Development of a powder formulation based on *Bacillus cereus* sensu lato strain B25 spores for biological control of *Fusarium verticillioides* in maize plants

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Abstract

Maize is an economically important crop in northern Mexico. Different fungi cause ear and root rot in maize, including *Fusarium verticillioides* (Sacc.) Nirenberg. Crop management of this pathogen with chemical fungicides has been difficult. By contrast, the recent use of novel biocontrol strategies, such as seed bacterization with *Bacillus cereus* sensu lato strain B25, has been effective in field trials. These approaches are not without their problems, since insufficient formulation technology, between other factors, can limit success of biocontrol agents. In response to these drawbacks, we have developed a powder formulation based on *Bacillus* B25 spores and evaluated some of its characteristics, including shelf life and efficacy against *F. verticillioides*, in vitro and in maize plants. A talc-based powder formulation containing 1×10^9 c.f.u. g^{-1} was obtained and evaluated for seed adherence ability, seed germination effect, shelf life and antagonism against *F. verticillioides* in in vitro and *in planta* assays. Seed adherence of viable bacterial spores ranged from 1.0 to 1.41×10^7 c.f.u. g^{-1}. Bacteria did not display negative effects on seed germination. Spore viability for the powder formulation slowly decreased over time, and was 53 % after 360 days of storage at room temperature. This formulation was capable of controlling *F. verticillioides* in greenhouse assays, as well as eight other maize phytopathogenic fungi in vitro. The results suggest that a talc-based powder formulation of *Bacillus* B25 spores may be sufficient to produce inoculum for biocontrol of maize ear and root rots caused by *F. verticillioides*.

Keywords

Bacillus cereus *Fusarium verticillioides* Spores Powder formulation Maize ear Root rots

Notes

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Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

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