Technical paper

Peat and beneficial microorganisms

Peat is a safe growing medium, since bacterial and fungal populations in peat are low compared to most other soils. This is because peat has developed in a harsh physical and chemical environment which does not enhance microbial growth.

Peat is derived from ancient sources of partially decomposed plants including *Sphagnum* moss. The likelihood of plant pathogens in peat is extremely low, because it has been harvested in remote areas, where no crops have been cultivated. There are, however, microorganisms associated with decomposing organic matter. They are usually known as saprophytes. These microorganisms are natural, they do not harm plant growth, and some have even been shown to suppress other pathogenic microorganisms.

Peat does not need to be sterilized. Sterilisation destroys all microbes, including the friendly ones that suppress diseases or provide beneficial nutritional effects. Microorganisms help to cycle nutrients in soils, making complex organic sources of nitrogen, phosphorus and potassium available to plants. Some of them inhabit the root zone ensuring that plant pathogens cannot gain a foothold, and some produce antibiotics. If peat is sterilized, it would result in an inactive growing medium. If plant pathogens are present as spores in the surrounding air or within plant debris, they can quickly contaminate the peat, and make it unsuitable for plant growth.

Sphagnum peat contains many types of microbes

Some of the most common microorganisms in peat are bacteria including *Bacillus*, *Pseudomonas* and *Streptomyces* species. Many of the species have been shown to help control plant diseases, for example many species of *Streptomyces* produce antibiotics, which can prevent harmful bacteria growing in the soil.

Some microorganisms are saprophytic fungi, such as *Trichoderma* and *Peziza* species. They live on dead plant material, and again, some have been shown to have beneficial effects on plant growth.

How do beneficial microbes in peat help to control plant diseases?

Beneficial microorganisms found naturally in soil have been studied extensively. They have several different mechanisms that provide a beneficial effect to plants. For example,

several naturally occurring saprophytic microorganisms in peat compete for nutrients with other microorganisms, including pathogenic microorganisms such as *Pythium* and *Phytophthora*, which rely on the same nutrients for growth. *Bacillus* and *Streptomyces* species found in peat produce antibiotics and thus these species, that are harmless to plant growth, can prevent pathogenic microorganisms from thriving. Some can break down and suppress pathogens including *Rhizoctonia* and *Fusarium*.

Different types of peat

Peat from different sources varies in age and microbial composition. Generally, blond or light-coloured peat (termed H1-H2 peat on the von Post decomposition scale) contains high populations of useful bacteria and fungi including *Trichoderma* and *Streptomyces* species. Older, darker peat contains smaller populations of microbes.

Other aspects which can encourage plant pathogens

In addition to the biological properties, the physical and chemical properties of the growing media can have a significant effect on soil borne diseases. For example, if peat is very wet, there is little oxygen available to the roots. This can lead to greater levels of plant stress. Waterlogging can cause root damage and lead to the entrance of pathogenic microorganisms into the plant and cause disease. Similarly, high salinity or a very high fertilizer level can cause plant stress and allow pathogenic microorganisms such as *Phytophthora*, *Pythium* and *Fusarium* species to infect the plant. It is therefore important that the growing medium is not saline, contains appropriate amounts of fertiliser available to the plant and growth stage, and drains freely.

References

- Reddy, S., 2005. Is peat helping you? GrowerTalks Magazine. March 2005.
- Zmora-Nahum, S., Chen, Y. 2010. Testing the suppressive potential of several turf types on damping-off induced by the pathogen Pythium aphanidermatum