

# Best-practice IPM Strategies for Control of Major Soilborne Diseases of Vegetable Crops Throughout Australia

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## Aim of HAL Project VG07125 (3 years)

To develop and encourage adoption of effective IPM strategies for key soilborne pathogens (*Pythium*, *Fusarium*, *Rhizoctonia* and *Sclerotinia*) in vegetable crops.



Fig.1. Endophyte (top) inhibiting growth of *Rhizoctonia* sp. (below).

	Isolate 1 (% growth versus control)	Isolate 2 control)
<i>Verticillium dahliae</i>	0.0	0.0
<i>Sclerotium rolfsii</i>	0.0	47.4
<i>Sclerotinia minor</i>	0.0	0.0
<i>Pythium ultimum</i>	21.8	72.6
<i>Fusarium oxysporum</i>	52.5	72.2
<i>Rhizoctonia</i> sp.	35.0	59.9

Table 1. Inhibition of pathogen growth by endophytic fungi.

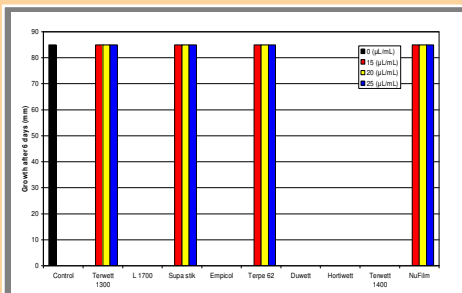
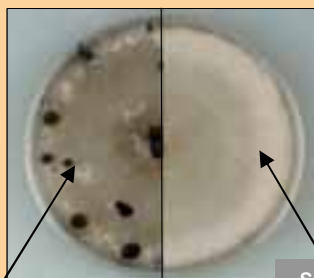


Fig. 2. Inhibition of growth of mycelium of *Pythium sulcatum* by various surfactant products in laboratory plate tests



Wild type

Sclerotia deficient mutant

## Review and summary:

- Available and emerging chemical and non-chemical strategies have been identified and their potential compatibility with IPM programs determined by reviewing international literature and consultation with pathogen and industry experts at a series of workshops.
- A written review 'Towards sustainable integrated control of soilborne plant diseases' has been prepared and a project plan developed (see overleaf).
- Research has begun in all project modules, key findings in several modules are highlighted here.

### Module 1: Reduction of pathogen survival structures

#### (a) Identification and evaluation of fungal volatiles

- Mycofumigants (volatile bioprotectant compounds from fungi) with potential to reduce dependency on synthetic pesticides have been identified from endophytic fungi isolated from cool temperate Australian rainforest.
- Several Australian isolates have shown activity against a range of soilborne pathogens in laboratory trials including *Pythium*, *Fusarium*, *Sclerotinia* and *Rhizoctonia*. (Table 1).

### Module 2: Disruption of the infection process

#### (a) Surfactants and biosurfactants

- Surfactants are being used to disrupt cell membranes, causing death of swimming zoospores, the infective agent of *Pythium* spp.
- A number of products have also been identified which inhibit growth of *Pythium* spp. in laboratory trials eg. *P.sulcatum* (Fig 2).
- The next stage of this work is to further evaluate products showing potential in the laboratory in glasshouse and field trials.

### Module 2: Disruption of the infection process

#### (b) Pathogenicity factors

- A PhD program has been initiated to study sclerotia (the survival structures) of *Sclerotinia* spp.
- Work is focusing on the study of sclerotia deficient mutants and the role of melanin in sclerotia biosynthesis with a view to ultimately using the information gained to disrupt the formation of sclerotia.
- Next steps include identifying interrupted genes leading to the deficient mutant phenotype and investigating chemical inhibition of melanin in lab and field trials.