

The use of Brassica green manure crops for soil improvement and soilborne disease management



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Aims

This poster presents our study on the potential of green manure crops, with and without biofumigation activity, for *Sclerotinia* disease management in lettuce.

Green manure crops



Introduction

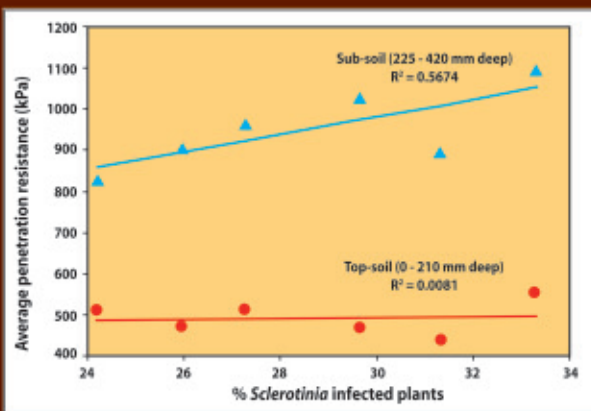
- Organic matter is vital as a food source and haven to beneficial microorganisms, and increased beneficial microbial activity is often related to increased soilborne disease suppression.
- The use of green manures in between successive crops helps maintain or increase organic matter in soils. However, little is known of the effects of different types of green manures on diseases of lettuces.
- Several varieties of brassica green manures have been selected for their ability to produce high isothiocyanates (ITCs) levels as well as high plant biomass. These varieties may provide potential for direct and indirect disease control through biofumigation activity and modification of the soil environment with increased organic matter.

Field Trial 1: The effects of green manure crops on *Sclerotinia* disease incidence on a subsequent lettuce crop at Cambridge, Tasmania

Pre-plant treatment	No. sclerotes/200g soil*		Total ITCs (μmole/g)		% <i>Sclerotinia</i> wilted plants**
	Initial	Final	Root	Shoot	
Control – Fallow	26 ± 6	10 ± 4	N/a	N/a	30.8 c
20 kg/ha Oats	16 ± 9	-	0	0	23.2 bc
240 kg/ha Broad bean	15 ± 3	11 ± 4	0	0	24.2 bc
16 kg/ha Fumus	16 ± 6	9 ± 4	5.92	6.14	16.5 ab
16 kg/ha BQ-Mulch	25 ± 12	7 ± 2	42.23	2.69	3.1 a

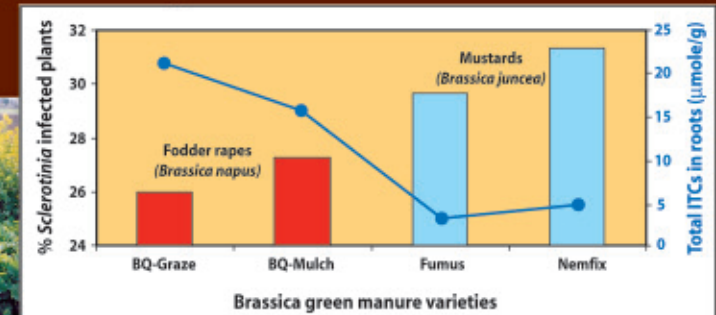
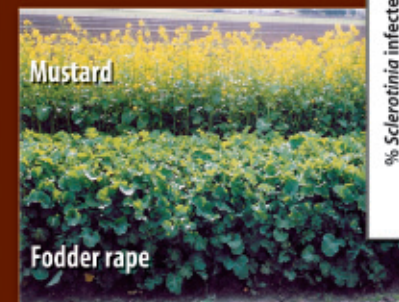
* Initial: soil sampled prior to green manure crops; Final: soil sampled at the end of lettuce crop.
 ** Means followed by the same letters are not significantly different according to least significance difference test ($P = 0.05$).

Reducing sub-soil compaction helps reduce *Sclerotinia* disease incidence on lettuces



Measuring soil compaction with a penetrometer

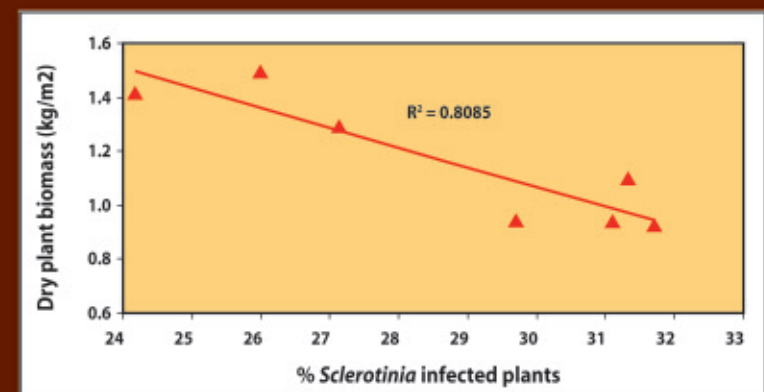
Field Trial 2: Fodder rapes that produce high levels of root ITCs appear to be more effective than mustards in reducing *Sclerotinia* infection on a subsequent lettuce crop at Cambridge, Tasmania



Brassica green manure roots (1) have the advantages of both fibrous roots of rye grass (2) and strong deep tap roots of broad bean (3) for soil improvement



Increasing plant biomass in brassica green manures was associated with decreasing *Sclerotinia* disease in lettuces



Project findings

- Brassica green manure that produce high ITCs can offer advantages over non-brassica break crops for soilborne disease management.
- Brassica green manures that produce high levels of roots ITCs were more effective for *Sclerotinia* control.
- As ITCs levels will diminish rapidly after incorporation into soil, their effects for disease suppression are expected to be relatively short term.
- Soil improvements by the brassica green manures have longer lasting effects, which may contribute to soil quality and soil health, in addition to soilborne disease management.

Acknowledgments

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