

# PROBLEMS OLD AND PROBLEMS NEW

Kate Entwistle casts her eye over the diseases which are currently affecting golf courses.

Damage to the turf that is caused directly by invertebrate or fungal pests, will noticeably affect either the colour or the growth habit of the plants in the sward and in some cases, both. Regardless of the cause, the specific way in which the sward is affected will depend on the interaction of several factors, including the type of grass in the sward, the invertebrate pest or fungus that is causing the damage, the way in which the sward is maintained (e.g. nutrient levels in the plant, height of cut) and the prevailing weather conditions.

Recognising the possible causes for a given symptom is a crucial first step in identifying any turf problem. For example, if the sward is showing patches of red/brown discoloured plants, it could be that individual lesions from a leaf spot disease are coalescing along the leaf blade and affecting the general appearance of the sward in discrete patches or alternatively, it could be that the plants are showing a general overall leaf discoloration due to nutrient or temperature stress. If lesions are present on the leaf, it is possible that a certain *Drechslera* species of fungus is the cause of the symptom. These symptoms, however, would rule out a disease such as take-all patch that does cause quite obvious leaf red/brown discoloration but will not cause lesions to develop on the lamina.

It must always be borne in mind that finding a fungus on a plant or finding an invertebrate in the rootzone does not necessarily mean that either are causing detriment to the turf. Many fungi can be identified on perfectly healthy swards and in a healthy rootzone, the number of microorganisms will be incalculable. Their relative population levels will fluctuate during the year with both the environmental conditions and the vigour of the sward. Thus, identifying the cause of a specific problem means completing both an investigation in to the development of the symptoms and an analysis to identify the presence of the causal organism. If certain invertebrate or fungal problems have been identified on your course in the past, it is likely that they will reoccur and that you will be able to recognise them as such because their symptoms will be similar to those of the initial outbreak. Difficulties arise when either the initial outbreak was not identified correctly or when problems with similar symptoms but very different causes occur on the same area of turf.

## A 42% CHANCE OF DISEASE.

Almost all the samples that I analyse are sent to me requesting an identification of the fungal disease that is causing damage to the sward. However, over the past seven months, only 42% of the samples that I have analysed in the laboratory had damage that was actually caused directly by a fungus. Twenty three percent of samples had symptoms caused by invertebrates (either frit fly or nematodes) and 35% had symptoms caused by environmental factors/rootzone conditions (physiological effects) and were in no way caused by an invertebrate or a fungal pest. It may come as a surprise to you that well over half of all samples analysed for turfgrass disease have no fungal disease problem. This clearly highlights the difficulty in making a correct diagnosis based purely on the symptoms of the sward – however convincing the symptoms may be.

With regard to fungal diseases, the fungus responsible will only cause noticeable damage if a suitable host (turfgrass sward) is present and environmental conditions prevail that allow the fungus to start infection. The

severity of the damage is in part dependent on the length of time that the favourable environmental conditions prevail. Many diseases occur at non-damaging levels for much of the time and it is only when conditions allow the fungus to reach its maximum potential with regard to causing damage, that disease development 'explodes'. Disease is inevitable and invertebrate pests can be a reoccurring nightmare. If we know what is present and when these potential problems are likely to cause damage, we can work towards limiting the severity of the problem on the most important parts of the course.

But what of those symptoms that were mistakenly thought to have been disease? Why were they confused with a fungal infection?

## WHEN IS A DISEASE NOT A DISEASE?

I have received numerous turf samples this year where the bentgrass in a mixed bent/fescue/annual meadowgrass sward had become discoloured and died out and where eventually, extensive bare areas had developed (Figure 1).



Figure 1: Bentgrass/fescue/annual meadowgrass sward showing symptoms of damage



In most cases, annual meadowgrass had tended to grow over the affected and thinned swards leaving them with an uneven and patchy appearance. In all cases, previous fungicide applications had shown no improvement in the overall condition of the sward. Analysis of all these samples showed the same result – in the areas where the symptoms were continuing to develop, there was no primary fungal disease causing the problem. This was a surprise to many of the turf mangers and agronomists who had sent the samples in, since the initial discoloration of the bentgrass in the sward, it's eventual death and the re-colonisation of the affected 'patches' of turf with annual meadowgrass, suggested take-all patch disease (though I'm not sure which fungicides had been applied during the early part of the year to manage that!). In fact, all of the samples were heavily infected with frit flies and their pupae were removed in great numbers from the dying bentgrass plants (Figure 2).



Figure 2: Frit fly infested bentgrass plant

These were not the only instances of invertebrates causing symptoms on the turf that resembled fungal disease. In previous articles I have written at length about the root knot nematode (*Meloidogyne* sp.) that I found to be causing yellow patches annually, between May and November, on creeping bentgrass greens across the UK and Ireland (Greenkeeper International, February & March, 2003). I was initially asked to help identify the cause of these yellow patches by Mark Hunt (Headland Amenity) at the end of 2000 and since then, I have received numerous turf samples in which this nematode is causing these quite dramatic symptoms. Since its initial identification as the cause of the problem, this nematode has been confirmed as a new species of root knot nematode, not previously known or described. It has now been named as *Meloidogyne minor* n. sp. (new species) and its complete and formal description will hopefully be published later this year in a nematology journal. It is important that this nematode has been identified and recognised as the cause of this problem since it has long been suggested that nematodes don't cause major turf problems on cool season grasses. Although we are now certain that nematodes can cause detrimental effects on all turfgrasses, we still have a lot to learn about these specific invertebrates and what makes them infect turf. This poses great problems for us with regard to management of both the *Meloidogyne minor* n. sp. and the many other types of nematode that damage turf.

#### PROBLEMS NEW...

Accurate identification of the cause of a problem is a huge step towards its long-term management and, when unusual or uncommon problems come in to the laboratory, there is a sense of excitement just before the realisation kicks in that 'now we know the cause of the damage, we have to find a way to manage it'. During July, I received two separate turf samples which both

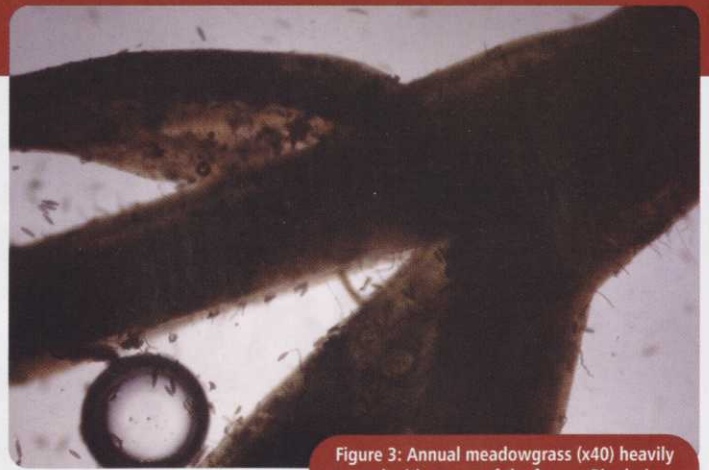


Figure 3: Annual meadowgrass (x40) heavily covered with spores of the fungus *Bipolaris* sp.



Figure 4: Germinating *Bipolaris* sp. spore (magnified 400x)

proved to be very interesting (yours and my definitions of the word 'interesting' may differ slightly here!) with regard to the cause of the damage to the sward. The first sample, received from Ireland, was a hole-cutter piece of a putting green that had a predominantly annual meadowgrass sward. The individual plants in the affected area appeared dark brown, almost black and watersoaked with occasional evidence of lesions or spots on the leaves. The problem had developed as one or two, 12-15 cm diameter patches which over the course of a few weeks had spread to total around 10 patches. There was an apparent increase in the severity and extent of these patches when the weather became hot and dry. During this time, the greens were irrigated to help relieve moisture stress. Although this problem started on only one green, since the initial patch had been noticed four weeks prior to the sample being taken, the patches were starting to show on other greens. The overwhelming presence of fungal spores on the sample, combined with the description of the disease development and weather conditions confirmed that the disease was being caused by a *Bipolaris* species of fungus. Figures 3 and 4 show the profusion of fungal spores present on an affected annual meadowgrass plant and a close-up of a fungal spore that is germinating at both ends. In addition, a fungal spore was inoculated on to artificial culture medium to show its mycelial growth and allow complete identification of the fungus (figure 5).

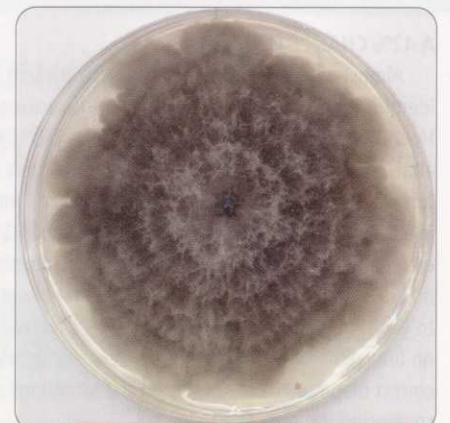


Figure 5: Mycelium of the *Bipolaris* sp., isolated and growing on artificial culture medium



The second uncommon turf problem came in during mid July. The information that was sent with the turf sample described the problem as looking like fusarium patch but not having the same characteristics that are normally associated with that disease. The green had been maintained under a 'lean fertiliser programme' and maintained so as to produce a consistently fast surface. The other notable comment regarding the disease was that it 'has spread rapidly across the whole green'. To me, the symptoms were alarming: watersoaked plants developing in small (2 cm diameter) spots that were coalescing and rapidly spreading across a 'lean' and very stressed annual meadowgrass sward, without any evidence of aerial mycelium (figure 6).

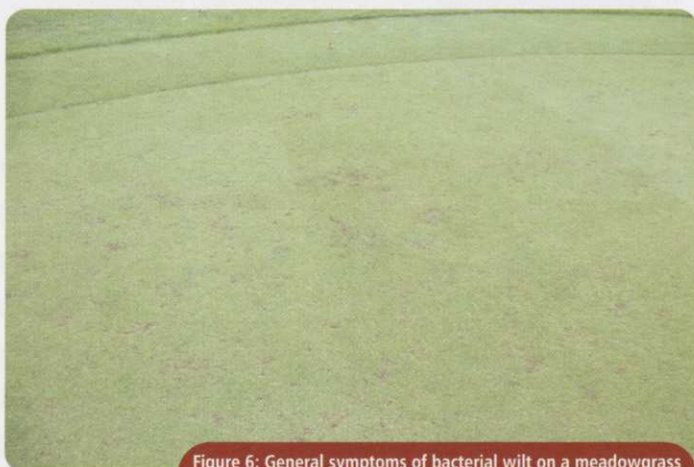


Figure 6: General symptoms of bacterial wilt on a meadowgrass sward (courtesy of Mark Hunt, Headland Amenity)

Analysis of the turf sample identified the problem as bacterial wilt. The evidence of the infection was extremely conclusive and the bacteria could be seen streaming (or pouring) out of the xylem vessels of affected plants (figure 7). A close-up analysis of some of the infected plants also showed the characteristic leaf discoloration and deformity as recorded for bacterial wilt in annual meadowgrass.

Although these two disease problems are well documented, they are certainly not commonly seen in our climate. Our knowledge of current invertebrate pests and diseases is based purely on evidence gathered from analyses completed, but it is possible that these fungi and bacteria are more common and more widespread than we imagine. There is no way of really knowing a problem exists until it is recorded during an analysis but when unusual problems are 'found', I believe that they should be reported so that we can all learn more about the potential problems that can affect our turf.

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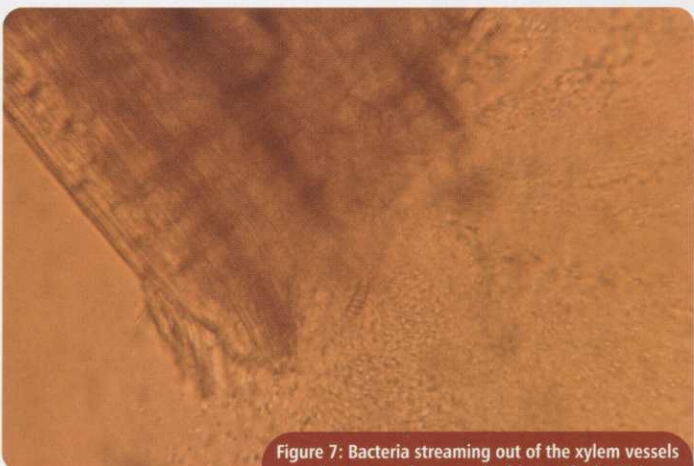


Figure 7: Bacteria streaming out of the xylem vessels of a cut meadowgrass leaf (magnified 400x)



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