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Abstract Book

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constraints, this study demonstrated that root pathogens are most prevalent and damaging in the Northern region of New Zealand and are estimated to cost $900 per ha per year in farm profitability. Harnessing the natural, defensive activities of a soil's biological community may present opportunities for sustainable disease control in these agricultural systems.

O19-5. Delivery of the entomopathogenic fungus *Metarhizium* spp. in seed coatings for plant growth promotion and plant protection against pests and diseases

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Entomopathogenic fungi belonging to the genera *Metarhizium* and *Beauveria* are well known for their natural ability to infect and kill insects. Recently it was established that these fungi are also able to associate with plant roots. Potential benefits for the plant from this fungal association include: nutrient acquisition, plant growth promotion, elicitation of induced resistance and plant protection against insect pests and plant pathogens. After maize seeds coated with conidia from *Metarhizium* spp. were sown, conidia germinated, and hyphae from the fungus colonized the rhizosphere and even grew endophytically within maize roots. The entomopathogenic fungal association with roots had a cost for the plants in terms of nutrients which was reflected in reduced maize growth. Conversely, in the presence of either larvae of *Costelytragiveni* (Coleoptera: Scarabaeidae) or the plant pathogen *Fusariumgraminearum* (Nectriaceae), maize plants from some fungal seed coating treatments had more dry weight than untreated plants. Furthermore, biocontrol properties resulted in up to 67% mycosis of larvae and a reduction in Fusarium rot root symptoms of between 24 to 44%. Finally, isolates of *M. anisopliae* were also able to increase levels of the phytohormones salicylic and jasmonic acid in roots, which could be indicative of an induced resistance response in maize. Entomopathogenic fungi delivered in maize seed coatings represent an alternative biocontrol strategy targeting soil-dwelling pests and diseases.

O19-6. Biological control of *Helicobasidium purpureum* (*Rhizoctonia crocorum*) causing violet root-rot of carrot and dwarf-bean

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Violet root-rot caused by *Helicobasidium purpureum* (*Rhizoctoniacrocorum*) causes significant losses for New Zealand carrot growers, and as fungicide use has not mitigated these losses, biological control was investigated. In glasshouse experiments, isolates of *Trichoderma atroviride*, *T. hamatum, T. polysporum*, and *T. harzianum* were applied as a seed-coating, and carrot seeds sown into H. purpureum infected soil. Several isolates enhanced seedling emergence and reduced disease severity compared to bare seed. Based on these glasshouse results, one isolate of *T. atroviride* (LU132), was then assessed for its ability to control *H. purpureum* in carrot (cv. Express Hybrid) and dwarf bean (cv. Top Crop Dwarf) in a field known to be infested with *H. purpureum* inoculum. LU132 significantly increased carrot seedling emergence (by 14%) and reduced disease severity (by 40%). In dwarf bean, LU132 also significantly increased seedling emergence (by 18%) and reduced disease severity, and increased the yield of green beans (by 43%) and final seed yield (by 52%). As the isolate LU132 also provides control of other soil-borne pathogens (*Rhizoctonia*