

Field performance of bio-primed seeds to suppress *Colletotrichum truncatum* causing damping-off and seedling stand of soybean.

ABSTRACT

The soybean is prone to be attacked by *Colletotrichum truncatum* at seed and seedling stages, resulting in pre- and post-emergence damping-off. The efficacy of bio-priming for the control of damping-off of soybean caused by *C. truncatum* and the final seedling stand using two fungal biocontrol agents (BCAs) *Trichoderma harzianum* and *T. virens* and one bacterial BCA *Pseudomonas aeruginosa* was evaluated under field conditions. Treatments consisted of chemo-primed with Benlate® as a positive control; bio-primed with *P. aeruginosa*; bio-primed with *T. harzianum*; bio-primed with *T. virens*; bio-primed with the mixture of *T. virens* and *T. harzianum* and the controls as hydro-primed and non-primed seeds. *Trichoderma* isolates used singly or as a mixture established on the seed surface with germinating hyphae, whereas the strain *P. aeruginosa* colonized profusely as determined by increased colony forming units (CFU) from 1.2×10^9 to 5.1×10^9 seed⁻¹ after 12 h of bio-priming. All bio-priming treatments significantly reduced pre- and post-emergence damping-off relative to hydro- and non-primed seed controls. In general, bio-priming with *P. aeruginosa* was the most effective treatment for controlling pre and post-emergence damping-off, with reductions in disease incidence with increases ranging from 48.6% to 51.9% and 65.0% to 97.2%, respectively. Moreover, *P. aeruginosa* resulted in enhancement of seed germination and healthy seedling stand ranging from 32.4% to 60.0% and 56.0% to 73.9%, respectively. Bio-priming with *T. harzianum* reduced pre- and post-emergence damping-off by 42.8–46.8% and 35.0–85.1%, respectively. However, *P. aeruginosa* was generally comparable to *T. harzianum* and the fungicide Benlate®. The combination treatment of *T. harzianum* and *T. virens* produced comparable results to *T. harzianum* alone, and *T. virens* was the least effective of the bio-primed treatments. Bio-priming with *P. aeruginosa* or *T. harzianum* offered an effective biological seed treatment system and an alternative to the fungicide Benlate® for control of damping-off of soybean caused by *C. truncatum* of soybean.

Keyword: Biocontrol agents; Soybean; Bio-priming; Seed borne infection; *Colletotrichum truncatum*; *Pseudomonas aeruginosa*; Benlate.