



Endotherapeutic treatments with *Trichoderma* spp. in chestnut groves

Introduction

Tuscan chestnut cultivation is still carried out using traditional methods. Climatic, economic and social factors led in recent decades to the ageing and physiological decline of chestnut groves. Moreover, the arrival of new pathogens and pests as well as the resurgence of already known parasites severely curtail chestnut production. Phytosanitary control in chestnut groves has always been carried out by traditional treatments, that caused a high product dispersion in the environment and a low efficacy.

For the above reasons the introduction of new, economically viable tree cultivation and protection techniques may provide a valuable solution. The objective was to transfer to chestnut groves biocontrol protocols that have already been tested and validated in others crop systems. This was the first case of application of biocontrol agents (BCAs) in chestnut groves. BCAs are beneficial microorganisms that live naturally in soil and/or within plants tissues (endopythas). *Trichoderma* spp., in particular, have been widely used in agricultural crops as “biopesticides” proving to be highly effective in enhancing plants growth and increasing parasite resistance.

Endotherapeutic treatments were carried out with various local strains of *Trichoderma* spp. These were directly injected into the tree sapwood by using the new, minimally invasive BITE® (Blade for Infusion in TrEes) injection tool, at 1,30 m of height. The best period for treatments is during the growing season when the tree canopy is fully developed, with transpiration and water transport within trees very high, so that the *Trichoderma* suspension can be quickly adsorbed and moved to the upper part of the crown. The same microorganisms were also inoculated into the soil where they can protect tree roots in the rhizosphere.

The results showed that *Trichoderma* empowers natural plant defenses, so that the tree is also more resistant to pathogens. In particular, this methodology has shown very significative results in limiting the nut rot disease caused by *Gnomognopsis castaneae*, which strongly impacts chestnut fruit production. Disease incidence reduction was by 30-35% in the first year and 60% in the second year.

The same BCAs were also used to protect pruning wounds (both ordinary and phytosanitary cuts) because some pathogens (e.g. the agent of chestnut blight *Chryphonectria parasitica*) cause wound infections. Moreover, biocontrol treatments proved also effective in increasing the density of *Torymus sinensis* larvae.

Lessons learned

Biological control, when coupled with good management practices, leads to a reduction in the incidence and severity of pest attacks on the fruit and, as a consequence, a remarkable increase in chestnut production. Tree endotherapy with local *Trichoderma* is functional to safeguarding ecological integrity and biodiversity of chestnut groves as well as to maintaining the ecosystem services these stands provide.

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Further information

<https://www.psingeca.it/it>



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