

Stella Inglethorpe gives the low down on how modern micro-biology can aid golf course maintenance...



Microbes, biostimulants, antagonists, mycorrhiza – the greenkeeping world has definitely gone mad! On a recent course visit to a club which shall remain nameless, I was told in no uncertain terms that if I was going to talk about microbes I could leave now! And I sympathise totally! Just as wetting agents were all the rage a few years back, all of a sudden it's 'biologicals' that are BIG news. A confusing array of products has flooded the market, many claiming to be all singing, all dancing, would probably even make you a cup of tea!



“ Research has shown that there are only about 1% of the number of microbes in a typical golf green compared to what you would expect to find in unmanaged turf ”

Unsurprisingly, this has led to a lot of scepticism and wariness about these type of products which is a great shame as given the right advice, technical support and analysis, they can and will work very effectively!

The Hard Truth

The fact of the matter is - there is no miracle cure to all your problems (except perhaps a very thick skin and a huge budget!). Good cultural practices are even more vital in this day and age with expectations of 365 days of golf a year, averaging over 30,000 rounds. With golf clubs springing out of the woodwork left, right and centre the government are looking to bring us into line with the rest of Europe with a Pesticide Tax. Use of pesticides on amenity land is already being taxed in Denmark and Sweden with Spain, France, Italy, Belgium and the Netherlands looking to follow suit in the near future.

Production of carbendazim, the last remaining worm control (and a fungicide) is to cease at the end of the year and MAFF are looking carefully at other chemicals on the market. So greenkeepers are being forced to consider alternatives rather than relying solely on chemical control, which is where biological products play an important part. However there is a feeling of fear of change - the biological concept is relatively new to the sports turf industry and so there is still a lack of understanding as to what and how to use them...

Microbes Make the World Go Round

Biotechnology really doesn't have

to be rocket science - it's all about harnessing Mother Nature to work in your favour. And let's face it, if you are being asked to produce Augusta every day all year round with golfers coming out of your ears, you need to use all the weapons in your armoury! It has been common practice to use physical (mechanical eg aeration) and chemical (eg fertiliser, wetting agent and fungicide) methods but the biological approach is an often overlooked, but extremely important part of successful turf management - the final piece to the jigsaw puzzle.

Microbes (that includes bacteria and fungi) literally make the world go around... they are responsible for nutrient cycling and degrading waste and just as importantly making beer! We have used them for years in other industries, for example sewage plants rely on them for degrading organic waste. The Forestry Commission has used mycorrhiza fungi for many years to improve tree establishment on poor sites and in horticulture/agriculture, fungi have been used as agents to control aphids in greenhouses and maggots in fruit orchards.

Microbes in the Sports Turf Environment

It is a common misconception that microbes are solely for disease suppression in sportsturf. Their importance to healthy grass growth is several fold - eg assisting with nutrient and water uptake, producing plant growth hormones, increasing root growth besides producing antibiotics against common turf diseases such as *Fusarium* (*Microdochium*

nivale) and *Take-All Patch* (*Gaeumannomyces graminis*). Have you ever put a slow release fertiliser on a new sand green and been disappointed with the response? This is often due to the lack of microbes which are responsible for converting your fertiliser into a usable form that the grass plant can take up (mainly ammonia and nitrate).

The results of a trial conducted on a USGA spec turf nursery at a golf club in Hertfordshire show that the areas treated with a cocktail of 14 bacteria and six fungi had significantly longer root growth compared to the untreated controls.

Research has shown that there are only about 1% of the number of microbes in a typical golf green compared to what you would expect to find in unmanaged turf. This is due to several reasons - past and present use of chemicals, sterile root zone material, low organic matter, compaction, etc, etc.

Turf health and resilience to wear and tear can be improved by boosting the level of beneficial microbes in the root zone. There are two options available to you:- Feed your existing microbes and/or inoculate the soil with specific species that are known to be beneficial to plant health.

The problem with the first option alone is that you may not have a lot of microbes in the soil to work with. Secondly, microbial feeds (also known as biostimulants) are not specific to feeding the beneficial microbes and can provide a food source for whatever is sitting in the soil. Therefore timing is crucial to their success. Inoculating the soil

The Forestry Commission has used mycorrhiza fungi for many years to improve tree establishment on poor sites

with specific microbes can be very effective, particularly when combined with the right microbial nutrition but the success of any biological approach requires integrated management.

It is very easy to dismiss 'biologicals' as unsuccessful on your course, if the other management practices are not modified to get the best from them - they need to be given a fair trial. After all, you can hardly expect the poor buggers to thrive in a heavy soil green which spends most of its time waterlogged, little aeration and is suffering from chemical toxicity in the form of iron and sulphur based fertiliser, wetting agents and fungicides!

The KISS Principle

Personally, I firmly believe in the KISS (Keep it Simple, Silly) principle! I would advise the following guidelines to integrate microbial management successfully into your programme:-

1) Go Back to Basics

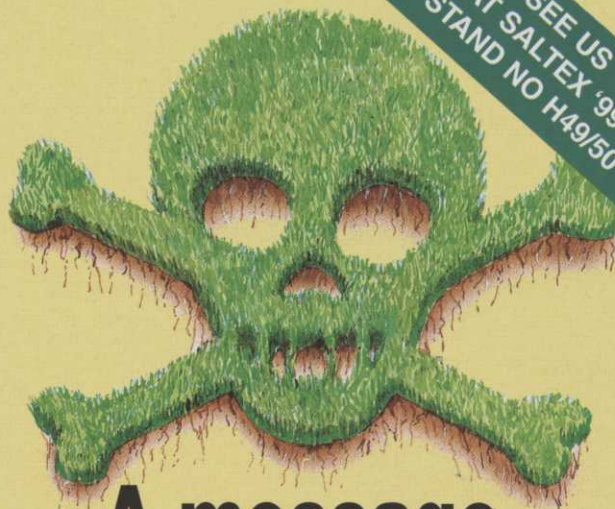
It is very difficult to monitor the success of any product if you are using a large number of different things. Generally staff and time are in short supply in the summer months to even keep on top of the grass growth, let alone do anything else. Therefore, simplify your programme to make time management easier (something that I'm pretty bad at, as those that know me can testify!) I would advocate that if you don't have time for anything else, keep up a good aeration programme, particularly on thatchy, heavy soil greens. Winter

aeration is fine for keeping the water moving through the profile and relieving compaction, however, it will do little to improve your thatch levels as there isn't sufficient temperatures for the microbes responsible for degrading this organic matter to work very rapidly.

In summer, the soil temperatures are right but the golfers moan like hell about having holes in their greens - they think you've got a personal vendetta against them! ('Why do we have to have it when Joe Bloggs down the road hasn't?') This is where integrating 'biologicals' into your programme can help - in the form of thatch-degrading microbes. You won't be able to reduce the amount of aeration you do - in fact the more the better as these microbes will degrade thatch 10x faster with air than without it. What you can do is perhaps swap a hollow-tining (which distresses the golfers no end and only removes 5% of the thatch, generally leaving an uneven surface!) in favour of regular pencil-tining/ sarrell rolling.

2. Know what you are working with

This applies to knowing your turf environment but also knowing what's in the products so you can choose the right combination for the job. Identify the problems to target e.g. excessive disease, thatch and drainage problems or conversely overly free-draining causing problems with leaching of nutrients and drying out. Treat the Causes not the Symptoms. Use technology to your advantage to help take some of the guesswork out of turf management.



A message to those still using Pesticides to control Turf Diseases

The use of chemicals on intensively managed turf can lead to a biological imbalance, opening the sward to repeated attack by disease.

BIOTAL		PESTICIDES	
Natural inhabitants of soil	✓	Do not occur naturally	✗
Boosts natural antagonists in soil	✓	Long term use may affect non target microflora	✗
Safe & easy to use	✓	Difficult and hazardous to use	✗
No container or disposal problems	✓	Difficult to dispose of containers safely	✗
No need for protective clothing	✓	Protective clothing essential	✗
Forms part of the natural cycle	✓	Subject to increasingly stringent regulations	✗

Biotals "Restore the Balance" programme reintroduces the correct microbes to the soil profile, promoting quality turf through healthier rootzones and enhanced nutrient utilisation.

Reduce your dependence on expensive hazardous chemical treatments and rebalance your soil profile, naturally.

Tel: 02920 747 414

The most natural way to prevent disease build up is to balance cultural and physical methods with a biological approach.



Feed, Boost and Balance your turf with Biotals Environmental Solutions for the Amenity Market.

Biotals Limited, 5 Chiltern Close, Cardiff CF4 5DL.
Tel: 02920 747414 Fax: 02920 747140 e-mail: bip@biotals.co.uk



“

Using a single species is like putting all your eggs in one basket - if it likes the conditions in your greens then great but if not then it's money down the drain.

”

For instance, regular soil and tissue analysis will help pinpoint which nutrients are being leached more quickly are too high and what is actually being taken up into the plant from the soil. This kind of information enables you to tailor your grasses nutrient requirements more precisely and can pre-empt diseases such as Anthracnose (encouraged by nitrogen/potassium deficiency) and Fusarium (encouraged by excess nutrient creating 'soft' growth.)

Choosing the right product for the task is probably the hardest part to

use up the available oxygen in the soil and make matters worse.

Similarly, it is important to choose the right biological product for the job and use it to its best advantage. With a microbial inoculant, you need to know what microbes are in it and what they do. Will they survive in your conditions e.g. pH, high sand content, etc. There is no one species of bacteria or fungi that can do everything! They work in conjunction with one another, for example it takes several different species to fully degrade organic matter into its component parts. Using a single species is like putting all your eggs in one basket - if it likes the conditions in your greens then great but if not then it's money down the drain.

Once applied, are the microbes surviving? Brand new sand greens are extremely hostile environments for a soil microbe. They are generally low in organic matter which is their food source, moisture levels can vary dramatically and sand grains don't make very good sites to attach to. Adding microbes to new greens can be a very effective way of avoiding the initial problems experienced such as high leaching and Take-All Patch. However, the above problems must be addressed to get success - using a liquid formulation of microbes alone will have a very short life-span in the root zone if other factors are not considered.

In old soil greens, introduced microbes have different problems to face - poor drainage and insufficient air are very common. Although they can survive these conditions, their activity is much reduced. Old soil greens also have their own resident

population of microbes (not necessarily very useful ones!) which will compete with the newcomers and again the success of the introduced species will depend on their suitability to your particular environment. Symbio biofixed have overcome these problems to a great extent as the microbes are freeze-dried into a zeolite (a porous mineral carrier) which acts as a survival suit, protecting them from chemicals and giving them a competitive edge. In fact, you can pass bleach solution across them without wiping them out!

With my pearls of wisdom, I've managed to make greenkeeping sound easy! (Well according to golfers, greenkeepers only cut the grass, right?) When I have all the answers, I'll be advising from the decks of my yacht sailing somewhere in the Caribbean!

Stella Inglethorpe BSc(Hons),
Grass Roots Trading Co.

“ Adding microbes to new greens can be a very effective way of avoiding the initial problems experienced such as high leaching and Take-All Patch. ”

do as it requires knowledge of what exactly is in a product and good advice. For instance to get the best fertiliser for any particular conditions you will need to know the form of the nutrients as well as the NPK analysis. If a soil is suffering from anaerobic conditions, avoid fertiliser containing sulphur and iron which are the main components of black layer. Similarly, complex slow-release fertilisers or organic products (derived from animal or plant e.g. hoof and horn, seaweed) will be of no benefit either as both require microbial activity and oxygen to breakdown and therefore they tend