



Biological control of pathogens with Trichoderma

Trichoderma is a beneficial fungi that resides in most soils. It is worthwhile to encourage in agricultural soils as it can aid plants fight diseases and promotes growth. Understanding its characteristics will help it work for your production system.

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Type the word *Trichoderma* into Google or a scientific database and it is impossible not to find numerous papers highlighting the link between a range of *Trichoderma* species and their use as biocontrol agents against pathogenic organisms. *Trichoderma* spp are among the most widely studied microorganisms with a plethora of research investigating the range of beneficial functions they perform in the soil-plant environment and validating the great potential of this humble fungus for combating disease.

Trichoderma as a biocontrol agent

Trichoderma belong to a group of beneficial soilborne fungi ubiquitous in nature, and various species have been isolated in a diverse range of environments – from tropical rainforest to temperate arid regions. Abundant research papers have highlighted the potential of *Trichoderma* as a biocontrol agent, which is due to the following key characteristics *Trichoderma* spp express:

- They are aggressive colonisers of new environments and can effectively establish themselves into new habitats (especially the rhizosphere) and occupy and defend this ecological niche.
- They compete with pathogens for space (infection sites) and nutrients. *Trichoderma* are known to digest nutrients rapidly (much faster than pathogens) and hence are very resourceful competitors.
- They demonstrate the ability to directly prey on other species of fungi (mycoparasitism).
- They synthesise and secrete a broad array of biologically active compounds that antagonise pathogens, including:
 - Enzymes that degrade the cell walls of pathogens thereby eradicating them.
 - Antibiotic and biocidal substances that all

control pathogenic organisms (over 100 compounds identified).

- Other secondary metabolites that make the environment more favourable for *Trichoderma* to thrive at the expense of pathogens (further enhancing their competitive ability).
- They improve plant growth and disease resistance by inducing the plant's immune response, mobilising its defences against disease attack (systemic induced resistance).
- They have been shown to be a plant root growth stimulant, thereby improving overall plant health, nutritional status and disease resistance.

Encouraging Trichoderma

Aside from environmental factors that influence all microorganisms (including *Trichoderma*) to a great extent, keeping *Trichoderma* well fed and well protected is of particular importance. *Trichoderma* have a feeding preference for material high in cellulose so apply organic amendments with a high C:N (carbon:nitrogen)

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ratio such as stubble/straw, non-legume hay, woodchips/shavings, nut husks and tree prunings. To encourage *Trichoderma* on the foliage, the application of humic acids,

fish hydrolysate and seaweed extracts are excellent. Protection from fungicides is also important, so fungicides should be used sparingly and only when necessary. Combine all fungicides with either humic acid, fulvic acid or another carbon source to help buffer the chemical and initiate decomposition via co-metabolism by microbial populations (check compatibility with chemicals first).

Conclusion

In today's world, sustainability is at the forefront of our society's consciousness, and within an agricultural perspective reducing our dependency on petrochemical-based inputs is of utmost importance. *Trichoderma* spp have proven they are viable candidates for Integrated Disease Management assisting in the reduction of chemical fungicides. However, further research and development is still required to reliably screen effective strains and understand the factors that influence the consistency and efficacy of *Trichoderma* against pathogens.

References

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