

## SOIL DISEASES

Soils contain diverse communities of microscopic organisms some of which (pathogens) are capable of damaging plants. Pathogens may grow in the soil feeding on the rotting roots of a host plant say for instance a tomato plant. These pathogens will be fairly specific in regards to their preferred host plant.

Thus if you plant a new tomato plant in the area where previously one died there is a reasonable chance that the pathogens present in the soil will attack and damage the new tomato plant.

If we were to plant say a lettuce instead then it is fairly unlikely that the lettuce would be affected by those pathogens that like tomatoes and members of that family of plants.

These specialised interactions between soil organisms and plants can kill seedlings and even adult trees. Some organisms target young plants but others only appear as problems in later stages of the plants life.

Then there are pathogens that are able to cause disease problems in many different plant species.

The soil organisms that have the potential to be plant pathogens include fungi, bacteria, viruses, nematodes and protozoa.

Some pathogens that attack leaves, stems of plants survive in the soil at various stages of their life cycles. Therefore, a soil phase of a plant pathogen may be important, even if the organism does not infect roots.

In spite of the potential for severe damage to be inflicted on plants by soil pathogens, most plants do not display serious symptoms of disease.

Disease usually occurs when conditions are particularly unfavourable, or when a soil pathogen is accidentally introduced into an area where a highly susceptible plant species is growing.

Because of the intensive chemical induced production of agriculture, horticulture or forestry this increases the opportunities for diseases to develop compared with the undisturbed natural ecosystems. Also by planting of similar plant species together in monoculture increases the probability of a disease outbreak. (A glasshouse full of tomatoes for instance)

In contrast, the damage caused by the fungus *Phytophthora cinnamomi* to many different plant species, in diverse natural ecosystems, demonstrates the damage that can be caused by a pathogen that infects the roots of many unrelated plants.

The control of pathogens and prevention of plant disease is a natural soil biological process.

Indeed, in most situations, plant disease is not strongly evident even when potentially pathogenic fungi are present in a soil.

In Nature soil pathogens are normally held at bay due to the beneficial microbes.

Where on the other hand chemical agriculture practices creates soil conditions and a high density of susceptible roots that encourages the multiplication of pathogens.

Once potentially damaging organisms become present in high numbers in a soil, they may be difficult to eradicate. Management practices are required that create conditions in the soil that are not favorable to pathogens so that their growth is limited and therefore, disease is restricted.

Owners of glasshouses become concerned about the build-up of disease in their glasshouse soils when tomatoes and similar crops are planted year after year.

In the past there was chemicals such as Basamid that we could use to sterilise the soil. That product has been banned. Besides Basamid was non-selective and it destroyed the good with the bad and having no beneficial microbes to control the pathogens one could find disease problems quickly building up in the soil.

Another common problem is a row of shrubs or trees are planted as a hedge or screen, they grow nicely and then one day a plant in the row becomes sick looking and dies, followed by the plant next to it and so on. You may put in plant replacements but they also die. You have soil pathogens that will kill the whole row in time and be impossible to plant that species there again.

Now we have a natural answer for the home gardener called Terracin.

Terracin uses a combination of a *Bacillus amyloliquefaciens* BS-1b a beneficial soil microbe and the enzymes, bacteriocins, secondary metabolites and signal molecules from the fermentation of *Enterococcus faecium* to suppress a broad range of fungal pathogens.

Terracin works fast. Firstly the *B amyloliquefaciens* directly attack the pathogens by excreting strong antimicrobial substances that inhibit the pathogens growth.

The enzymes and bacteriocins from the fermentation extract weaken the pathogen by break down its outer cell walls.

The signal molecules and secondary metabolites then activate the beneficial soil microbes that produce antimicrobial substances which act to further suppress the pathogens.

As the populations of beneficial microbes rise they suppress pathogens by simply out competing them for food. (That was simple wasn't it?)

Once the pathogens have been suppressed it is important to re-establish a healthy population of beneficial microbes so 3 weeks after using Terracin you drench the area with Mycorrhizal.

It is also important not to water the area with Chlorinated water (Put a 10 micron Carbon Bonded filter on your tap) as chlorine just kills the microbes and you waste your time and money.

To use Terracin either mix 20ml into 1 litre of non-chlorinated water and spray over 10SqM.

Alternative is mix 2ml of Terracin into 1 litre of non-chlorinated water and water over 1 SqM of soil.

As we stated earlier there maybe pathogens in your soil because of past management (chemicals, herbicides and manmade fertilisers) and even if your vegetables or roses appear to be growing happily a application of Terracin followed up by the Mycorrcin could improve your plants noticeably.

If no difference afterwards you will be comfortable in the knowledge that your gardening methods are working with Nature not against it.

The applications of Terracin can be over or around existing plants with benefits to them.

It always amazes me that after removing the access to harmful chemicals such as Basamid that our ecological scientists can come up with a perfect solution working in accord with Nature.

Ask for Terracin at your local garden centre or Mitre 10.