

# RESEARCH UPDATE...

**Fusarium patch disease, caused by the fungus *Microdochium nivale* (previously *Fusarium nivale*) was first recorded on golf greens in 1931. Mr F T Bennett, recognised as a pioneer researcher on turf diseases, reported the disease as being the commonest, most disfiguring and damaging disease of turf known at that time. More than fifty years later, despite the development of effective fungicides, this statement is still true today. This article details the cultural and environmental conditions that favour fusarium patch and pink snow mould (also caused by *M.nivale*). For both diseases the most effective prevention and control methods available are described.**

AS the cold, wet winter months are now with us, many greenkeepers, during the inspection of greens under their charge, will have seen the all-too-familiar symptoms of fusarium patch disease.

If effective control measures are not deployed, under favourable conditions fusarium patch will spread and may cause significant damage.

Indeed, fusarium patch may scar the surface to such an extent that an uneven putting surface is produced with deleterious effects on the visual attractiveness and playing quality of the green. Pink snow mould can be very destructive under prolonged snow cover, as experienced in more northerly regions.

The ability to recognise the early signs of fusarium patch and pink snow mould is essential, as is a knowledge of the environmental conditions that favour these diseases and measures that should be taken to control their growth.

Fusarium patch usually first appears as small (up to 5cm diameter) orange/brown water-soaked circular spots (Figure 1) which, under favourable conditions, may increase rapidly and coalesce together to form large circular patches. Correct diagnosis of these early signs is important as the best possible control will be achieved if the disease is treated at this early stage.

Under prolonged humid conditions sparse white or pink mycelium may be seen around the edges of each patch which tends to mat the green leaves together. A pale straw colour at this time indicates that the disease has become

less active, perhaps due to a drier climate.

Eventually scars are formed (Figure 2) which, particularly in the winter months, heal up slowly and are consequently prone to invasion by moss, undesirable grass species and weeds. If treatment is delayed

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until these later stages of disease development, only poor control will be achieved.

*M.Nivale* may also develop under snow, in which case the correct name is pink snow mould (Figure 4). After prolonged snow cover, large bleached patches of turf may appear, covered by white or pink mycelium, matting the leaves together.

If the disease cycle for fusarium patch is examined (Figure 3), useful information

on how it can be prevented or controlled can be gained.

The fungus responsible for fusarium patch, *M.nivale*, is a common soil fungus, universally present in golf greens, surviving unfavourable conditions in the thatch layer as pieces of dormant mycelium.

When conditions favouring disease outbreak prevail, then this mycelium can start to grow, produce spores, infect plants and spread to form the characteristic orange/brown patches typical of the disease. The active fungus can then spread by wind and/or water splash to areas of healthy turf in which new outbreaks of fusarium patch or pink snow mould can then take place.

If steps are taken to reduce or even eliminate the factors that favour disease development, then the cycle can be slowed down or even stopped. This can be achieved through an integrated disease control programme.



**Figure 1: Early symptoms of fusarium patch disease**





Figure 2: Typical fusarium patch scar

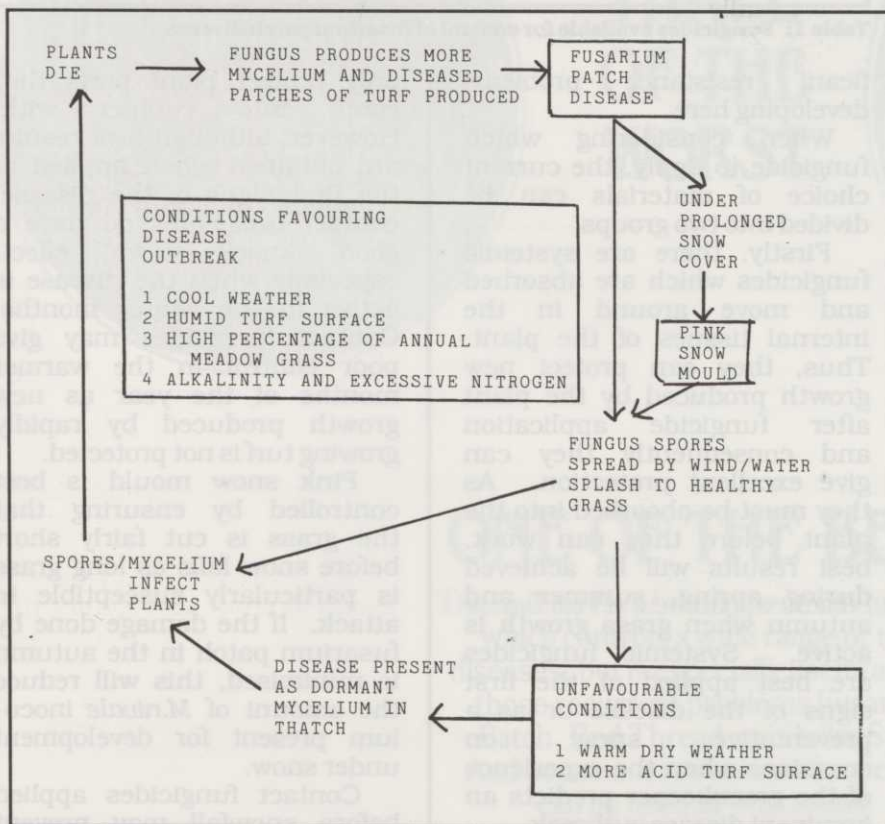


Figure 3: Disease cycle for fusarium patch and pink snow mould



Figure 4: Extensive damage caused by pink snow mould

Integrated disease control is the complementary use of biological, cultural and chemical control methods to achieve the most effective and economical disease control possible.

Fungicides are only part of an integrated disease control programme and their ready availability must not reduce the attention paid to those practices that reduce the risk of disease. Any management practice that helps to keep the turf surface dry, such as switching, spiking or slitting, will reduce the likelihood of fusarium patch occurring.

If necessary reduce the moisture-holding thatch layer e.g. by scarification, as this will again help to keep the turf surface dry. Surface drainage may also be improved by aeration and top dressing with a sandy compost.

It is also a good idea to promote air circulation over the greens by not siting trees, shrubs or tall buildings too close as this will inhibit the removal of surface moisture by the wind. Also, greens that are shaded from the sun will dry quite slowly.

Annual meadow-grass (*Poa annua*) is very susceptible to fusarium patch and consequently a sward containing a large percentage of this grass could suffer severe damage.

Good turf management, in its aim of promoting a healthy vigorous sward of fescue/bent, both of which are much more resistant to the disease than annual meadow-grass, will consequently discourage fusarium patch.

Great care must be taken when applying fertilisers as excessive nitrogen, especially the organic types such as dried blood, applied during cool wet weather, can lead to severe disease outbreaks. An alkaline turf surface also favours fusarium patch disease. The use of lime on golf greens is only recommended under exceptional circumstances and is best avoided for, as well as encouraging fusarium patch and other diseases, it leads to invasion of annual meadow-grass, weeds and worms.

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In situations of prolonged cool wet weather, despite all cultural control measures being implemented, fusarium patch disease is still likely to attack on many courses. Fortunately if the need arises, the disease can be controlled with fungicides, providing they are used wisely and according to the manufacturer's instructions.

Fungicides should only be used carefully and judiciously, for several reasons.

Firstly, too many applications may inhibit other fungi in the turf that are antagonistic to fusarium patch and partially responsible for keeping the disease at a naturally low level. This could be the reason why disease sometimes appears more severe following a fungicide application than previously. Fungicides may also affect other fungi present in turf responsible for decomposing the thatch layer.

Secondly, the repeated use of fungicides with the same mode of action can lead to the development of strains of *M.nivale* resistant to the fungicide. For this reason, fungicides with different modes of action should be considered for successive applications. For example, alternate the use of a dicarboximide fungicide such as iprodione or vinclozolin with chlorothalonil; or any of the systemic fungicides (benzimidazoles) with any of the contact materials (see Table 1). Fungicide resistance is widespread in the USA (where more frequent indiscriminate fungicide applications are made) taking note of the above points will lessen the chance of signi-

FUNGICIDE GROUP AND ACTIVE INGREDIENT	SYSTEMIC (S) CONTACT (C)	PRODUCT	MANUFACTURER/SUPPLIER
<u>BENZIMIDAZOLES</u>			
BENOMYL	S	BENLATE	DUPONT
CARBENDAZIM	S	FISONS TURFCLEAR MASCOT SYSTEMIC	FISONS HORTICULTURE RIGBY TAYLOR
THIABENDAZOLE	S	TECTO	SYNCHEMICALS
THIOPHANATE METHYL	S	MILDOTHANE	MAY AND BAKER
<u>DICARBOXIMIDES</u>			
IPIRODIONE	C	ROVRAL GREEN/ GRANULES	MAY AND BAKER
VINCLOZOLIN	C	MASCOT CONTACT	RIGBY TAYLOR
<u>OTHER</u>			
CHLOROTHALONIL	C	DACONIL TURF	ICI PROFESSIONAL PRODUCTS

A range of new fungicides are currently under test at STRI for control of Fusarium patch disease.

**Table 1: Fungicides available for control of fusarium patch disease**

ficant resistance problems developing here.

When considering which fungicide to apply, the current choice of materials can be divided into two groups.

Firstly, there are systemic fungicides which are absorbed and move around in the internal tissues of the plant. Thus, they can protect new growth produced by the plant after fungicide application and consequently they can give excellent protection. As they must be absorbed into the plant before they can work, best results will be achieved during spring, summer and autumn when grass growth is active. Systemic fungicides are best applied at the first signs of the disease or as a preventative spray on occasions when the experience of the greenkeeper predicts an imminent disease outbreak.

Contact fungicides are not redistributed within and will

only protect plant parts they come into contact with. However, although best results are obtained when applied at the first signs of the disease, contact fungicides do have a good 'knock down' effect, especially when the disease is active in the winter months. Contact fungicides may give poor control in the warmer months of the year as new growth produced by rapidly growing turf is not protected.

Pink snow mould is best controlled by ensuring that the grass is cut fairly short before snow falls as long grass is particularly susceptible to attack. If the damage done by fusarium patch in the autumn is minimised, this will reduce the amount of *M.nivale* inoculum present for development under snow.

Contact fungicides applied before snowfall may prevent pink snow mould from developing. ■

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