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Effect of some fungal and bacterial antagonists on broad been pathogens

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Abstract
One of the effective methods for controlling plant diseases is the use of fungal and bacterial antagonistic agents with pathologic properties. The effect of biological agents on the control of bean diseases has been less studied. In this study, the effects of *Trichoderma virens* and *Trichoderma longibrachiatum* and bacteria *Pseudomonas fluorescens* and *Bacillus subtilis* on *Sclerotinia sclerotiorum, Macrophomina phaseolina* and *Botrytis fabae* were studied under laboratory and greenhouse conditions. All antagonistic agents in laboratory conditions showed a favorable inhibitory effect on the growth of pathogenic agents. At the same time, Trichoderma isolates had a better effect. Laboratory investigations were carried out in two ways: intercropping of Trichoderma antagonistic agents and pathogens, and three-point cultivation of antagonistic bacteria and pathogens, as well as the effects of esophageal antagonistic agents on pathogens. The results showed that Trichoderma species had the same effect on the control of the *S. sclerotiorum* patient, but over time, *T. virens* had a more favorable effect with a mean inhibitory effect of 54.43, 73.81 and 92.13 in three time intervals. Also, *P. fluorescens* and *B. subtilis* were able to control the *S. sclerotiorum* patient with a mean inhibitory of 60.58% and 60% respectively. Both Trichoderma species managed to control the *M. phaseolina* patient 100% and cover the surface of the petri dish. Also, *P. fluorescens* and *B. subtilis* antagonistic bacteria prevented the growth of *M. phaseolina* with inhibitory activity of 75 and 68.5%, respectively. *Trichoderma longibrachiatum* could effectively control the *B. fabae* patient. Also, *P. fluorescens* and *B. subtilis* had a similar effect. Volatile compounds *T. Virens* against the *M. phaseolina*, *T. longibrachiatum* patient against *S. sclerotiorum* and *P. fluorescens* against *B. fabae* were more effective than any other antagonists against each patient. The antagonistic agents were able to control *M. phaseolina* in the greenhouse well. The *S. sclerotiorum* patient was also controlled by all of the antagonists, but did not show any significant difference in comparison with the control. Both Trichoderma species, especially T. longibrachiatum, were able to control the B. fabae pathogen in the greenhouse. Both *P. fluorescens* and *B. subtilis* antagonistic bacteria had a lower effect on infections of 50-36% and 35- 21%, respectively. In general, the control of the *B. fetaea* fungus was less successful than the two patients with *M. phaseolina* and *S. sclerotiorum*.

Keywords: biological control, biological control, inhibitor of growth