Biological & chemical control of Pythium root rot in hydroponic coriander

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Why is hydroponic production of leafy vegetables and herbs increasing?

- Double the growth rates of soil production
- Significantly reduced water and fertiliser use
- Production independent of soil quality
- Greater production per unit area of land
- Protection from unfavourable weather
- Superior ergonomics & reduced labour costs
- Reduced risk of faecal & *Listeria* bacteria contaminating food
Why are diseases caused by *Pythium* a problem in hydroponic systems?

- Aqueous systems favour the formation and dispersal of zoospores
- Elevated nutrient temperatures
- Accumulation of excess mineral salts
- Lack of antagonistic microbes that *buffer* the rhizosphere
- Poor farm & crop hygiene
- No conventional chemicals registered
Pythium species associated with root rot of coriander

- *Pythium sulcatum* identified as the major causal organism in pathogenicity studies

- Other *Pythium* species associated with minor root rot disease symptoms are *P. coloratum, P. ultimum* & *P. irregulare*
P. sulcatum & root rot of coriander
Design for each experiment

- Replicated complete blocks
- 8 treatments x 6 replicates (channels)
- 12 seedling plugs per treatment
- Yield estimated as marketable fresh weight of leaves & stems
Biological and chemical treatments

**Biological control treatments**
- *Bacillus subtilis* [Fulzyme PlusTM @2mL/L]
- *Pythium oligandrum* [isolate 05/590 @10^4 cfu/mL]

**Plant defence activator chemical treatments**
- acibenzolar-S-methyl [Bion® @2.5μL/L]
- potassium silicate @650μL/L
- phosphorous acid [Phoscare® @2mL/L]
Results

- Difficulties with high level of disease expression despite reducing inoculum in subsequent trials
- Variable efficacy – *B. subtilis* + phosphorous acid was the only effective treatment
- Both *B. subtilis* and *P. oligandrum* stimulated plant growth in the absence of the pathogen
Acibenzolar-S-methyl showed some disease control but it was also slightly phytotoxic.
Future work ??

- Project proposal submission to study biological & chemical controls in a broader range of vegetables grown in hydroponics
- Need to assess more biologicals x pathogen strains x more combinations with compatible chemical treatments
- Further use-pattern considerations (re-application frequency; concentrations; benefit-cost)
- Requirement for product registrations
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