Development of a biological control strategy against fusariosis and rabies of Fuentesaúco-Chickpea (PGI) through the use of the *Trichoderma* fungus

Jorge Poveda[1,2]*

[1]Institute for Multidisciplinary Research in Applied Biology (IMAB), Universidad Pública de Navarra, Pamplona, Spain

[2]Instituto de Estudios Zamoranos "Florián de Ocampo" (IEZFO), Zamora, Spain.

*Corresponding author e-mail: jorge.poveda@unavarra.es; ORCID: 0000-0002-1415-3580

ABSTRACT:

The Protected Geographical Indication (PGI) Fuentesaúco-Chickpea (F-C) includes a legume crop developed in the south of the province of Zamora (Spain), of great agronomic, economic and cultural importance for the area, as well as globally gastronomically. Its cultivation is mainly affected by the fungal diseases called fusariosis (caused by *Fusarium oxysporum* f. sp. *ciceri*) and rabies (caused by *Ascochyta rabiei*). Through an *in vitro* antagonism study we were able to select the species *Trichoderma atroviride*, *T. hamatum*, *T. harzianum* and *T. koningii* as the most effective against both pathogens, thanks to mechanisms of action such as mycoparasitism, antibiosis and/or competition for space and/or nutrients. Subsequently, these four species were used in studies with F-C plants and both pathogens, inoculating *Trichoderma* radicularly. Using this methodology, we described how *T. atroviride* and *T. koningii* were able to control *F. oxysporum* f. sp. *ciceri* both directly and by activating plant defenses, in the case of *T. koningii*. On the other hand, the species *T. hazianum* and *T. koningii* were able to significantly reduce foliar infection with *A. rabiei*, by activating systemic plant defense responses. Regarding the productivity of F-C, the species *T. hamatum* and *T. koningii* were able to significantly increase the formation of grains in each plant. Therefore, *T. koningii* is capable of controlling both pathogens under greenhouse conditions, in addition to increasing their productivity.

Keywords: *Fusarium oxysporum* f. sp. *ciceri*; *Ascochyta rabiei*; *Trichoderma*; antagonism; plant systemic resistance; *Trichoderma koningii*.

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