

Figure 2: Typical fusarium patch scar

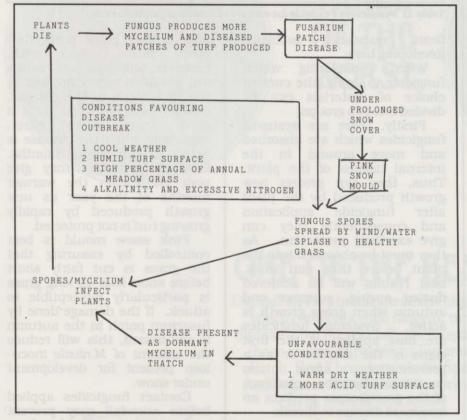


Figure 3: Disease cycle for fusarium patch and pink snow mould



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 fussarium patch occuring.

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 meadowgrass, 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 keeping the disease at a naturally low level. This could be the reason why disease sometimes appears more severe following a fungicide application than Fungicides may previously. also affect other fungi present responsible turf 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. example, alternate the use of a dicarboximide fungicide such iprodine 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
BENZIMIDAZOLES			
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
DICARBOXIMIDES			
IPRODIONE	С	ROVRAL GREEN/ GRANNULES	MAY AND BAKER
VINCLOZOLIN	С	MASCOT CONTACT	RIGBY TAYLOR
OTHER			
CHLOROTHALONIL	С	DACONIL TURF	ICI PROFESSIONAL PRODUCT

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. 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 Systemic fungicides active. are best applied at the first signs of the disease or as a preventative spray 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 However, although best results are obtained when applied at the first signs of the disease, contact fungicides do have a 'knock down' good 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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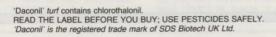
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