, all of which clearly contribute to high disease susceptibility through autumn and into winter.

Agrostis species including Agron 83 (creeping bentgrass) are very susceptible to Fusarium Patch. Brownrou bent (Agrostis stolonifera ‘Highland’) is more prone than cultivars of Agrostis capillaris. Lolium perenne (perennial rye grass). Poa annua (smooth stalked meadow grass) and Festuca species are somewhat less susceptible.

They have a low to medium thatching tendency compared with Poa annua and Agrostis species which is medium to high.

There appears to be a positive correlation between high thatching tendency and frequency of bilar disease including Fusarium Patch. High nitrogen availability which generates soft succulent growth increases turf susceptibility to Fusarium Patch, while high available soil potassium has the reverse effect.

Factors pre-disposing to Fusarium Patch

Pre-disposing factors related to
Microdochium nivale

Fusarium patch is caused by a fungus now called Microdochium nivale after mycologists changed the name from Fusarium nivale some years ago. The disease is additionally called pink snow mould because symptoms may appear as a pink or white mycelium (mould) on grasses and turf patches. Some other fungi such as Fusarium alternaria and Fusarium avenaceum sometimes cause similar problems. The disease occurs more in some areas than others, and even in the same area from year to year. It remains one of the most problematic turf grass diseases.

Symptoms of Fusarium patch

General descriptions of plant disease are largely subjective and in the eye of the beholder and that documented for Fusarium Patch is no exception.

General consensus has Fusarium patch disease as circular patches on the turf, first appearing as water-soaked spots less than two inches (5 cm) in width, then quickly changing its colour from orange brown to dark reddish brown and eventually to tan or straw colouration. When conditions become favourable the pathogen infects the leaves of living grass plants through fungal hyphae growing up from the thatch or via germinating conidia.

The disease may grow and spread slowly at first with some weeks passing before detection, but under wet and overcast conditions and within a wide range of temperature (freezing point to 60°F [16°C]) will start to spread rapidly. Huge numbers of conidia produced at this time are ready and rapidly spread along and around the grass, and from wheels of equipment, mowers, spreaders and sprayers on and under the feet of animals.

The pathogen slows down and becomes inactive during periods of warm sunny weather which cause the grass to dry out.

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Specific conditions that encourage spread of the fungus include drizzle, fog, frost occurring night after night and alternating thawing and snow cover.

Poor drainage favours Fusarium Patch development especially in autumn from late application of fertiliser especially nitrogen.

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wear or irregular cutting which may cause ‘shaving’, too low cuts resulting in ‘scalping’ and insufficiently sharp blades that tear rather than cut and therefore cause leaves to have cut jagged edges which are more prone to infection.

Best practice

Many good management practices minimise opportunities for M. nivale to infect grass plants and spread and spread across the turf. Examples of good practice are:

- Remove early morning dew and other surface water by sweeping or washing and improve air circulation above the sward by good pruning and management of adjacent hedges and overhanging trees. Maintain good air circulation within the turf and ground by regular aeration. Minimise shade where shade is unavoidable (reduce) fertiliser levels accordingly.

- Maintain thatch at optimum height and density for the particular sports surface situation. Box off and remove grass clippings and do not smother turf when applying top dressing by making sure it is well worked into the turf.

- Establish a regular programme of mowing with correctly set and adjusted blades for height of cut and self-sharpening.

- Appraise seed mixtures and turf composition for maximum resistance to Fusarium patch disease and minimise annual meadow grass content.

- Maintain surface acidity using applications of sulphate of iron to toughen and green up grass for autumn and winter and to additionally deter cast iron earthworms and control moss.

- Take care to balance soil fertility and increase the proportion of potassium relative to nitrogen when going into high risk autumn situations.

- Apply nitrogen early enough in the late summer/early autumn period so that grass can harden off sufficiently before winter.

- Do not allow grass to go into winter too high and ensure drainage is adequate.

Fall back on fungicides

The foregoing management practices may not completely avoid Fusarium patch but will decrease incidence and severity should it appear.

Fungicides are required to completely eradicate Fusarium patch but adherence to best management practice should reduce the required frequency and intensity of use.

There is a bewildering range of fungicides for Fusarium control carrying increasingly sophisticated claims by manufacturers on activity and action. However, there are several salient points greenkeepers can use as markers to assess whether a fungicide product will deliver.

Fungicides are essentially protective or curative in action. Protective fungicides remain on the leaf surface and protect the grass plant against infection and as such deposits must be on the leaf surface before infection is attempted by the pathogens.

Curative fungicides can move into the grass plant to eradicate established infections. Fungicides may enter the plant through the leaves, the roots or both, and move around the entire plant in which case they are said to be truly systemic.

Some which do not move out of the leaf they pass into are termed trans-laminar. Curative fungicides may also deliver significant protection depending on how long they remain on the leaf surface before moving into the plant.

Protectant fungicides and systemic fungicides that only enter the leaves are essentially lost once they drip off (or are washed off) the leaves and into the soil. Those which can additionally enter via the roots may be taken up and used to good effect.

There may be a grey area for some essentially protectant fungicides that migrate a short distance into the leaf and therefore provide some marginal curative action.

Products which contain two or more different active fungicides may deliver protectant and curative action depending on the nature of the individual active fungicides they contain.

Greenkeepers (and groundsmen) are in a unique situation with regard to fungicide application and foliar disease control.

Every time turf is mowed grass plants are ‘wounded’ thus facilitating easy pathogen entry through the leaves are essentially protectant fungicides remain on the leaf surface and protect the grass plant against infection and as such deposits must be on the leaf surface before infection is attempted by the pathogens.

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