



Identification of IPM strategies for *Pythium* induced root rot complex of Apiaceae vegetables VG 08426

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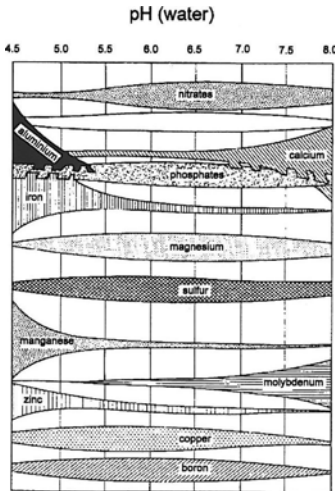
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Nutritional characteristics of parsnip and parsley soils

- different soil types and textures
- soil samples from 0-15 and 15-25 cm
- 1 parsley, 7 parsnip sites
- low to medium OM content
- levels of nutrients were typical for soil types
- low iron levels were evident in sandy and calcareous soils
- low potassium levels in sandy soils
- possible iron deficiency (no virus detected)



The effect of soil pH on nutrients availability



- soil pH affects nutrients availability
- pH ranged from 6.4 to 8.3 in all soils tested
- soils low to moderately saline
- suitable for cropping moderately tolerant crops
- lime with caution

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Parsnip Field Trials

1. To determine the role of *Pythium* spp. in parsnip canker
2. To identify control options

Sites

- sandy loam (Chromosol)
- medium clay (Vertosol)
- sown in March, trials set up in emerged crops



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Field Trials

Treatments:

- Untreated control
- 4 schedules of metalaxyl applications (weeks 8, 1&8, 15&21, 1,8,15&21)
- Strobilurin
- Biological agent *Streptomyces lydicus* (sandy loam only)

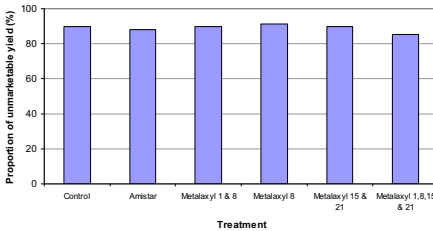
Disease assessments:

- Monthly surveys of parsnip roots from untreated control plots
- Isolation for pathogen identification
- Incidence and severity of symptoms in untreated plots
- Proportion of unmarketable yield and severity at harvest in all treatments

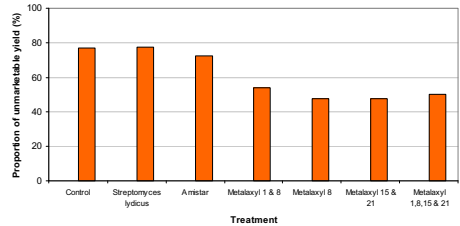
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Results

Average unmarketable yield from treated and untreated plots
at Devon Meadows



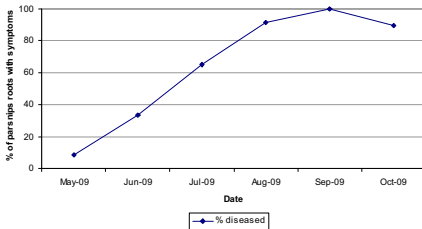
Average unmarketable yield from treated and untreated plots
at Clyde



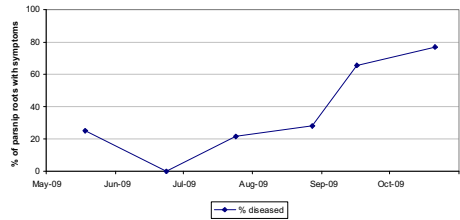
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Results

Incidence of disease on parsnip roots in untreated plots at Devon Meadows



Incidence of disease on parsnip roots in untreated plots at Clyde



Conclusions

Sandy loam site:

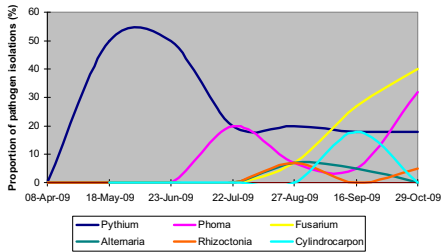
- Metalaxyl reduced the incidence of canker and increased marketable yields
- Strobilurin and *S. lydicus* were not effective but both reduced the disease severity

Clay site:

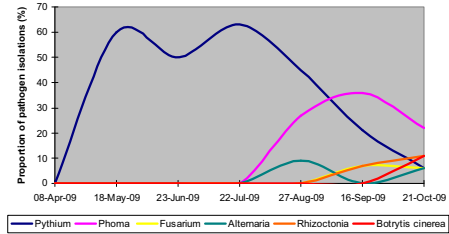
- Metalaxyl and strobilurin had no effect
- Enhanced degradation of metalaxyl in slightly alkaline soils under anaerobic conditions
- Control of canker on clay soils may require improved soil air-water conditions
- Rotation crops

Succession of pathogens in parsnip crops

Pathogen genera observed on parsnip roots in monthly survey of untreated plots at Devon Meadows



Pathogen genera observed on parsnip roots in monthly surveys of untreated plots at Clyde

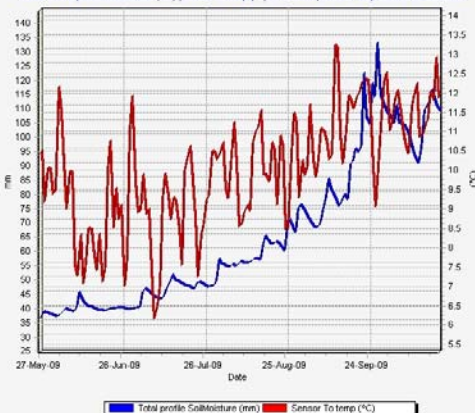


- *Pythium* spp are involved in development of canker on parsnip roots at both sites
- Only Pythia were isolated early in the coolest period of the cropping season (no competition from other pathogens)
- Pathogenic fungi (*Fusarium*, *Phoma*, *Rhizoctonia* & others) entered crops after the cool period

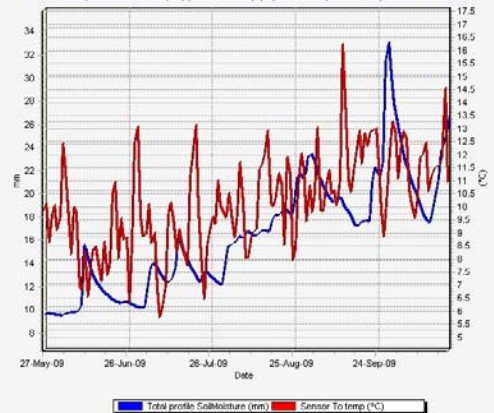
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Soil Moisture and Temperature

Site 572 Total profile SoilMoisture (mm), Sensor To temp (°C)'s time for period 27-May-2009 to 20-Oct-2009

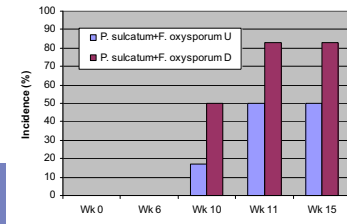
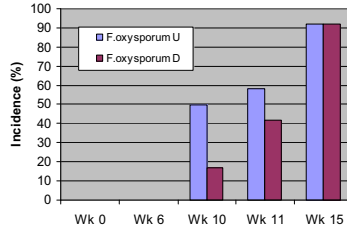
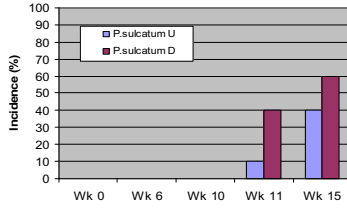


Site 578 Total profile SoilMoisture (mm), Sensor To temp (°C)'s time for period 27-May-2009 to 20-Oct-2009



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Pathogenicity of different pathogens to parsnip



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Biological Control of Pythium in Hydroponics

Len Tesoriero, NSW Department to Agriculture, Camden

Hydroponics system
– controlled environment

Coriander
Which *Pythium*?
11 species
P. sulcatum



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Biological Control of *Pythia* in Hydroponics

Len Tesoriero, NSW Department to Agriculture, Camden

Biological control agents – root rot of coriander

SAR (Systemic Acquired Resistance) – resistance activator (Bion™)

- no effect, phytotoxic

Bacillus subtilis (Fulzyme Plus™)

- 3 week protection

Pythium oligandrum (mycoparasite)

- no effect (home grown preparation)



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Milestone No. 103: Review & stop-start.

Date: 31/03/2010

Achievement Criteria

No.	Item	Achieved	Comment
1	Pathogenicity (inoculations in vitro with single and combinations of pathogens) completed	✓	1) Unsatisfactory results, 2) Revise method
2	Growth chamber studies (for moisture and temperature relationships) in progress	✓	<ul style="list-style-type: none"> ▪ Field data suggest concentrate on temperature ▪ Slow start – limited growth cabinets ▪ Student project
3	Report on monitoring of moisture and temperature relationships in parsley and parsnip	✓/x	<ul style="list-style-type: none"> ▪ Temperature important for parsnip ▪ Equipment failed in parsley
4	Field trial (biologicals and chemicals) completed	✓	<ul style="list-style-type: none"> ▪ Suggests <i>Pythium</i> affects all stages ▪ Need a biological active at low temperatures
5	Report on completed hydroponics trial	✓	<ul style="list-style-type: none"> ▪ Final report November 2010 ▪ Len Tesoriero has had a heart attack so it may be delayed
6	Report to industry in one: 1) field day, 2) an article for a grower magazine, and 3) a steering committee meeting	✓	<ul style="list-style-type: none"> 4) Parsnip field day 21/10/2009 5) Vegetables Industry Report 08-09 p38. 6) 18/03/2010
7	Project review undertaken with stakeholders & any redirections put in place		

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Milestone No. 104: Hydroponics trials completed

Date: 30/11/2010

Achievement Criteria

No.	Item	Comment
8	Report hydroponics work to industry	Final report pending - may have to be revise as Len Tesoriero had a heart attack and his 2 IC is relocating to QLD
9	Monitoring of moisture and temperature relationships commenced in parsley and parsnip crops	Relocate weather stations and soil moisture sensors (dealing directly with supplier in QLD) <ul style="list-style-type: none"> Locate parsnip sensors in the field trial
10	Field succession of <i>Pythium</i> and <i>Fusarium</i> etc populations commenced in the laboratory.	<ul style="list-style-type: none"> Succession monitoring commenced 2009
11	Meet with and consulted steering committee to develop 2010 field trials. Trials for e.g.: <ul style="list-style-type: none"> Irrigation, cover crops, cultural practices and initiation of infection in the field (in 2009) 	Options: <ul style="list-style-type: none"> Metalaxyl early – <i>Phoma</i> /<i>Fusarium</i>/<i>Itersonilia</i> Mulch High pH Biologicals – <i>P. oligandrum</i>, <i>B. subtilis</i> Irrigation
12	Commence interstate trials with biologicals in WA on carrots	<ul style="list-style-type: none"> Evaluate or proceed?
13	Commence interstate trials with biologicals in QLD on coriander (Herb Industry)	<ul style="list-style-type: none"> Warmer soil temperature – send up biologicals for field testing

Acknowledgments

Project team:

- Liz Minchinton – DPI Vic
- Dolf de Boer – DPI Vic
- Joanna Petkowski – DPI Vic
- Des Auer – DPI Vic
- LenTesoriero – IINSW

Thanks to:

- HAL, DPIVic, State and Federal Govts.
- Frank and Angelo Lamattina and Darren Schreurs for providing the field site & crops.

