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Trichoderma Strains as Biocontrol Agents

Lurdes Jorge*

Department Biology and Biotechnology, School of Agriculture, Polytechnic Institute of Bragança Campus Sta Apolonia, Bragança, Portugal

***Corresponding author:** Lurdes Jorge, Department Biology and Biotechnology, School of Agriculture, Polytechnic Institute of Bragança Campus Sta Apolonia, Bragança, Portugal, Tel: +351 373303276, Ext: 3276; Fax: +351 273 325 405; E-mail: lurdesjo@ipb.pt*

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Editorial

In recent years there has been a growing interest in biological control of pests and diseases as a strategy for integrated pest management (IPM) of crop cultures. Species of the genus *Trichoderma* have been used as antagonists for the control of some of the most important phytopathogenic fungi (*Fusarium oxysporum*, *Rhizoctonia solani*, *Botrytis cinerea*, *Sclerotinia sclerotiorum*), resembling *T. harzianum, T. viride, T. virens* and *T. atroviride* the best options for biological control of plant diseases.

These species exert simultaneously different mechanisms acting synergistically to achieve disease control:

1. Competition for space and nutrients

2. Modification of the environmental conditions

3. Promotion of plant growth and plant defense mechanisms and antibiosis

4. Production of extracellular lytic enzymes involved in mycoparasitism such as chitinases and β-1,3- glucanases, proteases and lipases [1]

5. Production of secondary metabolites with potential applications as novel antibiotics [2]

Marzano et, al. [3] reported strains of *T. harzianum* as effective biocontrol agents of crown, stem and root rot diseases caused by *Rhizoctonia solani, Sclerotinia spp.* and *Pythium* in tomato and other vegetable crops. In sclerotial phytopathogenic fungi, like *Sclerotinia* spp., *B. cinerea* and *R. solani*, sclerotia are highly resistant structures that allow survival in soil under long periods of unfavourable conditions. Enzymes degrading cell walls (chitinases and cellulases), phenolic compounds (lignin and melanin degrading enzymes), proteases and lipases of *Trichoderma* spp. strains have been related for sclerotia mycoparasitism [4].

Shelton [5] reported that colonization of corn roots by *T. harzianum* strain T-22 required about 40% less nitrogen fertilizer than corn non treated plants. Nitrogen fertilizer use is responsible for increased salinity in soils and water eutrophication, so the possibility of reducing their input to agricultural crops without loss of yield looks promising and should be explored. Besides, *Trichoderma* strains play an important role in the bioremediation of soil that are contaminated with pesticides and herbicides, having the ability to degrade a wide range of insecticides (organochlorines, organophosphates and carbonates).

For the reasons described above, formulations of the most promising strains of *Trichoderma* have being applied to seeds, plantlets and soil to control plant root pathogens such as *Pythium, Rhizoctonia, Fusarium, Cylindrocladium* and *Thielaviopsis*, mostly in nurseries and greenhouses in developed countries. However there are still many diseases without an effective biocontrol agent, so it is necessary to increase knowledge about the effects of more enzymes and metabolites of Trichoderma with the aim of extending its spectrum of action as a biocidal agent.

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