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Biological control of soilborne fungal pathogens in soybean

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Diseases can severely affect soybean crops in northwestern Argentina. Management of some of these diseases requires the use of fungicides, which increase the risk of environmental pollution. In addition, chemical control of certain soilborne diseases, such as charcoal rot (*Macrophomina phaseolina*) (Mp), damping-off and root rot (*Rhizoctonia solani*) (Rs) and Sclerotinia stem rot (*Sclerotinia sclerotiorum*) (Ss), is difficult, expensive and usually ineffective. Biological control could then be an alternative tool for disease management. *Trichoderma* spp. has been used for biological control of diseases in several crops. The objective of this work was to study the antagonistic effect of *Trichoderma* spp. isolates collected in northwest Argentina against the soilborne fungal pathogens Mp, Rs, and Ss. The pathogens were isolated from symptomatic soybean plants and seven *Trichoderma* spp isolates were obtained from soil samples at five locations in northwestern Argentina. All isolates were characterized morphologically, culturally, and microbiologically. The *in vitro* antagonistic effect of *Trichoderma* spp against the three pathogens was evaluated using the dual-culture technique. Competition for the substrate, the antibiotic effect and mycoparasitism were also determined. Competition was calculated using Bell's scale (Bell *et al.*, 1982), time of contact, and pathogen and antagonist radial growth. For the assessment of the antibiotic effect, percent inhibition of radial growth (PIRG) was calculated, whereas for mycoparasitism a scanning electron microscopy study was conducted. All three pathogens were effectively controlled *in vitro* by all the *Trichoderma* spp. isolates evaluated. The best antagonist was Tr009, which exhibited values of 1-2 in Bell's scale, PIRG values of 72.4 to 86.0%, and mycoparasitism by strangulation, perforation and tearing of pathogenic hyphae, as confirmed by electron microscopy.